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THE appointment of John H. Marble as secretary of the Interstate Commerce Commission, succeeding Mr. Moseley, seems like an excellent one. Mr. Marble has been connected with the commission some half dozen years and has appeared as its attorney in several important cases. He is now attorney for the United States Senate committee which is investigating the election of William Lorimer as senator from Illinois. Mr. Marble's work for the commission and in the Lorimer case has marked him as a man of ability. He is young, energetic and resourceful, and these qualities, as well as his experience as a lawyer, should make him valuable as secretary of the commission, for it seems likely that he will have special charge of the enforcement of the criminal provisions of the various statutes under which the commission acts. His predecessor had gained, whether justly or unjustly, a reputation for being unfriendly in his attitude toward the railways. This was due less to his activity in enforcing criminal statutes, for in this he was but doing his duty, than to his persevering activity in promoting the passage of laws which at times seemed intended to benefit railway employes only and not the public, and so framed that in the long run they were likely to injure railways without promoting the true interests of either employees or the public. Mr. Noble has the advantage that railway managers who know him personally or by reputation, while they expect him to enforce the laws vigorously, do not believe that he considers it one of his duties to promote legisation or so enforce laws as to further the interests of one class at the expenses of another. His former work has been such that railway men rather expect that he will consider it his duty to seek and promote only the interests of the public. With his comparative youth, his ability, his legal knowledge and his industry he should make an excellent record as secretary of the Interstate Commerce Commission.

THE value and necessity of keeping complete and accurate right of way records is conceded by all railway officers, but in actual practice this work is almost universally neglected to a greater or less degree. The indefinite and incomplete description of land is probably the source of most trouble. The common method is to tie a description into the located center line. Not uncommonly the location of the line is changed somewhat, or it is rebuilt, and it is but a short time until this original center line is lost and it becomes very difficult to follow the land description. As a general rule, when beginning construction or reconstruction, engineering forces are so rushed with preparatory matters that they are forced to reduce the work in connection with the purchase of right of way to a minimum, and after a deed is drawn and placed on record it is felt that there is not much use of taking further measurements. Giving a little additional time and labor to tieing the description into some permanent corner stone or monument would often later save many hours of fruitless surveys and troubles in court. Again, after property is bought it becomes very desirable definitely to locate its limits on the ground by properly marked corners while all the measurements and agreements are fresh in mind, especially if the property is located where land is valuable or where it is probable it will become valuable. When all the measurements are at hand it is but short work to set suitable iron or stone monuments at various corners, a section of old rail with one end driven into the ground making a cheap and serviceable marker. Such evidence becomes very valuable in later years in establishing or maintaining ownership. The third source of weakness in right of way records is often found in the system used for filing them. Their value is now so generally realized that they are placed in fireproof vaults, but it is equally important that it should be possible readily to find them when they are wanted for reference. Otherwise precautions for their safekeeping are of little value. Several methods are in use for filing and indexing them, probably the most common being that of grouping them according to the location of the land, as by counties, or similar

divisions. The method of indexing varies, but any method used should show readily where to find all papers relating to any particular tract of land. One convenient method is to plat on an alinement map all property owned by the railway and list on this the filing numbers of all records.

THERE has been an apparent conflict between the American Railway Association's car service rule 15, and the Master Car Builders' Association's loading rule 6 and interchange rule 2. This seeming conflict was remedied by action taken by the M. C. B. Association at its recent meeting. A clause was added to its loading rule 6 providing that in case of transfer or rearrangement of lading section D of the A. R. A. car service rule 15 will apply. Changes were also made in interchange rule 2, relating to loaded cars, providing that covered cars must, effective September 1, 1911, be accepted, A. R. A. car service rule 15 to apply. The only loaded cars the acceptance of which will be optional with the receiving line under the new M. C. B. interchange rule 2 are leaking tank cars and open cars where the lading is not properly secured on the car and where it exceeds the usual allowance of 10 per cent. beyond the marked capacity of the car. In other words, the right of rejection will, after these changes become effective, exist only in cases where the manner of loading is imperfect and not where the car itself is defective. However, to whatever extent leaking tank cars or open cars are accepted, A. R. A. car service rule 15 will apply. The cars which it will be permissible to reject under the new rule constitute probably less than 5 per cent. of the total number interchanged, and it does not appear probable that the right of rejection will be fully exercised in the case of open cars, as car service rule 15 fully protects the receiving road which accepts such cars. Even if the entire 5 per cent. should be rejected, 95 per cent. will be assured of a continuous forward movement. The reduction in the number of back-haul movements which often have been caused in the past by unnecessary rejections of cars will promote in no unimportant degree the efficiency of railway equipment, and eleminate a substantial [illegible]

GOVERNMENT INVESTIGATIONS OF ACCIDENTS.

THE order of the Interstate Commerce Commission requiring fatal railway accidents to be reported to it by telegraph is followed by the establishment of a division, or bureau, to have [illegible] (2) the investigation of accidents, (3) the work of the safety appliance inspectors and (4) the records of the operation of the hours-of-service law. This bureau is in charge of H. W. Belnap, for eight years past one of the safety appliance inspectors, and latterly engaged in the negotiations between the government and the railways concerning the new safety appliance standards which have been established under the law of 1910. On the part of the government he [illegible] and [illegible] known to many railway men. For the detail work of investigating accidents Mr. Belnap is to call upon the safety appliance inspectors, of whom there are 24 scattered about the country. This consolidation of kindred functions in a single bureau is a businesslike move which ought to have been made long since. The boiler inspection service, however, is left out; presumably because the [illegible] are [illegible] by the president, and therefore are not easily [illegible] the authority of the commission.

The plan for the investigation of accidents is liable to defeat itself by the scattering of its forces. There has been a public demand for federal inspection of accidents (and it has waited [illegible] for this) because [illegible] to do something useful about it which [illegible] better than has been afforded by state commissions, coroner's juries and newspapers. [illegible] is [illegible] of [illegible] one of the principal uses to put it. No single state, or single authority, deals with enough cases to make its activities really impressive. The federal government, supervising 240,000 miles of road, is free from this drawback; but the 24 inspectors are likely to have the same difficulty nevertheless. Each one must labor under the disadvantage of having comparatively few important cases to study, and of having most of his time occupied with other matters. And the inspectors, as a body, will labor under the disadvantage of not being able to correllate their work effectively. An important element in the marked public usefulness of the British Board of Trade investigation of train accidents is the smallness of the number of investigators (four) and their free and frequent conferences with each other.

The word "important," as used with preceding paragraph, has a peculiar meaning. All train accidents are important, in the sense that each one involves risk to the lives of passengers and trainmen; but a public investigator has to select. He has to consider, first, whether a given accident is one that the public—that is, the law makers—can be made to take an intelligent interest in; and, second, whether the lesson of the accident is one which needs the elucidation that he can give to it. With the record of a thousand collisions and derailments each month, which we have in this country, he must shut his eyes to a large part of the cases that come to his attention even when his district has only one-twenty-fourth of the whole. For an example of the need of omission, look at collisions. The investigations of collisions which have been made by state commissions during the past five years have taken up at considerable length the operation of time-table rules and despatchers' and telegraphers' practices; yet all well-informed persons know that those questions are of a secondary nature, because it has been settled long since that time-tables, despatchers and telegrams are out of date as preventatives of collisions; that the block system is the only cure for such accidents.

The need of concentration of attention may be seen by considering the subject of enginemen sleeping in the cab. This weakness, or vice, is as old as our grandfathers, and every railway officer of experience has familiar knowledge on the subject. The government has an important duty to perform in studying this phase of the accident record and finding out which one of three conclusions is the right one; (1) The men are as good as can be had and the danger is too small, or too difficult to deal with, to require action; (2) the men can be improved or replaced by better men; (3) automatic train stops are needed. If the 24 inspectors could gather in one place and there see and talk with the 24 enginemen who during the next few months will get into trouble by sleeping on duty; if they would then give a frank and candid report of their findings, and could then have the right kind of an interview with 24 superintendents, some tangible result might be accomplished; but the plan does not seem to provide for anything of that kind.

Investigation of accidents by the government is desired not only by the traveling public but also by public-spirited railway officers. Both these classes want to have the work done by the highest talent available. High-minded ex-railway officers, worth $10,000 a year, would be none too good. Even assuming that public-spirited railway officers are not numerous and are afraid to speak, or indeed are kept down by other officers, not public spirited, there still remains two important functions that the government can perform for the railway manager, namely, that of an impartial judge between his subordinate officers, as when they will not agree whether a derailment is due to bad track or bad wheels, and that of an impartial judge between his superintendent and the grievance committee or the brotherhood leader when this superintendent is either overbearing, to the injury of the employes or cowardly to the injury of the company and the public.

In writing the foregoing, we have assumed impartiality on the part of the investigators. In order to get at the true facts and to get them presented in such a way that neither the employees nor the railways can effectively deny their accuracy and so that

the public may know the truth, it is desirable that investigations shall be made by impartial persons representing only the government. It was with the intention of securing such investigations that Congress passed the accident law of 1910. The original bill provided that either the Interstate Commerce Commission or any person designated by it might make the investigations. It was finally modified to provide that "the commission or any impartial investigator thereunto authorized by the said commission shall have authority to investigate such collisions, etc." Representatives of the railways who conferred with the committee of Congress having the matter in charge indicated that they did not feel it would be just to the railways to have the safety appliance inspectors, because of their labor union connections, make the investigations, and they understood, and railway men generally understood, that the words "any impartial investigator," indicated that the safety appliance inspectors and other persons belonging to the railway brotherhoods would not be employed in this capacity.

Mr. Belnap, personally, has a good reputation with railway men. They believe in his ability and in his disposition to be fair. He is the most competent inspector. But from every standpoint the employment of Mr. Belnap and other safety appliance inspectors belonging to the railway brotherhoods to make these investigations of accidents is extremely undesirable. Hardly ever does a serious accident take place out of which does not arise the question of whether defects in railway rules or equipment or shortcomings on the part of railway employees were to blame. It is not humanly possible that members of railway brotherhoods should impartially weight the evidence and decide as to where the fault lies. Even if the reports are both intelligent and unbiased they will not do as much good as the same reports would if they were made by men who had no connection either with the railways or the brotherhoods. If they are colored with bias in favor of the employees they probably will have no tendency whatever to remove the causes or reduce the number of accidents. Nobody connected with an investigation ought to have any reason for wanting to cover anything up or put any blame except where it belongs, and we do not believe that the action the commission is taking is going to provide the right kind of investigators or the right kind of investigation. And we believe that the blame really lies with Congress, which will not give the commission enough money to get the right men.

THE SOCIETY FOR TESTING MATERIALS.

THE American Society for Testing Materials, which held its fourteenth annual meeting at Atlantic City last week, has shown a healthy and almost phenomenal growth. The work of the association, like that of the American Society of Mechanical Engineers, includes so wide a range of topics that it is, in a way, handicapped by the very wealth of matter that is available. The discussions are disappointing in their meagreness. Papers are presented by men who are experts, while there are but few others in the room who know anything at all about them. On the other hand, most of the subjects would necessarily have been given short shrift had discussion been at all profuse at the recent meeting. The work laid out on the program was certainly very great. Nine sessions were held, and in those nine there were 58 reports and papers considered. Two sessions were held each day, of from two and a half to three hours each. It was too much, and the evident fatigue of those in attendance reminded one forcibly of the late M. N. Forney's remark, after a dull paper had been read, that engineers were very careful not to exceed the limit of elasticity in the stresses which they are wont to impose on the materials that they use, but fail to appreciate that there is such a thing as the limit of elasticity of an audience, yet there was always a sense that each subject was being hurried. Evidently the executive committee of the association has recognized this, as an announcement was made at the last session that a movement is on foot to limit the number of papers presented, as well as to place a more rigid censorship upon those that are accepted. Up to the present there has apparently been little or no scrutiny of these papers, for a glance through the program of this last meeting will disclose many subjects that are mere descriptions, simply catalogue work, that should have no place in the proceedings of such an association. In addition to this, there were a number of papers which gave in great detail a mass of routine laboratory work, that, while possibly interesting and having a bearing on the general work of the society, had not been carried to sufficient lengths nor were of sufficient importance to be of any great value, and were presented by men to whom the merits of the blue pencil and the art of condensation are unknown quantities. It might, then, be very appropriately suggested that the executive committee exercise a pretty rigid censorship over the work of the future and exclude that large and voluminous mass of matter that proves little and which no one reads.

It has been suggested that an ideal method of presenting papers to the association would be to have the subject matter, conclusions and recommendations presented in a readable manner, so as to be thoroughly understandable. All the detail tables, including the figures and tabulations of original data, would be compiled on separate sheets and filed in duplicate or triplicate in the office of the secretary or library of the society. Very few would care to consult this original data for a verification of the author's conclusions, and to those few the tables could easily be sent. This would place all the facts before the association in a discussable form and would save the expense both of tabular typesetting and of the bulkification, to coin a word, of the proceedings.

There is another thing which some members of the association show a disposition to carry to extremes. That is the standardization of specifications. Specifications are necessary, but it is not necesary that everything should be standardized; and when it is urged that a poor and confessedly faulty specification had better be accepted as a standard than that the society should have no standard, it really does seem, to an outsider, at least, as though that were carrying it a little too far. It should be remembered, too, that the association has no executive powers. Its standards are and must always be purely recommendatory. The work done by the association is of such value and of so high a character as to leave little to be desired. But the program could be improved by admitting fewer topics to its pages, and by subjecting those few to a closer scrutiny.

NEW BOOKS.

The Spontaneous Combustion of Coal with Special Reference to Bituminous Coals of the Illinois Type. By S. W. Parr and F. W. Kressman. Published by the University of Illinois, Urbana, Ill.

Bulletin No. 46 of the engineering experiment station of the University of Illinois describes a series of experiments directed toward the determination of the fundamental causes underlying the spontaneous combustion of coal. These causes may be summarized as follows: (1) external sources of heat, such as contact with steam pipes, hot walls, and the impact of large masses in the process of unloading, height of the piles, etc.; (2) fineness of division; (3) moisture; (4) activity of oxidizable compounds, such as iron pyrites. A historical review of the literature upon the spontaneous combustion of coal is given in the appendix.

Copies of this bulletin may be obtained gratis upon application to W. F. M. Goss, director of the Engineering Experiment Station, University of Illinois, Urbana, Ill.

The Borsig Locomotive Works in Berlin last January received a contract for 12 locomotives for Japan—the first German engines to go to that country. The locomotives were wanted in a hurry, and they were ready for delivery in the short time of 66 days.

Letters to the Editor.

A RAILWAY EFFICIENCY BUREAU.

Chicago, June 26, 1911.

To the Editor of the Railway Age Gazette:

Replying to the criticism of M. W. Maguire, general manager of the Montana, Wyoming & Southern, in your issue of June 23, 1911, of my communication regarding the organization of a railway efficiency bureau or department, published in your issue of May 26, 1911, I beg to say that Mr. Maguire is evidently not informed as to the progress made on many of our larger railway systems today in the creation of efficiency committees and specialists who investigate and analyze railway operation in its various branches and report directly to either the president or vice-president of these systems. There is now scarcely a large system of railway that does not find it necessary to have such an organization; and the results accomplished have justified such action in every case.

The day of railroading by "rule of thumb" has ceased and railway operations must be reduced to a scientific basis. The recent action of the Interstate Commerce Commission in refusing the railways the right to advance their rates was based almost entirely on the evidence given at the hearing, that if the railway business were conducted as economically as could be reasonably expected, no increase in rates would be necessary. The railways naturally contradict the truth of the evidence produced in this case. Nevertheless, since the decision of the Interstate Commerce Commission, there have been organized on many roads efficiency committees, and methods have been put into operation to economize and increase the efficiency of railway operation to the greatest possible extent.

Mr. Maguire refers to the obnoxious character of what he terms a "smelling committee." From my own personal experience in organizing investigations of operations of large terminals on an important railway system, the fact is that such committees are welcomed rather than spurned, and any railway official who is loyal to the interests of his road will put aside any personal prejudice and be willing to accept any suggestions made that will tend to an improvement in the service. The railway officers operating properties do not own them, and if they are performing their duties conscientiously and fully they need have no fear of criticism; but, on the other hand, if their operations are the subject of proper criticism, it is their duty to put aside their personal feelings and accept what is not only to their own interest, but to the interest of the road as well.

We owe a duty to the stockholders and to the public, as railway men, to conduct the operations in our charge in the most economical and efficient manner and the criticism which carries with it a suggestion that is an improvement over former methods is always welcome.

It pleases me to say that in my own experience as a division superintendent in charge of about 500 miles of busy railway, with responsible charge of operation, maintenance and construction during a period of grade and line revision, whenever any investigating committee came to my division they were welcomed and heartily cooperated with and the result created were always an improvement. No division superintendent has universal knowledge of all subjects and when his operations are reviewed from the standpoint of the experience and judgment of men who have had a wider experience and [illegible] knowledge of what is being done on other roads and whose opinions and judgments are not warped by the routine duties of a single operating division, there can be no question but that the results created will be beneficial not only to the superintendent himself but to the railway.

[illegible] exist in that station to an alarming extent. No superintendent preceding me for years had gone into the details of the operation of this freight station, and the result was that work was being duplicated and that practices were being followed which were over thirty years old. A complete revision of the operation and performance of that station was made with most excellent results. I have time and again had the pleasure of having an agent at a large freight station inform me, after the investigation of the terminal committee, that he and his staff had secured much valuable information and were gratified with the results secured from the terminal committee's investigation.

I do not know what Mr. Maguire refers to when he mentions "stove committees," but our stove committee should be the president, our board of directors, stockholders and the public, and when a criticism is made it should be followed by suggestions that will remedy the matter criticised. What care we for the criticism of irresponsible persons who form the usual roundhouse or stove committees?

The American railways are operated for results, and personal feelings must give way to modern methods, and the railway officials who will face this fact and make a study of economics and efficient methods will be the ones who will reap the greatest benefits and show the best results.

One of the principal reasons why the operations of large industrial concerns is so successful today is the fact that they subject their operations to careful analysis and periodical investigation by organized efficiency bureaus. By the same token the railway operations today are what they are by reason of a lack of such a system. One of the greatest needs in railway operations today is the establishment of a department or bureau which shall specialize in this line of work and shall be charged with the responsible duties of devising ways and means of economic and efficient conduct of the operations in all departments of railways and shall enforce strict economy in the outlay of time and money, scrutinizing all expenditures to determine if the highest and best use is made in the disbursement of labor and material entering into its operation. While some progress has been made toward this end by the above mentioned committees among the officers of railways, and much good has resulted therefrom, anyone familiar with the operation of railways and the work of these committees is aware of the fact that such committees have not the time, as a rule, necessary to go into a thorough and complete analysis of the situation.

The organization of such a bureau or department should be along comprehensive lines, and should include within its scope all matters pertaining to inspection and the promotion of operating efficiency, and should be without interference from other departments as far as its investigation into their operations are concerned. Necessarily, therefore, such a department should be responsible directly to the president or other executive officer, but should co-operate to the fullest extent and without prejudice with every department for the promotion of general economy and efficiency in the service.

No matter how willing an officer in charge of a department may be to co-operate with other departments, departmental lines are, and will be, drawn to the detriment of the service. Such conditions can be met and remedied if properly investigated by an instrumentality which has for its object the improvement of the service as a whole.

When we consider that a division superintendent in charge of 500 miles of road may have charge of property representing from $25,000,000 to $50,000,000, does not the right exist that the owners of this property know that its operations are being judiciously conducted and the money expended to produce the greatest net results?

As a people, Americans are constitutionally extravagant in their tastes and expenditures, and this is true on railways as well as in our social life. The time has now come when rigid economy and greater efficiency must be introduced or the balance between the gross earnings and the expenditures will become narrower and narrower.

In most industrial enterprises the larger the plant becomes the more economical per unit is its operation. This is not true of the railway industry; the larger the system the greater becomes the opportunity for waste and loss which, extending over thousands of miles, in many cases aggregates enormous sums. On most of the smaller lines, where supervision by the highest and most competent authority is closer, this waste and loss does not occur.

I do not doubt that on Mr. Maguire's road of 22 miles of line he has his hands on the pulse of every operation and secures the greatest efficiency and economy from the expenditure involved. On a larger system, however, any one man spreads out very thinly over a thousand miles; and it is in such instances that he needs the help of others to enable him to detect the loss and the waste.

We are familiar with a recent case on a railway where, perhaps, a million dollars were lost to the railway through unscrupulous methods, a thing which could not have taken place if there had been the proper machinery for the inspection and review of the operations of this particular road. This instance cast a reflection upon every railway man in the country, both honest and dishonest; and it is against such practices that we must wage war so that we can present evidence that our operations are clean, conscientious, economic and efficient; and if we are able to prove this there will be no refusal to grant us our rights, whether they be in the matter of rate increases or relief from burdensome legislation.

Now that this question has been opened by Mr. Maguire I will suggest what a proper organization for an efficiency bureau or department should consist of, for a system of from three to five thousand miles.

In the first place, the department should be in charge of a man of exceptional ability in the railway service who has a general knowledge of all departments of railway operation and shall be constituted properly to co-operate with the other departments.

EFFICIENCY DEPARTMENT ORGANIZATION

	Salary, Annual
Vice-president, in charge of department	$15,000
One chief clerk, in general charge of vice-president's office	3,000
One clerk	1,500
One clerk	1,200
Two stenographers	2,000
One engineer, in charge of engineering matters pertaining to roadway and tracks	3,600
One assistant engineer	2,000
One clerk	1,500
One clerk	1,200
One stenographer	1,000
One engineer, in charge of engineering matters pertaining to motive power, equipment and machinery	3,600
One assistant engineer	2,000
One clerk	1,500
One clerk	1,200
One stenographer	1,000
One inspector of transportation, in charge of transportation matters	3,600
One assistant inspector	2,000
One assistant inspector	1,500
One clerk	1,200
One stenographer	1,000
One statistician and accountant, in charge of statistics and accounting matters	3,000
One assistant	2,000
One clerk	1,500
One clerk	1,200
One stenographer	1,000
One file clerk	1,000
One office man	800
One messenger	500
Total 29 men	$50,900
Traveling expenses, rental, light, etc.	39,100
Total	$100,000

The operating expenses of a line of from 3,000 to 5,000 miles in length, range from $25,000,000 to $50,000,000, depending, of course, upon the density of traffic; by taking the average at $30,000,000, such a department would have to save only one-third of 1 per cent. per annum to cover its expenses. There is scarcely a road of this mileage in the country today which could not save at least three times that much per annum through the operation of such a department if properly constituted.

L. C. FRITCH,
Chief Engineer, Chicago Great Western.

THE SOUTHERN PACIFIC'S STUDENT-EMPLOYEE COURSE.

BY A STUDENT EMPLOYEE.

What is railroading? Is it a business or a profession? Or is it just swinging from a business to a profession?

While a business can be mastered by men endowed with great common sense, a profession can be mastered only by men trained in the theory and scientific nature of their calling, while still retaining the common sense needed by the man in business. Thus with the swing of any line of human activity from a business to a profession, must come a radical change in the method of training men for that activity. In a business, it is expected that a man will start in at the bottom, learning by dint of application and hard knocks the many lessons that will later make him a successful manager. In a profession, it is expected that a man will start by studying, for theory and sound reasoning are so essential a part of the professions that a thorough grounding in them must precede and accompany all his efforts to grasp success. Therefore, trained teachers, books, and a carefully prepared course of study, demand the first years spent in his chosen career. And then, when this period of preparation is completed, he too is sent out to work and gain experience, which will modify and enrich his theoretical training until he also becomes a man of sound judgment, who can cope successfully with life.

The Southern Pacific Company is, in its "Student Course in Railroad Operation," manifestly trying to consider railroading a profession, for it is adopting the professional method—that of teaching a young man the theory and thoroughly grounding him in it, before he is sent out to gather his practical experience. And still this is not wholly true, as I shall point out, largely from the exigencies of the case.

Up to the present time operating officials have come from any and all departments of the road, and even from outside employments. Our superintendents and general managers are chosen from among trainmen, enginemen, telegraphers, stationmen, trackmen, and shopmen, and as we go higher to the president's office the sweep of choice is even greater. But in it all one fact stands clear—that from whatever line they have come they are trained for a business, in the business way of requiring an education in the school of practical experience only. Very few, if any, have had any sort of a special training, studied out in every detail, to fit them peculiarly well to fill their high offices.

As a profession, the Southern Pacific Company is now adopting a system of theoretical training first, for its students. In any line where practical experience and practical knowledge is as essential as in railway operation, a course purely theoretical is both unwise and impossible. Impossible, because as yet the theory of transportation, its economics, laws, and historic growth are in the infancy of their development. Also the supply of good books is woefully small, and a corps of competent instructors "nil." So a course of combined theory and practice has been adopted which, as I have gone through it part way, has seemed more and more admirably suited to fulfil its purpose, in spite of some weaknesses not yet remedied.

The total length of the course, the division of time among the various departments, and the order in which the work should come, have all very carefully been studied out. There are naturally three main lines to be studied, one the business relations with the public, one the construction and maintenance of the permanent way, and the third the care and use of the rolling stock and power, which make possible the business career of the road. All other sides of the work, as the store, the auditor's office, etc., are simply accessories to these greater functions.

Ignorant, at the start, of the intricacies of this new world of work, the easiest, most natural, and most successful beginning can be made in station work. Here a student still sees a great deal of the public, with them his sympathies have naturally al-

ways been, and yet is led, step by step, to see the railway side of the picture. Here he sees the money coming in very rapidly, but soon is made aware of the great volume of expenses which these revenues must defray. In countless ways each day spent here slowly opens up the true character of his future work, while the needs of the public are also very much in evidence.

Later, a very abrupt change to track-work forces him to study the second great side of the work. Simpler than shop work, it is still so peculiarly a railway problem that his sympathy and understanding broaden rapidly, and he gets the railway point of view, while not forgetting the public view-point, and can study this side of railway expense that is so great and is yet so carefully guarded at every point.

So with the shop work and train service which follow. Each of these departments form one step in the progression to the more complex work of the succeeding departments, while together they form a group of the great functions of the road, to which may be added in turn study in the other minor departments, as rounding out the modern operating mechanism.

In brief, the course is divided into eight periods, devoted to the study of each department of the operating organization. The first period is six months in station service; the second, nine months in maintenance of way work; the third, six months in the car department and the shops; the fourth, five months in the train service; the fifth, two months with the signal department; the sixth, two months in the store; the seventh, four months with the auditor, and the final period, eight months with the trainmaster, in the yards and on the road.

Each period is subdivided to cover the various activities of each department. On reporting for the nine months in the maintenance of way work, at our Los Angeles office, I was sent out to the Yuma desert with a section gang for ten weeks. With only three white men and about twenty Mexicans within many miles, I certainly had no great distractions. The foreman saw to it that I learned to tamp ties, dress track, handle the jack, and raise joints. After a little he gave me two or three men and had me do the advance work while he finished up, calling me back when anything was wrong, and showing me how to do the work better and faster. Then he let me do all the work while he acted as censor. In the evening, after we had finished our housework, we would read and talk over the ideas explained in my text-books. Likewise on the bridge and building gang, to which I went for six weeks, the foreman expected me to do a full day's work along with the other men, but gave me every opportunity to move about from one task to another in order that I might have as complete a training as the time allotted me would permit. Then for five weeks I was sent out as an extra clerk in a roadmaster's office, for eight weeks was rodman and general assistant in the division engineer's office, for three weeks [illegible] and finished my maintenance of way experiences with eight weeks as a section foreman, in charge of a branch section. And while I was thus learning the track work I also had an excellent op[illegible]

In connection with all this work there are assigned books, bearing on the theoretical side of the work, which we must [illegible]

[illegible]

the regular employees must meet, even in a few months a student can acquire a basis of knowledge that will stand him in very good stead in the future demands made on him to handle these departments on his division with the greatest intelligence and efficiency. Thus, by this practical work and daily study so closely allied, we ought to receive a far better training in the ground work of our profession than is given in any of the present-day technical schools.

From my standpoint, as a student, there are still two great obstacles encountered in the student course. The first one is the lack of good reference books and text-books, written by railway men Men studying law, theology, medicine, or engineering need use only the books written by men standing, now or in the past, at the head of their profession. To them the books by outsiders lack the value that can alone come from a broad experience of a lifetime spent in the profession, and of such books they find no lack. But when we look for similar books in our line, with their almost priceless knowledge and information we find practically nothing. With few exceptions our books are written for us by outsiders, especially by different kinds of college professors, whose books must lack the stamp of practical knowledge of a railway which alone can insure any great value to them.

The second great drawback in the course is hardly less important. This is the misunderstanding of many of the officials of the purpose of this course, which we meet constantly. Brought up by a different method, they see few saving qualities in the student course, and give no more than necessary attention to any student who happens to be under them. The good that they could do the student by a personal interest in their work, and by occasional talks with them to point out new lines of observation and study, and the friendly correction of misdirected efforts and faults, is more imaginary than real, as I have never experienced it, but ought to be very great; while the inspiration to the student to greater effort, and the new enthusiasm obtained in such interviews, would be tremendous and influence his whole course for the better. This attitude is, however, less frequent than formerly, and will die out in time as the officers find out that we mean business and are making every effort to use our opportunities.

Special training has proven, and is proving every day, its superiority to the old "hit or miss" system of promotion and training. The supposition that an excellent master mechanic will make a good superintendent does not always prove true, as the work of the two positions is decidedly different. Further, we little know as yet what new standards of efficiency a man trained for a superintendent's or general manager's position will establish, and whether he may not be so much more effective, because of his theoretical and all-round training that, like other lines that specialists have entered, he will monopolize the field. If in engineering, science, and all the humanities, men excel in proportion as they receive a more or less complete professional training in their respective lines, why should not the law that special training makes for greater efficiency be universal and apply to railway operation as well as to these other lines?

As a college man with my own career to make, with success or failure dependent on my own efforts and ability, I have entered this student course, because I believe it opens to any man the finest opportunity in the east or west. From whatever angle you look at railway operation it is a big field, worthy of the best efforts a man can make, and calls for a variety of talents and a scale of ability found in no other industry. Its influence on public progress, and the spread of education and comfort is greater than any other agency. So as a field for public service and personal achievement, it appeals to me as the finest work that a college man can enter. And in this student course of the Southern Pacific Company we are given the opportunity to enter it by the most rational method yet devised, where scholarly habits and a college training are invaluable assets, and future success certain if we are able to measure up to the opportunities it holds out to us.

AMERICAN SOCIETY FOR TESTING MATERIALS.

The American Society for Testing Materials held its fourteenth annual meeting at Atlantic City, N. J., June 27-July 1. Some of the papers discussed are presented herewith. A few more will be published later. In his address to the society, President Henry M. Howe emphasized the desirability of standard specifications which should be international in their scope. He recognized the difficulty of reaching final results in such a matter because of the present apparent conflict between the interests of certain important countries; as in the case of rails, where the ore conditions of one country may force it to use the acid Bessemer process, while those of another may necessitate the use of the basic process.

"In view of this it would seem that the path of least resistance is to choose, for their earliest international specifications, not objects the composition of which is determined by the ore conditions of individual countries, as that of rails is; but, rather, objects which can readily give one and the same composition in all the great producing countries."

He urged throughout the whole address that whenever standards are adopted they should serve as standards of reasonableness of what is just and proper, and of what safeguards the buyer with the least hardship to the maker.

MANUFACTURE OF PURE IRONS.

The first paper on the program was the Manufacture of Pure Irons in Open-Hearth Furnaces, by Allerton S. Cushman. The pure iron described was the American ingot iron made by the American Rolling Mill Company, Middletown, Ohio. It will be borne in mind that Mr. Cushman is one of the chief advocates and exponents of the electrolytic theory of corrosion; his paper was written to show the possibility of obtaining a pure iron having great rust-resisting qualities on a large scale. In defining his position as to what he meant by "pure iron," the author said that he must not be understood to mean an absolutely pure iron, as that would probably never be produced commercially, but an iron that was pure when compared with other commercial products.

In following down the history of the manufacture of pure iron, he cited an analysis of the crude iron and the finished bar as produced at Ragdohar, Salem district, India. It shows the possibility of purity when the forging process is conducted with great care.

	Crude Iron.	Finished Bar.
Carbon	0.660 (Chiefly charcoal)	0.030
Silicon	1.113 (Chiefly slag)	0.010
Sulphur	0.005	Trace
Phosphorus	0.028	0.013
Manganese	0.013	Nil
Iron by difference	98.181	99.947
	100.000	100.000

The rust resisting properties of these old Indian irons are of world-wide repute, and it is interesting to compare this analysis with that of the ingot iron of which the author was speaking and note the close similarity between the two. The paper follows the development of the open-hearth process, and says that about 1903, H. H. Campbell produced an iron of the following analysis:

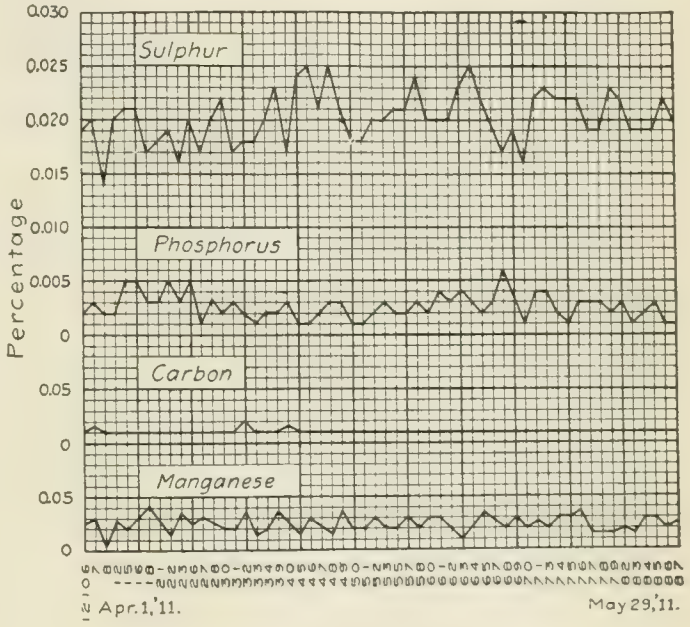
Carbon	0.025	per cent.
Phosphorus	0.009	" "
Silicon	0.005	" "
Manganese	0.040	" "
Sulphur	0.024	" "
Copper	0.100	" "

In commenting on Campbell's work, in the discussion, President Howe said that had the value of such a material been known at the time it was made it could probably have been produced in paying quantities, but it needed the work of Cushman and Walker and their investigation into the rust-resisting properties of pure iron to make the market and pave the way for the introduction of ingot iron on a commercial scale. This investigation was instituted by the Department of Agriculture, because of the complaints that had been made as to the rapid corrosion of fence wire and the greater durability of the older makes.

The investigation resulted in the conclusion that, though manganese does not segregate to the same extent as the other impurities, it is, however, somehow involved in the question of rust resistance. This is an opinion that practical men had already reached. At the time the report was made public, though there was a mass of literature bearing on the subject, there was very little actual experimental evidence.

It was this conclusion that led to the development of ingot iron. The material at first produced was simply a low-manganese mild steel. Then, when an attempt was made to eliminate the manganese entirely, the resulting ingots were of such an oxidized character as to leave the metal in a very unsatisfactory condition. But by the use of pig iron to burn out the oxygen, the ingot iron was produced. The general description of this metal has already been published in the *Railway Age Gazette* of September 30, 1910.

The following are a few analyses of normal ingot iron as it is being produced today, all of which serve to show the possibilities of this process in the production of pure iron. The analyses are extremely accurate, the carbon and the oxygen being determined



Typical Normalizing Curves.

by combustion with the special care necessary in dealing with the determination of such minute quantities.

ANALYSES OF NORMAL INGOT IRON.

	(1)	(2)	(3)	(4)	(5)	(6)
Silicon	0.003	0.002	0.005	0.004	0.006	0.003
Sulphur	0.014	0.015	0.019	0.017	0.018	0.014
Phosphorus	0.002	0.001	0.005	0.004	0.003	0.003
Carbon	0.009	0.011	0.015	0.02	0.016	0.008
Manganese	0.012	0.015	Trace	0.02	0.015	0.025
Oxygen	0.024	0.020	0.021	0.016	0.022	0.019
Copper	0.06	0.07	0.05	0.08	0.04	0.02
Aluminum	0.005	0.011	0.012	0.010	0.013	Trace
Nitrogen	0.006	0.004	0.005	0.003	0.005	0.007
Hydrogen	?	?	?	?	?	?

In order to simplify the matter of following the normal analysis of ingot iron on successive heats, the writer suggested the adoption of a system which may or may not be new. A record of the fluctuation in analysis of the various elements encountered is plotted out so as to cover the entire number of heats for a given period. The curves as produced are known as normalizing curves, and any departure from the normal practice is at once clearly shown. A number of the typical normalizing curves are shown herewith.

Considerable attention has been paid to the physical properties of this new iron, and comparisons between it and steel and the purer forms of wrought iron have been made. In tensile strength it closely approximates high-grade well-rolled charcoal iron, and in elongation and reduction of area it not only equals

but in many cases surpasses the finest soft steel. It is a well-known fact that iron is usually inferior to steel in elongation and reduction of area.

Owing to its more steel-like qualities in this respect, therefore, pure open-hearth iron becomes available for deep drawing and stamping purposes where very often ordinary wrought iron is unavailable and steel must usually be employed. The pure ingot irons, while perhaps not equal to mild steel under certain strenuous conditions, in most cases proved themselves to be adaptable. In fact, it is claimed for them—and reasonably so, it seems to the writer—that they appear to combine to a high degree the good qualities of both iron and steel, with a comparative absence of at least some of the undesirable qualities of each. The annealing, as well as the temperature at which the metal is delivered from the rolls, the rapidity of cooling, will all, of course, just as in the case of steel, exert a marked influence on the tensile strength, reduction of area, and elongation. In brief, it is safe to state that the tensile strength lies between that of iron and mild steel, the reduction of area being usually higher than mild steel, and the elongation about the same as mild steel.

In considering the right of the metal to the title, "Ingot Iron," he said, "that theretofore iron has been used to define metal having slag enclosures, but he maintained that from a purely scientific standpoint, when we use the word 'iron' we must inevitably refer to a product which, in all of its characteristics, essentially corresponds to the element itself, and this is exactly the case with ingot iron."

Again, in the discussion, President Howe differed with the author and maintained that the old distinction of cast iron, wrought iron and steel should be retained. Cast iron is a metal cast into shape and not malleable. Steel is a metal cast into shape and malleable. Wrought iron is a metal not cast into shape, and originally malleable.

As to the corrosion resisting properties, it is the consensus of opinion among investigators of this subject that the acid test should not be used as a true measure of corrosion resistance under service conditions. While much can be said in support of this point of view and while the writer does not believe that the acid test should be made the sole basis for specification, he has not the slightest hesitancy in recording the fact that *other things being equal* he would advise the purchase of material which showed well in the acid test, provided the prime consideration under the conditions of service was durability and longevity of the material.

There was but little discussion on the paper, but that little brought out facts as to the ease with which the metal can be welded, and its great value as the welding metal for the flowing-in process of welding as practised in the oxy-acetylene and electric arc methods.

[illegible] OPEN HEARTH STEEL

The paper on acid and basic open hearth steel by Henry Fay was merely a detailed account of an investigation of two specimens of steel of nearly the same composition, to determine [illegible] the following [illegible]

[illegible]

[illegible] results:

[illegible]

[illegible]

tensile strength and the limit of elasticity of both steels rose with the temperature, but the difference was much less than with the original specimens. The heat treatment served to lower the acid steel about 7,000 lbs., and the basic about 1,000 lbs. in tensile strength, and the limit of elasticity about 8,000 lbs., and 4,000 lbs. respectively. The discussion showed that members were not disposed to consider such a meager test at all conclusive, and the question was asked as to whether, under the showing made, it would not be fair to assume that, had the two steels possessed the same physical properties at the start, the basic steel would have made the better showing under the heat treatment.

FLUE SHEET CINDER FORMATION IN LOCOMOTIVES.

The paper on Flue Sheet Cinder Formation in Locomotives was presented by Robert Job, and is published in full on page forty-seven.

STANDARD SPECIFICATION FOR STEEL.

The committee on standard specifications for steel presented four, as follows: For forged and rolled, forged or rolled solid steel wheels for engine truck, tender and passenger, subway and elevated railway service; for forged and rolled, forged or rolled solid steel wheels for freight car service; for heat-treated carbon steel axles, shafts and similar parts; and for steel reinforcement bars. In the specification for steel wheels, the range of permissible carbon content was from 0.60 to 0.85 per cent. A most decided opposition was raised to the proposition to submit the specifications for wheels to letter ballot, on the ground that the carbon range was too great and unnecessary. Attention was called to the fact that wheels were now being made satisfactorily and successfully under much narrower limitations and more rigid specifications, and that an increase was unnecessary. Further than this, so wide a variation in carbon would surely produce a wide variation in the hardness and consequent wearing qualities of the wheels. It was, therefore, necessary to consider the effect of the specifications on the two wheels of a pair rather than upon one only. While there might not be much difference between wheels made from the same heat, there would be a difference between those coming from different heats; and if one of a pair were hard and the other soft, the soft wheel would wear the more rapidly. The larger wheel would then run ahead, crowding the worn one to the rail, and a cut flange would be the result.

A representative of one road said that they recognized this difficulty and met it by mating wheels of the same heat. When asked as to how old wheels were mated, he replied that the heat number was stamped on the rim next the wheel number and that when wheels were removed they were stored by heat numbers and mated accordingly.

A strong plea was made for the specification on the ground that a great deal of time had been spent in drawing them up; that of course they were not perfect, no specifications could be, and that something, even an imperfect specification, was better than none. The reply was that while it was, perhaps, out of the question to draw up a perfect specification, it would be absurd for this association to submit a specification to letter ballot that was manifestly so undesirable as this one. The two specifications for car wheels were, therefore, referred back to the committee, with instructions to consult with the practical men of the railways who use and turn these wheels, and then submit a revision at the next meeting.

The specifications for axles were also criticised, because of the upper carbon limit, 0.60 per cent. It was urged, on the one hand, that the upper limit was too high and that there should be a lower one, and, on the other, that there should be no carbon specified at all. It was, however, voted to submit the specifications for axles and reinforcing bars to letter ballot.

[illegible] specification for axles is as follows:

PROPOSED STANDARD SPECIFICATIONS FOR HEAT TREATED CARBON STEEL AXLES, SHAFTS AND SIMILAR PARTS.

1. Steel under this specification shall be made by the open-hearth or other approved process.

2. A sufficient amount of discard must be made from each ingot to insure freedom from piping and undue segregation.

3. The steel shall conform to the following limits in chemical composition:

Carbon	Not over 0.60 per cent.
Manganese	0.40 to 0.80 " "
Phosphorus	Not over 0.05 " "
Sulphur	" " 0.05 " "

4. Drillings shall be taken from the crop end of one axle, shaft, or similar part from each melt represented, parallel to the axis on any radius one-half the distance from the center to circumference, to determine whether the chemical composition of the heat is within the limits specified in Paragraph 3.

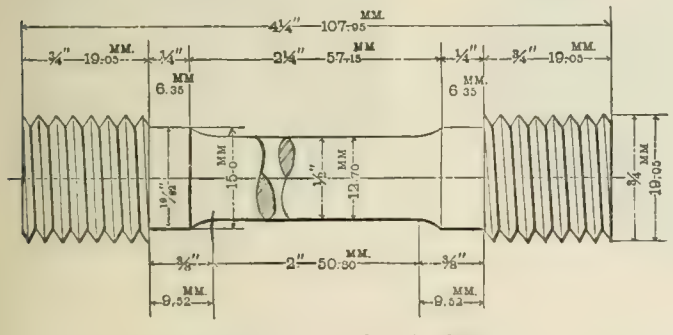
In addition to the complete analysis, the purchaser has a right to call for a phosphorus determination, to be made from turnings from each tensile test specimen, and the phosphorus must show within the limits called for by Paragraph 3.

5. The steel shall conform to the following minimum physical properties:

Ultimate strength, lbs. per sq. in.	85,000
Elastic limit, lbs. per sq. in.	50,000
Elongation in 2 ins., per cent.	22
Reduction of area, per cent.	45

The elastic limit shall be determined by extensometer. Above 40,000 lbs. per sq. in., each increment of load shall be not more than 1,000 lbs. per sq. in.

6. The test specimen as shown, 0.5-in. diameter and 2-in. gage length, shall be used to determine the physical properties as specified in Paragraph 5. Tests specimens shall be taken from the crop end of one axle, shaft, or similar part, from each treating-plant heat; if more than one open-hearth heat is represented in a treating-plant heat, a test shall be taken from each open-hearth heat represented. A full-size prolongation shall be left on each axle, shaft, or similar part.



Test Specimen of Axle Steel.

7. A cold bend test shall be made from the crop end of one axle, shaft, or similar part, from each treating-plant heat; if more than one open-hearth heat is represented in a treating-plant heat, a test shall be taken from each open-hearth heat represented. The test shall be made with a ½-in. square specimen, not exceeding 6 in. in length, around a flat mandrel with edges of ½-in. radius, and the specimen shall bend, without fracture, 180 deg. around the said mandrel.

8. Specimens for tensile test and cold bend test shall be taken parallel to the axis of the axle or shaft and on any radius one-half the distance from the center to the circumference.

9. In case the physical results obtained from any lot of axles, shafts, or similar parts, do not conform to those called for by paragraphs and 7, the manufacturer shall have the privilege of re-treating such parts, from which new tests shall be taken by the purchaser, and these shall govern the acceptance or rejection of the lot.

10. Each axle, shaft, or similar part shall be allowed to cool after forging, shall then be re-heated to the proper temperature, quenched in some medium, allowed to cool, and then re-heated to the proper temperature for annealing.

11. Warped axles or shafts or similar parts must be straightened hot; that is, at a temperature above 900 deg. Fahr., and before offering the parts for test.

12. All axles, shafts, and similar parts shall be free from cracks, flaws, seams, or other injurious imperfections when finished. Those which show such defects while being finished by the purchaser will be rejected and returned to the manufacturer, who must pay return freight.

13. All axles, shafts, and similar parts must be rough-turned with an allowance of ⅛ in. on surface for finishing, except on collar, which is to be left rough forged. Turning must be done on 60 deg. centers with clearance drilled at point.

14. The heat number shall be stamped on the rough forged collar. After rough turning, the manufacturer's name, heat number, individual axle or shaft number, and inspector's mark shall be stamped at place indicated by the purchaser, except at any point between the rough collars.

15. The inspector representing the purchaser shall have free entry, at all times while his contract is being executed, to all portions of the manufacturer's shop which concerns the manufacture of material ordered. All reasonable facilities shall be afforded to the inspector by the manufacturer to satisfy him that the axles, shafts, and similar parts are being furnished in accordance with the specifications. All tests and inspection shall be made at the place of manufacture prior to shipment and free of cost to the purchaser. The purchaser shall have the right to make tests to govern the acceptance or rejection in their own test-room, or elsewhere, as may be decided by the purchaser, such test, however, to be made at the expense of the purchaser and to be made prior to the shipment of the material. Unless otherwise arranged, any protest based on such tests must be made within six days, to be valid. Tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the mill.

STEEL TIRES.

A joint paper by Robert Job and Milton L. Hersey was presented, which was a study as to the causes of tire breakages. The general practice of the writers (after getting all the data obtainable regarding the conditions of service) was to take a transverse full section of the tire, as near as possible to the point of fracture or failure, making careful scrutiny of the polished surface to detect any visible defect. The section was then etched to develop seam lines and similar defects. Meantime, a standard test piece was cut from another portion of the tire and the usual tensile tests were made. A ⅜-in. section was next cut from the center of the transverse section and polished and etched for microscopic investigation, and another similar section was taken from the transverse section, and microscopic examination was made of a face one-half inch from the outside surface of the tire, for reasons which will be explained later. Borings were also taken from the tire for analysis, the carbon being determined by direct combustion in a current of oxygen in an electric furnace. Photo-micrographs were taken at a magnification of fifty diameters to determine the size of grain, that magnification having been found the most satisfactory for the purpose. Also, the hardness of the steel was determined with the Shore Schleroscope.

The number of tires tested has been considerable, representing the output of many of the mills, both here and abroad, and the general results of the study have been exceedingly interesting, and in many cases the cause of failure has been fully demonstrated, but in the brief time at our disposal we can merely touch upon the main findings.

A fair proportion of failures were due to radically defective composition, as for instance, tires which contained over one per cent. of carbon. The proportions of manganese, phosphorus and sulphur were generally within the usually accepted limits for tires. The carbon varied from 0.53 per cent. to 1.03 per cent.

Under the above conditions there was naturally a wide variation in the tensile properties of the steel, and in one case the metal had a tensile strength of 165,650 lbs. per square inch, with elongation of 10.9 per cent. in two inches, the proportion of carbon being 0.86 per cent., with granular size of about one-quarter

inch at fifty diameters. They also found a marked difference between the tensile properties of test pieces taken longitudinally, and those taken transversely from the same tire, as shown by the following:

	Tensile Strength (lbs. per sq. in.)	Elongation in 2 ins.
Longitudinal	157,000	9.3 per cent.
Transverse	126,700	2.3 per cent.
	Carbon, 0.795 per cent.	
Or—		
Longtiudinal	150,000	11.0 per cent.
Transverse	118,300	1.5 per cent.
	Carbon, 0.770 per cent.	

The hardness ranged between 37 deg. (0.83 per cent. C.) and 55 deg. (0.82 per cent. C.), and as would be expected, the degree of hardness found did not necessarily bear any direct relation to the percentage of carbon or of manganese in the steel, as in the examples just cited, these variations resulting evidently from changes in the physical condition of the steel due to differences in the heat-treatment.

In the granular structure, the index of the rolling temperatures, we found remarkable differences, as for instance, Fig. 1, which represents a tire which fractured in service, the composition being:

[illegible]	0.649 per cent.
[illegible]	0.057 " "
[illegible]	0.697 " "
Sulphur	0.039 " "
[illegible]	0.100 " "

In this tire the huge size of the grain proves that the tire was finished at an excessively high temperature, and that it was ill adapted to meet even the more ordinary conditions of service. Fig. 2 represents another very similar tire which also fractured in service. The size of grain is smaller, indicating a lower range of temperature, but the size is excessive and unquestionably a source of weakness. The composition was:

Carbon	0.539 per cent.
[illegible]	0.052 " "
[illegible]	0.781 " "
Sulphur	0.032 " "
Silicon	0.254 " "

In contrast with the above, Fig. 3 has been taken from a tire which had been annealed. The granular form is fairly fine, although the structure is rather irregular. It represents, however, steel of far greater toughness and power of resistance to shock than Figs. 1 and 2 [illegible].

In the examination of tires which had not been defective in service, we found the usual range in composition. The hardness tended toward the lower figures, as for instance about 42 deg. to 47 deg. with carbon at about 0.70 per cent to 0.80 per cent. and manganeses at about 0.70 per cent.

The granular structure in such tires was usually fairly fine with granules at fifty diameters about one-quarter to three-eighths in diameter, though with the lower portion of carbon, e. g., 0.50 per cent., the metal was in some cases coarsely granular.

From the brief account which has been given it will be clear that the failure of a tire may be caused by any one of many variables, both in composition and in physical properties, as well as by changes induced by conditions of service, as for instance by skidding. It will also be evident that with metal which is subjected to the severe service which must of necessity be borne by the steel tire under present conditions, every feasible precaution should be taken not only to guard against unsoundness and incorrect composition, but also to avoid undue hardness and coarse structure. On the other hand, we must bear in mind that if a tough, fine-grained structure is secured by annealing the tires, the elastic limit of the steel is at the same time lowered and the tire is thus more liable to crush in service. The same condition was observed some years ago by one of the writers in connection with some service tests of annealed rails upon the Reading. (An account of this investigation apears in the Proceedings of the New York Railroad Club, December, 1906.) In that case eleven 90-lb. rails were sawn in halves, and one half of each rail was annealed, having the structure at center of head 50 diameters, shown in Fig. 4, as compared with the natural condition shown in Fig. 5.

After 88,000,000 tons' traffic, it was found that the annealed rails averaged 31.9 per cent. the more rapid wear, and that they also showed the greater tendency to mash down and splinter, but we found then on test that the elastic limit of the steel had been reduced from 80,600 lbs. per sq. in., to 70,225 lbs. per sq. in., the carbon averaging 0.54 per cent. and manganese 1.06 per cent. As was stated at that time in the paper referred to above, "the clear teaching of the trial was that under heavy traffic high elastic limit is essential to the best service, and it was also evident that if one proposes to get greater toughness and safety by some treatment, like the annealing, which lowers the elastic limit, one should also, to get the best results, increase the carbon or manganese contents of other constituents to the point at which the elastic limit will be high enough to resist crushing, even though the steel be somewhat unsound. In other words, the toughness and elasticity produced by the fine granular structure permit one to increase the hardening contents considerably beyond the point which otherwise would be safe, thus obtaining greater capacity for wear." If, for example, in a tire a carbon content of 0.55 to 0.65 per cent. is deemed sufficiently high with coarse-grained steel, it may safely be assumed that with fine-grained steel the proportion of carbon should properly be increased, say to 0.65 to 0.75 per cent. or perhaps higher, and with far greater chances for safety with the latter quality than with the former with its brittle coarse-grained structure.

Figs. 1 and 2—Locomotive Tires, fractured in Service; Center of Tires.

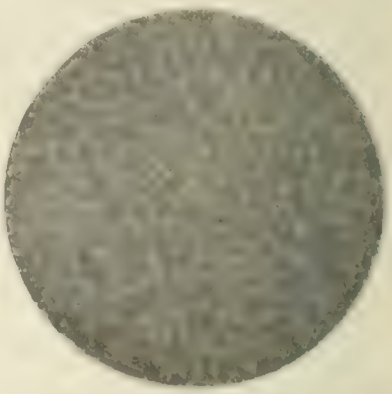


Fig. 3—Locomotive Tire, Annealed; Center of Tire.

In the inspection of tires it has been customary to take a tire at random from a shipment and subject it to a drop test. This practice, of course, gives an indication of the quality of the one which is selected for test, but it does not do so, unluckily, as to that of its mates which go into service, and upon that account other supplementary tests are necessary. A section for tensile test cannot be taken from a tire without rendering the latter unfit for service, but we have found it entirely feasible to take a section for microscopic work in such manner that the service value of the tire is not in the least impaired, and a study of this

section gives a clear idea as to the heat treatment which the tire has received at the mill.

In our first experiments we took sections from the edge of the tire at a distance of ¼ in. from the surface, but we quickly learned that such a section might not indicate the condition of the metal beyond the immediate surface of the tire. We found, however, that by taking the section at a depth of ½ in. from any surface of the tire, a very clear indication as to the character of the granular form at the center of the tire could be obtained, and the relative difference in size of grain, at the center, and at ½ in. from the surface of the same tire is shown in Figs. 6 and 7, the former being at the center of the tire. The analysis was as follows:

Carbon	0.53	per cent.
Phosphorus	0.037	" "
Manganese	0.54	" "
Sulphur	0.030	" "

In Figs. 8 and 9 a similar example is given of a coarse-grained steel, Fig. 8 being from the center of the tire and Fig. 9 from a point ½ in. from the surface. The composition was:

Carbon	0.83	per cent.
Phosphorus	0.077	" "
Mangarese	0.47	" "
Sulphur	0.049	" "
Silicon	0.21	" "

We found also that a test section sufficiently large for the purpose could be obtained by boring into the tire with a hollow drill of special steel with walls not exceeding ⅛ in. in thickness and having a core ¼ in. in diameter; thus the drill had an outside diameter not exceeding ½ in. A hole slightly more than ½ in. deep was then sunk into the tire, preferably from the inside, using screw cutting oil or compound, and the core was broken off with a small wedge, and the end filed off until the face was just ½ in. from the surface of the tire. This small section ¼ in. diameter was then polished, etched and photographed. The ½-in. hole bored into the tire in the position indicated does not injure the tire for service, and consequently tests may be made quickly of any number of tires in a given shipment, in order to prove definitely whether or not the mill practice as to heat treatment has been satisfactory, and in accordance with specifications.

In drawing up specifications for the regulation of the heat treatment, it is simpler, it is thought, and far more satisfactory, to make an engraving from a photomicrograph at 50 diameters showing the maximum size of grain which will be accepted, printing this cut as part of the specifications. The small ½-in. test piece may also be used subsequently if so desired, in making the hardness test with the Seleroscope, provided a plane face is ground longitudinally on one side of the steel, using care to have this face exactly parallel with the opposite side at all points.

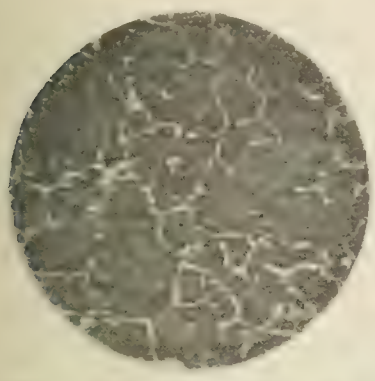


Fig. 4—90-lb. Rail, Center of Head, Coarse-Grained.

Fig. 5—Same Rail as Fig. 4, but Annealed.

Fig. 6—Locomotive Tire, Center (Carbon 0.53 Per Cent.)

In the suggestions which have been made above, we realize fully that this method of investigation does not indicate whether pipes, blowholes or similar defects are present, and reliance must be placed upon present methods of test and particularly of mill inspection to determine such quality. We are convinced, however, that if, in addition to soundness of steel and freedom from the grosser defects of manufacture, there is also present the fine granular form indicative of toughness, and with composition proportioned to insure a suitably high elastic limit, there will result not only increased safety of service, but also lessening of failures which now occur.

PROTECTIVE COATINGS.

Reports of progress were made by the committees having charge of the panels exposed on the Havre de Grace bridge of the Pennsylvania Railroad and the Atlantic City fence. While the observations have been made they have not yet been tabulated and analyzed, so that no definite statement can be made at present. There was also a further statement presented regarding the Westinghouse, Church, Kerr & Company paint tests. The tabulations, however, are averages taken by groups, so that it is impossible to tell what may have been the individual performance of any paint in a group. Announcement is also made of the immediate commencement of an elaborate white paint test at the Arlington, Va., experimental farm of the Department of Agriculture. The point

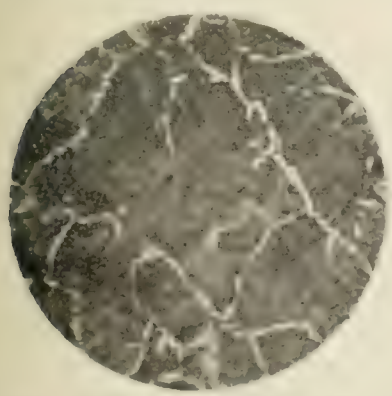


Fig. 7—Same Tire as Fig. 6, but One-half Inch from Surface.

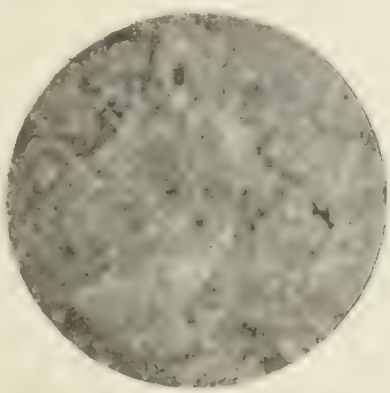


Fig. 8—Locomotive Tire, Center (Carbon 0.83 Per Cent.)

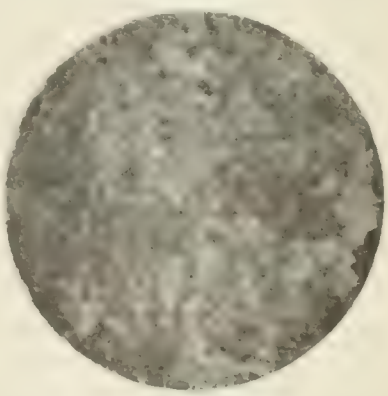


Fig. 9—Same Tire as Fig. 8, but One-half Inch from Surface.

is to be supplied by the various manufacturers, the panels are to be made by the Pennsylvania Railroad; the Baltimore & Ohio is to apply the paint; and the government is to provide the site.

THE SULPHURIC ACID CORROSION TEST.

There was a sharp discussion on the value of the sulphuric acid corrosion test as an indication of a metal's power to resist corrosion. According to the author of the paper on the subject, Cloyd M. Chapman, "a service test is the only certain method of demonstrating the true wearing qualities of the product, but a service test may require years to give the desired information," hence the demand for an accelerated test. He deprecated the sulphuric acid test as an unreliable indication of endurance in service, and cited two panels of iron and steel that had shown almost the same amount of pitting when exposed for eighteen months to the weather; while strips cut from the same plates showed a loss of iron of 6.7 per cent., and of steel of 83 per cent. when submerged for one hour in dilute sulphuric acid. He disclaimed any desire to be understood as claiming that the sulphuric acid test is useless, or that when properly used it may not give useful information, but he did wish to call attention to its utter inability to give a reliable indication of the relative ability of metals to withstand the corrosive action of the weather.

It was claimed by one member that the presence of copper in iron or steel had a very decided influence on the rate at which steel would go into an acid solution. Figures were presented in which the mere presence of copper seemed to drop the rate from more than 18 per cent. to about 0.43 per cent. As the analyses of the metals did not give the oxygen content, another member showed that while copper, as an alloy, might have a protective effect, as an impurity or mechanical mixture it might be the reverse of protective, and that the oxygen content was really the crucial point. He quoted case after case where the corrosion varied with the oxygen and that, therefore, it was quite as necessary to know the oxygen content as the copper.

DETECTION OF MINERAL AND RESIN OILS IN OTHER OILS.

A. E. Outerbridge, Jr., of the Wm. Sellers Company, made a demonstration of a method employed by that firm for the detection, quantitatively, of mineral or resin oil adulterations in linseed and other vegetable oils. It is based upon the fact that all of the mineral oils, except the gasolene distillates, show a bluish or greenish bloom when subjected to the light of an enclosed arc lamp. For purposes of comparison, he has a series of bottles containing the oil, say linseed, and adulterated with various percentages of mineral oil. In the linseed oil series, the first bottle contains pure linseed oil, the second 0.10 per cent. mineral oil, and the following, 0.20, 0.30, 0.40, 0.50, 1.00, 2.00, 5.00 10.00 and 20.00 per cent., respectively. These bottles of oil are set in a rack and exposed to the light of the lamp all displaying a fluorescence [illegible] sample to be tested is put in a bottle of the same size and run along beside the rack until its fluorescence corresponds with that [illegible]

[illegible]

diameter and about 14 in. long, may be cast for each cylinder. When placed horizontally upon supports 12 in. apart and tested under a centrally applied load, these test bars shall show an average transverse strength of not less than 3,000 lbs., and an average deflection not less than 0.09 in.

The above test pieces shall be cast on end in dry sand, the metal being taken from the ladle before pouring into the cylinder mold.

Before pouring, a sample of the iron shall be taken from the ladle and chilled in a cast-iron mold of the dimensions shown in Fig. 1. [Drawing not shown herewith. Dimensions: 5 in. x 2½ in. at top, and 4 in. x 1½ in. at bottom, x 2 in. deep. 90-deg. V, in bottom of mold, 1 in. wide.]

The sample shall be allowed to cool in the mold until it is dark red, or almost black, when it shall be knocked out and quenched in water. The sample, on being broken, must show a close-grained, well-mottled gray iron, with a well-defined border of white iron at the bottom of the fracture.

Castings shall be smooth, well cleaned, free from blow-holes, shrinkage cracks, or other defects sufficiently extensive to impair the value of the casting, and must finish to blue-print size.

Each cylinder shall have cast on each side of the saddle the manufacturer's mark, serial number, date made, and mark showing order number.

The inspector representing the purchaser shall have all reasonable facilities afforded to him by the manufacturer to satisfy himself that the finished material is furnished in accordance with these specifications. All tests and inspections shall be made at the place of the manufacturer.

INSULATORS.

During the period from 1887 to about 1898, the Canadian Pacific Railway Company used white porcelain insulators on a portion of the long through wires. These were of German or British manufacture. An elaborate series of tests proved their great superiority over glass from a mechanical standpoint, the average blow necessary to break a porcelain being three times that required to break the glass insulator. It was also discovered that usually a porcelain insulator was only partially destroyed when hit by a stone and that the wire was not set free and remained fastened to each pole, but the glass insulator was so badly shattered that the wire would be freed and this frequently resulted in a cross with other wires which remained attached to the pole. This advantage was offset to some extent by the fact that, on account of the porcelain insulator being white, it offered a much better mark and was the one aimed at. The price of the porcelain insulator was increased until it reached about nine cents each laid down in Montreal, and its use by us, therefore, aban[illegible] for some years. The glass insulator with which we were supplied then depreciated in quality, apparently on account of improper annealing, and appeals or complaints to the manufacturers resulted in no improvement; and, as the cost of the porcelain insulator was again very largely reduced, we have purchased nothing but white porcelain for the past three years.

Last year we procured porcelain insulators from Canada, the United States and Germany. One make turned out to have defective insulation properties, and we had a series of tests made comparing the three manufactures and glass. All of the in[illegible] pattern and dimensions. One dozen insulators of each make, selected at random, were placed on pins in the open air, and frequent readings taken of insulation, hu[illegible] During the tests the weather was of nearly every description, from dry cold to sleet, wet snow and rain. These tests proved that in every respect the German and United States insulators had from 5 to 10 times the insulating qualities of the Canadian and glass insulators, the two former giving practically the same results with a slight difference in favor of the German, and the Canadian porcelain and glass about on a par. Tests of wires after erection show the same difference. H. J. Cooper, C. P. R., before Railway Telegraph Superintendents.

LETTERS FROM AN OLD RAILWAY OFFICIAL TO HIS SON, A GENERAL MANAGER.*

SAN ANTONIO, TEXAS, May 20, 1911.

My Dear Boy: Let me tell you something about a wonderfully effective human machine, the Confederate Army. I sit facing a Confederate monument which depicts a self-reliant son of the Southland, the type of man real railway training helps to perpetuate. Hard by is a shrine to valor, the Alamo, a reminder of the duty of altruism which an individual owes to his fellows.

Fifty years ago two great armies were organized to fight to a practical, working conclusion some of the indefinite compromises of the Federal constitution. Each army was supported by the intelligent spirit of an aroused people. Each sought in its organization and operation to give the most effective expression to that spirit. Jefferson Davis and his advisers sought to profit by the experience of the old United States Army and to avoid inherent weaknesses in organization. So the Confederate Congress created the grades of general and of lieutenant general, in order that a general might command a separate field army, a lieutenant general a corps, a major general a division, and a brigadier general a brigade. By thus more exactly defining official status, jealousies were minimized. Until Grant was made lieutenant general in 1864, the Federal Army had only two grades of general officers, major general and brigadier general. This led to confusion, to bickerings, and to petty jealousies. Since a major general might command such distinct and self-contained units of organization as a division, a corps, or a separate field army, numerous special assignments by the President became necessary.

The Confederate Army had another feature of organization that was epoch making. Samuel Cooper had been adjutant general of the United States Army, with the rank of brigadier general, issuing orders over his own signature from Washington "by command of" somebody else, Brevet Lieutenant General Scott or the Secretary of War. Because of his acknowledged efficiency in office work and administrative routine, Samuel Cooper was made adjutant general and inspector general of the Confederate Army. Did they give him the rank of brigadier general? No, sir; they made him a full general, and number one on the list, senior to Albert Sidney Johnston, Robert E. Lee, Joseph E. Johnston and G. T. Beauregard, who, as generals at one time or another, commanded separate field armies or territorial military departments. General Cooper at a desk in Richmond was the ranking officer of the Confederate Army. This detracted not one iota from the fame of Lee, the great soldier and the first gentleman of the South. On the contrary the increased efficiency due to receiving instructions from a real superior, not under-strappers or chief clerks, made greater the reputation of Lee. From one viewpoint General Cooper was a high-class chief clerk for his President and Secretary of War. From a broader view he was their technically trained, highly efficient chief of staff.

The Confederate Army gave in effect, but not in name, the chief of staff idea to the world as a great object lesson in the applied science of organization. Historians say that Jefferson Davis, himself a graduate of West Point, a veteran of the Mexican war, and Secretary of War in the cabinet of Pierce, meddled too much in military affairs when as President he should have been attending also to civil affairs. Be that as it may, the organization was elastic enough to meet just such variations of personal equation. Whether the President, the Secretary of War or the adjutant general (chief of staff) acted in a particular case, the subordinate knew who took the responsibility and that the action came from a real superior in rank.

The Confederacy fell. The passions of the time, the short-sightedness of prejudice, precluded the adoption at that time by the United States of any feature of the Confederate organization, however meritorious in principle and practice. It remained for the Germans, already applying the idea, to dazzle the world in 1870 and conquer France by the work of their general staff and its able chief, von Moltke. Not until after the costly lessons of the little war with Spain in 1898 did our Congress wake up and give the United States Army a general staff and a chief of staff. The new law includes several desirable features of elasticity. Among these is a provision for the selection by each administration of its own chief of staff. A permanent chief of staff might be an obstruction or might become too perfunctory in compliance. The law wisely limits the selection of a chief of staff to about twenty general officers. This prevents playing untrained favorites. It permits any passenger conductor to be made superintendent, but forbids selecting an extra brakeman or the call boy. Furthermore, if conditions change or a new administration arrives, the chief of staff is not penalized for efficiency by losing out entirely but reverts to his permanent status; the superintendent holds his rights as a conductor and bids in a good run according to his permanent seniority. This feature of good organization, the conferring of definite local superior rank, and the protection of the incumbent from unnecessary degradation, was discovered centuries ago by another effective institution, the Catholic church.

Life is a composite. The army, like several railways, has been waking up to the fact that a lesson can be learned from the civil courts. A large city may have several courts and judges. A judge may sit for one term in the equity court, then in the criminal branch, and next in a court *en banc*. All the time there is only one office of record, one clerk of the court, with as many deputies as may be found necessary. When one judge wishes to know what another judge has done, the former does not write the latter a letter to inquire, but sends to the clerk's office and gets the complete record up to date.

Are the railways above copying sound working principles of efficiency from such tried institutions as the army, the navy, the civil courts and the churches? Certainly not, as some roads are showing in a highly practical way. Such movements as these are but expressions of a cosmic tendency, greater and more powerful than any one branch of human activity. Such trends of progress are noted by observers who happen to be favored with a view from the watch towers and who are able to make suitable adaptations because they realize that ideas are greater than men, that practical devices are greater than their inventors.

Sound ideas often depend for their development and permanency as working practices upon some great exponent of acknowledged capacity for leadership. In 1870 Bismarck had baited on the French and von Moltke had planned their discomfiture. In 1870 General Robert E. Lee, entering upon the last year of his life, was president of Washington and Lee University at Lexington, Virginia, where Colonel Allan, of Stonewall Jackson's staff, was a prominent professor. There came to sit at the feet of these great teachers a mere boy in years, but an adult in intellectual grasp. This callow youth was of German lineage but born and reared in New Orleans, a city stamped with the civilization of the French. Perhaps this modest youngster dreamed that twenty years later he would be a great railway engineer. Hardly, though that in forty years he would, as a great railway operating man, be called the von Moltke of transportation. Strange, indeed, that this von Moltke, Julius Kruttschnitt, should find his opportunity for highest development under the Napoleon of our profession, Edward H. Harriman, himself among the last of the feudal railway barons. Stranger still that as this Napoleon was passing his von Moltke was starting the railways away from feudalism in interior administration by introducing within the latter's own sphere the chief of staff idea of the Confederate, the German, and the American armies. For, my boy, the unit system of organization on the Harriman lines, of which you have read more or less, is primarily a substitution of the modern chief of staff idea for the outgrown, dwarfing, irrational government by chief clerks.

The unit system of organization requires that an official, whether the head of the unit or an assistant, shall, when absent on the line, be represented at headquarters by the senior or chief assistant of the unit. Such senior or chief assistant is in effect though not in name the chief of staff. Normally, this senior is number one on the list of assistants, but whoever is so acting becomes, as above explained, the senior for the time being, and

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when relieved reverts to his permanent place on the list. Rotation for this chief of staff depends largely on the personal equation of the head of the unit and of his various assistants. In the last two years some divisions have not rotated the chief of staff at all. One superintendent who credits the system with increased supervision and notable decreases in expenses is now rotating his assistants in the senior chair every two weeks.

There are diverse views on the subject of rotation in general. My own opinion is that it may or may not be desirable. I incline rather to rotation because it seems to be a biological concomitant of rational evolution. Nature rotates her seasons and her types. Where, as in the tropics, there is less rotation we find more stagnation and quicker death. Many soils are impoverished by neglect of proper crop rotation. The other day in a terminal, I found a superintendent lately rotated, like a Methodist minister, from another division. Favored with a fresh viewpoint, he was having switch engines give trains a start out of the yard, and was taking off a helper engine which for years had seemed an unavoidable expense. For what was in this particular instance a case of over-specialization he was substituting engines which could more economically perform the dual functions of switching and of pushing.

Speaking of yards, see if you have not some bright fellows on your staff who can figure out a car record that can be taken by the mechanical men, the car inspectors, that will answer all the purposes of transportation, including claims. Instead of two sets of specialists, car inspectors and yard clerks, partly duplicating each other' work, see if you cannot develop one set of all 'round men with some interchangeability of function. No, you cannot do it all at once. Even if you have a workable scheme it will take a long time to establish. The Brown system of discipline required nearly twenty years for its complete extension to practically all American railways, although in successful operation for nearly a hundred years at the United States Military Academy at West Point. The demerit system is better handled at West Point than is the Brown system on railways. This is because most of the officers are relatively better trained than railway officials, having all been through the mill themselves. Better training cultivates the judicial quality. Too often the number of Brownies does not depend upon a fixed scale for a like offense, but rather upon how mad the superintendent is or on how hard he has been pounded by the typewriter in the offices above.

Before you condemn any system be certain that its apparent shortcomings are not the fault of your own interpretation and administration. We used to speak of engine failures alone. Nowadays we distinguish as between engine failures and man failures. Likewise there is a difference between a system failure and a man failure.

Affectionately your own, D. A. D.

Kotaro Tanaka, a director and the manager of the Japan Rolling Stock Company (Mihon Sharyo Kwaisha), in an article on the future of the rolling-stock industry in Japan, contributed to the journal, *Industrial Japan*, of May 1, says that the amount of rolling stock which will be required in the near future as a result of the expansion of Japanese railways will be very large. He says he knows it to be a fact that the estimated amount of new rolling stock to be placed on the government lines in Japan between 1910 and 1923 consists of more than 500 locomotives, 750 passenger cars, and 9,300 freight cars, to cost about $13,450,000. This amount will be needed prior to the completion of the broad-gage line between Tokyo and Shimonoseki probable to be completed next year, while almost twice as much will likely be required after its opening sometime around 1925. Mr. Tanaka says that with the enlarged demand for rolling stock domestic manufacturers will be stimulated to increase their output. He urges that they should endeavor to prevent the necessity for the future importation of foreign railway supplies, but that still orders as possible and for cheap manufactures will doubtless secure a good share of the orders for the new rolling stock, especially locomotives.

TRANSPORTATION AND CAR ACCOUNTING OFFICERS.

The summer meeting of the Association of Transportation and Car Accounting Officers was held at Cape May, N. J., June 20-21, with 122 members in attendance, and President M. B. Casey in the chair. At the opening Tuesday morning, the association was favored with an address by Theodore Voorhees, vice-president of the Philadelphia & Reading, extracts from which are given elsewhere.

The report of the Executive Committee indicates a membership operating 244,383 miles and having in service 2,438,510 cars. Twenty-four roads were admitted to membership during the past six months. It was decided to hold the next meeting at Louisville, Ky., December 12 and 13.

The association adopted the recommendation of the Committee on Car Service with regard to proposed revision of Rule 10, Code of Car Service Rules, for submission to the American Railway Association; the committee accepting on the floor a slight change in the wording of the proposed form of rule. The proposed rule as it will be submitted to the American Railway Association, with request that it be eliminated from the Code of Car Service Rules and included in the Code of Per Diem Rules, as a new rule, is as follows:

> (a) When any freight car is detained by reason of a railway error *or omission and demurrage cannot legally be assessed, this fact to be certified to by the demurrage manager or official in charge of demurrage under the organization in effect on each road,* the erring road shall pay to the holding road the rate established by the Per Diem Rules for freight cars, *provided the holding road notifies the road originating the shipment, as shown by the billing, by wire within five days from date of arrival of shipment at billed destination, or point at which car is held, that delivery cannot be effected.*
>
> (b) *Failure on part of holding road to notify originating road within five days that car is being held will make reclaim eligible only from date of notice and five days in addition thereto.*
>
> (c) *If it develops that error was made by an intermediate road the holding road will take up by wire with the first connection of the originating road, or with the road at fault, within three days after receipt of advice that originating road is not responsible for the error.*
>
> (d) *Claims under this rule must be made and sent to the erring road within twelve months from the first day of the month succeeding that in which the car is received.*

In connection with the remarks of Vice-President W. L. Park, of the Illinois Central, at the last meeting of the association, with regard to misuse of cars, the committee presented a recommendation which was adopted by the association for submission to the American Railway Association. The recommendation is as follows:

> "Inasmuch as serious objection has been raised from an accounting point of view to the application of an arbitrary penalty for each diversion, your Committee would recommend that provision be made in the Per Diem Rules Agreement, that in the event of habitual failure to observe these rules, the offending road be "cited" to defend its action before the Executive Committee of the American Railway Association, and, further, that the Executive Committee of the American Railway Association be empowered to fine the offending road in accordance with the magnitude of the offense. The amount of the imposed to be based upon the injury sustained by the complainant road, plus the cost of the proceedings before the American Railway Association."

The Committee on Office Methods and Accounting reported that 185 private car owners have adopted the reporting marks assigned by the committee, and are applying the same to their cars. The plan of the committee in this connection contemplates a separate and distinctive assignment of marks for each private line of cars for the purpose of preventing confusion in identifying ownership. The assignment of these marks by the committee of this association is by authority of the American Railway Association. The recommendation of the committee with regard to entering the records of delivery of foreign cars to connections from junction reports after they have been prepared from the current interchange reports was adopted as the recommended practice of the association. The reiteration of the com-

mittee in connection with the receiving road retaining the best carbon copies of interchange reports, the delivering road accepting the original or hard copy and one carbon copy, was concurred in. The form presented for transmitting per diem claims was adopted as the recommended form of the association. Acting under instructions of the association at its last meeting, the committee reported that it had conferred with the per diem rules arbitration committee of the American Railway Association and had suggested an explanatory foot note relating to Interpretation No. 34, in connection with which a letter was subsequently received from the chairman of the per diem rules arbitration committee advising, "that in view of the general situation, an adherence to Interpretation No. 34 is necessary to preserve the intent of per diem Rule 11 and do substantial justice."

The report of the Committee on Conducting Freight Transportation containing proposed uniform practice for the preparation of statistics showing the average cost of handling cars through a terminal yard was returned to the committee for further consideration.

The Committee on Conducting Passenger Transportation presented an interpretation of Rule 7, Code of Car Service Rules, as it relates to wrongful diversion of passenger and baggage cars, and proposed an addition to the rule as follows:

(C) Should a passenger equipment car be appropriated, without consent to the owner or joint service; and in addition thereto the established the road responsible shall pay to the owner the established Per Diem Rate under Rule 7 (B) from the hour of appropriation until hour car is returned to the owner or joint service; and in addition thereto the established mileage rate under Rule 7 (A) shall be paid owner by each road using car.

This proposed addition will be submitted to the American Railway Association.

In connection with the subject of manner of payment for the service of cars damaged while in joint service, the committee presented a resolution, which was adopted for submission to the American Railway Association, viz.:

Resolved, That under Rule 7, Code of Car Service Rules, when a foreign passenger equipment car received in joint service is damaged, necessitating its movement to and from shops, the mileage due under Section A of such rule shall be paid for the distance that car was used in the joint service, and, that under Section B of such rule, the owner shall be paid the Per Diem Rate during the period that the car is out of service. When a car is detained awaiting the receipt of repair material from its owner, the Per Diem shall cease from the date the necessary material is ordered from the owner until the date when it is received by the road holding the car.

An interesting report was presented by the Committee on Joint Interchange and Inspection Bureaus, which advised that at its meeting held jointly with representatives of the committee from the Master Car Builders' Association a letter was drafted for presentation to the General Superintendents' Association of Chicago, recommending the permanent establishment of the Joint Car Inspection and Interchange Bureau at the Union Stock Yards, Chicago, which was then being experimentally conducted; also commending the consideration by the General Superintendents' Association of the question of modification of the agreement under which cars are now interchanged throughout the Chicago switching district, with a view to a strict observance of M. C. B. rules and the application of M. C. B. defect cards, and assuring that association of the committee's co-operation to that end. The bureau at the Union Stock Yards has been made permanent.

The following officers were elected for the ensuing year: President, G. W. Taylor (Sou. Ry.); First Vice-president, W. T. Wolff (Pa. Lines); Second Vice-president, J. M. Daly (Ill. Cent.); Secretary, G. P. Conard, New York; Treasurer, F. M. Luce (formerly C. & N. W.).

After the close of the business session on Wednesday, a banquet was given in honor of H. G. Sleight, who retires this year from the Executive Committee, because of retirement from the service of the Vandalia on account of the age limit. Mr. Sleight is the father of the association, the original association having been formed in the year 1876, pursuant to a suggestion which he made to several friends among the superintendents of transportation and car accountants who were in office at that time.

SOME HISTORY WITH NAMES OMITTED.*

The diversity of interest between the car borrowers and the car owners has always led to the fixing of the per diem rate at less than an equitable return to the car owner. With the fluctuations in traffic and the occasional considerable surplusage of equipment, such as exists at the present time, the roads have again and again endeavored to open the question of per diem rates and seek relief from their proper payments. This is no new condition. We have all heard the same story and have known of cases where roads have endeavored to suppress proper acknowledgment of amounts due to foreign roads for car service.

I remember a case a good many years ago where I became satisfied from an analysis of the traffic and the returns, that a particular road, through its car accounting officers, was cutting mileage due us to a very considerable extent each month. I found that our cars in through traffic on the road in question were reported as averaging about four miles a day each. Knowing the principal executive officer of the company quite well, and, in my innocence, believing that he could not possibly appreciate what was being done by his subordinates, I laid the matter before him. In reply, he said: "This is about the hundredth letter that I have had in regard to this very same thing. I have been through it with our people, and if they cut the mileage they have done it on their own account and have covered it up. In looking up this matter, however, we have found some extraordinary things in the reports of mileage of other roads to our company, and I shall be very glad if the time ever comes when we get a per diem."

Now, gentlemen, that may have been "smart," but I doubt whether such "smartness" pays in the long run. It was not many years after, that one of the principal railway officers in that territory was an embezzler of his company's funds to a very large amount. It is an easy step from cheating in behalf of your employer to cheating the employer himself.

Old tricks of cutting mileage or suppressing reports wholesale have been pretty nearly done away with by the adoption of the per diem plan. There remain, however, the questions of errors and discrepancies in reports, which are only brought to light by inquiry. Apparently a good many people think that it is all right to forget to make reports, and only acknowledge amounts due after claim is made and pressure brought to bear. One of my sons, when a little chap, was obliged by his mother to wear shoes without heels. Day after day he would come down to breakfast wearing his elder brother's shoes which had heels, and invariably his mother would send him upstairs to put his own shoes on. One morning a lady visiting us, said to him: "Gerald, why do you keep coming down with your brother's shoes, when you know that your mother will not allow you to wear them, and you simply have to go upstairs to take them off?" "Well," he said, "Aunt Nellie, some day she will forget!"

No doubt this is actually due in many cases to want of sufficient force in the car accountants' offices. I think it is a great mistake for a road to economize in that department in the way of clerical force. It is equally a mistake to compromise or jump at a conclusion in regard to a balance. Either per diem charges are right or they are wrong, and they should be settled accordingly in exact amounts.

We have for many years past collected, as a result of great painstaking, sums that were due the company but which would otherwise have been lost through carelessness—considerably in excess of the cost of the clerical force and correspondence necessary to secure the same. In the past eight years, the Philadelphia & Reading has secured from other roads, as a result of claims, more than 4 per cent. of the total amount of its car service balances, while we have paid out to other roads on like account only one-third of 1 per cent.

*From an address by Theodore Voorhees, vice-president, Philadelphia & Reading, before the Association of Transportation and Accounting Officers, at Cape May, N. J., June 20.

RAILWAY TELEGRAPH SUPERINTENDENTS.

The Association of Railway Telegraph Superintendents held its annual convention at Boston, June 26-30, with a large attendance. First Vice-president J. B. Sheldon presided, President I. T. Tyer being detained at home by ill-health. The secretary's report showed 169 members in good standing.

The first paper read was that of W. J. Camp (C. P.), extracts from which will be found in other columns. In the discussion of this paper it appeared that on some roads the efficiency of porcelain insulators is seriously interfered with by cobwebs, as well as in some degree by deposits of smoke. Mr. Johnson, of the Pennsylvania, said that on his road wires are paired for telegraph working, as well as for telephone.

Mr. Chetwood (W. U. Tel.) said that the double-petticoat porcelain insulator is about four times as good as glass, but final conclusions are yet to be established. Signs of aging of porcelain are apparent. A new type of double-petticoat glass insulator has been designed and tests indicate about 75 per cent. better insulation than former types, besides being less fragile. At this time a porcelain insulator does not appear generally justified for telegraph lines, except for exceptionally long haul service. A porcelain insulator to be of any value must be absolutely non-absorbent.

On the second day brief speeches were made by Belvidere Brooks, general manager of the Western Union, and other officers of that company. The first paper was one by W. P. Cline, on Co-operation Between Railway People and Commercial Telegraph Companies. A paper on telephone transmission was read by J. L. McQuarrie.

A report from the committee on high tension wire crossings was presented by G. A. Cellar (Pa. Lines). This report was approved and the committee continued. The large telegraph and telephone companies will be invited to co-operate in the work of this committee.

E. P. Griffith (Erie) reported that the fund for the erection of a monument at Turner, N. Y., commemorating the first telegraphic train order, had been brought up to $1,116; and he read a letter from Mrs. E. H. Harriman, offering to meet the whole expense of providing the monument, which announcement was greeted with applause. Mrs. George S. Minot, a niece of Charles Minot, superintendent of the Erie Railroad, who sent that first telegraph order, was present at the meeting. Mrs. Minot lives in Brookline, Mass., near Boston.

F. F. Fowle, of Chicago, read a paper on line conductors for telegraph transmission, demonstrating the effect of leakage by artificial circuits set up in the meeting rooms.

G. K. Heyer, of the Western Electric Company, read a paper on telephone economy in railway service. Mr. Heyer finds that some railways estimate the loss due to the stoppage of traffic on their main lines by a wreck at $1,000 an hour, from which it will be seen that the use of the telephone in decreasing delays on such occasions, as compared with telegraph working, must be a definite money saver. W. F. Williams, of the Seaboard Air Lines, has found that in a single month on 150 miles of his line, single track, the average running time of through freight trains was by telephone operation reduced 1 hour and 16 minutes, as compared with 1908; and passenger and other trains also received decided benefit. Mr. Heyer thinks that the Seaboard Air Line thus saved $1,000 a month, showing that the telephone apparatus paid for itself the first year. Telephones are now in use on about 48,000 miles of railway line in this country, so that if the saving effected on the Seaboard Air Line is repeated everywhere, the benefit derived from the telephone amounts to a large sum. The Delaware Lackawanna & Western also reports a marked saving in the time of through freight trains since the adoption of the telephone.

On Wednesday the first paper read was one by John B. Adams on telephone cable transmission. Mr. Adams set forth the rules for calculating the capacity of telephone lines, putting his ideas in non-technical language.

W. J. Hopkins, of New York, read a paper on current supply for selective calling systems, comparing the cost of different combinations of apparatus; and W. Maver, Jr., of New York, read a paper on high speed automatic perforators and perforator receivers. A paper by William Bennett, of Chicago, on economy in the telegraph department, was read by W. F. Williams. U. J. Fry (C., M. & St. P.), described the telephone circuits which he has in use for train despatching between Mobridge, S D., and Seattle, Wash., 1,376 miles. These circuits are worked duplex regularly. There is one repeating station between Butte and Seattle.

The following officers were elected for the ensuing year: President, G. A. Cellar (Penn. Lines), Pittsburgh; first vice-president, William Bennett (C. & N. W.); second vice-president, A. B. Taylor (New York Central); secretary and treasurer, P. W. Drew (M., St. P. & S. S. M.), Chicago.

The forenoon of Tuesday was devoted to sightseeing. In the evening a trip was made to Revere Beach. On Thursday a party of members went to Plymouth to see the place where the Pilgrims landed, spending the entire day.

EXHIBITS.

American Typewriter Telegraph Co., New York; the Cardwell printing telegraph.

J. H. Bunnell & Company, New York; Ramsey cable jack or quick switch.

General Railway Signal Co., Rochester, N. Y.; selector apparatus for telephone lines.

Holtzer-Cabot Electric Co., Brookline, Mass.; tubular wire connectors.

National Telephone Selector Company, New York; new alternating-current open-circuit telephone selector system for train despatching; also a selector for message circuits.

Randall Telephone Mfg. Co., New York; Randall telephone train despatching outfit, with loud speaking telephone receiver.

United States Electric Company, New York; Gill selector apparatus for railway telephone lines; train order semaphore, designed to be controlled by the despatcher; selectors having both the two-figure and four-figure combination; a new selector with two time-wheels, with which a call can be made in three seconds. This company also exhibited a large variety of other specialties.

Western Electric Co., New York and Chicago; loud speaking receiver for telephone lines; rotophone transmitter arm; new master selector; and a great variety of telephone apparatus and accessories.

THE LOETSCHBERG TUNNEL.

The following notes on the completion of the Loetschberg tunnel, in Switzerland, are taken from the *Moniteur Industrielle*. An illustrated description of the work was published in the *Railway Age Gazette* of July 2, 1909.

On March 31 the two headings of the Loetschberg tunnel between Kandersteg and the Loetsch valley came together. But the formal opening of the line is not expected until 1913.

Work was begun in the latter part of 1906, so that something less than five years has been required for the penetration of about 47,675 ft. of rock from north to south. No enterprise of this kind has ever approached this rapidity of execution before, and it is quite proper to consider this as establishing a world's record.

The work is French in conception and execution. According to the first estimates and surveys, the tunnel was to have had a length of 45,050 ft. with a single track; and it was upon this basis that the work was begun. At the start the pick was used, but with this primitive method years on years would have passed before it would have been completed. On March 1, 1907, an electric system with means of mechanical drilling was installed; and thanks to a Swiss subvention, it became possible so to enlarge the tunnel that a double track could be laid.

It was the electric installation, the first to be set up at the work, that made the completion a possibility, and the results obtained at the Loetschberg show that mountain tunneling has been robbed of most of its difficulties. Here an excavation of 1,000,000 cu. yds. of rock was required and an advance at the rate of 130 cu. yds. a week was regularly effected.

At the north end the electric current was furnished by the hydraulic works at Spiez, at 15,000 volts as a three-phase alternating current. At the south end a similar current was furnished by the works at Lonza with which it was possible to supply power to the several secondary work shops. Electricity was not, however, used as a motive power in the heading. All drilling and all underground traction was done with air that had been compressed by electricity.

COMPARATIVE SUMMARY OF FREIGHT CARS IN SERVICE ON RAILWAYS OF THE UNITED STATES—1900 AND 1910.

NOTE.—Narrow gage cars excluded.
Non-revenue cars excluded.
Company freight included.

	Miles.		Freight Equipment.				Freight cars per mile of road.		Average length of haul.		Freight Cars. Per 1,000 Frt. car miles.		Per 1,000 rev. ton miles.		Rate per ton mile (dollars).		Frt. cars per $1,000 Frt. earnings.	
	1900.	1910.	1900.	1910.	In-crease.	De-crease.	Percent of change.	1900.	1910.	1900.	1910.	1900.	1910.	1900.	1910.	1900.	1910.	1900.	1910.
New England Roads:																			
Boston & Maine R. R.	1,787	2,290	12,230	24,747	12,517	....	102.35	6.8	10.8	66.99	102.84	.126	.115	.0146	.0105	.01430	.01085	1.02	0.97
Bangor & Aroostook R. R.	354	599	3,091	5,356	2,265	.....	73.30	8.7	8.9	89.62	118.58	....	.316	.0539	.0280	.01420	.01153	3.79	2.43
Central Vermont R. R.	513	536	2,006	2,489	483	.....	24.10	3.9	4.6	94.97	79.27	.063	.086	.0079	.0085	.00880	.00910	1.09	0.94
Maine Central R. R.	816	932	3,586	7,030	3,444	.....	96.04	4.4	7.5	81.11	88.90	.163	.152	.0123	.0125	.01130	.00980	1.09	1.29
New York, New Haven & Hartford R. R.	2,008	2,042	13,116	35,716	22,600	.....	172.31	6.5	17.5	85.36	93.44	.076	.170	.0097	.0168	.01451	.01417	0.67	1.19
Total	5,478	6,399	34,029	75,338	41,309	.....	121.39	6.5	11.8	83.61	96.61	.107	.168	.0197	.0133	.01264	.01109	1.49	1.36
Trunk Line Roads:																			
Baltimore & Ohio R. R.	3,179	4,434	61,708	83,693	21,985	.....	35.62	19.3	18.9	194.81	191.48	.128	.105	.0068	.0069	.00412	.00577	1.96	1.21
Buffalo, Roch. & Pittsburgh R. R.	472	567	8,858	16,232	7,374	.....	83.25	18.7	28.5	136.16	154.60	.139	.205	.0097	.0106	.00470	.00481	1.99	2.15
Central R. R. Co. of New Jersey	639	631	15,002	21,958	6,956	.....	46.37	23.4	34.8	77.88	72.39	.153	.172	.0118	.0103	.00871	.00846	1.36	1.21
Chesapeake & Ohio R. R.	1,476	1,937	17,270	37,453	20,183	.....	11.69	21.6	19.3	302.00	267.90	.082	.116	.0058	.0061	.00343	.00407	1.71	1.50
Delaware & Hudson Co.	665	843	13,030	20,659	7,629	.....	58.71	19.6	24.5	94.46	129.21	.147	.141	.0113	.0078	.00789	.00680	1.54	1.24
Delaware, Lack. & Western R. R.	947	957	27,287	28,284	997	.....	3.65	28.8	29.5	151.00	170.00	....	.111	.0144	.0081	.00808	.00766	1.79	1.07
Erie Railroad	2,104	2,227	46,225	48,294	2,069	.....	4.48	21.9	21.7	191.40	165.48	.101	.112	.0089	.0075	.00539	.01599	1.60	1.26
Lehigh Valley R. R.	1,382	1,433	34,954	43,752	8,798	.....	25.17	25.3	30.5	188.08	164.01	.135	.146	.0106	.0089	.00542	.00646	1.97	1.43
N. Y. C. & H. R. R. R.	2,817	3,785	59,180	71,131	11,951	.....	20.19	21.1	18.3	163.00	192.19	....	.089	.0088	.0067	.00560	.00630	1.72	1.22
Pennsylvania R. R.	3,716	4,045	80,385	137,981	57,596	.....	71.65	21.6	34.1	109.54	156.17	.091	.120	.0067	.0064	.00540	.00583	1.25	1.17
Reading R. R.	1,000	998	31,824	40,971	9,147	.....	28.74	31.8	41.0	89.42	92.93	.139	.137	.0114	.0084	.00831	.00727	1.50	1.16
Western Maryland R. R.	279	543	691	6,949	6,258	.....	905.64	2.5	12.8	51.02	105.66	....	.119	.0038	.0072	.00734	.00612	.053	1.17
Total	18,696	22,400	396,414	557,357	160,943	.....	40.60	21.2	24.9	145.73	155.09	.093	.131	.0092	.0079	.00622	.00713	1.56	1.32
Southern Classification:																			
Atlantic Coast Line Ry.	1,759	4,491	5,378	24,322	18,944	.....	352.25	3.6	5.4	121.90	146.15	....	.167	.0143	.0148	.01401	.01273	1.02	1.17
Central of Georgia R. R.	1,196	1,916	5,041	10,095	5,054	.....	100.26	4.2	5.3	148.86	149.69	.107	.138	.0183	.0111	.01096	.01069	1.26	1.27
Louisville & Nashville R. R.	3,007	4,591	23,402	43,019	19,617	.....	83.82	7.7	9.4	163.00	164.21	.096	.118	.0090	.0086	.00758	.00751	1.13	1.12
Mobile & Ohio R. R.	876	1,114	5,389	10,682	5,293	.....	98.22	6.2	9.6	195.63	169.36	...	.104	.0076	.0075	.00590	.00600	1.33	1.37
Nashville, Chat. & St. Louis R. R.	1,189	1,230	5,328	9,557	4,229	.....	79.37	4.4	7.8	151.00	219.34	.113	.355	.0096	.0113	.00880	.00990	1.10	1.14
Norfolk & Western R. R.	1,551	1,937	18,656	38,025	19,369	.....	103.80	12.0	19.6	253.41	148.00	.085	.103	.0068	.0057	.00430	.00447	1.58	1.27
Seaboard Air Line Ry. (1901)	2,604	2,997	8,335	14,712	6,377	.....	76.51	3.2	4.9	153.32	264.53	.119	.118	.0136	.0120	.01180	.01133	1.14	1.06
Southern Railway	6,306	7,050	26,814	49,092	22,278	.....	83.08	4.2	7.0	168.82	150.64	.107	.130	.0116	.0099	.00916	.00957	1.27	1.29
Total	18,488	25,326	98,343	199,504	101,161	.....	102.90	5.3	8.4	169.49	175.29	.105	.154	.0114	.0101	.00906	.00902	1.23	1.28
Central Classification:																			
Chicago, Ind. & Louisville R. R.	546	616	5,440	5,895	455	.....	8.36	9.9	9.6	153.00	149.00	.155	.163	.0141	.0112	.00757	.00773	1.86	1.45
Cincinnati, Hamilton & Dayton Ry.	652	1,036	7,838	11,881	4,043	.....	51.58	12.0	11.5	108.96	127.93	....	.159	.0122	.0090	.00610	.00529	2.00	1.76
C. C. C. & St. L. R. R.	1,891	1,982	15,484	24,477	8,993	.....	58.07	8.2	12.3	169.30	151.80	.094	.092	.0083	.0063	.00583	.00546	1.42	1.23
Grand Rapids & Indiana R. R.	582	587	3,015	3,228	213	.....	7.06	5.2	5.5	90.12	105.37	.140	.089	.0156	.0068	.00870	.00657	1.88	1.04
Lake Erie & Western R. R.	725	886	5,549	3,922	.....	1,627	29.32	7.6	4.4	153.51	128.34	.137	.079	.0110	.0056	.00614	.00656	1.89	0.90
Lake Shore & Mich. Southern Ry.	1,411	1,663	19,958	50,497	30,539	.....	153.02	14.1	30.4	178.00	158.70	.067	.118	.0055	.0076	.00505	.00523	1.09	1.55
Michigan Central R. R.	1,635	1,803	14,219	24,673	10,454	.....	73.52	8.6	13.7	193.50	152.00	....	.094	.0070	.0076	.00592	.00629	1.19	1.28
N. Y., Chicago & St. Louis R. R.	513	523	6,743	13 098	6,355	.....	94.24	13.1	25.0	297.00	203.00	.059	.091	.0055	.0069	.00478	.00504	1.16	1.41
Pennsylvania Company	1,396	1,416	43,967	56,444	12,477	.....	28.38	31.5	39.8	77.95	80.02	.177	.132	.0135	.0077	.00590	.00583	2.30	1.35
P. C. C. & St. L. R. R.	1,407	1,468	12,884	24,508	11,624	.....	90.22	9.1	16.7	111.14	117.93	.056	.072	.0052	.0053	.00620	.00614	0.84	0.87
Pere Marquette R. R.	1,821	2,328	7,944	18,433	10,489	.....	132.03	4.3	7.9	112.64	179.03	....	.125	.0124	.0091	.00802	.00591	1.55	1.65
Vandalia R. R.	727	827	5,922	8,832	2,910	.....	49.14	8.1	10.7	74.46	105.86	.121	.107	.0119	.0076	.00718	.00611	1.66	1.25
Total	13,306	15,135	148,963	245,888	96,925	.....	65.07	11.2	14.4	143.63	138.25	.112	.110	.0102	.0076	.00645	.00601	1.57	1.31
Western Classification:																			
Atchison, Topeka & Santa Fe Ry.	7,426	9,961	27,486	54,419	26,933	.....	97.99	3.7	5.5	349.19	360.59	.073	.079	.0079	.0059	.00976	.01015	0.81	0.76
Chicago & Alton R. R.	855	998	9,386	11,884	2,498	.....	26.61	10.9	11.9	176.16	150.83	.135	.117	.0148	.0079	.00794	.00598	1.87	0.46
Chicago & Eastern Illinois R. R.	711	966	8,206	18,892	10,686	.....	130.22	11.5	19.5	144.70	155.81	.132	.177	.0096	.0091	.00483	.00460	1.99	2.04
Chicago & Northwestern R. R.	5,219	7,629	40,846	62,685	21,839	.....	53.47	7.8	8.2	151.30	141.40	.108	.175	.0106	.0113	.00830	.00890	1.28	1.26
Chicago, Burl. & Quincy R. R.	7,546	9,040	42,287	49,881	7,594	.....	17.96	5.6	5.5	254.87	266.80	....	.080	.0111	.0067	.00851	.00783	1.29	0.86
Chicago, Great Western Ry.	930	1,495	5,782	11,772	5,990	.....	103.59	6.2	7.9	301.68	239.69	.087	.113	.0081	.0098	.00720	.00716	1.13	1.38
Chicago, Mil. & St. Paul R. R.	6,423	7,297	35,740	43,415	7,675	.....	21.47	5.6	5.9	189.07	173.52	.093	.091	.0106	.0070	.00929	.00843	1.14	0.97
Chicago, Rock Island & Pacific R. R.	3,647	8,044	17,150	40,380	23,230	.....	135.45	4.7	5.0	213.00	209.55	.094	.095	.0096	.0077	.00990	.00920	1.08	0.96
Chicago, St. P., Minn. & Omaha R. R.	1,557	1,739	10,253	11,606	1,353	.....	13.20	6.6	6.7	160.55	148.10	.149	.173	.0135	.0108	.00971	.00908	1.39	1.19
Colorado & Southern R. R.	762	2,062	2,979	9,666	6,687	.....	224.47	3.9	4.7	101.00	149.00	.108	.106	.0115	.0070	.01242	.00964	0.93	0.80
Denver & Rio Grande R. R.	1,674	5,541	8,359	14,850	6,491	.....	77.65	4.9	5.8	.....	104.51	.118	.145	.....	.0096	.....	.01280	1.09	0.86
Duluth, S. S. & Atlantic R. R.	585	606	2,697	3,056	359	.....	13.31	4.6	5.0	49.07	67.51	....	....	.0209	.0122	.01221	.00857	1.70	1.43
Great Northern Ry.	5,418	7,147	21,484	44,283	22,799	.....	106.12	3.9	6.2	192.00	244.51	.104	.111	.0085	.0067	.00899	.00822	0.93	0.95
Illinois Central R. R.	3,996	4,551	32,439	59,330	26,891	.....	82.90	8.1	13.0	213.83	238.48	.092	.113	.0094	.0076	.00651	.00589	1.45	1.53
Iowa Central R. R.	510	558	2,238	3,561	1,323	.....	59.11	4.4	6.4	152.30	166.67	.099	.121	.0084	.0074	.00696	.00588	1.21	1.34
Kansas City Southern Ry.	833	827	5,118	6,536	1,418	.....	27.70	6.1	7.9	304.41	240.01	.118	.090	.0091	.0059	.00613	.00725	1.49	0.90
Missouri & St. Louis R. R.	597	1,027	3,066	4,385	1,319	.....	42.72	5.1	4.3	108.79	108.95	.196	.184	.0155	.0123	.01212	.01050	1.45	1.39
Minn., St. Paul & S. Ste. Marie R. R.	1,255	3,533	6,631	21,453	14,822	.....	223.69	5.3	6.1	194.65	215.88	.129	.123	.0109	.0090	.00658	.00722	1.67	1.23
Missouri Pacific Ry.	4,938	6,775	25,186	37,958	12,772	.....	50.71	5.1	5.4	236.24	217.90	.102	.100	.0095	.0068	.00834	.00688	1.15	0.99
Missouri, Kansas & Texas Ry.	2,218	3,072	9,669	22,497	12,828	.....	132.77	4.4	7.3	298.93	193.05	.073	.118	.0082	.0113	.00840	.01050	0.98	1.32
Northern Pacific R. R.	5,006	5,814	23,138	43,816	20,678	.....	89.37	4.6	7.5	309 60	296.60	.105	.117	.0104	.0066	.00987	.00900	1.04	0.88
St. Louis & San Francisco R. R.	†1,659	5,072	5,974	27,899	21,925	.....	36.70	3.6	5.5	182.05	155.66	.093	.119	.0114	.0082	.01058	.00980	1.08	1.09
St. Louis Southwestern Ry.	1,258	1,473	5,386	9,268	3,882	.....	72.08	4.3	6.3	196.28	260 12	.127	.136	.0130	.0116	.01110	.01040	1.17	1.12
San Antonio & Aransas Pass R. R.	687	724	1,553	2,023	470	.....	30.26	2.3	2.8	162.26	155.82	.113	.092	.0142	.0111	.01861	.01500	0.95	0.74
Southern Pacific Company	7,576	10,077	29,413	44,254	14,841	.....	50.46	3.9	4.4	307.31	243.42	.096	.082	.0062	.0056	.00957	.01162	0.73	0.57
Texas & Pacific R. R.	1,570	1,885	6,263	10,983	4,720	.....	75.36	3.9	5 8	231.77	184 00	.079	.097	.0093	.0099	.01030	.01010	0 91	0.98
Union Pacific R. R.	5,428	6,996	21 826	25,618	3,792	.....	17.37	4.0	4.1	305.68	345.78	.080	.060	.0082	.0035	.01046	.01024	0 78	0.42
Wabash R. R.	2,340	2,515	13,087	21,536	8,449	.....	64.55	5.6	8.6	216.70	219.56	.071	.079	.0068	.0061	.00558	.00585	1.23	1.11
Total	82,624	113,724	423,642	717,906	294,264	.....	69.46	5.0	6.3	211.25	201.98	.104	.114	.0106	.0084	.00926	.00881	1.21	1.09
TOTAL, ALL ROADS	138,592	182,984	1,101,391	1,795,993	694.602	.....	63.07	8 0	9.9	172.89	176.35	.105	.128	.0112	.0089	.00835	.00811	1.37	1.22

*1910 figures include Wisconsin Central R. R. † Before consolidation with other companies.

COMPARATIVE SUMMARY OF FREIGHT CARS IN SERVICE ON RAILWAYS OF THE UNITED STATES—1909 AND 1910.

	Miles		Freight Equipment				Freight cars per mile of road.		Average length of haul.		Freight Cars. Per 1,000 Frt. car miles.		Per 1,000 rev. ton miles.		Rate per ton mile (dollars).		Frt. cars per $1,000 Frt. earnings.	
	1909.	1910.	1909.	1910.	Increase	Decrease	Percent of change.	1909.	1910.	1909.	1910.	1909.	1910.	1909.	1910.	1909.	1910.	1909.	1910.
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	3,841	3,747		11[illegible]	[illegible]	10.8	10.8	104.09	102.84	.121	.115	.0117	.0105	.01083	.01085	1.08	0.97
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		4	0.01	10.4	8.9	123.91	118.58	.305	.316	.0295	.0280	.01170	.01153	2.81	2.43
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		241	8.89	5.1	4.6	89.23	79.27	.102	.086	.0093	.0085	.00840	.00910	1.12	0.94
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		39	1.11	7.6	7.5	88.80	88.90	.157	.152	.0141	.0126	.00995	.00980	1.42	1.29
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4.48	16.7	17.5	93.77	93.44	.174	.170	.0182	.0168	.01420	.01417	1.29	1.19
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]														

Shop Section.

FOR six months we have been publishing articles on scientific management, and as a climax we invited the efficiency engineers to tell us how to apply it to a railway shop. The results appear in this issue. It seems only fair that our readers should also be allowed to have their say. What practical results have you gained from all this discussion and editorial criticism? Has it done you any good at all? Have you applied it in any way, direct or indirect? Have you evolved or developed any practical schemes for improved efficiency during the past six months whether inspired by the articles on efficiency or not. We realize that you are busy and that it is hard to get the time or energy to write an article during the hot weather. Therefore we invite you to write a short, chatty letter to the editor, telling of your experience or ideas along the above lines. You need not make hard work of this. It wouldn't be hard work to write your brother or your best friend a newsy letter of this sort. Just imagine the editor as your best friend—he is just as anxious to hear from you, and will be just as pleased as your best friend would be. Make the letter just long enough to clearly tell your story, and do not worry about the rhetoric or spelling. For those letters which are accepted for publication we will pay our regular space rates. A minimum rate of $3 is paid for all articles which are used. The letters must be received on or before Thursday, July 27.

ANOTHER general shop kink competition will close September 15. Kinks of any kind used in the repair or maintenance of locomotives, cars or other mechanical department equipment will be eligible. Do not make the descriptions so meager that the judges and editor will have to use their imaginations to fill in the details. Remember that the design of the piece which the kink is used on may be peculiar to your own road or shop and hardly be intelligible to outsiders. We have been asked to make our descriptions more extended. We can do it, if you will help us. Just a word as to the illustrations. All that is necessary is that they clearly show the design of the kink so that its construction and working may be clearly understood. Blueprints, sketches or photographs may be used, or all three. A prize of $50 will be awarded for the best collection of three kinks, and a prize of $25 for the next best collection. More than three kinks may be submitted, allowing the judges to base their decision on the best three in each collection. Kinks not awarded a prize, but accepted for publication, will be paid for at our regular space rates.

H. H. VAUGHAN, assistant to the vice-president of the Canadian Pacific; G. W. Wildin, mechanical superintendent of the New York, New Haven & Hartford, and T. S. Lloyd, superintendent motive power and equipment of the Delaware, Lackawanna & Western, the judges in the competition on "How Scientific Management Can be Applied to a Railway Shop," which closed June 15, have rendered the following decision: "None of the articles submitted are properly discussions of the subject—The Application of Scientific Management to a Railway Shop. They are directed more to questions of organization, or of the merits and meaning of scientific management in a general sense. After carefully reviewing them we have decided that those possessing the greatest general interest and merit are Nos. 5 and 4 in the order named." No. 5 was submitted by Max H. C. Brombacher, practical production or efficiency engineer, 94 West 183 street, New York, and No. 4 by L. W. Allison, Los Angeles, Cal. There were three other contestants, C. J. Morrison, manager of the department of effective organization, Suffern & Son, New York; J. S. Sheafe, engineer of tests, Illinois Central, Chicago, and H. F. Stimpson, chief engineer, Universal Audit Company of New York.

JULY 15 marks the close of the competition on reclaiming scrap material. No competition that we have yet announced offers such an attractive field for good articles. The range covered by it is so broad that there is not one of our Shop Section readers but should be in position to enter the competition. For the past few years the attention of mechanical department employes has been focused on the question of economical and efficient operation. The study of the scrap pile has offered a fruitful source of economies, which have resulted in cutting down the expenditures for new material. Some have made savings in one way, others in another. Our idea is to make the result of this competition a sort of clearing house for all the good things that have been accomplished along these lines. More complete announcements will be found in the April, May and June Shop Sections. The best article will be awarded a prize of $35, and the second best a prize of $20. Articles accepted for publication, but not awarded a prize will be paid for at our regular space rates.

IN reading the essays on the application of scientific management to a railway shop let us cast aside all prejudice which we may have against the efficiency engineers and let us study their articles with an open mind, for they represent the results which have been reached by men of more or less practical experience, who have spent much time and energy in studying the problem of efficiency. We may disagree with them in many things, but if we are big enough and broad enough we must surely find some inspiration or some suggestions which we can put to practical use in the plans which they have so courteously submitted.

MR. BROMBACHER, in his essay on the application of scientific management to railway shops, which was awarded the first prize in the competition on that subject, emphasizes the value and importance of "really intelligent piece work." In an article on Comparing the Efficiency of Railway Shops, in the *Railway Age Gazette* of June 2, he also directed attention to this fact, and cited the Delaware, Lackawanna & Western as having an ideal piece work system. Undoubtedly piece work has been and is being abused, but we believe that in the majority of cases it is now being properly directed in railway shops. If it is not properly or fairly administered the workmen will be the first to find it out, with a resulting decrease in efficiency of the plant. Fortunately, most railway managers have awakened to the fact that the "square deal" and "maximum efficiency" are terms which go hand in hand and cannot be separated. Le Grand Parish, one of the best mechanical department organizers and managers, and who was more than ordinarily successful in introducing piece work, said, when he was still a master car builder on the Lake Shore: "The first law of piece work is honesty, and departure from this law should meet with instant dismissal from the service. This applies to foremen as well as workmen." Mr. Brombacher makes some good, general suggestions concerning the method of introduction and the administering of piece work. We congratulate him upon being awarded the first prize.

THE Old Railroader's article on the Instruction of Apprentices and Handy Men struck a discordant note in the articles which were submitted in the competition on the instruction of workmen and apprentices, which closed two or three months ago. The other papers were chiefly concerned with advanced methods of apprenticeship and were written largely by men in an atmosphere favorable to the best development of apprentices. There are still many shops, however, where the old order of things exists—where little attention is paid to the

apprentice or his welfare and where he has to shift largely for himself. He is tolerated as a sort of necessary evil—the busy foremen desire to be troubled with him as little as possible, except to make sure that the company loses nothing by his presence. The Old Railroader has stated the case frankly and plainly, and such roads or shops as are guilty of handling the apprentices in this way are to be pitied, for after all the railways need good apprentices much worse than the young men or apprentices need the railway shops. Fortunately the number of shops where this is not realized is growing smaller rapidly, and even the car department, which, except for a few isolated cases, has hardly known the meaning of the word apprentice, is beginning to wake up.

THE provision of transfer tables and overhead cranes for handling locomotives, always a serious problem, even in the larger shops, and far more so in the smaller ones where it is only necessary to provide a few pits in the erecting shop, has been solved in the new shop plant of the New York, Philadelphia & Norfolk, by leaving them out entirely. As shown by the drawings on another page the five tracks leading to the pits in the erecting shop radiate from the turntable, which also serves the six stalls on the engine house. Just how the shop would be modified should it become necessary to double the number of erecting pits does not appear. The most logical solution would seem to be to extend the engine house and use the portion of it nearest the erecting shop for erecting purposes. Possibly the conditions at Cape Charles are such that the present shop will take care of all future requirements; at least the location of the blacksmith shop, preventing any possibility of an extension of the erecting shop on that side of the machine shop would seem to indicate this.

LE ROY ALLISON, the winner of the second prize in the competition on How Scientific Management can be Applied to the Railway Shop, has given us a splendid essay on common sense—and it is the man with a goodly supply of this rather scarce commodity that will make the most of the recent discussions of efficiency and scientific management. He will be the first one to look inward and examine himself and his methods to see if they can be improved by putting into practical effect any of the ideas or theories which have been so voluminously advanced by the efficiency engineers. And there is not the slightest doubt but that some of them can be so applied in the average railway shop. Their value, however, will never be fully demonstrated unless they are administered by the practical man with plenty of common sense. Handled by the theorist, in a mechanical manner, as the engineer applies a formula which he finds in an engineer's handbook, they are sure to fall flat.

AS a general rule it is well to select young men as apprentices, but that the older men cannot make a big success of the job, if they are properly adapted to it, but because it is so much easier for the younger men, who are just a few years out of their own, to understand the feelings of the apprentice and to see things from his viewpoint. There has been such a wonderful development in railway shop practice and equipment in the last 10 or 15 years, and the conditions and environment of the workmen have changed that it is exceedingly difficult for one who has been trained under the older conditions to realize how the apprentice of today looks upon his work and his surroundings. With this thought in mind the article by D. C. Ralph on the Education and Development of Apprentices, which appears on another page, is of more than ordinary interest. Mr. Ralph is an apprentice instructor on the Santa Fe at Port Madison, Iowa, and passed his time at that shop just before the new apprentice system was introduced a few years ago. While readers of the Blue Envelope are familiar with the details of the apprentice work as carried on on the Santa Fe, Mr. Ralph's description of the work from his viewpoint is well worth reading.

IN a most interesting series of articles, entitled The Autobiography of a Jailer, which has been appearing in *The Saturday Evening Post*, we find this statement: "To paraphrase Lincoln, a house of correction can't stand with the prisoners all sober and the guards all under the influence of liquor." By treating the prisoners decently and giving them a square deal their behavior and deportment improved wonderfully and they were encouraged to lead better lives, instead of being coarsened and losing all their self-respect, as was the natural result under the opposite methods of treatment. We do not, of course, want to put mechanics and apprentices in the same class with prisoners, nevertheless human nature is the same in the home, the shop, the church, or the jail. In order to prove effective in developing and uplifting the apprentices, those in charge of them must be men whom the boys will look up to. Every boy or young man—and the older ones too—has some man or men that he admires and whose example he is quite likely to follow. The apprentice instructors, coming in intimate contact with the boys, are the men to whom they will be naturally attracted and whose every move they will watch closely. It is, therefore, absolutely necessary for the best interests of the railway and the community that these men be most carefully selected, and that although their ability as mechanics and instructors should be an important factor in their selection, that their morals and personal magnetism and probable influence on the boys be given the most careful consideration—all of which is suggested by reading the lines and between the lines of the article on The Making of Good Mechanics, which was prepared by D. C. Davis, an apprentice instructor on the Santa Fe.

LIKE a cool refreshing breeze on a hot sweltering July afternoon comes the statement in C. J. Morrison's article on the Application of Scientific Management to a Railway Shop that: "The workmen will be of great assistance in this (improving the condition of tools and machines and designing labor-saving devices) if suggestions are encouraged and the co-operation of the men secured. In commercial enterprises it has been found profitable to pay for useful suggestions. There is every reason to believe that this policy would pay on a railway." And again, "In all cases harmonious working must be striven for, the organization must be constructive, and everyone in the shop must be *encouraged to think*." The doctrines of one or two of the leading efficiency engineers have emphasized the necessity of having a planning department to direct all the operations performed by the workman. As one editor aptly expressed it this planning department is expected to have a monopoly of all the brains in the workshop. Another efficiency engineer took a workman to task for making a suggestion because, as he said, "you are paid for doing the work and I am paid for doing the thinking." If we are going to smother all the initiative on the part of the workmen, where are our future leaders to come from? Where would the efficiency of our railway shops be today if this policy had been pursued in the past. Of course, Mr. Morrison's suggestion is a good one, but it is not original with the efficiency engineers. Practical shop managers, and in railway shops at that, have realized its importance for many years. The reference to the sweltering July afternoon did not refer to the rest of Mr. Morrison's article, which on the whole is a very good one, but to the above-mentioned attitude of some of the less practical efficiency engineers toward the workman and his efforts.

MR. STIMPSON, in his article on the application of scientific management to a railway shop, rightly emphasizes the fact that the greatest efficiency can only be obtained when the movement has the support of the entire organization from

the board of directors down. This should not discourage those in direct charge of the shops from doing their best and of trying to show the higher officers where their policies may seriously effect the efficiency of the repair shops. Mr. Stimpson's idea that the loss of efficiency between the directing power in an organization and the workers, or rank and file, may be compared to the loss in energy between the coal pile and the various agents through which its energy is transmitted until it actually performs the work in a machine, is a happy one. Just how we may get the same efficiency from a large organization as was formerly obtained by a master with three or four or more men working directly under him is a serious problem and one that will not easily be solved. The type of management must be such as to eliminate as much lost motion as possible by having the workers understand exactly what is wanted and giving them the facilities for doing it. But more than this, and what promises to be more difficult to bring about, the workers must have a keen realization that their welfare is dependent upon that of their employer. The employer on the other hand must do his full part in bringing the workmen to realize that he is interested in their welfare. No form of management or no method of paying wages can accomplish this in itself. The spirit which dominates an ideal organization of this type is not the product of school or college, nor of any system of management. It is developed by real leaders—like Topsy, "they just grow." Nevertheless, if they have the natural talent they can do much to develop and cultivate it by the observation and study of principles which have helped others to gain successful results.

SUMMER CONVENTIONS.

FIVE conventions, all of more or less interest to Shop Section readers, will meet during July, August and September. These include, in the order of their meeting, the American Railway Tool Foremen's Association at the Wellington Hotel, Chicago, July 11-13; the International Railway General Foremen's Association at the Hotel Sherman, Chicago, July 25-27; the International Railroad Master Blacksmiths' Association at the Boody House, Toledo, Ohio, August 15-17; The Traveling Engineers at the New Hotel Sherman, Chicago, August 29-September 1; and the Master Car and Locomotive Painters' Association at Atlantic City, N. J., September 12-15.

The American Railway Tool Foremen's Association is the youngest of these associations, having only been organized in December, 1909. The attendance at the meeting last year, considering that it was only the second meeting, was good and the members discussed the different subjects thoroughly and to the point. A campaign for new members has been carried on during the year and the prospects are for a well-attended meeting. Among the subjects to be reported upon and discussed are the following: The making of dies for forging machines; the economical use and care of emery wheels; equipment of railway tool rooms; special appliances for use with pneumatic tools; standardizing tools; and the co-operation of the shop foremen and tool room foremen in the care and maintenance of small tools. The president of the association is M. H. Bray, tool room foreman of the New York, New Haven & Hartford at New Haven, Conn.; the secretary is O. T. Harroun, tool room foreman of the Chicago & Alton at Bloomington, Ill.

The International Railway General Foremen's Association was organized in 1905. It had a splendid meeting at Cincinnati last year and the indications for the coming convention are that it will be a record breaker. In the first place the executive committee has arranged for the discussion of thoroughly practical questions of vital interest to shop and engine house foremen, and in the second place a most aggressive campaign has been made for new members during the past year. The meeting was quite well attended at Cincinnati last year, but the secretary has been canvassing the situation and expects an attendance at least three times as large this year. The executive committee, feeling that better results can be obtained by the thorough discussion of a few important questions, has assigned only four subjects for committee reports. These are: How can shop foremen best promote efficiency; shop kinks; methods of shop organization; and axle wheel fits. The committee on shop kinks has secured the co-operation of the *Railway Age Gazette* in the publication of a book on Railway Shop Kinks, an extended announcement of which will be found under New Books. The president of the association is C. H. Voges, general foreman of the Cleveland, Cincinnati, Chicago & St. Louis at Bellefontaine, Ohio; the secretary is Luther H. Bryan, general foreman, Duluth & Iron Range, Two Harbors, Minn.

The International Railroad Master Blacksmiths' Association's next convention will be the nineteenth in its history. It is a strong, thoroughly organized association and has a splendid record behind it. There is no lost motion in the work of the convention. A good blacksmith is always thoughtful and thorough, and this characteristic predominates in the work of the association. There is also a certain individuality about its meetings that differs entirely from that of the other foremen's associations. Among the subjects for consideration this year are the following: Tools and formers; drop forging; flue welding; frogs and crossings; high speed steel; locomotive frame making and repairs; oxy-acetylene process for welding and cutting metals; case hardening; and piece work and other methods. The president is John Connors, master blacksmith of the Atlanta & West Point at Montgomery, Ala.; the secretary is A. L. Woodworth, of the Cincinnati, Hamilton & Dayton at Lima, Ohio.

The Traveling Engineers' Association, like the Master Blacksmiths', is about to hold its nineteenth meeting. Like the former association it has a splendid organization and next to the Master Mechanics' and Master Car Builders' Associations is probably the most important and influential mechanical department organization. The attendance, always large, will undoubtedly be much greater this year, because of the place of meeting, Chicago. Because the attendance will be so large it is extremely advisable that special precautions be taken this year to secure a room for the meeting having good acoustic properties and as far removed from the noises of the street, or kitchen, as possible. The entire second floor of the new Hotel Sherman, where the meeting is to be held, will be used for exhibits, about 8,000 sq. ft. of space being available. The subjects to be reported on this year are: Advantages of the brick arch; increased efficiency of locomotives and the advantages of treated water; actual demonstration vs. oral instruction in air brake operation; lubrication of high pressure and superheated locomotives; efficient handling of electric locomotives; developments and improvements in locomotive stokers; revision of progressive examinations for firemen and new men for promotion; and the Mallet compound in road service. The president is F. C. Thayer, general road foreman of engines, Southern Railway, Atlanta, Ga.; the secretary is W. O. Thompson, master car builder, New York Central & Hudson River, East Buffalo, N. Y.

The Master Car and Locomotive Painters' Association is almost as old as the Master Car Builders' Association, which recently held its forty-fifth convention, and the Master Mechanics' Association, which held its forty-fourth convention in June. The next convention of the Master Painters' will be the forty-second meeting. The association has a large membership list and accomplishes its work thoroughly and with dispatch. Undoubtedly a large part of the progress which has been made in the painting of railway rolling stock can be directly traceable to the work of this association. J. H. Pitard, master car painter of the Mobile & Ohio at Whistler, Ala., is president, and A. P. Dane of the Boston & Maine, Boston, Mass., is secretary.

It is noteworthy that three of the five presidents of the above associations are located in the far south—John Connors at Montgomery, Ala.; F. C. Thayer at Atlanta, Ga., and J. H. Pitard at Whistler, Ala.

MECHANICAL ARTICLES DURING JUNE

THE following articles of special interest to mechanical department readers, and to which Shop Number readers may wish to refer, have appeared in the weekly issues since that of June 2:

Maintenance of Equipment Costs. By C. J. Morrison. Maintenance of equipment ranks second among the items entering into railway operating expense. Mr. Morrison's studies of the comparative costs of repairs and renewals to locomotives, maintenance of freight and passenger cars, and maintenance of shop machinery and tools on different roads is thoroughly illustrated by a large number of diagrams and charts. He suggests that a better unit than the cost per locomotive or the cost per locomotive-mile by which to compare the cost of repairs and renewals to locomotives would be a work unit calculated by multiplying the tractive effort in pounds by the average mileage per locomotive and dividing by 1,000,000. June 9, page 1308.

Controlling Modern Passenger Trains. Abstract of a paper presented before the Air Brake Association by Walter V. Turner. Ordinary passenger brake equipment is not equal to the demands of modern service and heavy equipment. Diagrams are presented showing the advantages of the improved passenger brake equipment for this service as compared with the ordinary passenger brake equipment. June 9, page 1316.

Turbine Locomotives. An editorial commenting on the application of the steam turbine to locomotives and drawing attention to a small locomotive so equipped at Milan, Italy. June 16, page 1399.

Rigid vs. Non-Rigid Freight Trucks. A communication showing how the truck journal box and its contained parts are distorted when the truck is forced out of square. June 16, page 1400.

Forty-Foot Refrigerator Car. Illustrated description of a car built by the Union Fibre Company. It is equipped with a collapsible ice tank, a non-splash drip pan, a specially heavy insulation and a Leeds ventilator, all of which are illustrated. June 16, page 1404.

Mikado and Pacific Type Locomotives; Baltimore & Ohio. The 40 Mikados and the 10 Pacific type locomotives recently built for this road are the heaviest of their types thus far built by the builders, the Baldwin Locomotive Works. June 16, page 1411.

Fuel Economy on the Chicago & Alton. The new Mikado locomotives equipped with superheaters are far more efficient, from the standpoint of fuel economy, than the non-superheater consolidation locomotives formerly used for the same service. The article presents data derived from the monthly performance sheets. June 16, page 1414.

Breaking-in-Two of Freight Trains. Abstract of the discussion on this subject at the recent meeting of the Air Brake Association. June 16, page 1434.

57½-Ton Steel Hopper Car; Norfolk & Western. A description of a type of all-steel hopper car which has been developed on the Norfolk & Western for the coal carrying traffic. June 23, page 1656.

NEW BOOKS.

Locomotive Breakdowns. By George L. Fowler, M.E.; enlarged and revised by Wm. W. Wood. Published by the Norman W. Henley Publishing Co., New York. 276 pages, 99 illustrations; 4½ in. x 6½ in. Price, $1.

This volume is a catechism treating on accidents and breakdowns of locomotives on the road and how to repair them. It is written in the question and answer form, containing over 500 practical questions. In this, the seventh edition, the breakdowns have been revised to include features of the more modern locomotives and the air-brake chapter has been enlarged. Information has also been added concerning the Walschaert and Baker-Pilliod valve gears. The book is intended especially for enginemen and roundhouse mechanics, but contains information for all interested in locomotive repairs.

[illegible] By W. Wagner, Mechanical Department Editor [illegible] Published by the [illegible] New York.

This book will be ready for distribution July 10. Since the inauguration in September, 1909, of the Shop Section in first [illegible] number has contained a large number of shop kinks. These have been [illegible] competitions, from special contributors and from investigations which have been made by the editors. Five general shop kink competitions have been held, two power shop kink competitions and a car department kink competition. Special contributions containing a large number of kinks have been received from the Chicago & North Western shops at Chicago; the Silvis, Ill., shops of the Chicago, Rock Island & Pacific; the West Milwaukee shops of the Chicago, Milwaukee & St. Paul; and the Meadville, Pa., shops of the Erie Railroad. Among the shops which were visited by the editors in quest of kinks were the Mt. Clare shops of the Baltimore & Ohio; the Elizabethport, N. J., shops of the Central Railroad of New Jersey; the Delaware, Lackawanna & Western car shops at Buffalo, N. Y.; the Erie Railroad car shops at Buffalo, N. Y.; the Dale street shops of the Great Northern at St. Paul, Minn.; the Lehigh Valley shops at Sayre, Pa.; the Long Island shops at Morris Park, N. Y.; the New York Central & Hudson River car shops at East Buffalo, N. Y.; and the Delaware, Lackawanna & Western shops at Scranton, Pa. The kinks submitted in the competitions and special contributions were received within the limits of Cienaga, Cuba, on the south; Skaguay, Alaska, on the north; Albuquerque, New Mexico, San Bernadino, Los Angeles and Bakersfield, Cal., in the west; and the Atlantic seaboard on the east. The descriptions of the kinks have been carefully revised and many of the less important ones have been discarded. They have also been classified and arranged in seventeen chapters, as follows: Machine shop kinks; erecting shop kinks; boiler shop kinks; oxy-acetylene welding and cutting; blacksmith shop kinks, locomotive department and general; brass foundry kinks; tin and copper shop kinks; engine house kinks; car department kinks, general; steel freight car kinks; passenger car kinks; planing mill kinks; blacksmith shop kinks, car; air brake kinks; oil house kinks; paint shop kinks; miscellaneous kinks.

This classification has had to be made on a more or less arbitrary basis, since oftentimes the same kink may be used in three or four departments. A thorough index has, therefore, been provided. The value of the book will lie not so much in the fact that the kinks may be copied, as from the suggestions that will be inspired by its study, enabling the reader to perfect methods he may be using or to develop new labor-saving devices to suit his peculiar conditions. No attempt has been made to designate the best kinks or the best way of doing any one class of work, but in many cases a number of kinks are shown for doing the same job. The reader can thus study them and determine for himself which method will best suit his conditions.

Letters to the Editor.

SAFETY APPLIANCES.

West Albany, N. Y., June 12, 1911.

To the Editor of the Railway Age Gazette:

Your Wilkesbarre correspondent, writing under date of May 8, 1911, page 1251 of the June 2 issue, I fear either fails to understand just what I wished to convey, or (perish the thought) is interested in a chain type of pin lifter. He quotes from my article in the May 5 issue in which I stated that 60 per cent. of the uncoupling mechanism defects were due to (a) uncoupling chain broken; (b) uncoupling chain kinked; (c) knuckle pin broken; (d) block broken; (e) lock block inoperative—six different causes. Then follows the statement that uncoupling chains (which includes clevises) are responsible for 70 per cent. of this, and can be avoided by the use of a chainless lifter. Now 70 per cent. of 60 per cent. is 42 per cent., or *42 per cent of the defects due to uncoupling mechanism are due to lift chains and clevises.* I did not say 70 per cent., but in effect 42 per cent. I believe most railway officers interested in this lifter question agree that the chain should be eliminated, and as I said there are pin lifters without chains that meet all requirements, and that are not rigid under abnormal conditions.

The defense of the chain lifter by "J. G." has reference to but one type of patented lifter, which requires about twice as much labor in its application as another chainless one which is more advantageous. Am not "interested" in any of these lifters, and that is an explanation, not a defense. My information was derived from the last annual report of the Interstate Commerce Commission.

C. L. ALDEN.

APPLICATION OF SCIENTIFIC MANAGEMENT TO A RAILWAY SHOP.*

BY MAX H. C. BROMBACHER.

The question which the *Railway Age Gazette* has propounded to the efficiency brethren, reads, and very appropriately, "How can scientific management be applied to railway repair shops?" It seems to the writer that any use of the word scientific in connection with the management of men, successfully, is a misnomer at best; it is hard to imagine an instance outside of a proposition in mathematics, or, outside of the performance of an autopsy, which would permit of scientific management, according to the real meaning of these words in actual practice.

Certainly, in any case where the human equation is the dominating factor, as is admittedly the fact in railway repair shops, scientific management in the correct sense is a practical impossibility. It may be qualifiedly possible in instances where the operator is a mere feeder to the machine, as is said to be the case in screw factories, since the element of personal judgment is largely if not entirely eliminated from the problem. All the treatises and explanations on the subject of scientific management, which I have seen and which were prepared by efficiency engineers, seem to indicate that the basis and superstructure of scientific management, so called, is such as would tend to effect the elimination of the factor of individual judgment. This alone would explain the practically unanimous opposition of railway repair shop heads to scientific management, since the element of personal judgment cuts a practically dominating figure in the management of their shops.

The words scientific management, functionalizing, despatching, etc., are part of a new terminology, which has been born or manufactured within the past few years; and, as our people dearly love a well turned phrase, or a phrase maker, they have attained and are enjoying an immense vogue at the present time. They do not describe anything really new; the same processes exist and have existed for ages; only, under the old terminology all were included and described by the humdrum expression of "thoroughly efficient management." This would seem to indicate that sometimes a rose under another name smells sweeter. The *Railway Age Gazette's* question of "How can scientific management be applied to railway repair shops," will be considered as meaning, "how can *thoroughly efficient management* be applied to railway repair shops," and, as every thing in the industrial world at least is relative, it follows that the question to be answered is in effect, "how can *relatively* thoroughly efficient management be applied to railway repair shops?"

The modern conception of relatively thoroughly efficient management is that type of management which shows in practice a relatively maximum output per operator, a relatively minimum cost per article and a relatively maximum earning rate per hour per operator. These requirements may to some sound like contradictions in terms; but they have been proved to be a realizable goal, and not infrequently at that, in industrial concerns. There is nothing visible to the writer in or about railway repair shops, which forbids its attainment in this class of industrial organization.

It may not be out of place to precede the statement of which system, if any, can be relied upon under proper auspices to attain these three desired results, by a statement of some of the reasons which make these results unattainable by other systems; and in this connection, it is the writer's opinion that the obtainment of the best in every operator is a condition precedent to even hoping to attain the results desired. It follows that any evident thing in any system which obviously precludes the idea of obtaining the best there is in operators, precludes the consideration of that system as a means to our end. It also follows that peace of mind upon the part of the operator is necessary before one can expect him to give his best, irrespective of what system he is working under.

Taking up first the flat rate, or daily wage system, we have to acknowledge that its inevitable tendency is to level down the good operator to the level of the poorer, if not to that of the poorest. As this is premiumizing inefficiency, it is automatically and diametrically opposed to the attainment of the desired results. It has been contended that a modification of this flat rate system by the granting of bonuses in addition to the flat rate, the bonuses consisting of a portion of the value of the increment earned by the operator through an increased output due to increased efficiency on his part, is bound to give the best possible results. But, though it may be possible that it gives better results than the flat rate system, and it certainly would be hard to get worse results than this flat rate is bound to yield in the long run, it does not seem possible to the writer that it should possibly give maximum output per operator, minimum cost per article and maximum earning rate per hour per operator.

Peace of mind on the part of the operator is absolutely necessary to his doing his best under any system, and this must be considered in the light of the fact that the operator is, in a state of nature, suspicious, and often justly suspicious of his employers. If there is any one thing which will throw an operator out of kilter as regards peace of mind, it is the slightest doubt as to how much he is earning, or has earned, and as to whether this has been calculated correctly. Now, under any form of bonus system, the figuring is bound to be more or less complicated. As the average operator is no mathematician, he is always prey to that innate suspicion of his employer, that he is not really sure that he got all that was coming to him in the first place, and as to whether the proportion he did get of the value of the increment accruing from his increased output was a fair portion, even if his pay check contains no errors in fact. These reasons indicate that we cannot expect to attain the desired results with any system which does not permit the operator to know where he is at every day in respect to his earnings, and which does not make clear to him that he is getting full advantage of his increased output due to his superior efficiency as an operator.

Based on individual experience and observation as a manufacturer, and supplemented by years of observation of the experience of other manufacturers, the writer's opinion is that maximum output per operator, minimum cost per article, and maximum earning rate per hour per operator, can only be attained in railway repair shops, or in any class of shops in which the element of personal judgment is a large factor in the success of the shop, by means of the proper installation of a *really intelligent* piece work system, and, in arriving at this conclusion he has not overlooked the basis nor the results of the *typical* piece work system. The bane of this latter system is that grossly ignorant employers will cut the rate as soon as an operator lets out a link in response to a tempting rate (price), so that the operator is practically reduced, as regards his earnings, to the flat rate limit, beyond which this action shows his employer to be determined he shall not go. Space limits preclude amplifying the asininity possessed by the employer who does this sort of thing, nor does our regret alter the fact that his name is legion. Suffice to say, that this kind of ignorant employer is the father of labor unionism "as she is played." The flat rate unionist premiumizes in efficiency; the rate cutting piece worker penalizes efficiency. The same result is arrived at by (apparently) opposite methods.

About the strangest system of piece work which ever came under the writer's observation was that in which a comparatively high price schedule was accompanied by a disproportionately low "dead line" of earning rate per hour which the men were forbidden to overstep. Luckily the number of instances of employers

*This article was awarded the first prize of $50 in the competition on How Scientific Management Can Be Applied to a Railway Shop, which closed June 15. Mr. Brombacher is a practical production or efficiency engineer with offices at 94 West 183d street, New York City.

who operate their shops under this system is very small; the inevitable result of this system is a comparatively maximum cost per article, accompanied by a forced decrease in the efficiency of the entirely innocent tool. It would be hard to find a system more admirably adapted to demoralize the morale of a shop, either as to ethics or practice.

As is the case with every system, really intelligent piece work requires the recognition of conditions precedent to its proper installation; some of these conditions are of an ethical nature, while others are almost entirely practical. While these conditions differ as to their nature, they are in almost absolute agreement concerning their importance as to the success or failure of the installation of such a piece work system. Incidentally, these conditions do not differ as to the fact that like other later day industrial policies they seem to indicate the desirability of a return to what might be called the first principles of industrial life—toward the application of paternalistic principles. Paternalism is not socialism. Socialism means equalization of earnings—an economic principle, even though it be unworkable in practice. Paternalism means a form of government or administration, and it has been proved to be a practical success. It leads, when properly understood and applied, straight to our desired results. It knows nothing about the equality of man; it is based on the frank recognition of the inequalities of man, i. e., that men are of vastly different efficiencies, and that equalization of earnings would, if enforced, tend to level the race down toward inefficiency.

It goes without saying, almost, that the question of how to supply relatively thorough efficient management to railway repair or other shops, permits of treatment from different angles. It can be treated from an angle which requires only the statement of broad general principles with the reason for them; again, it can be treated from an angle which, to do it justice, requires the writing of a good sized book. The judges in this competition are busy men, and could not reasonably be expected to wade through a book; and the attempt to apply relatively thoroughly efficient management, whether by one system or another, in shape of a book, would doubtless strike them as being similar to farming by book; it would be just as impractical, only very much more expensive; besides, it would be idle to affect ignorance of the feeling which is abroad in railway circles, that efficiency engineers and scientific management men have produced too many brilliant results in books, as differentiated from producing them in shops. The writer will, therefore, attempt to confine himself to treating the subject from the angle requiring only the statement of broad general principles with its reasons for them.

Apologizing in advance for the personal tone which utmost brevity consistent with clearness requires, the writer, assuming that he had been entrusted with the contract to introduce and install a really intelligent piece work system, would go about it as follows: It is assumed, of course, that the shops are fairly modern as concerns both design and equipment and that the tools have a surplus of power; that, as he would naturally have to [illegible] and through the shop head, that the shop head be intelligent, and affirmatively sympathetic with the idea that conditions as susceptible of improvement in most any shop, his shop included. If these conditions, which are elemental, did not exist, it would be best to quit [illegible] unintelligent; i. e., immune to ideas not originating in his own [illegible]

A request would next be made to the management to permit of the installation of what is sometimes called welfare work; that is, installing a surgeon and nurse whose duties will be to treat the injuries of the men, slight or serious, at once and with [illegible] time of the accident to the time the operator returns to work. Either the nurse or the surgeon should always be at the shop, if it is of ordinary size. When the surgeon is visiting those whose injuries do not permit their being at work, the nurse should be at the shop to take care of the men. No man who cuts or jams his finger even, should be allowed to bandage the injury. The nurse should do this; incidentally there would be no cases of prolonged loss of work through dirt being left in the wound, nor of any of the ills which follow unskilled attention to injuries at the time they occur. When the nurse is out renewing dressings for patients confined to their homes (which she should do under the direction of the doctor) the doctor should be at the shop.

The idea underlying this suggestion is that the men are relieved from the worry which otherwise always hangs over them, of loss of time and money through injuries which are common to their calling; no one can do his best in that frame of mind. Again, it tends to arouse or generate a feeling of personal loyalty upon the part of the men toward their employers. This treatment does not affect the self-respect of men, because they know, and intelligent employers have discovered, that it pays the employers, and hence is not charity. The men, however, recognize the fact that it involves considerable thought and work on the part of the employer. This is a suggestion with a statement of the reasons therefor; it is not intended as an ultimatum. Conditions in the shop could be materially improved, even if the management turned down this suggestion; the writer can understand that the management might be more willing to install this sort of thing after having seen evidence of results from the application of other suggestions, rather than in advance. He is himself prone to prefer things which are visible to the eye physical, to those things visible only to the eye of faith in matters of this world.

The writer considers the above suggestion, with the succeeding and every other suggestion which will be found herein, to be essentially educational; he recognizes that only as a result of real education can conditions be improved. He knows of no agency more effective in building up the standards of life and living, than a really intelligent piece work system, faithfully carried out; and experience has convinced him that this is due to the fact that it is based on and carried out in a really educational sense.

The next suggestion would be the installation of instruction for the apprentices in mathematics, physics and chemistry during their employment. Stress is laid upon their receiving this education while being employed, because the only real education is that where, if at all possible, the acquirement of practice precedes or at least is synchronous with the obtainment or acquirement of theory. An operator who knows why he knows, or does, what he knows, or does, is infinitely superior to the operator, however, skillful he be, who does not know why he does what he does. And this applies in even a greater degree to higher education. The college graduate who gets his practical experience, before or as he he goes through college, is worth a car load of the other kind of college graduates. Nowhere is this more true than in a railway shop, and nowhere has the typical college graduate been productive, though unconsciously, of greater errors than in just this class of shop. The writer is not unaware that some railway shops have an apprentice instruction system installed. This, unlike modern design and equipment, is not initially, at least, part of his requirements. Outside of the evidence of intent of the intention of the management to aid in every reasonable and practical way in the upbuilding of the employee, the results will show later on that it incidentally tends to enable a shop to develop its own skilled operators.

It goes without saying that a condition precedent to the successful working and proper installation of a really intelligent piece work system is that the men believe or be brought to believe that the principles of the square deal are the practice;

this will be referred to later on in connection with the price schedule. It is one of what might be called the ethical conditions underlying the proper installation of this kind of piece work.

In the formulation of price schedules, the writer would be guided almost entirely by the caliber, mentally and mechanically, of the shop manager. Speaking generally, but with special application, the writer bases this on the fact that the day-work rate should be the compensation for the average man; hence the schedule would afford opportunity for a good man to earn at least 25 per cent. more per hour than the day-work rate; and it follows that a very good man could earn much more than 25 per cent. over the day-work rate. Unless the working head of the shop (and his superiors) were thoroughly in sympathy with the idea that within competitive limits, the more the earning rate per hour of the operator increased, the better they would be pleased, it might appear to be necessary to do some preliminary educational work in the case of the management itself. Almost any increase in the earning rate per hour per operator, is, if accompanied by an increase in operator's output, advantageous to the management. And where, as in the case of intelligent piece work, the increased earning rate per hour is conditional upon at least a pro rata increase of output upon the part of the operator, the management is all to the good, since the increase of output decreases the percentage of the burden per unit of output; this sounds elementary to the verge of kindergartnerish, yet the writer has met heads of large concerns, who took issue with this statement at first glance, but were compelled to admit its essential soundness upon reflection. But when it came to putting it into practice they simply could not do it; they preferred blundering on in the old way of cutting the rate whenever a man let out a link, yet could not understand the to them disproportionate percentage of burden to output.

In introducing the price schedule, the writer would prefer that the shop manager be a man who achieved his position of leadership along old fashioned lines, i. e., by virtue of having demonstrated his right to the place by reason of his superior skill and ability, and by always holding his mind open to new ideas, not necessarily to their immediate acceptance, but to at least looking into them and, if found feasible, to trying them out. This kind of a shop head will, if the shop is run on the principles of the square deal, always enjoy the respect and confidence of his men. Working men seldom refuse the tribute of their respect and confidence to a shop manager of this kind. He gets their respect by virtue of his ability to show them with his hands, as differentiated from showing them with his mouth, the best manner of doing a given job if necessity arises; and by virtue of their knowing that he knows what a day's work is for the various classes of operators into which the men are divided by their natural differences in ability.

A price schedule, formulated by and with the advice of this kind of a shop head, will seldom require revision downward, except as the result of the introduction of improved equipment or labor saving devices. It is not claimed that the writer or such a shop head are infallible, that they never get a price too high. Such a shop head will also make mistakes in the other direction and will perhaps base a price on the ability of a good man instead of on the ability of the average man. As soon as this is discovered he will revise upward. One such case will enable him to correct many mistakes, if necessary, in the other direction without shaking the confidence and respect of the men under him either as to his fairness or of his knowledge of the business. Most revisions in most shops are the result of ignorance by the formulators of the original price schedules of a personal knowledge of what constitutes a day's work on a given job.

It may be that the price schedules are the result of the combined wisdom of a "bureau of statistical research," or of "compared efficiencies" taken in connection with the findings of the most (apparently) efficient shop of a number of really inefficient shops; or it may be that a body of college graduates, working in connection with stop-watch artists, have formulated the price schedule. It need not even have been observation by stop watch; it may have been just plain observation; but in either case, not having a personal knowledge themselves as to what constituted a day's work on the different jobs, they were stop-watching or observing "soldiers in the worthy cause of a day's pay for ½ day's work." Again, the schedule may have been formulated on the "hit and miss" principle; in this event, it will contain prices which not only do not afford a good man an opportunity to earn at least 25 per cent. more than the day-work rates would have netted him on the same job, but his returns are often less than when working on the day rate basis. The shop head who would permit such a condition of affairs to pass him more than once, even if the operator affected did not object, is admirably adapted to realize low efficiency in his shop and remain in serene ignorance of the cause thereof.

If the shop manager were intelligent and desirous of seeing the efficiency of his shop increased, but unfortunately was not of the kind described as being able to show with his own hands that his price schedule was fair and that he could come pretty close to earning a large increase over the day work rate on a given job, the writer would suggest having recourse to men who could do just this. The writer never makes a price on a job under given conditions, but what he has men where he can lay his hands on them, who can show that the price is good for an increase to them of about 50 per cent. or more over day-work rates. If an operator balks at the fairness of a price, and is shown by demonstration that 50 per cent. or over is being earned and can be earned over and above the day-work rate, he generally applies for leave to withdraw his objection to the fairness of the price. There is no after-clap to that sort of argument; it is the kind that appeals to the operators.

Just a word regarding claims which some efficiency engineers assume not only to be the prerogative of their systems, but which they almost claim to have patented for their systems. This refers to the matter of full and accurate records, of detail management and accurate individual records of each operator; and also, to the claim that predetermined costs and the striving therefor and, when reached, the maintenance thereof, in conjunction with some sort of bonus system, is not only the best method of attaining maximum output, minimum costs per article and maximum earning rates per hour per operator, but that these systems of keeping these accounts are the only proper ones.

This question of records is, with some of the efficiency systems, a fearsome thing; the writer has read papers in which it is claimed that it has been found to pay to have as many as three non-producers to one producer. The writer has seen many systems based upon "full and accurate records" commence as "buds of promise," but alas for human hopes they never "blossomed into flowers of performance," except that it was ascertained that the system cost more than the business could net in the shape of profit; the result was a rather premature demise of the system, accompanied by the consigning of its inventors to Hades by the victims gullible enough to try it at their expense.

The truth is, that a really intelligent piece-work system would give the shop manager every detail necessary to enable him to know where he was at, both in respect to any department of his shop, or for any operator in any department; so much for the matter of full and accurate records. As regards getting the best possible results from an operator by reason of his knowing that his record was known to the management, that is also covered. In addition to this, each individual operator in a shop governed by the principles and practices of really intelligent piece-work systems knows that he is perfectly safe in studying at any time and all the time as to how he can get his work out quicker; he knows that he will get the benefit of anything he does in that way. He knows that the shop superintendent is anxious to co-operate with him along these lines; and he knows that he will

never be penalized for using his brains by having his rate cut by the management, because they know enough to know that he is decreasing their costs (reducing their percentage of burden) by his increased output, and this insures a lower cost per article than any system of predetermined cost would produce outside of a book. His pay check evidences in increased size the recognition that the management knows him to be an efficient unit; and he knows by his daily life in the shop that the set of records kept there, simple though they may appear, are sufficient to keep tab on every move made by every man in every department of the shop.

These records would provide in a simple manner for the dividing of the shop into departments, by the listing of every operator's name under the heading of his department, and by the classification in every department of the operators in that department, i. e., in the machine shop, as machinists, machinists' helpers, apprentices, etc., and so on down through every department in the shop. The shop manager could then have a simple report with about 12 headings covering the items of piece work hours, day work hours, piece work amounts (earnings), day work amounts, day work rate, piece work rate, a column to show the amount of earnings over and above day work rates and another a column showing less, if any. On the line below and at the left of these headings, would follow the name of each man. On another sheet, there would be kept a summary of the foregoing; and on still another a comparison of this summary month by month, which would include the names and salaries in each department of the shop, as well as in the office of the shop, of what might be called the non-producers, such as clerks, telephone operators, etc. This sheet would give the percentage of piece work to day work for the shop as a whole; and thus monthly, weekly and yearly comparisons are at hand for the shop manager, giving him every detail of every department and of the earnings of every man under him in the entire shop. These, with a copy of the price schedule, and of the requisitions for materials and supplies contain about as complete, yet as simple and inexpensive a system of records as can well be imagined. They constitute a chart which precludes the idea of the shop head going on the rocks—if he keeps his eyes open. Taken in connection with a similar system for the other shops of a railway they constitute a quick method of comparing division efficiencies over the whole road; if copies of each monthly summary be exchanged between division heads, they serve not only to spur each shop superintendent to increased efficiency, but if the detailed monthly showings are exchanged they serve to put each division shop head wise as to where he can improve his own administration.

It will be observed that my system is based on the shop manager having all the figures, including the price schedule of his own shop, under his hands at all times; there will be at least weekly consultations with every foreman and sub-foreman present, at which the details of each department will be gone over. In this way no unpleasant surprises will develop for the shop head, either as to a given job or man. If a man's record shows that he cannot or will not rise above the day work rate, inquiry is made as to whether he needs instruction or whether it is a case of unconquerable inertia. If the former, instruction is given, and if the latter, the man is moved. It would be unfair to the shop's record and to the tool to allow this kind of an operator to keep the efficiency of the tool 25 per cent., or over, below normal; neither humanitarianism nor common sense require the tool to be penalized in this way.

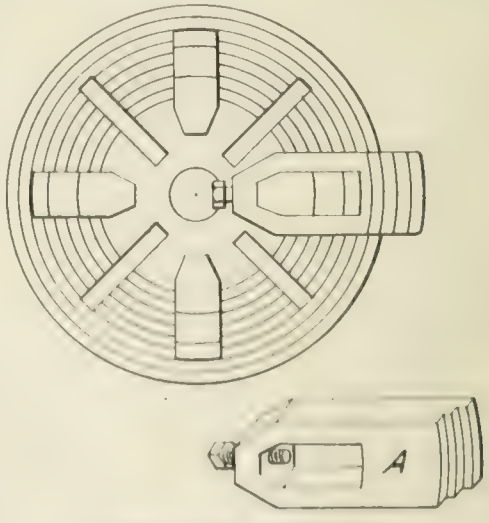
The [illegible] of giving the shop manager control of at least a copy of the records pertaining to his shop, is not intended to debar the management from permitting the accounting department all the activities it sees fit to indulge that department in. It is intended to limit the activities of the accounting department as to its tendencies to assume that statistics are its sole property and not subservient. The system described above contemplates that the shop head's chart is needed and is useful before, not after, a vessel has gone on the rocks. A shop head, as regards records, "wants what he wants when he wants it;" not when the circumlocution office gets around to it. Take the column of possible earnings by an operator at less than day-work rate; with this knowledge confined to the accounting department, the shop head lies under the imputation of being unfair to the man; if the man makes an objection, time is lost getting the facts necessary for an investigation; perhaps a good man leaves. By the other method, the shop head either knows of it at once, or he is in position to investigate at once; the men's confidence in his fairness is retained and this is quite necessary.

In conclusion, the question may be asked as to the concrete results which the writer thinks possible to show by the installation of such a piece-work system as herein outlined. The answer is impossible to give off-hand and in definite statements without knowing something of the conditions to overcome and of the atmosphere under which the problem would have to be handled. And this would be the case even if the question were asked with the questioner before me, and with the latitude which conversation permits in answering questions intelligently.

Speaking, therefore, generally, from my knowledge of the piece-work schedules of several roads in the Eastern Traffic Association, and of the costs on given jobs of roads which are not operated on the piece-work plan, I estimate that at least 25 per cent. could be saved by the installation by me of "a really intelligent piece-work plan" on the present costs of running repair shops by most of the roads in the Eastern Traffic Association. This is predicated on the assumption that the design and equipment of the shops are fairly modern; if strictly up to date a still greater efficiency might be reasonably expected.

LATHE CHUCK ATTACHMENT.

The attachment shown in the accompanying illustration is in use at the Canadian Pacific shops, Montreal, Can., and serves to increase the radius of usefulness of an ordinary lathe chuck of small dimensions. It consists of auxiliary jaws *A* that slip over the regular jaws and are held in place by set screws. The



Lathe Chuck Attachment.

one shown is intended for holding piston rings or other hollow work that may be caught on the inside. It is evident, however, that a modification of the same arrangement having an overhang, may be applied, by which larger diameters may be chucked than would be possible with the regular chuck.

The Prussian legislature recently voted money to electrify a section of the road in Silesia, which runs through a semi-mountainous region with many variations of grade.

SETTING INSIDE ADMISSION PISTON VALVES WITH WALSCHAERT GEAR.*

A design of Walschaert valve gear used with inside admission piston valves is shown in Fig. 1. The names of the various parts are as follows: *A*, valve; *B*, valve stem; *C*, combining lever; *D*, crosshead link; *E*, radius rod; *F*, reverse shaft; *G*, lifting link; *H*, reach rod; *K*, reverse lever; *L*, reverse link; *M*, eccentric rod; and *N*, eccentric crank. The main pin is shown on forward dead center and the reverse lever is in its middle position, with the link block in the center of the link. A careful study of the diagram shows that with a valve having inside admission the valve rod is connected to the combining lever at a point *below* the latter's connection to the radius rod. If the block is in the *lower* half of the link when in forward gear, the eccentric crank *follows* the main pin. If the block is in the *upper* half of the link when in forward gear, the eccentric crank *leads* the main pin.

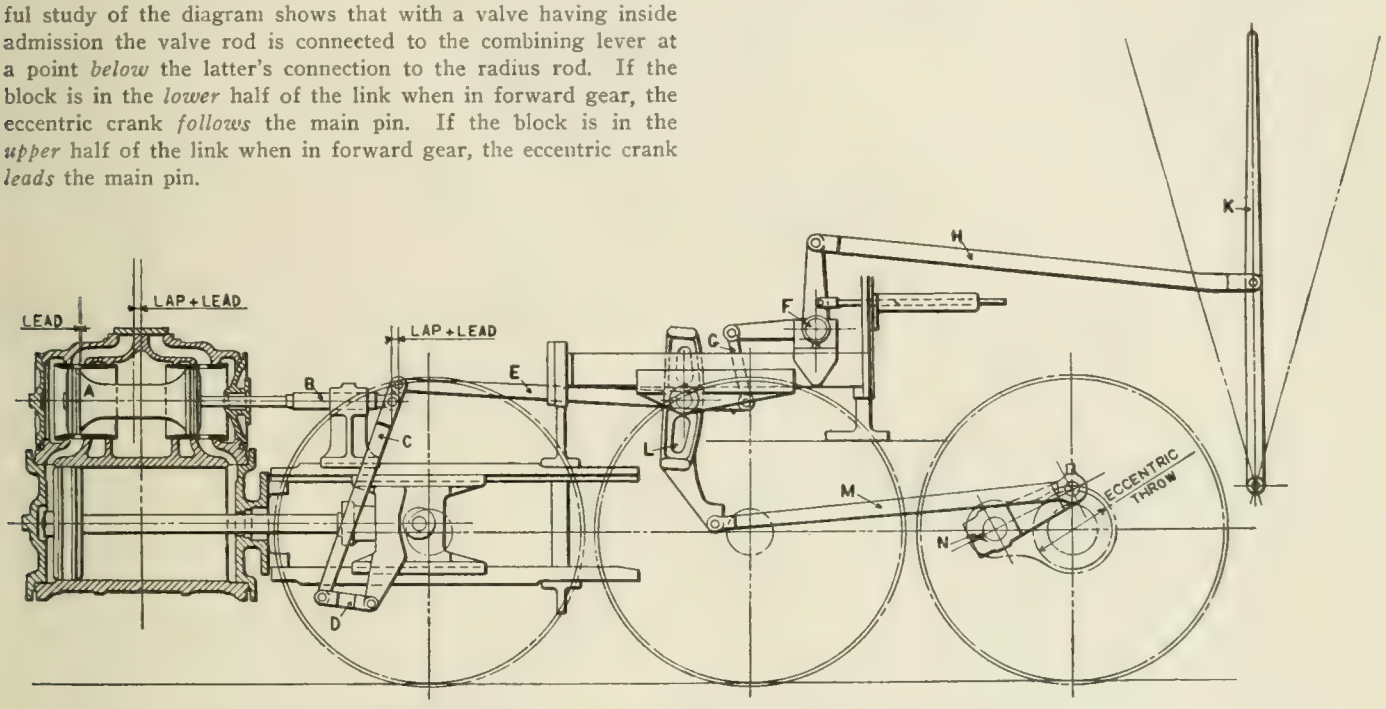


Fig. 1—Walschaert Valve Gear as Used with Inside Admission Piston Valves.

The method of setting inside admission piston valves is generally similar to that for outside admission valves, as described in the *Railway Age Gazette* of June 2, 1911, page 1254. It must be remembered, however, that to perform corresponding functions this valve moves in a direction opposite to that of the slide valve. When setting piston valves, the steam chest heads should be removed, for the sake of convenience. The line and line positions of the valve are determined by observation through peep holes provided for the purpose. In this way the points *F* and *F'* (Figs. 2 and 3) are located on the valve stem by tramming from any convenient point on the back wall of the steam chest. The lead points on the valve stem can thus be obtained by placing the crank on the dead centers, and again tramming from the steam chest wall (Fig. 4). The test for lead is made as described for the outside admission slide valves, the combining lever occupying positions as shown in Fig. 5. The lead in full gear, with this style of valve, is examined precisely as for outside admission valves.

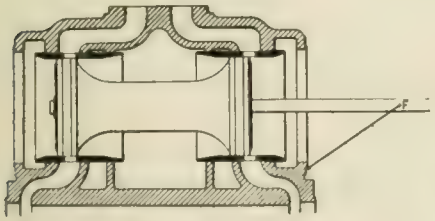


Fig. 2.

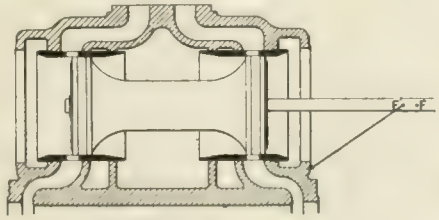


Fig. 3.

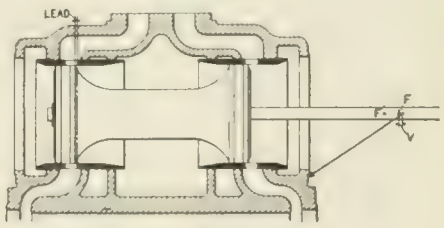


Fig. 4.

*From Record No. 70, published by the Baldwin Locomotive Works, Philadelphia, Pa., and entitled "Walschaerts Valve Gear."

CORRECTIONS.

Methods used for correcting errors can be best explained by two hypothetical cases. For example, suppose the specification of a locomotive having inside admission piston valves, calls for the following:

Maximum valve travel, 5¼ in.
Eccentric crank throw, 15½ in.
Constant lead, ¼ in.
Steam lap of valve, 1 in.
Link block below link center in forward gear.

The influence of the eccentric rod changes on the direction (ahead or back) of the movement of the valve, is explained by reference to Fig. 6. An examination of this figure will show that if the eccentric rod *E* is lengthened to *E'*, then the radius rod *R* will be moved ahead to the position *R'*, and the valve stem will be moved a distance *X* in the direction of the arrow, thus displacing the valve from position *V* to *V'*. Therefore, the rules applying in the case of outside admission slide valves also apply to this style of valve, as follows. In forward motion if the eccentric rod is lengthened, the valve is moved ahead. If the eccentric rod is shortened, the valve is moved back. In backward motion if the eccentric rod is lengthened, the valve is moved back. If the eccentric rod is shortened, the valve is moved ahead.

If the link block is above the center when running ahead, then, in each case, the valve will be moved in the direction opposite to that stated above.

In any case, regardless of whether the gear is in forward or backward motion, to move the valve ahead, lengthen the radius rod the amount desired. To move the valve back, shorten the radius rod the amount desired. It must be remembered that with an inside admission valve, the front port opening is in-

creased if the valve is moved ahead, and the rear port opening is increased if the valve is moved back. Bearing these facts in mind, two hypothetical cases will now be considered.

HYPOTHETICAL CASE NO. 1.

Let it be assumed that on tramming to the valve stem with the main crank on the dead centers the following irregularities in the lead are

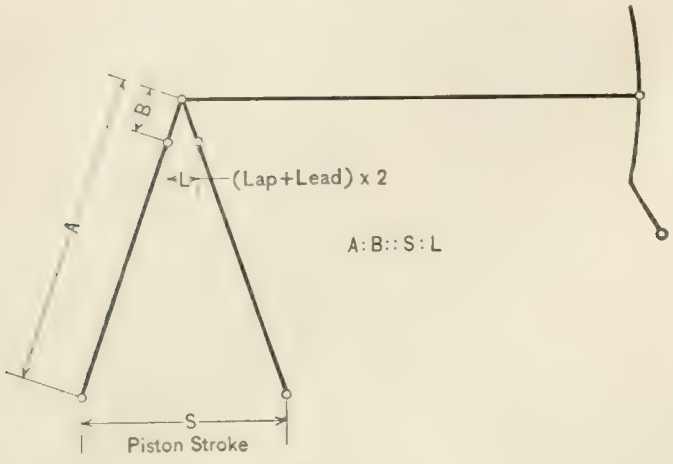


Fig. 5.

Error in forward motion—

Front, 3/8 in. — 1/4 in. lead = 1/8 in. error.
Back, 1/4 in. lead — 1/8 in. = 1/8 in. error.

{To square the lead, the valve must be moved 1/8 in. back.

Error in backward motion—

Front, 7/16 in. — 1/4 in. lead = 3/16 in. error.
Back, 1/4 in. lead — 1/16 in. = 3/16 in. error.

{To square the lead, the valve must be moved 3/16 in. back.

As the errors in the two motions occur in the same direction, it follows that the greater one partialy neutralizes the effect of the lesser, and that the combined or average error will be the difference between the two, viz.: 3/16 in. minus 1/8 in. equals 1/16 in., the average error.

To divide an average error of 1/16 in. equally about a central point, it will be necessary to move the valve one-half the amount, or 1/32 in. (in this case, 1/32 in. ahead in forward motion).

In the engine now under consideration, the eccentric crank throw is 15½ in. and the valve travel 5¾ in. Hence the ratio of eccentric throw to valve travel, is approximately as 2.7 to 1. Therefore the eccentric rod must be lengthened 2.7 times 1/32 in., or approximately 5/64 in. to move the valve ahead 1/32 in. When this has been done, the valve stem points will tram as shown in Fig. 8.

The errors in forward and backward motion have thus been equalized, and it remains only to square the lead front and back for both motions. The valve as now standing is 5/32 in. too far ahead to equalize the lead, viz.:

13/32 in. — 1/4 in. lead = 5/32 in. error front.
1/4 in. lead — 3/32 in. = 5/32 in. error back.

As the influence of the radius rod is direct, it follows that by shortening the rod 5/32 in., the valve will be moved back that amount and the lead squared. The valve stem can then be trammed to the dimensions shown in Fig. 9. These dimensions are the ones required by the specification.

The valve has thus been squared and the errors corrected by the changes

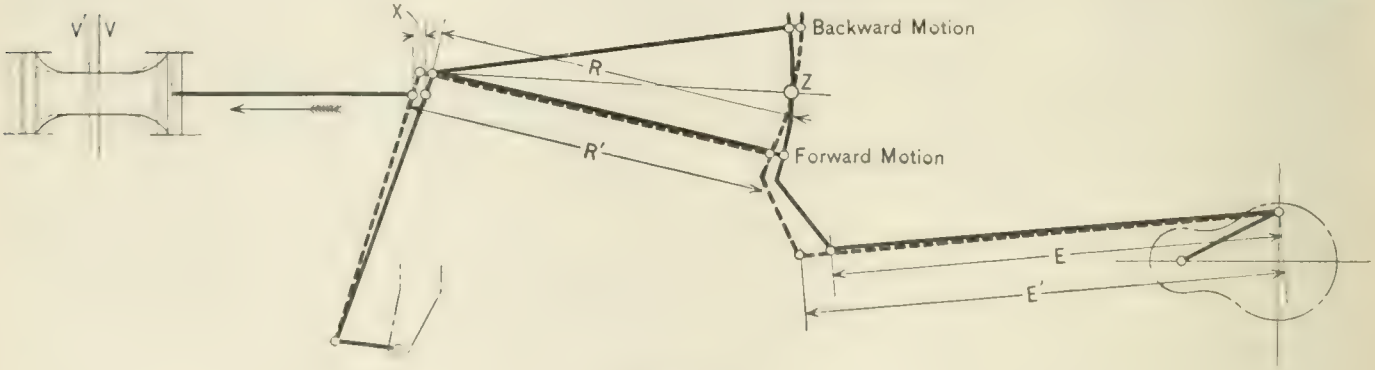


Fig. 6.

noticed for the engine under consideration. The dots on the diagram [illegible] while the crosses represent the irregularities in the lead when trammed [illegible]

The first procedure will be to divide the error between the forward and [illegible]

noted below: Eccentric rod lengthened 5/64 in. Radius rod shortened 5/32 in. A final trial of the valve and cut-off, etc., can now be made in the previously described manner.

HYPOTHETICAL CASE NO. 2.

Let it be assumed that on tramming for lead, results are obtained as represented by Fig. 10. Divide the error between the forward and backward motions, as follows:

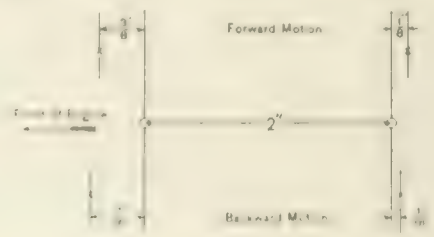


Fig. 7.

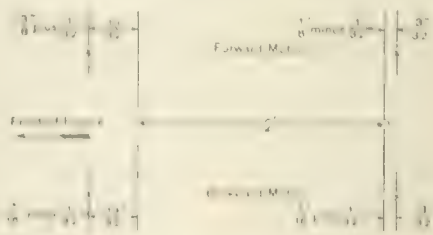


Fig. 8.

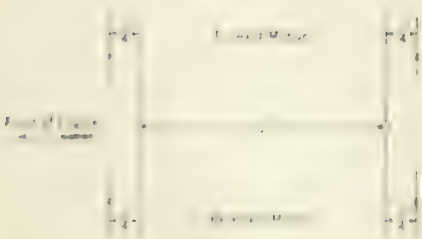


Fig. 9.

Fig. 10.

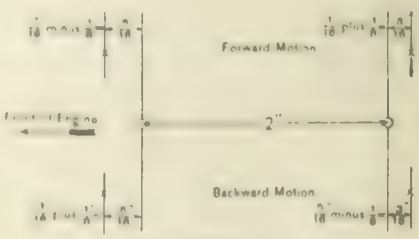


Fig. 11.

Error in forward motion—

Front, 7/16 in. — ¼ in. lead = 3/16 in. error.
Back, ¼ in. lead — 1/16 in. = 3/16 in. error.

{ To square the lead, the valve must be moved 3/16 in. back.

Error in backward motion—

Front, ¼ in. lead — 3/16 in. = 1/16 in. error.
Back, 5/16 in. — ¼ in. lead = 1/16 in. error.

{ To square the lead, the valve must be moved 1/16 in. ahead.

As the errors in the two motions occur in opposite directions they augment each other, and the combined or average error will be the sum of the two, viz.: 3/16 in. plus 1/16 in. equals ¼ in. average error. To divide the error equally about a central point, it will be necessary to move the valve one-half the amount, or ⅛ in. (in this case ⅛ in. back in forward motion).

The eccentric rod must be shortened 2.7 times ⅛ in., or approximately 11/32 in., to move the valve ⅛ in. When this has been done, the valve will tram as shown in Fig. 11.

The errors in forward and backward motion have thus been equalized, and it remains only to square the lead front and back for both motions. The valve as now standing is 1/16 in. too far front to equalize the lead, viz.:

5/16 in. — ¼ in. lead = 1/16 in. error front.
¼ in. lead — 3/16 in. lead = 1/16 in. error back.

To move the valve back 1/16 in., the link radius rod must be shortened 1/16 in., and the lead will then be squared. When trammed for lead, the results will be as shown in Fig. 9. These dimensions are the ones required by the specification.

The lead has been squared and the errors have been corrected by the changes noted below: Eccentric rod shortened 11/32 in. Link radius rod shortened 1/16 in. Trial of the valve travel and cut-off, etc., can now be made in the manner previously described.

EDUCATION AND DEVELOPMENT OF APPRENTICES.*

BY E. B. RALPH.

Apprentice Instructor, Atchison, Topeka & Santa Fe, Fort Madison, Iowa.

Before the Santa Fe adopted its present method of educating apprentices, few, if any of the graduates, were considered to be worth full mechanic's wages at the shop where they had served their time. They were thus encouraged to leave the parent shop and gain further experience in some other shop on the system or on some other road, after which they would be received back at full pay. These boys generally remained away. Under the present system of training they are encouraged from the time they begin their apprenticeship to remain in the company's service. The company has found them to be much better mechanics than it is possible to hire from other places, not only from the fact that they are trained to Santa Fe methods and standards, but they are educated along certain lines which required the "old timer" years of good hard experience to gain. They can start in at the completion of their apprenticeship and fill better positions and do better work than the "old timer."

To produce good mechanics the boys cannot be left to the mercy of the foremen alone, for the foremen are too heavily burdened with other duties to give the apprentice proper attention. Special men must be assigned to this work, and they must be thoroughly trained and competent in their particular line of work. This was accomplished on the Santa Fe by placing instructors in the various departments of the different shops. Wherever possible men who had served their apprenticeship on the Santa Fe were utilized for this purpose. They were thus not only skilled mechanics, but were familiar with Santa Fe methods and standards, and, better yet, were acquainted with the Santa Fe men and boys over whom they would have control.

It is the special duty of these men to receive the apprentice when he first starts in the shop, and follow him through the several branches of his chosen trade, giving him personal attention until he has passed through all that pertains to his particular trade, according to the facilities afforded by the shop in which he is working. These instructors are amenable to the general foreman and their superior officers only, which organization makes possible the best results. The instructor, with the approval of the general foreman, outlines a schedule of the different departments through which the boy must pass before completing his time. If the shop to which the boy is assigned does not contain facilities ample for a thorough knowledge of his trade, he is transferred to a larger shop to complete the last year or so of his apprenticeship. In this way all the apprentices, no matter where located, have the advantage of gaining a thorough training in their particular trade so far as it is able to be taught by the Santa Fe.

There is a well organized school system in connection with the shop instruction. At the larger shops a special man is assigned to look after the school, but the smaller places are taken care of by traveling instructors, their work being so arranged that each apprentice receives four hours school work each week, in periods of two hours each. These school instructors are technical school graduates, and as far as possible men who were employed in the mechanical department of the Santa Fe. While the school is made sub-servient to the shop, yet each boy is compelled to be present for four hours each week. If business be such that he has to be retained in the shop during his regular class period, he makes up this time at the first opportunity. Mechanical and free-hand drawing, shop mathematics and the rudiments of mechanics are taught; all in such a manner that they may be applied to the boy's daily work, and thereby keep him more interested in it, and more desirous of pursuing his studies when in school.

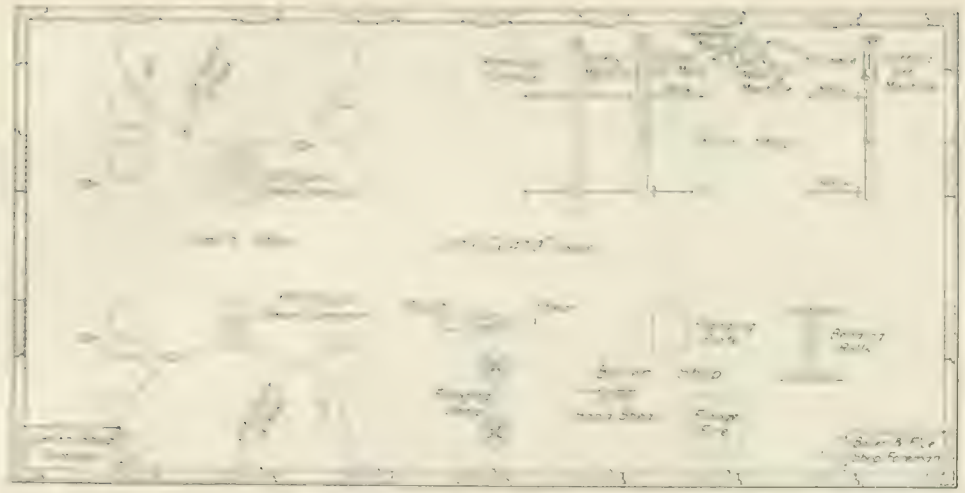
The obstacles encountered in establishing this system on the Santa Fe, so far as the writer's knowledge is concerned, were few, due to the efficient organization established to put it into operation. The best possible man for the head of such an organization was selected, one who had worked for years in the mechanical department as an official, and had become well acquainted with the various division officers with whom he was to come in contact. He is a technical school graduate, but a machinist by trade, and best of all a first-class mixer, one who has that wonderful ability to make all his subordinates fall thoroughly in love with their business. He, in turn, selected men for instructors who were able to mix with the boys. Unless an instructor can do this, he will not last long on the Santa Fe.

The system has been very effective in producing a good moral effect on the apprentices and shop men. The apprentices in particular are encouraged to seek good clean sport, and to this end, athletic teams have been organized along the system. The teams of the different shops meet each other in friendly contests. At these games will be seen some of the higher officials. This is noticed by the boys, who feel that they are being recognized and as a result they return to their work with a greater ambition. They are also encouraged to clean-up before leaving the shop after quitting work for the day; to seek the better places of amusement; and not to indulge in pastimes which are not for the bettering of themselves and their fellows. To assist in accomplishing this, a set of rules has been drawn up for the apprentices, containing nothing which will interfere with their pleasure or work, but which will help them to seek a better view of life, and thereby gain a better opinion from the people of the community. To further assist in guiding the boy right, there has recently been inaugurated on the Santa Fe, at some of the larger shops, reading rooms for the apprentice. At the other points the instructors are encouraged to have the school rooms open at night, that the boys may congregate there and play clean games and meet in a social way.

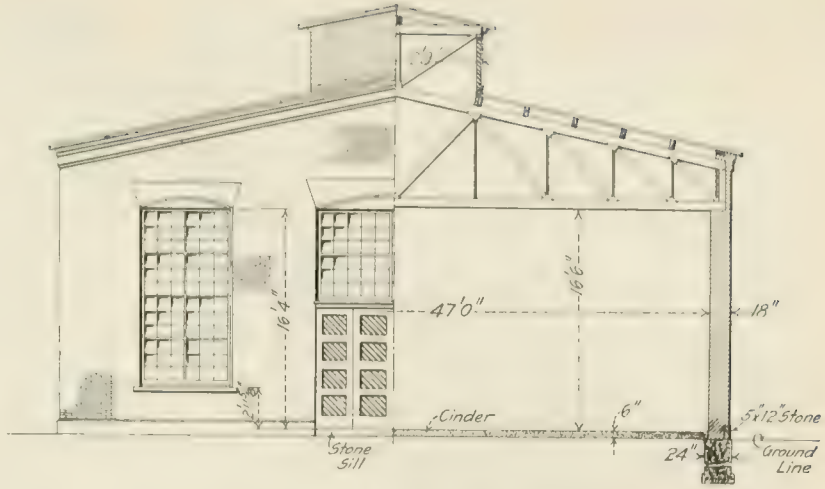
The effect has been such that the apprentices in their first and second years are now doing as well in their shop work as the average journeymen. About twenty of our graduated boys are holding good positions, although the system of instruction is only about three years old. Does it pay? Ask any mechanical department officer on the Santa Fe.

*Entered in the competition on the instruction of apprentices and workmen which closed April 15, 1911. Mr. Ralph's comments are especially interesting in view of the fact that he served his apprenticeship at Fort Madison before the new scheme of apprenticeship was introduced and is thus able to realize more clearly the advantages which it has to offer to the boys.

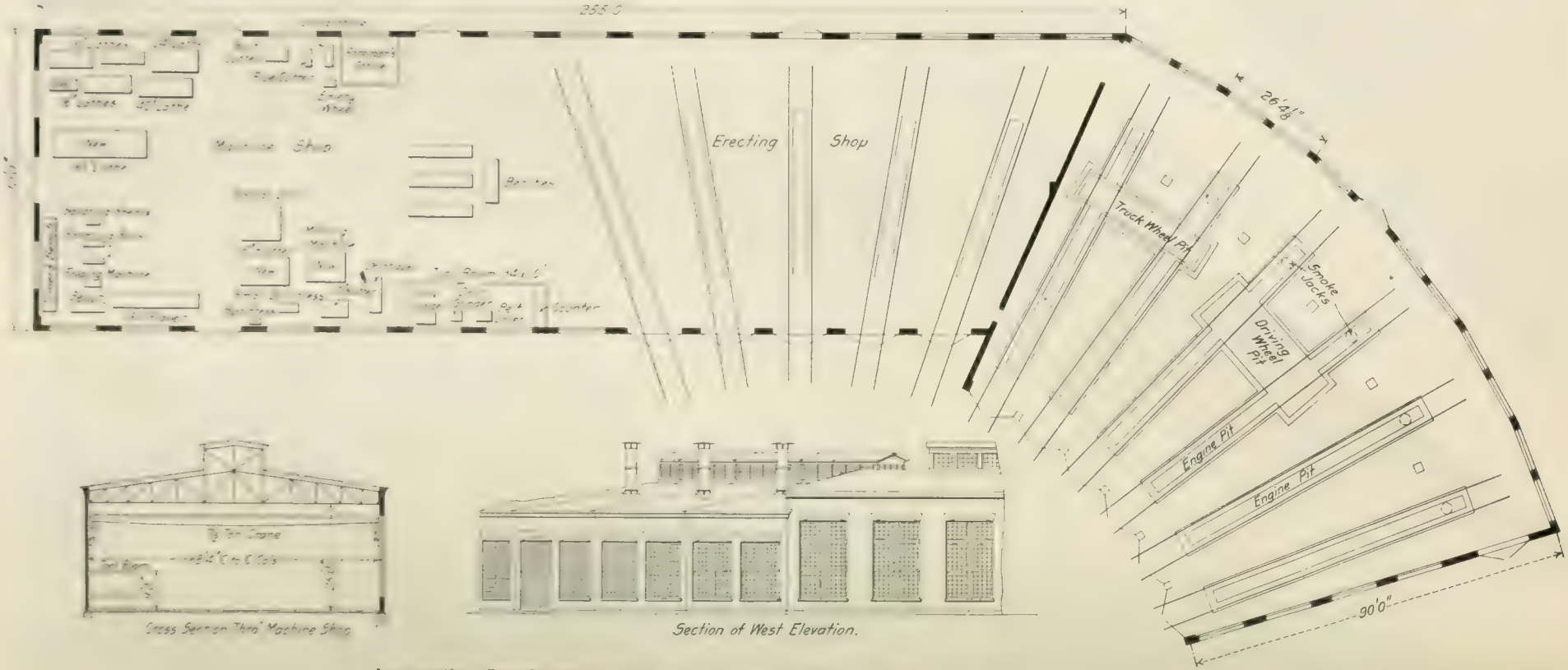
The Chilean government has under construction nearly 1,500 miles of railway, the cost of which will be about $75,000,000.



Arrangement of Equipment in the Smith, Boiler and Flue Shop.



Blacksmith and Boiler Shop.

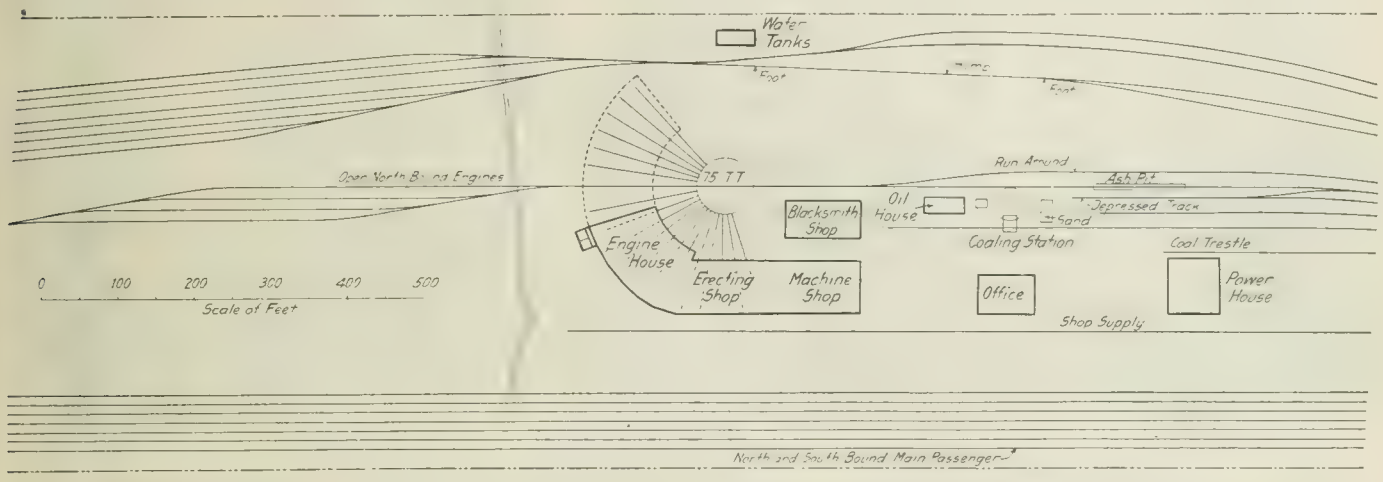


Locomotive Repair Shop and Engine House Building; New York, Philadelphia & Norfolk.

NEW SHOPS OF THE NEW YORK, PHILADELPHIA & NORFOLK.

A unique arrangement for the engine house, erecting and machine shop has been adopted by the New York, Philadelphia & Norfolk in its new locomotive repair shop plant at Cape Charles, Virginia. These shops were built to replace those which were erected when the road was originally constructed and will enable all repairs to be made to the locomotives, except for the heaviest boiler repairs. The engine house is at the end of the erecting shop with a common wall between, and various tools transferred from the old shop, which are arranged in groups for motor drives, with the exception of one or two tools to which individual motors have been applied. The new tools installed include a 30 in. x 16 ft. engine lathe, a 15 in. rapid production slotter, a universal milling machine and a pipe cutter. All of these tools have individual motor drives.

The engine house, which measures 90 ft. from the inner to the outside circle wall, is immediately adjacent to and connected with the erecting shop. It contains six tracks with provision for future extension. A driving wheel pit, and a truck



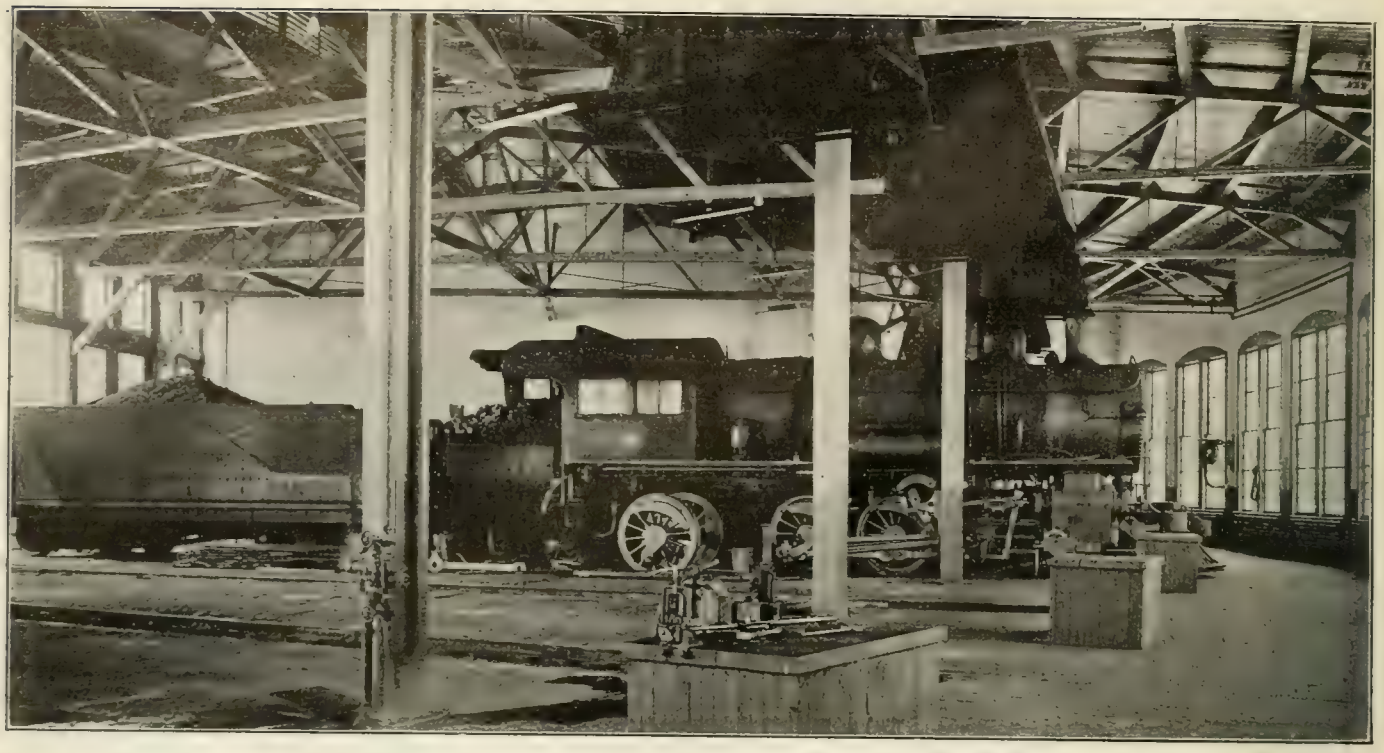
General Arrangement of the New York, Philadelphia & Norfolk Locomotive Repair Shops at Cape Charles, Va.

the five tracks in the erecting shop radiate from the center of the turn table so that the locomotives are run into the shop directly from the turntable, making unnecessary the use of either a transfer table or of cranes for lifting the locomotives from track to track inside the shop.

The erecting and machine shop is 70 ft. 6 in. wide and 255 ft. long, 153 ft. being used for erecting shop purposes. A runway is provided for the future installation of a crane for the handling of material in the erecting shop and machine shops. All the buildings are of brick construction, and are well lighted, ventilated and heated. The machine shop contains the wheel drop pit each serve two tracks. Cast iron smoke jacks are installed and the floor of the engine house, as well as the floor of the erecting shop, is of creosoted blocks.

The smith, boiler and flue shop is 50 ft. x 100 ft. The boiler shop tools, as well as the flue shop tools, are motor driven; among the new tools are a combined punch and shear, a 1,100 lbs. capacity steam hammer, a flue furnace, and pneumatic flue welding and swedging tools. The oilhouse is 22 ft. x 53 ft. in size, and contains a sweat room, waste room and distributing room, the various oils being placed in the storage tanks and drawn by gravity.

Machine and Erecting Shop; New York, Philadelphia & Norfolk, Cape Charles, Va.



Engine House; New York, Philadelphia & Norfolk, Cape Charles, Va.

The power plant is 70 ft. by 75 ft. In the boiler room are installed three 200 h. p. boilers arranged in one and one-half batteries, the boilers being hand-fired. Two fire pumps are also installed in the boiler room, each having a capacity of 500 gal. per minute; boiler feed pumps and general water service pumps are provided in duplicate. A feedwater heater is also installed. The engine room contains two 175 k. v. a., 3 phase, 60 cycle, 2,400 volt generators, driven by two 14 in. x 18 in. slide valve 225 h. p. engines. Also a 25 k. w. motor generator set and a 25 k. w. turbo-generator set for use as exciters.

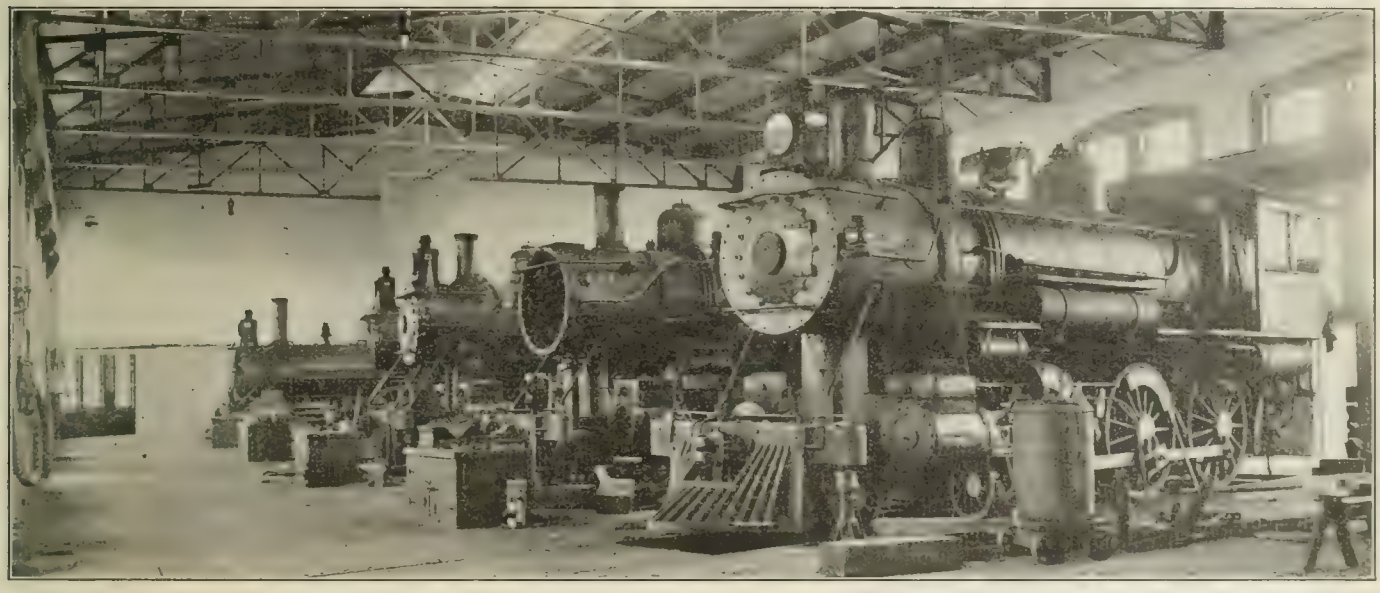
The switchboard is built up of six panels of black marine finished marble. For lighting the shop and terminal yards, two 25-light, four ampere metallic flame arc lamp outfits are installed. The power plant supplies power and light for the various shop buildings, as well as light for the yards and the passenger and freight depot, offices of the superintendent and other officials which are located about a mile distant. An air compressor having a capacity of 690 cu. ft. of free air per minute is also installed in the engine room and furnishes air for various shop purposes. An hydraulic after-cooler is in-

Blacksmith Shop; New York, Philadelphia & Norfolk, Cape Charles, Va.

stalled in connection with the air compressor. Provision is made for the installation of additional boilers, generators and air compressors. Also for the extension of the building proper as may be necessary.

The storehouse and office building covers an area of 50 ft. x 72 ft., and is devoted largely to the handling of material and supplies. The building contains a basement and two floors; the office of the master mechanic and shop clerk, as well as the drafting room occupy a portion of the second floor, while the remaining portion of the building is devoted to material and supplies. An electric freight elevator of 6,000 lbs. capacity has been installed. The artificial lighting throughout the building, as well as in the oilhouse and the offices of the various shop foremen, is by means of tungsten lamps; all other lighting in the buildings is furnished by type F Cooper-Hewitt lamps.

The turntable is 75 ft. in diameter, and is operated by a pneumatic turntable tractor. The ash-pit is equipped with a pneumatic hoist for the handling of ashes, and the locomotives are coaled by a clam shell bucket operated by a hoisting engine. Ample provision is made for protection from fire by a 6-in. fire main in the form of a loop surrounding the shops, which supplies the various plugs and hose reels.



Erecting Shop; New York, Philadelphia & Norfolk, Cape Charles, Va.

The water supply is obtained from 36 3-in. wells varying in depth from 26 ft. to 84 ft. From these wells the water is pumped to two 50,000 gal. steel tanks from which it is distributed through the various mains. Toilet and wash rooms have been provided with hot and cold water, and expanded metal lockers are installed throughout the shops for the comfort and convenience of the employees.

The J. W. Ferguson Company, of Paterson, N. J., erected the plant, and the various piping systems were installed by the B. F. Shaw Company, of Wilmington, Del., the plans having been prepared by R. N. Durborow, superintendent motive power of the Eastern Pennsylvania division of the Pennsylvania Railroad.

Peru in 1908 engaged the famous German firm of engineer-contractors, Arthur Koppel, to make preliminary surveys and plans for a railway from the Pacific port Paita over the Cordilleras to the Amazon. Plans and estimates for six different routes have now been submitted. The longest, costliest, but most valuable line would be 467 miles long, with eastern terminus at Melendez, on the Marañon, the cost of which is estimated at a little less than $24,000,000. Steamboats drawing 7 ft. of water may ply from Melendez to Iquitos, whence the Amazon is navigable by ocean steamers. The steepest grades on all of the routes surveyed are 158 ft. per mile.

SCIENTIFIC MANAGEMENT IN THE RAILWAY SHOP.*

BY LE ROY W. ALLISON.

Correct management has ever been a science, and scientific management is but a synonym for good management. The introduction of a system of betterment in any branch of industry is dependent upon one fundamental essential—exercising common sense; without it, system, ideals and theories notwithstanding, we are lost. These latter offer the basis of the doctrines of the good and the poor so-called efficiency engineers. The poor have sprung up in countless numbers, they are found everywhere—having a theoretical schooling, and having read a few books on the subject. Having devised a schedule of operations and ideals so based, does not constitute an efficiency engineer, or even a near one. The good efficiency man, the one who deals in a practical manner, with practical training, and endowed with an appreciation of common sense treatment is hard to find.

In the application of scientific management in the railway shop, it is a question whether the efficiency engineer be needed at all. The writer has seen him, oftentimes, doing more harm than good, and simply because of that self-infused consideration of his own importance and "know it all" ability. Each particular shop presents its individual problems, the effective solution of which lays with the practical man. No railway shop has the time for experimenting with this or with that, neither can it profitably permit of an argument of possibility; its existence and purpose demands the assurance of defined and definite intent.

Scientific management in the railway shop depends upon three things, the common sense treatment of the workman, the common sense judgment of equipment, and a mode of operation which is the outcome of a slow development and is adapted intelligently to the special requirements in the particular plant. These are listed in order of importance, and it is only through the harmonizing of the three that the desired effects may be realized.

Any system of management is directly dependent upon the workman in the shop for its success; this statement is as broad as it is true. Dealing with theories, ideals and principles, and *not* with the workman, can never result in good or scientific administration. He cannot be treated as one of a crew of nonentities, typically a human machine, [illegible] leaving the

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*This article was awarded the second prize of $50 in the competition on The Application of Scientific Management [illegible] which closed June 15. Mr. Allison is an engineer located at Los Angeles, Cal.

confidence of his employer, and do justice to a method for betterment. Neither can we expect a continuance of results if we initiate a square deal proposition, offering a bonus system and the like, and annul it in a short interval of time. Under such conditions it is far better to omit entirely any consideration of increased wage scale. We are not doing justice to the employe and the shop is sure to show it.

The term "co-operation and harmony" is not a new one; it is present orally and in print wherever scientific management and efficiency is mentioned; they are ever prevalent in its literature and pervade its very end. Spoken or written in the idealistic sense they mean nothing; deduced and intelligently interpreted, the expression offers the key-note to the prosperous issue of the system, all other things being equal. To gain the co-operation of the workman, are we to hand him a printed schedule of operations and the time allowed for each, or put him under a speed boss and hold a stop-watch over him? Never! At least not to the intelligent shop employe and citizen. Even though it offers a slight increase in wages, this will bring about *forced* co-operation, and this means nothing but disaster to the system, due to entire lack of interest of the workman, whose thoughts are bent and whose eyes are open for another position—a job where the driving element will not be in evidence.

When we take the workman into our confidence, reasonably explain why a certain plan of procedure is to be inaugurated, accord him a consideration for knowing something, show him how his earning capacity and ability will be increased, how both he and the railway are to benefit, then will we derive from the intelligent workman, who has the interest of the shop and road at heart, the full advantage accruing from co-operation. Harmony will necessarily follow, for one is never present without the other. To be interested in one's personal welfare is human nature; the man who is not so addicted is usually not worth very much to himself or his employer. When we give the intelligent employe common sense treatment, the method which affords him an opportunity to use his brains and does not entirely stunt his initiative, which handles him as a man and not as an animal, he is bound to recognize the square deal and reciprocate; this is directly returnable to the railway in pecuniary value.

The man to lead and direct is directly responsible to the railway for the effectiveness of his department. In scientific management such a man must be a real leader, a practical man with enough theory to discern the distinction; he must have the ability to show and direct concisely; and, above all, must understand the failings and weaknesses of his men. Such a man will have seen service continued and varied, in his particular line—not from college, or books, or looking on, but from actual work in the shop. This is the class of men who can obtain co-operation and harmony from their men by the simple application of common sense. The impractical and theoretical man, with his system, when chosen to direct the practical workman is almost inevitably a failure, and the direct cause is not difficult [illegible]

Shop equipment should, of course, be of such design and quality as will offer the most efficient results and service. Placing a poor tool in the hands of a good workman is as much [illegible] The selection of a tool, or tools, requires the ability of one who knows machinery, and [illegible] In standard equipment, such as lathes, planers and the like, the numer- [illegible] individual product [illegible] there can be but one *best* for each particular class of work [illegible] The amount of good [illegible] is of equal importance to the employment of competent workers.

The [illegible] of the installation of a system of scientific management in a railway shop demands that the principles involved should be thoroughly practical, tried out, and correctly interpreted. They must be based upon fact, sound and liberal, and warranting a just return for the expenditure of time and money. The system must be made to conform to the shop, never the shop to the system; it must be one for the betterment of existing conditions, as found, and not a method which is to demolish with a blow that which has taken brains and years to perfect. Established precepts cannot be discarded for illusory ideals which *may* be attained, without a full research as to their worth and fitness. In justice to the shop, the employes and itself, the railway cannot neglect practical and common sense effort; consideration must be given as to *why* and the reason therefor, otherwise a confused and tangled mass will result which will prove disastrous.

The writer has often seen and heard the phrase, "fit the man to the plan"; it means little more than making a dog do tricks. "Fit the man and fit the plan" is more sensible; both require fitting and often the latter is the hardest and more difficult to cut to shape. The definite standards of operation must be derived from the shop in question from actual work and the full investigation thereof; results can never be attained from "what it ought to be," based upon a foreign plant or theory—this may be suited to the library and book-shelf but not to the railway shop.

In an age of industrial betterment it is easy to become inoculated with the efficiency germ. Scientific management should spell economy, an increased output with decreased cost, but such decrease never by a reduction in wages. The ultimate outcome is assured if we administer and are governed by the laws of common sense—to the workman, his welfare and wage scale; to the shop equipment, its aptitude and quality; to the system, its suitableness and recompense to the railway shop and employe.

WALSCHAERT VALVE GEAR BREAKDOWNS.*

The handling of the Walschaert gear in the event of a breakdown, presents no special difficulties. It is usually desirable, if possible, to take down both the eccentric rod and main rod. The crosshead and valve stem can then be securely blocked, exactly as in the case of an engine equipped with the Stephenson gear. The radius rod should be disconnected from the reverse shaft by removing the lifting link. If the valve is blocked in its middle position the cylinder on the damaged side will be cut out.

If the main rod, crosshead and piston on the damaged side are in a condition to run, the main rod may be left up, provided there are relief valves in the cylinder heads. The relief valves should be removed, so that the cylinder can be lubricated and excessive compression be avoided. With the eccentric rod down, and the valve securely blocked in its middle position, the engine can be run with the other side. It is of course necessary, in this case, to remove the crosshead link, and fasten the combining lever in the forward position. The foot of the lever can readily be secured to one of the cylinder cocks by a stout cord or wire.

If the damage is confined to the eccentric crank or rod, or to the lower end of the link, and the latter is still supported on its trunnions, the main rod may be left up, and the valve may be operated by the combining lever. To accomplish this, take down the eccentric rod, disconnect the radius rod from the reverse shaft, and secure the link-block exactly at the center of the link. The maximum port opening on the damaged side will now be equal to the lead, and the cut-off will be very short; but the steam will do at least some work, and the engine can be reversed and both the cylinders will be lubricated

*From Record No. 70, published by the Baldwin Locomotive Works, Philadelphia, Pa., and entitled "Walschaerts Valve Gear."

ENGINE HOUSE KINKS; PENNSYLVANIA RAILROAD.

BY C. C. LEECH,
Foreman, Buffalo, N. Y.

OIL HOUSE.

A compact and convenient arrangement of handling the different kinds of oil required for locomotives is shown on the accompanying drawings, Figs. 1 and 2. To economize space, a cellar was excavated alongside the engine house, but the tanks can be housed in a building above ground if desired. The arrangement of the tanks is clearly shown on the drawings. Where two tanks are filled with the same kind of oil, they are connected by pipes. The arrangement for filling the tanks is clearly shown in one of the illustrations, section *C, D*. The

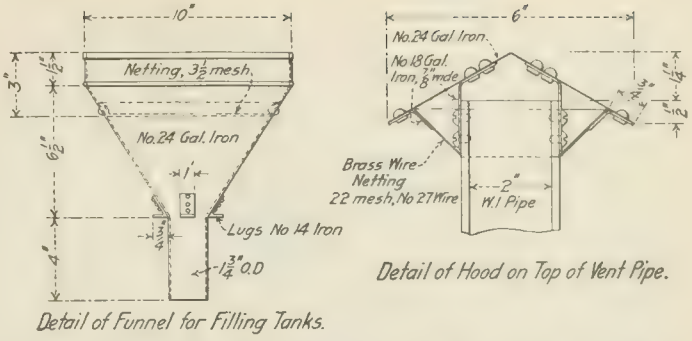
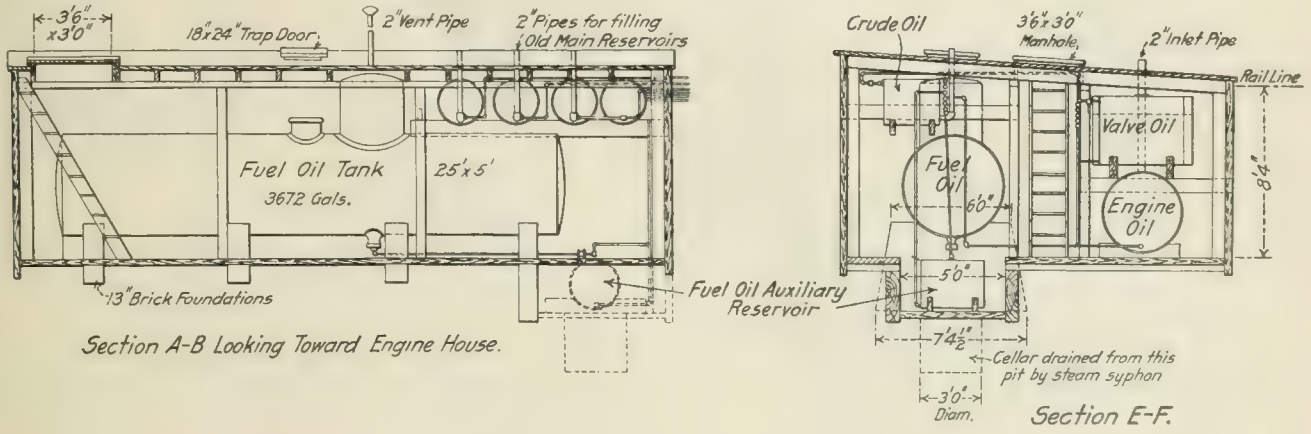
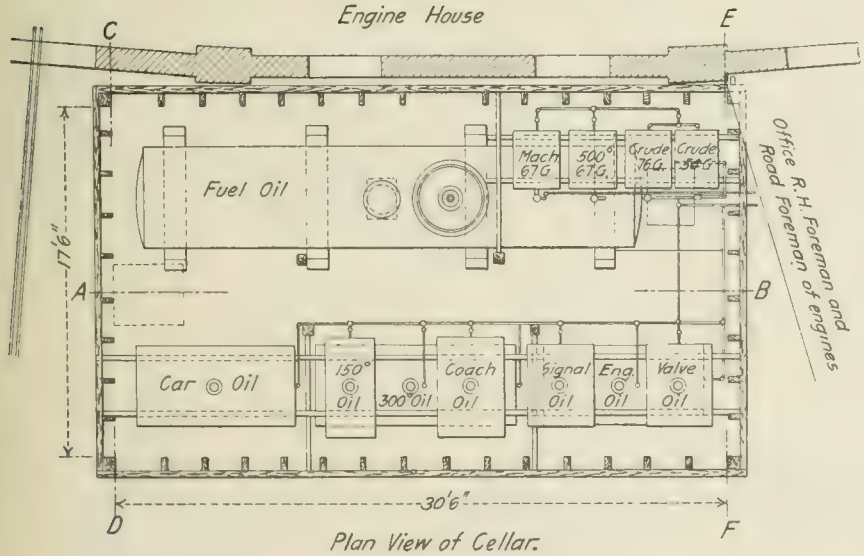
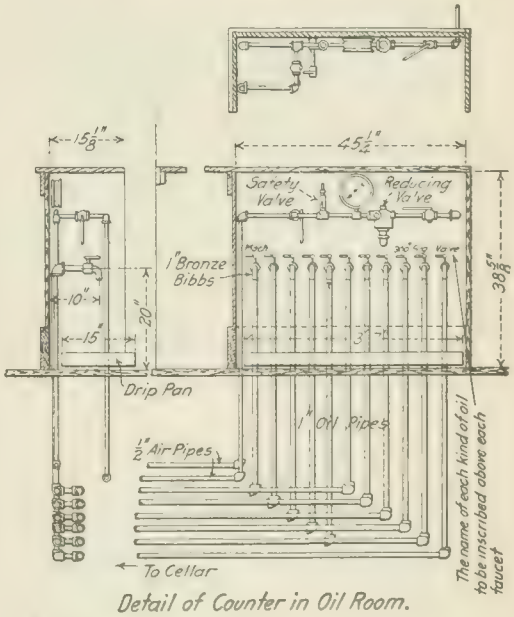
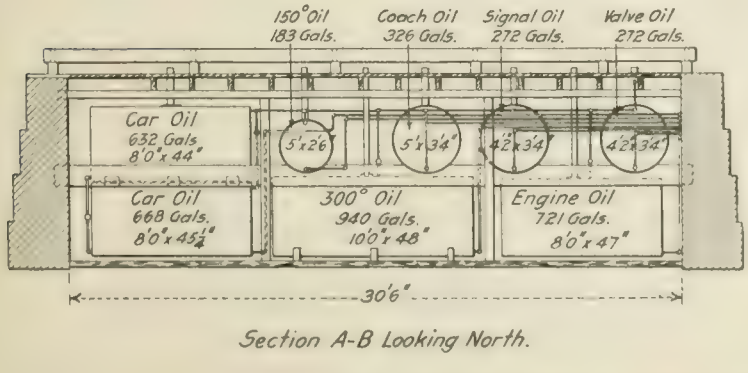

10"
Netting, 3½ mesh.
No. 24 Gal. Iron
Lugs No 14 Iron
3" O.D
Detail of Funnel for Filling Tanks.
6"
No. 24 Gal. Iron
No. 18 Gal. Iron, 8 mde
Brass Wire Netting 22 mesh, No 27 Wire
2" W.I Pipe
Detail of Hood on Top of Vent Pipe.

Fig. 2—Funnel for Filling Oil Tanks, and Hood at Top of Vent Pipe.









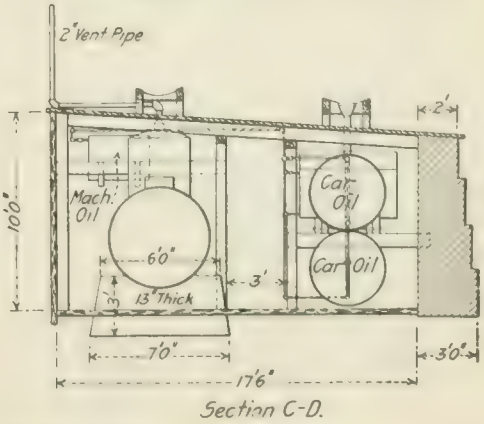


Fig. 1—Arrangement of Oil Cellar and Delivery Counter.

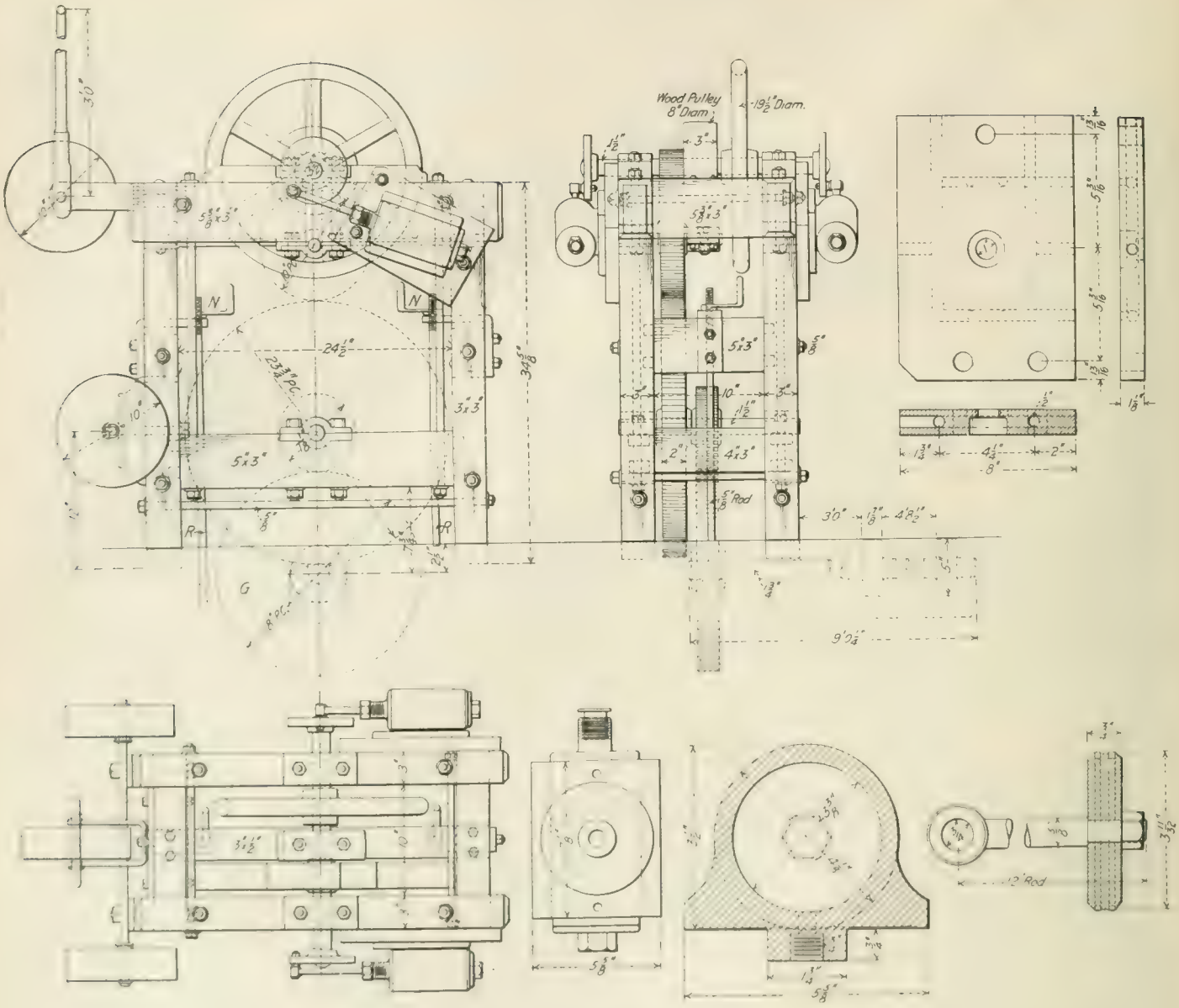


Fig. 3—Valve Setting Machine.

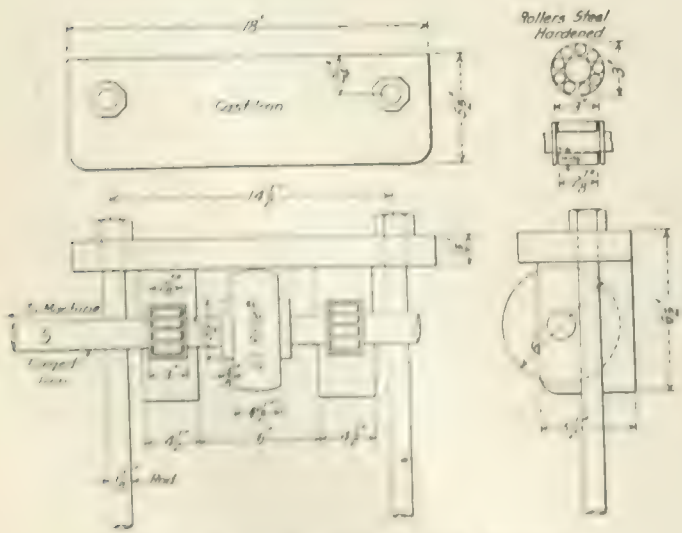


Fig. 4—Rollers for Valve Setting Machine.

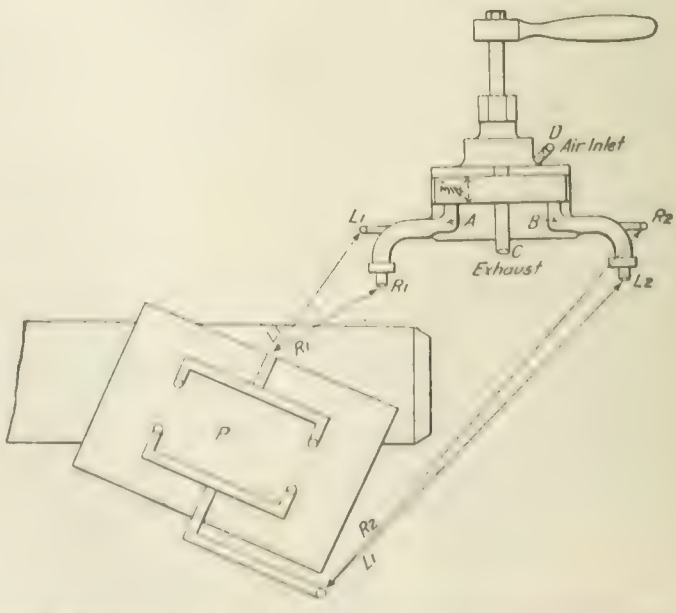


Fig. 5—Four-way Valve and Method of Piping It to Cylinders.

funnel is placed in the top of the inlet pipe after the cap has been removed and the oil barrel is rolled out on the runway or skids, and placed so that the bung in the barrel is directly over the funnel. Air pressure is, of course, shut off from the oil tank while it is being filled. A reducing valve in the air supply line reduces the pressure in the oil tanks to 25 lbs. per sq. in. One of the illustrations shows a detail of the oil pipes and faucets at the delivery counter, which is inside of

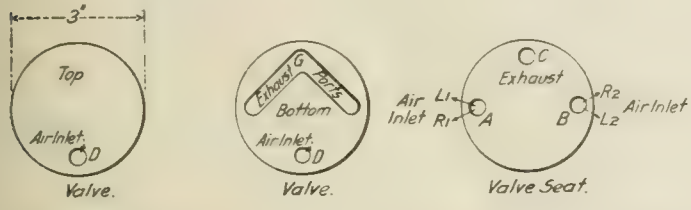


Fig. 6—Arrangement of Valve and Valve Seat for Oscillating Cylinders.

The frame of the valve setting machine shown in Fig. 3 is of attendant without moving from his position.

VALVE SETTING MACHINE.

The frame of the valve setting machine shown in Fig. 3 is of wood, well bolted together. The oscillating cylinders by which it is operated are of brass. The journal boxes are of cast iron, with babbitted bearings. A small pulley is placed on the driving shaft so that in an emergency the device may be utilized for driving one or two of the machines in the machine shop of the engine house. The machine is fastened rigidly in place alongside the locomotive, whose valves are to be set, by means of the two rods, *R*, which hook into eyebolts, which are let into the floor; the rods may be adjusted and tightened by means of the two handle nuts, *N*. It is, of course, necessary to have these eyebolts in the floor alongside each of the pits in the engine house, preferably at the right hand side. The four cast iron boxes, one of which is shown in detail in Fig. 4, are placed in position on the rails with the cast iron rollers resting against the tread of the driving wheel tires. Each set of boxes is tied together by the 1⅛-in. rods, the nuts on these rods being drawn up tightly enough to lift the main driving wheels off the rails, thus allowing the weight to be carried on the rollers. The shafts carrying the rollers revolve in the roller bearings in the cast iron boxes. The rollers are located on the shafts at points which correspond to the distance from the center to center of the wheel treads. One of the shafts is extended out far enough to allow a gear at its end to engage with the train of gears on the machine. In this way the driving wheel may be revolved at will.

Details of the four-way air valve and the method of piping it to the cylinders are shown in Fig. 5. The cylinders are of the oscillating type, and are secured to the plates, *P*, by a center stud, the faces of the cylinders and plates being first carefully faced and ground to a bearing. The arrangement of the valves and ports, and also the valve seat, is shown in Fig. 6. The arrangement of the piping shown in Fig. 5, of course, only shows one side, the left hand in this case, but the arrows *R*1, and *R*2, indicate the piping of the right side. The upper air ports of each cylinder plate are both piped to the *A* side of the valve, while the lower ports are piped to the *B* side. Therefore when air is admitted to the valve at *D* and the valve is turned so that the port *D* (Fig. 6) in the valves is directly over the corresponding port *A* in the valve seat, air passes into the cylinders through pipes *L*1 and *R*1 and the top ports in the plates, and is exhausted through the lower ports *R*2 and *L*2

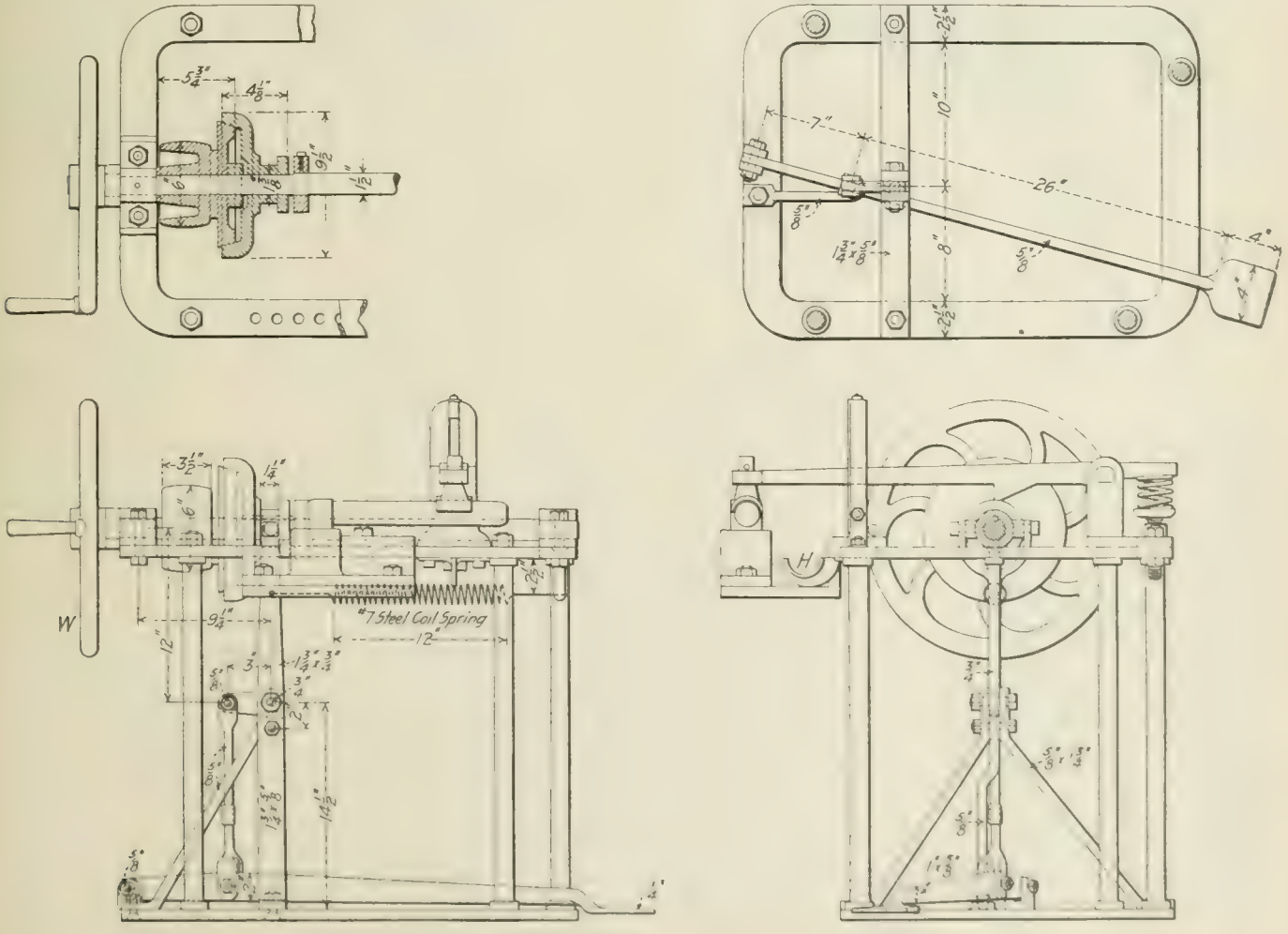


Fig. 7—Tube Welding Machine Arranged for Power Drive.

up through the port *B* in the valve seat and through the exhaust cavity *G* in the underside of the valve, and then on to the atmosphere through the exhaust *C* in the valve body. Reverse motion is obtained by moving the handle of the valve to the opposite side and sending the air through the pipes *R2* and *L2* and exhausting out through *L1* and *R1*.

At one side of the machine are three wheels, near one of which is a handle. When it is desired to move the machine about the

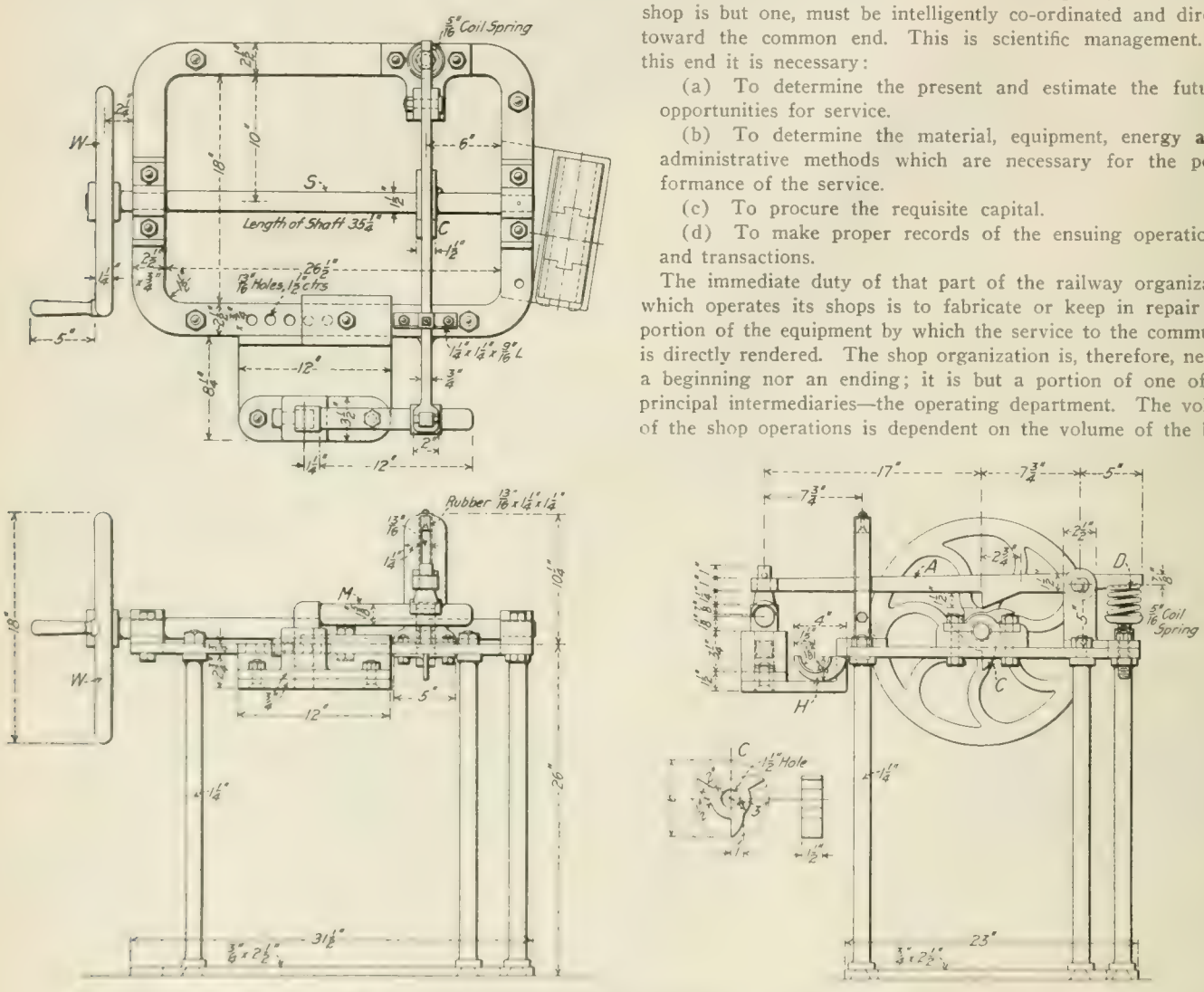


Fig. 8—Tube Welding Machine Arranged for Hand Power.

engine lathe, it is rigged over so that it is supported by these wheels and may then be moved about with ease.

TUBE WELDING MACHINE

Where power cannot be had for operating a tube welding machine in the engine house, the device shown in Fig. 8 may be used to good advantage, and it requires only a blacksmith and a helper to operate it. The framework of the machine is made of 2-in. x 2-in. bar iron, which is supported on four posts of 1½-in. round iron. The machine is operated by turning the hand wheel *W*, which is keyed to the shaft *S*, on which a three-toothed cam *C* is fastened. As this cam is revolved, the arm *A*, which rests on it is raised and lowered rapidly. The force of the striking movement is controlled by the coil spring, *D*, which may be adjusted by means of the screw and nut. The left-hand end of the arm, *A*, is fitted with dies for welding the tube to the stay purposes. Where power is available, this tool may be operated by the application of a pulley and a clutch mechanism for operating it, as shown in Fig. 7. The [illegible] is for scraping the scale off the tube at the end before welding.

THE APPLICATION OF SCIENTIFIC MANAGEMENT TO A RAILWAY SHOP.

BY H. F. STIMPSON.*

The object of any legitimate organized enterprise is to serve beneficially the entire community. A railway company is an instance of such an effort. In order that the effort may be successful the efforts of all its constituent parts, of which the shop is but one, must be intelligently co-ordinated and directed toward the common end. This is scientific management. To this end it is necessary:

(a) To determine the present and estimate the future opportunities for service.

(b) To determine the material, equipment, energy and administrative methods which are necessary for the performance of the service.

(c) To procure the requisite capital.

(d) To make proper records of the ensuing operations and transactions.

The immediate duty of that part of the railway organization which operates its shops is to fabricate or keep in repair that portion of the equipment by which the service to the community is directly rendered. The shop organization is, therefore, neither a beginning nor an ending; it is but a portion of one of the principal intermediaries—the operating department. The volume of the shop operations is dependent on the volume of the business developed by the traffic department, and is largely affected by the efficiency with which the train crews, etc., handle the equipment with which they are entrusted. The resources at the command of the shop organization are derived from the financial department and are also largely affected by the efficiency with which the operating equipment is handled.

The shop organization, therefore, is not and cannot be considered as a separate entity. This must be taken into account in considering any question of shop management. In any line of reasoning we must have a starting point. The position which the community, through its Interstate Commerce Commission, has recently assumed regarding an increase of rates, goes to show that the present, or lower, instead of the higher rates must be taken as being such a point. While the charge against new construction is a charge against capital account, the interest on that as well as the cost of repairs on both transportation and shop equipment becomes an overhead charge on the direct cost of transportation. If then the rates are fixed, it is desirable that

*Chief Engineer Universal Audit Company of New York. This article was entered in the competition on the application of scientific management to a railway shop, which closed June 15.

both the amount and cost of all shop operations be reduced to the lowest possible terms in order to reduce the overhead charge on the direct cost of transportation.

Any waste here or in any other contingent operations will either increase the cost or decrease the quantity or quality of the service rendered to the community, of which each of the workers is a part, whereas the attainment of a high state of efficiency should result in a decrease in cost or an increase of the quantity or quality of the service, thus benefitting the community. The interests of the community as a whole, of the stockholders as such, and of the workers as such are, therefore, identical. If the operation of the railway results in over or under protection to any of these interests, it will be because either the industrial or commercial management has been inadequate. If the industrial management has failed, the actual cost of production will be found to have been unduly increased. If the commercial management has failed, the profits will be found to have been improperly divided between worker, stockholder and community.

Because the shop organization is, as has been said, neither a beginning nor an ending, but simply a part of an intermediary, it is as unwise to attempt the immediate and exclusive application of the principles of scientific management to such organization as it would be to develop one leg of a horse. We must consider both the things which precede and the things which follow its operations. For instance; I was told, with much pride, by a shop manager of the number of locomotives which came out of his shop each month. This was not of much importance. The important thing was the *time which each locomotive had been withdrawn from service*. I was perfectly convinced from what I saw, being accustomed to observe such things and to draw correct deductions therefrom, that, if a chart had been made showing the chronological durations and relations of the actual operations performed, it would have been found that not only were there large wastes of time in the performance of the individual operations, but between them. Not the least evidence of this condition was the difficulty the executives had in comprehending the possibility of such a thing. They were not interested in searching for a remedy for a disease which they did not believe existed. Here we have a diminution of earning power co-existent with the increased cost of repairs, both of which add to the overhead charge, thus burning the candle at both ends.

To arrive at correct conclusions, we must first have complete and accurate statements as to what should have and could have taken place (*standards*), as well as of what has taken place (*records*). Liberal expenditures of both time and money are necessary in order to obtain these, but these expenditures are insignificant when compared with the savings which should result from their use.

Taking the maintenance side of the question, the first step should be to separate the process of deterioration of the direct operating equipment into the preventable and the unpreventable factors; second, to determine the actual and necessary rate of each; third, the causes of each; fourth, the remedies for each so far as possible. We have now determined the necessary gross rate and volume of repair work which should come into the shop. From an analysis of this we can determine the unit operations together with the material, equipment and energy and administrative methods which are necessary for their performance. Scientific management, so far as the shop is concerned, is the process of properly supplying these essentials and of directing their use.

The first essential is material. Certain material is fairly standard as to quality and the rate of consumption. Other material is more irregular in both respects. In either case, as the result of the above analysis, the exact date of delivery to the shop can be and should be fixed both specifically and in detail by a person who is in a position to grasp the entire chain of operations in which the one involving the use of any bit of material is but a link. While this work is often delegated to or attempted by a foreman or other person immediately engaged in the performance of manual operations, it is evident that such a course is illogical. Not only is the foreman unable to grasp correctly the entire situation, but the ill effects of any erroneous sequence which he establishes will be felt throughout the entire organization.

Having been given the desired date of delivery to the shop, the storekeeper should set a date for delivery to himself which is sufficiently in advance to admit of the necessary examination, checking up and redelivery. The order should then go to the purchasing agent. Having been instructed as to the quality of the commodities and the date at which they must be delivered to the storekeeper, the only variables in the operations of the purchasing agent are price and time. It should be possible to establish his efficiency upon the basis of a compound unit composed of dollars and days. Thus a high price would be compensated for by the saving in the productive time of the operating unit, which could be effected by a quick repair resulting from a quick delivery.

The next essential is the equipment by which the material is fashioned, or the work performed. Equipment represents a capital investment upon which interest and depreciation must be earned. It is therefore desirable to use the smallest possible quantity by which, when operated to its fullest legitimate capacity, the desired amount of work can be produced. This condition is not often as closely approached as should be the case. Here again we must use compound units to measure results. The cost of interest and depreciation on the machine, the time of operation and the cost of power must all be taken into account. It is conceivable that a quick acting machine might be so costly to maintain and to drive as to be far excelled by a slower machine which besides being far cheaper took less power to drive. Details of past accomplishments and the opinions of men and foremen in such matters are extremely unsafe and unsatisfactory as guides when contrasted with the cool scientific analysis of the efficiency engineer of the results which it is mechanically possible to achieve. There is, furthermore, a curious tendency to do things by halves, to utilize highly developed mechanical energy and appliances for a part of an operation and the crudest kind of methods for the rest. I have seen, in a railway shop, a highly developed press for forming boiler heads, operated by hydraulic pressure. The controlling valves, instead of being operated by mechanical energy through a secondary system of cylinders and pistons, were operated by human physical energy, applied slowly and painfully through levers. The same thing was true of the work of prying the heads from the dies where they often stuck. Boiler sheets were lifted and lowered over the jaw of a riveter by an expensive crane which was needlessly tied up on the job. The crane should have transferred its burden to a stationary hoist. Man, at a slow rate of speed, rotated the shell when rivetting the transverse seams. A vertical, power driven drum, cable-connected to the shell, should have done the trick more cheaply and quickly. These wastes clearly demonstrate the fallacy of depending on men immediately engaged in the direction of manual or mechanical operations for the evolution of operative methods.

The third essential is energy, of which there are two types—physical, which may be either of mechanical, animal or human origin; and mental, which is of both superhuman and human origin, the latter variety alone being under consideration at present. Human physical energy is essential to the control of either mechanical or animal energy. Human mental energy is essential to the direction of all types of physical energy.

Working back from the equipment, on one side we find in series, the tool, the generator, the engine, the boiler and the coal, which is one of the chief sources, terrestrially speaking, of mechanically energy. The boiler, engine, generator and motor are only the means whereby the latent energy in the coal is transformed, transmitted and applied to the tool. Controlling the tool we find the body of the man actuated by his mind which is his motor. Working back from the mind of the man, we find

that it is at the end of a series composed of the minds of the foremen, superintendents, general manager, president, executive committee, board of directors and stockholders. The wish in the minds of the stockholders that a railway shall be operated for the purpose of making money is the real latent energy which, transformed and transmitted through the whole human organization finally reaches and is applied to the mind of the worker and causes him, by means of his physical energy, to put the mechanical energy into operation. If the various appliances by which the energy in the coal is transmitted to the tool are not suited to the end in view or are not properly connected, the result will be disappointing. It is even more true in the human machine or organization that there must be a sufficiency of adequate mind units, properly connected, to insure satisfactory results. A motor cannot be energized through a lightning rod by occasional flashes of lightning. It must receive a continuous supply through proper connections from an adequate generator backed by coal of high thermal qualities. Similarly a man must receive a continuous supply of mental energy through a proper organization from a competent executive backed by energetic stockholders.

As we have seen, the railway shop is but a part of one of the principal divisions of a railway organization. In a well-designed power plant there must be a principal steam drum main into which all the boilers discharge and from which all engines draw the necessary steam. This steam drum may be compared to the chief executive officer. The title of president, usually employed, is incorrect, being purely parliamentary and not executive in its nature. A better term would be general manager, as expressing universal control of the operating organization. The departmental managers, which are the heads of the principal divisions, may be compared to the generating sets by which the energy, focused in the general manager, is applied to the various phases of the business.

In a power plant, however, but little in the nature of a refining operation, except a certain amount of drying, is applied to the steam in the drum. In the case of the human steam it is different. The increase in the volume of ascertained fact, in recent years especially, has been so rapid that it is physically and mentally impossible for the general manager of a great railway or other industrial enterprise to acquire a complete acquaintance with that which pertains to his line of work. To overcome this difficulty, two general methods have been pursued, sometimes separately and sometimes in combination. The first method is to require each member of the organization to absorb such new information as pertains to his particular work. This is not advisable because it requires a man to carry on, simultaneously, two radically different lines of thought which require different conditions and equipment for their operation. Productive and investigative operations cannot be conducted at one and the same time with mutual advantage. The second method is to attach certain specialists, or energizers, to various parts of the organization to perform the investigative portion of the work. This is an improvement, but it fails of entire success because the effect of this disjointed advice on the other divisions of the organization has not and cannot be properly digested in advance of its application. It is only when these specialists are entirely withdrawn from the operating organization and separated into sections corresponding to the divisions above alluded to, and put directly under the control of the general manager that success will attend their efforts.

When a new standard practice instruction is to be applied, it will have been considered from every possible standpoint; it will have received the final consideration of the chief executive, as to generalities, and

would be a development of workers, first into the administrative positions under carefully formulated instructions, and finally into positions on the staff which formulates these instructions. The expense of maintaining this staff would not be by any means an entire addition to the present operating cost, for most of the men are, at present, doing such work, but in the wrong place and under the wrong directions. Any additional cost which ought to eventuate would be many times regained from the increased efficiency of the great army of workers.

The fourth essential is the administrative methods by which proper directions for the utilization of material, equipment and energy are transmitted to the various units of which the organization is composed, and proper records are secured as to the results obtained. Both of these things are equally necessary for the comparisons which are essential to the successful control of any business.

The line of the outward flow of the directions must be carefully determined, in great detail, so that all units will receive their proper share of the directions in the proper sequence. The experience necessary to lay down these lines is, contrary to the common belief, quite distinct from that necessary to pass upon the subject matter of the directions. The phases of all such directions are much alike, as are the principal phases of all organizations. This is almost incomprehensible to those whose chief study has been that of the subject matter, but it is nevertheless true. The specialist in this work, therefore, finds much less difficulty in devising a proper routine for almost any business than the specialist in any one line would find in devising a routine for the business with which he is most familiar. The two lines of work are separate. The machinist can make a better typewriting machine than can the stenographer; though, being unable to compose the letters which are to be written upon it, he is unable to operate the machine to advantage after its completion. This the stenographer can do even though he is unable to construct the machine itself.

The line of inward flow of the records must carefully parallel that of the outward flow of the standards. The maxim should be a standard for and a record of every operation. Because frantic attempts have been made to deduce information from records alone, which it is impossible to get except from a comparison of records with standards, most concerns are loaded up with a vast amount of unproductive bookkeeping. It is quite possible to gather, at a large expense, masses of figures which never become of the slightest use, and to leave ungathered much data which is of extreme value. Hence the correct correlation of standards and records is of the highest importance.

Both standards and records, however, fail to be of use unless diligently studied by the various members of the organization, especially the chief executives. Of what use would be the most careful observations and plotting by the navigators of a ship if the captain did not digest the information and act accordingly? When the information has been put into proper form, the work of using it has not been even begun. For this reason the data should reach each administrator in such shape that only the problems suited to his rank will be presented to him for his solution, thus economizing his energy.

In closing this very brief discussion of the principles which should guide the application of scientific management to the railway shop and also, as is absolutely essential, to the entire organization, a word may be in order as to the characteristics of the efficiency engineer and the part which he should play. Such an engineer should be a corporation, or other aggregation of individuals, co-ordinated under a competent head and having among its members individuals able to advise in every form of *administrative* detail, both commercial, disciplinary and technical. No single individual can possibly have acquired the necessary breadth of experience which is necessary in order to properly

for his investigations, which should be impartial and unprejudiced.

He should lay down the entire form of the organization by offices, leaving the railway officials to fill them. He should revise the present routine and the forms which insure its operation, and make such specific recommendations as are necessary to bring about the desired condition. He should suggest the order of changes and promotions, but not pass upon the ability of the individuals to be affected by them. He should, directly or through trusted subordinates, give such explanations of new methods as are necessary for the proper understanding thereof, to any individual needing them. He should conduct such a process of friendly inspection, from the president down, as will determine, until the natural checks get into full operation, that the administrative operations are being properly performed.

This work will take several years in any railway for its accomplishment. Large results will not be seen immediately. Only patient and persistent effort and honest co-operation from all concerned will eventually produce them. Given these things, the results are sure to follow.

SHOP KINKS; NEW YORK, SUSQUEHANNA & WESTERN.

BY W. H. SNYDER.

Assistant General Foreman, Stroudsburg, Pa.

TWISTING ECCENTRIC BLADES.

A convenient device for twisting eccentric blades is shown in Fig. 1. The two hooks are placed on the eccentric blade

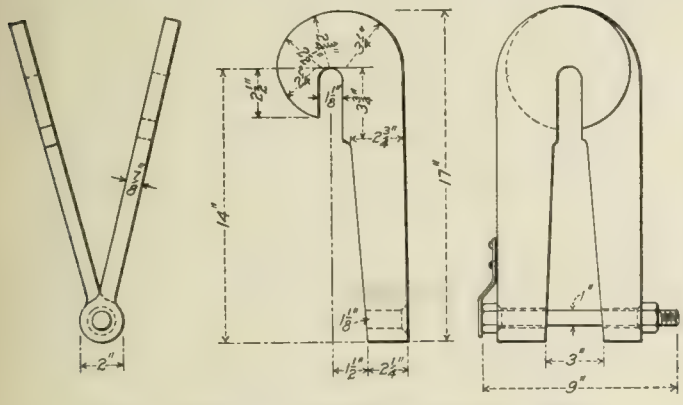


Fig. 1—Device for Twisting Eccentric Blades.

from opposite sides and it may then be twisted the desired amount by tightening the nut on the 1-in. bolt which passes through the ends or tails of the hooks.

UNIVERSAL OLD MAN.

A universal old man, useful for drilling purposes, is shown in Fig. 2. The base *A* may be removed from the upright by

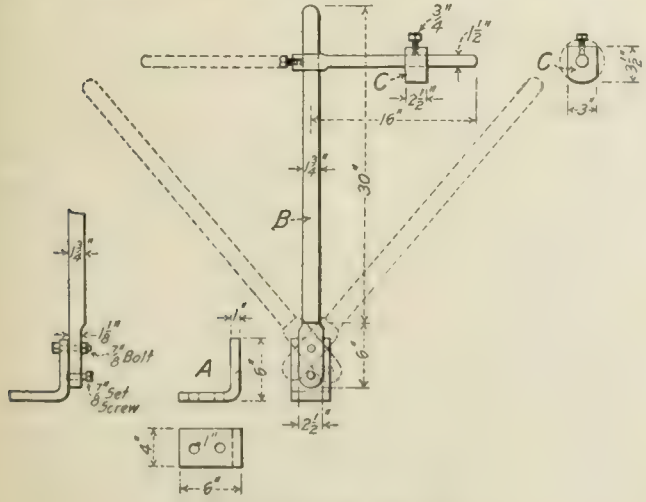


Fig. 2—Universal Old Man.

taking out the 7/8-in. bolt; it is thus convenient where an old man with a solid foot cannot be used. The 7/8-in. set screw at the bottom of the upright prevents the post from twisting on the base after it has been properly set. The block *C*, which is grooved or serrated lengthwise, does away with the necessity of punching the arm with centers and the device is universal in every respect.

MANDREL FOR TURNING TIRES.

The mandrel for turning tires, which is shown in Fig. 3, was made from an old pair of driving wheel centers which were taken from the scrap pile and were mounted on a scrap axle.

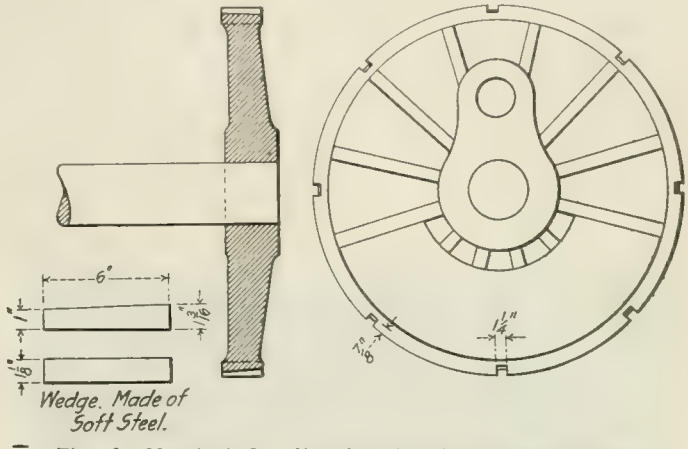


Fig. 3—Mandrel for Turning Driving Wheel Tires.

They were turned down about 1/8 in. smaller in diameter than the bore of a 48-in. tire and the edges were slotted, as shown, the taper of these slots being 3/8 in. to 1 ft. The wedges are driven from the outside and a pair of tires can be properly mounted on the mandrel for turning, or be removed from it, in a comparatively short time. The wedges do not have to be drawn up very tight in order to hold the tire securely. A

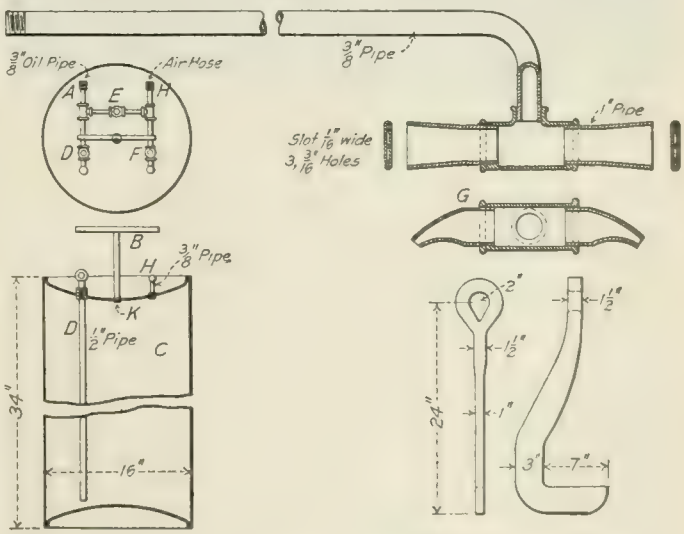


Fig. 4—Crude Oil Tank and Burner for Heating Tires.

mandrel of this kind is not only useful for turning old tires which have been removed from a heavy class of engine, but are thick enough to be used on a lighter engine, but they may also be used to splendid advantage where standard wheel centers are used and the finished tires are carried in stock at the engine houses and are exchanged for worn tires, which are sent to the shop for re-turning.

TIRE HEATING APPARATUS.

The tire heating apparatus shown in Figs. 4 and 5 is not only convenient, but is economical in the use of fuel. It uses the cheapest grade of fuel oil, about 12 gals. being re-

quired to remove a set of six 48-in. tires 1⅞ in. thick, and 25 gals. to apply new tires 3 in. thick. At three cents a gallon the cost of the 37 gals. of fuel oil would therefore be $1.11. Prior to the introduction of this apparatus, about 18 gals. of kerosene were required for removing a set of similar tires and 45 gals. for the application of new tires. At 10 cents a gal. the cost of kerosene was $6.30, or $5.19 greater than the cost of the fuel oil. By removing the handle *B* in the top of the tank *C*, shown in Fig. 4, the tank may be filled with oil through the hole *K*. When the handle has been reapplied, the air hose is connected to the pipe *H*. The burner *G* is connected to the ⅜-in. oil pipe at *A*. Air is admitted to the top of the oil tank through the pipe *H* and the valve *F* and the pressure forces the oil out through the pipe *D*, which extends to within 1½ in. of the bottom of the tank. The flow of oil is regulated by the globe valve *D* and the flow of the air which mixes with it by the valve *E*. Valve *F* is always left open when the apparatus is in use.

The hook shown at the right in the same illustration is used for supporting the tire as it is hoisted by the one-half ton chain hoist. Directly back of the tire in Fig. 5 and near the

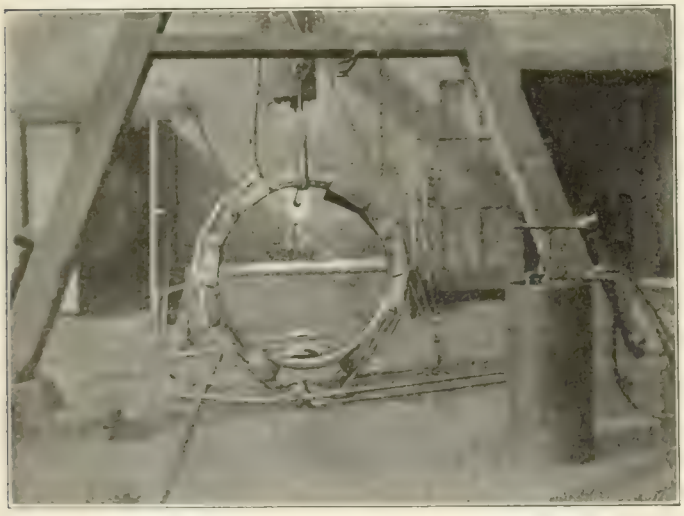


Fig. 5—Apparatus for Heating and Mounting Driving Wheel Tires.

center of the track may be seen two castings, which are securely bolted to the planks. Two pedestals, which are indistinctly shown leaning against the uprights of the large trestle, are placed in these castings, or bases, and the wheels are lifted by the air hoist shown in the back ground, the axle being placed on top of the pedestals. The pedestals are high enough so that the bottom of the wheel is some distance above the ground and in a convenient position for applying the tire after it is heated. Both the air and the chain hoists are suspended from trolleys, so that the wheels and tires may be handled easily and conveniently. The hoods, which are placed over the tire while it is being heated, are made of ⅛ in. sheet steel and are supported by frames constructed of ⅝ in. [illegible] so that they may easily be pulled away from the tire when it has been properly heated.

A [illegible] sued the Western Union Railroad for damages, which it set at $5000, because the railway did not deliver sundry carloads of freight until after the time prescribed by law. The case pleaded force majeure, which includes what our law calls "act of God." There was a strike on the railway, and on the docks there was no resolution, there was more freight than they could handle anyhow. But the court held that this did not excuse the railway, and it sent the parties to an arbitrator to estimate the actual damages.

APPLICATION OF SCIENTIFIC MANAGEMENT TO A RAILWAY SHOP.

BY C. J. MORRISON.*

Scientific management, which has so recently become a popular by-word, is a misnomer. The average interpretation placed upon the term is that it describes a certain system of management, whereas in reality it does not refer to specific methods but to basic principles of intensive production. The application of these principles to any business does not necessarily mean a thorough revolution of all existing methods and practices, as one would infer from the generally accepted description of scientific management. Changes in methods, however, may follow the application of these principles which direct the way toward maximum output at minimum cost. Briefly enumerated these principles are:

Establishment of an equitable standard for measuring the quantity and cost of output.

Continuous record of accurate and reliable production data.

Full knowledge and thorough analysis of all details.

The business of a railway is manufacturing and selling transportation and the problem is, wherein can railways furnish their product in a more economic manner. Before any progress can be made in the application of the principles involved, it is necessary for railway managers to know the actual cost of their commodity.

A thorough study of railway methods discloses the utter absence of standards which will serve as a comparative unit among the various roads, or even on the same road during different periods. In the operation of a railway much dependence is placed on the ratio of operating expenses to the gross earnings as a measure of efficiency in operation. Careful analysis of this standard will disclose it to be useless for the purpose, inasmuch as an increase or decrease in the revenue per ton hauled will alter the ratio, notwithstanding the highest efficiency of management in both instances. In the maintenance of locomotives, the generally accepted standards are cost per locomotive or cost per locomotive mile. Inasmuch as the size of the locomotive, the operating conditions, and the tonnage hauled all affect the maintenance cost, the value of either of the above standards as a basis is changed and all comparison is destroyed. The same objections apply to comparisons of maintenance of both passenger and freight cars.

In measuring locomotive performance considerable stress is often laid on the mileage run between engine failures, but careful investigation shows that there is a great variation as to the definition of an engine failure on different roads, and that the personality of the division master mechanic, trainmaster, and the division superintendent are all important factors in the determining of performance, irrespective of the actual record. It is, evident, therefore, that considerable attention must be directed to the formulating of proper standards for the purpose of measuring the efficiency, not alone of the individual departments, but of the railway as a whole. On one road the low cost of repairs per locomotive mile was given considerable prominence, while no attention was paid in any manner whatever to the cost of fuel, or to the tonnage hauled, which further indicates that standards must be provided on an extensive and comprehensive basis, since all of the various items of expense are finally included in the cost of furnishing transportation.

Proper standards having been determined upon, a suitable system of keeping records should be inaugurated in order that accurate measurements may be made at any and all times with reference to the situation in each individual department. The bookkeeping of the various costs oftentimes destroys any com-

*Manager of the department of effective organization, Sutfern & Son, New York City. The contribution was entered in the competition on the application of scientific management to a railway shop, which closed June 15, 1911.

parison that might be made due to the variation in what constitutes a capital or maintenance charge. This is particularly noticable in the cost accounting of shop production, one railway adding 10 per cent. above the actual cost of labor and material to cover surcharge, while another finds it necessary to add as high as 90 per cent. Inasmuch as 10 per cent. will barely take care of the shop buildings, it is very evident that many items which should be legitimately included in the surcharge are not given any consideration. Further, from the rules laid down by the Interstate Commerce Commission for the handling of the accounting features, it is perfectly feasible and proper for any road to add from 40 to 60 per cent. of its shop labor, charged to a general expense account that may be afterwards prorated over other accounts which have not participated whatever in the labor involved in this charge.

The present organization of the general officers on a railway does not conform to the ideal. Fundamentally there are two separate departments in any manufacturing business, divided between those who sell the product and those who spend the money in manufacturing it. In other words, one department gets the business while the other department spends the money. Therefore, an ideal organization would be one where these two departments were entirely separate and with officers at the head of each continuously watching the details in each department. On a railway, for example, the traffic department in reality acquires but a portion of the business. The general manager, general superintendent, or division superintendent spend a great deal of their time looking out for business in their local territories or in pacifying dissatisfied shippers, while their expenses are charged entirely to the operating or manufacturing side. It is safe to say that the average general manager, being on the manufacturing side, knows but little of the details of the manufacturing costs.

As to the method employed in the application of these principles, this must needs vary according to local conditions. One of the fundamental weaknesses on many roads is the failure to accord recognition to the ability of men in the mechanical department. In commercial life men rise regularly from the manufacturing department to the head, but in the railway work the cases where men have risen out of the mechanical department are rare. At the same time instances are numerous where men have left the mechanical department of railways and risen to the highest positions in commercial fields. Such a condition makes the department fundamentally weak, as there is no constant upward current, and stagnation results. The railway organization should be so modified that merit in the mechanical department is recognized, experience given in other departments, and a regular line of promotion established. The mechanical department should be made an active, integral part of the business of conducting transportation.

Second in the mechanical department to weakness of stagnation is the fact that, on a majority of roads, the organization is purely line. The application of knowledge to the business is therefore difficult, as the line is occupied with the routine duties and there is no staff to study the problems and apply knowledge. More than this, as there has been no encouragement to acquire knowledge in special branches, few in the line organization are competent to be recognized as authorities. Every road should have a staff organization, the personnel of which would differ on different roads and under different circumstances. In every case there should be a chief of staff with only staff duties. On the larger roads the staff might contain several members whose only duties would be staff, while on the smaller roads the assistants might have duties on both line and staff. For instance, a man might hold the line position of master mechanic and be the staff authority on machine tools. All problems concerning machine tools should be referred to him, and it would be his duty to keep himself so posted as to be able to solve these problems. The fact that staff positions would demand that a man keep posted on subjects outside of his routine duties would help to keep him out of a rut and would broaden his horizon. This feature alone would be of great value to a road.

The chief of staff should be a man with a wide range of experience, a keen sense of proportions, a good imagination and an analytical mind. He should direct the work of the staff, pass on all reports, make all recommendations, and make personal studies of the organization and general conditions in the shops. He should also act as the intermediary between the mechanical and the other departments and, in this capacity, produce the harmonious working of all for efficiency. One of his first steps in a shop should be to provide for adequate, reliable and summarized records. The immediate knowledge of costs is as important in a railway repair shop as in a manufacturing establishment, and the records should be so arranged as to show the costs of each operation. Later, standards can be established and any departure from the standards, either above or below, should be investigated. Costs which are obtained weeks after an operation is performed are valuable only as history. In many cases the costs can be obtained the day after an operation is performed and in all cases they should be obtained not later than the second day. If the cost keeping is properly done, this will not require an excessive clerical force. It takes just as many clerks to determine costs six weeks after an operation as it does to determine them the next day. It is simply a matter of keeping up with the work. The records should not only display the costs but should also contain full information as to men and operations. By using a duplicate carbon cost ticket these records may all be made at once.

Summarized reports, possibly in graphical form, should be given to the shop superintendent each week. These reports are the pulse of the shop and show the conditions immediately. The superintendent can at once apply remedies to those that are not normal. Another important record which should be kept is that of the materials used. The importance of this record can be illustrated by a concrete example. In one shop the record showed that 16 piston packing rings were being drawn for each engine that passed through the shop, regardless of the condition of the engine or whether the engine was simple or compound. As the compounds called for only eight rings this excessive use of material was investigated and the discovery made that the foreman ordered the extra rings to "allow for breakage." Needless to say the breakage was immediately reduced. The record also showed that certain parts applied to engines at the central repair shop were being removed at other shops and engine houses. Many other irregularities were revealed and stopped.

Just what would constitute the staff in any specific case cannot, of course, be stated in a general article, but in all cases the assistants in a broad sense should cover chemistry, power, tools and machinery and methods. Each should be the recognized authority in his staff position.

The chemist should study the problems of lubricants, materials, fuel and water. He should furnish specifications and arrange for tests that will assure the greatest economy—that is economy in the final analysis when viewed from all standpoints. He should also arrange for an inspection that would prevent departure from the standard specifications. The records should bring to his attention any inefficiencies arising from items under his jurisdiction. For instance, the question of unusually hard castings should at once come to his attention.

The assistant on power should be responsible for all problems of power and light, from the receipt of the fuel to the delivery of the power and light to the machines and men. He should not only provide for the most economical production of power and light, but also for the most efficient distribution. This means efficiency from all standpoints. Fluctuating and intermittent power and light are far from efficient. Neither is power efficient which is consumed by poor bearings and machinery, shafting out of line, bad belts, or leaks in the line. In one large plant the leaks in the air line consumed the entire power of a 100 h. p. compressor. This condition had existed for a long time, but

...ng was done until the power became a specific problem for one man. In the same plant a saving of 30 per cent. was made in the fuel bill by the adoption of coal specifications and a change in the design of the grates. Of course on the last problem two of the staff assistants worked together.

The assistant on tools and machinery should solve the problems of securing and supplying standardized tools and machines. He should provide designs of tools for maximum production and also arrange for a method of handling which will eliminate loss of time to the workmen. Only recently in a large shop which was inspected the machinists were noticed taking their tools to the forge where they were dressed according to their own ideas. New tools were also made to the workmen's designs. It was the old story of everyone's business and no one's special duty. The tools should all be made and ground to standard designs and a machinist should always be able to secure a new tool without leaving his machine or losing time. The providing of adequate grinding facilities is a very important duty, but is usually left to a clerk to simply order an "emery wheel." This member of the staff should be responsible for the condition of all tools and machines and for the design of labor saving devices. The workmen will be of great assistance in this if suggestions are encouraged and the co-operation of the men secured. In commercial enterprises it has been found profitable to pay for useful suggestions. There is every reason to believe that this policy would pay on a railway.

The assistant on methods should handle the problem of securing the greatest efficiency from the workmen. He should provide for the planning, routing and despatching of work and so arrange for doing it by the most efficient methods that the work will be handled the fewest possible number of times, and that it will be so despatched that each piece is ready when needed, and also so that at least one job will always be assigned ahead to each workman. This despatching is exceedingly important as no matter how efficient the workmen may be, or how willing they are to work, there is loss if the work is not kept up to them. There is also a loss if each piece is not ready at the right time. It is not an infrequent occurrence for an engine to stand in the shop while workmen idle around it waiting for some part to be rushed to completion. The assistant on methods should also arrange for the inspection of incoming parts to be repaired, of outgoing parts after repairs, and of finished new parts. It is not at all infrequent for the final decision as to repairs to be made, and of new material to be ordered, to descend to some workman. Engines have been sent to the shop with no instructions except, "Needs general repairs." Careful inspection should be made and no work should be done or material ordered without proper authorization. The inspection should extend to the engines in service in order that repair parts may be prepared before the engine comes to the shop. One case comes to mind where an engine waited nine months for a part, ...ought it was known for a year before the engine came to the shop that the part would be required. This assistant should also supervise the ordering of material from the store-... and the ...ntrol of stock. The handling of scrap is very ...portant, as the neglected scrap pile often eats up money. Economies can be effected not only through the efficient han-...dling of scrap, but also through the prevention of serviceable ...material going into the scrap pile. By limiting the market to ...a fixed price.

Standard times should be established for each operation, stand-...ard methods of doing the work prescribed, and a record kept of the ...performance. The desirability of offering a premium to encourage the attaining of standards seems to be questioned by leading ...shops. The premium should be established just as soon as a fair ...day's work can be made without overstrain, but no premium can be ...paid for any improvement that can be made before the standard ...time has been established. Time for learning a task can be allowed ...when the task is specified, but this should be done only when ...necessary. In all cases the standard should be attained by the ...average workman. The organization must be constructive, and everyone in the shop must be encouraged to think.

SHOP KINKS; FROM AN EASTERN SHOP.

BY AN OLD RAILROADER.

TRUCK FOR MOUNTED WHEELS.

A simple truck or buggy for handling mounted engine truck wheels between the engine house and the machine shop, without using the turn-table and pit tracks with the resulting delays, is shown in Fig. 1. When first built it was fitted with two movable plates *A*, which were used for running the wheels on and off the truck, but these have been removed and wedges are now

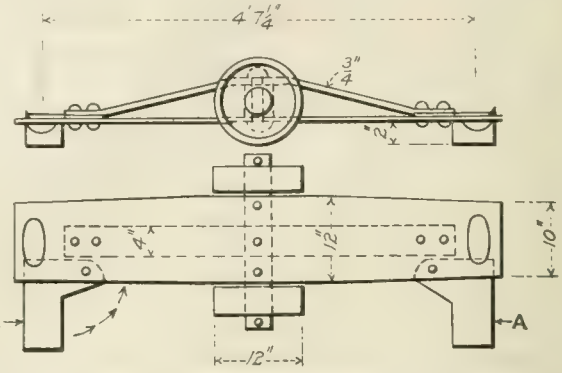


Fig. 1—Truck for Mounted Engine Truck Wheels.

used for placing the wheels on the plate or floor of the truck, which is only 2 in. above the ground. Two ⅝-in hooks are used to catch the spokes of the wheels, and two men can handle a pair of 36-in. wheels easily. The floor of the truck is made of ½-in. boiler plate, with a 4-in. by ¾-in. brace extending over the axle. The floor is dished out at each end to keep the wheels from rolling off the truck.

PISTON HEAD MANDREL.

A mandrel for turning piston heads on a vertical boring mill is shown in Fig. 2. Most railways use a standard taper and standard sizes for the fit of the piston rod in the piston. The mandrel has a lug which fits the center hole of the boring mill table, and two lugs or projections which fit in slots in the table,

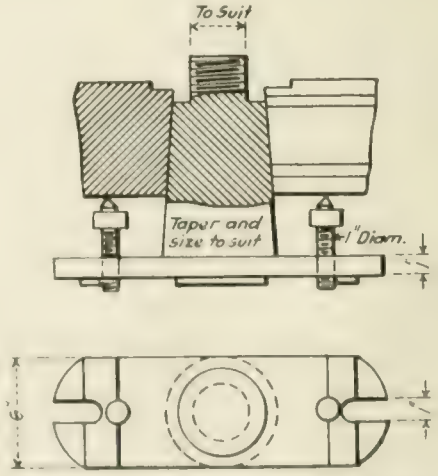


Fig. 2—Mandrel for Machining Piston Heads on a Boring Mill.

thus relieving the strain on the clamping bolts. A nut and a washer on the end of the mandrel draw the head down tight. The two 1-in. set screws are used for removing the head when it is completed. In machining the piston heads, they are first bored and reamed to fit the piston rod and are then placed on the mandrel. The nut and washer are applied and the roughing and finishing tools are placed in the two heads of the boring mill, these two operations being performed at the same time. Standard tools for the packing ring grooves are then placed

in the heads, and after the grooves are finished the nut and washer are removed and one of the boring mill heads is used to recess the piston head for the piston nut, while the other boring head operates a tool for rounding off the corners of the piston head. On a 50-in. boring mill, seven piston heads, 22 in. in diameter and 6 in. thick, were finished complete in 10 hours at a cost of 43 cents each for labor. This is much less than the same work could be performed for on a lathe.

ROD TRUCK.

The truck shown in Fig. 3 is not a circus stake puller, as might be inferred at the first glance, but is used for transporting side and main rods from the engine in the erecting shop or engine house to the machine shop. With it one man can handle a main rod much easier than three men could handle it otherwise. The buggy is run over the rod, or rods, and the handle is raised. A chain is passed around the rod a little back of the

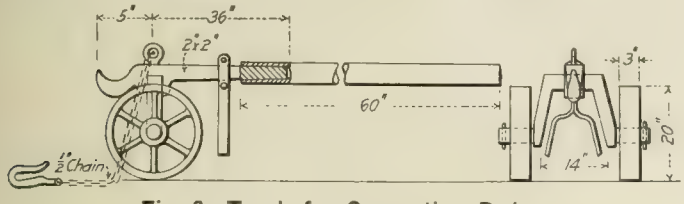


Fig. 3—Truck for Connecting Rods.

center and is hooked up. The handle is then pulled down and the rod is raised from the ground, the lighter end catching in the fork just back of the wheels. I have seen men pick up rods so close to the center that when the handle of the buggy was in a horizontal position, the rod would remain so. It is then an easy matter to push the rod about the shop or engine house.

CROSSHEAD SHOE JIG.

A jig which facilitates the planing of babbitted crosshead shoes is shown in Fig. 4. It is practically one-half of a crosshead, except that it does not contain a hole for the piston rod. The shoes are bolted on, as shown, and a special tool, which finishes the shoe in eight strokes of the planer, is used. The finished crosshead shoe is 6 1/32 in. wide. The tool has a 2¼ in. cutting face and is also made so that the sides will cut. The first two cuts are taken in the center and then one at each side. Then the finishing cuts are taken in the same

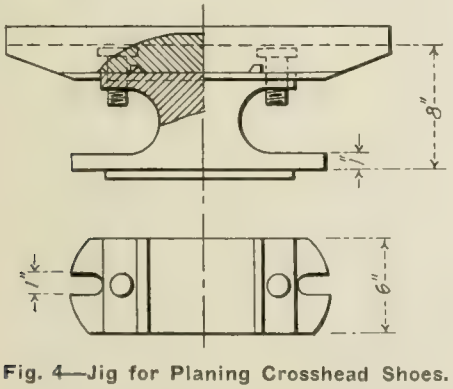


Fig. 4—Jig for Planing Crosshead Shoes.

manner. I have used a tool with the cutting edge the full width of the finished crosshead, but in crowding it would occasionally pull off the babbitt. When the shoe is removed, no scraping or fitting is required. A pair of these shoes may be planed up at the cost of six cents.

AIR PUMP VALVE LIFT GAGES.

Two gages for getting the correct lift of the discharge and receiving valves of 9½-in. air pumps are shown in Figs. 5 and 6. In Fig. 5 the application of one of the gages to the air chamber cap is shown; when the movable piece comes in contact with the projection on the cap the other end of the gage shows the correct distance to the valve when the gage is laid on the cylinder casting into which the cap screws. Fig. 6 shows the valve in position and the gage checking the lift, the other end of it having been properly set. As shown

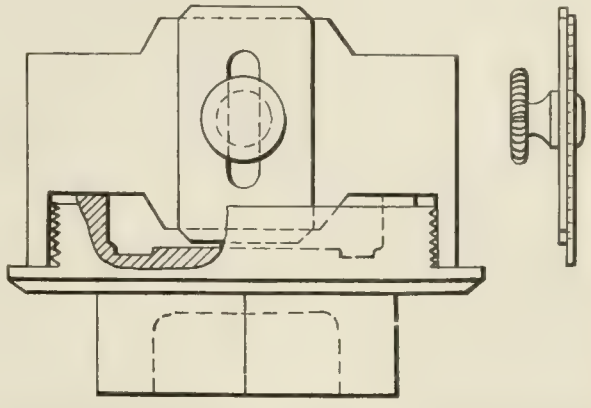


Fig. 5—Gage for Checking the Depth of Air Pump Receiving Valve Cap.

on the sketch, the valve has too much lift. When the sliding scale or piece is set for the cap as shown in Fig. 5, or for the valve as shown in Fig. 6, the reverse end of each gage is correct for the lift of the valve in the first case, or the depth of the receiving valve chamber in the second case. The construction of these two gages is such that the use of the

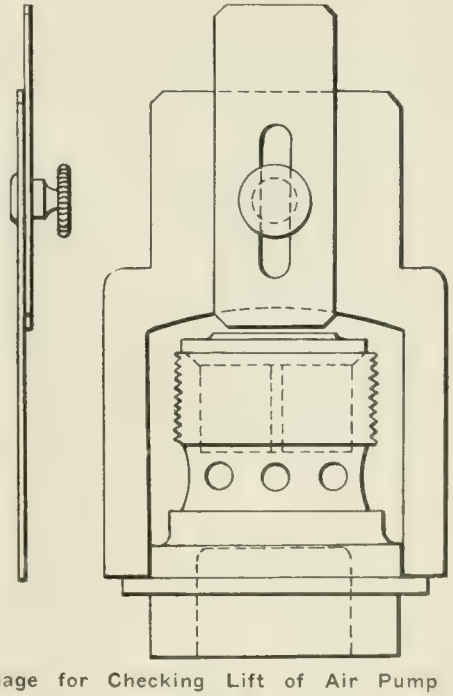


Fig. 6—Gage for Checking Lift of Air Pump Receiving Valve.

depth gage is done away with. As only one scale is used, there is less possibility of error. The center pieces are movable in both gages and may be locked in any position by the knurled nut or thumb screw. The gages are made of 1/16 in. sheet steel, hardened and ground. Gages for 8-in. and 11-in. air pumps may be made in the same way.

In Baden they plan to decorate their waiting rooms with photographs, of a uniform size of 30 in. x 60 in., representing picturesque landscapes, buildings, etc., in the grand duchy. Photographers, professional and amateur, are called upon to submit pictures, bearing in mind that they must be attractive when enlarged to this great size, and prizes are offered for the best ones.

THE MAKING OF GOOD MECHANICS.*

BY D. C. DAVIS.

Apprentice Instructor, Atchison, Topeka & Santa Fe, Newton, Kan.

Any apprenticeship system to be a success must have the approval and support of the highest officials. It should be in charge of a man who has had experience in handling other men, one possessed of the personal magnetism necessary to draw men to him and promote mutual confidence. He should also be a man who is in full sympathy with the work and in position to devote both time and energy to it. The local officials can do much towards building up such a system by their co-operation. The shop foreman of today is not the fatherly, easy-going individual of former days, but a business man to whom the management looks for the shop output. He has his own work to be taken care of and to be done in the least possible time and will not have much time to spend with beginners. If a boy is quick and bright he may pull through by himself with a comparatively small amount of attention, but the slower and more plodding brother will be dropped unless some one takes the time to show him. This is where the shop instructor becomes a necessity. It is his duty to instruct the boys in the correct and most efficient methods. He should have from twenty to twenty-five boys under his care, but not more than this. He should be capable of performing any of the operations called for in the shop. He should be neat in his personal appearance and have good morals, as his influence on the boys under him is great. The success of the apprenticeship system is determined largely by the competency of this man.

When the boy enters the service he should supply himself with the necessary tools to do the work in his department, unless they are furnished by the company. An experienced workman can work with poor tools but it is difficult for beginners to learn to do any kind of work properly with such tools, or no tools at all. Each boy is shown how to do his work right and to properly care for his tools. He is advanced as rapidly as possible after having become proficient in any line of work, the object being to provide as much variety as possible and to keep the boy from apparently standing still, as this leads to discontentment. Boys are treated with respect and are made to feel that they are a part of the shop organization; that the shop in which they work is a good place to stay, and they are encouraged to feel at home there.

The school instructor, who conducts the classroom work, should be educated in the technical branches and also have experience in practical work. What was said as to the shop instructor's habits and morals is just as applicable to the school instructor.

[illegible] attend school four hour a week, on company time, and is paid the regular rate while attending school. The classroom should be as light and cheerful as possible. The subjects taught are: Mechanical drawing, sketching, mathematics, the principles of mechanics, and business letter writing. All of this work should pertain directly to the shop work with which [illegible] should be a supplement to the shop work. For example, a boy is put in the valve gang in the shop. The school instructor knows when the classes reach and the boy is given work on valves in the schoolroom. The principles of the different valve gears are explained to him, and by sketching and supplementary reading matter prepared by the instructor he learns how the changes and adjustments are made and why. The shop men say that this is a help to the boy because he understands the work and takes hold of it better.

When a boy is a little backward on some line of work in the shop it is found that if he is drilled on that particular branch in the school it nearly always brings good results. Likewise the boys are instructed individually in the school, as in the shop, as one boy may require more help than another. It sometimes happens that two boys in the same class are working on the same thing, and, if the instructor sees fit, he may allow them to work together.

In some places the schoolroom is used by the boys as a sort of clubroom, where they hold meetings in the evenings about twice a month. Here they discuss mechanical subjects pertaining to their trade. They are governed by parliamentary rules. In this way they learn to express their thoughts intelligently without becoming frightened at the sound of their own voices.

A careful record is kept of each boy, and at a moment's notice one can tell just what and how well each one is doing, both in the school and in the shop. This outline of the method of teaching and training apprentices may be modified and used to advantage in training other help. Many men in the shop would work harder and take more interest in the work if they felt that there was an interest taken in them. In some places night schools have been established for shop men. The same objection holds here as with boys; a few will stick to it and get the benefit and others feel that they cannot afford it, and cannot spare the necessary time.

*Submitted in the competition on the application of scientific management to a railway shop, which closed April 15, 1911.

APPLICATION OF SCIENTIFIC MANAGEMENT TO A RAILWAY SHOP.*

J. S. SHEAFE,

Engineer of Tests, Illinois Central.

The application of a more or less scientific management is being followed up in almost every shop of any size in the country. Increase of judicious economy is increase of efficiency, the latter meaning increase of scientific management. In all fairness to the efficiency engineers it is doubtful just how far their massive scheme of minute detail can be advantageously applied. The application of scientific management, in some cases, has been the introduction of piece work. This is always a good thing if careless work can be overcome, the right count made, and not to be overlooked, if an accurate knowledge can be obtained of the cost the necessary additional force adds to the work, or the finished article.

There is a pressing need in most shops for a more careful check on the time of doing certain classes of work, even if only a close approximation. A cost of labor and material can easily be recorded, for future comparison, and the record can be kept by the foremen and gang foremen. Should a locomotive go into the shop for a general overhauling, and tires be ordered after stripping, there is room for improvement.

An important part of scientific management would be the addition of an engine and boiler inspector. As soon as an engine arrives dead on the shop track, it should be carefully surveyed and material for repairs immediately assembled. A good boiler man should be ready with new side sheets, firebox, or any part of the boiler. Time would be saved, and hence money, and the output would be increased.

This would be facilitated by standards, the best recommendation of the efficiency engineers. If the standardization of shop practices and tools were the only thing accomplished by them, their value would be inestimable. What a great thing it is for an engine house man in a small town to wire in for an engine part and merely name it, telling the engine number! It applies equally as well to car repairs, passenger and freight, but means more work on the part of the drafting force and closer touch on their part with what is going on in the shop.

When a machine is set up for making a certain piece, extra parts should be made and added to the stock, thus saving the expense of again setting up. A maximum output, with the quality of the work not under a high mark, and a minimum of expense, will be scientific management. To attain the maximum output several things must be considered, in the first place, pre-

*Submitted in the competition on the application of scientific management to a railway shop, which closed June 15, 1911.

liminary planning is necessary as to what will be needed, when needed and how it will be obtained. This means proper supervision, or a head who can see the critical moment far in advance and have all preparations made to meet it. Work can be well done just as easily as poorly done, and with far greater satisfaction to the one who does it.

It is almost axiomatic that minimum cost follows maximum output. The man responsible for a shop's success would not have the ability to produce the maximum output unless he were also able to do it, not cheaply, but at a reasonable cost.

Consider a shop where everything is clean and neat, the employees making large wages under piecework and bonus systems. The output is large and everything about the place looks prosperous and good. Every cost can be shown instantly (and correctly?) and anyone will admit it to be a shop to which so-called scientific management has been applied. However, the painting may have been the most carefully done work, and while the rolling stock looks nice it will not stay out in service. In an endeavor to keep down the cost, records and competition in records have a tendency to promote less exact work. The repairing of rolling stock in such manner that it goes out and sticks is really the good old fashioned, hard shelled management that keeps trains on time, makes money for the stockholders and upbuilds the reputations of the operating officials. One may prove that $2 = 4$ on paper, or that the returns from a 10 acre fruit farm will exceed the most extravagant wants, but the conditions do not change for all that. It takes just so long to accomplish a certain piece of work. An amount of figuring will perhaps bring out some short cut, or improvement, but if it does, disregarding the usual "personal equation," it merely reveals the inventive genius of the man who accomplishes it.

If we are to have scientific management, let us go for it in a reasonable manner, as some shops have. Their attempts at improvement are not radical, but are successful. The best man is enabled to make the most money, as is right. His work corresponds to his pay check. The standardizing of everything possible is a large factor in the total plan. Free rein to, and proper recognition of, original ideas is lacking in some railway shops, and the "what's the use" idea is very prevalent. In general it may be said that if all loafing is eliminated, the indifferent and careless workman let out, co-operation and harmony built up, scientific management has imperceptibly crept in and will influence everybody and everything constantly and appreciably.

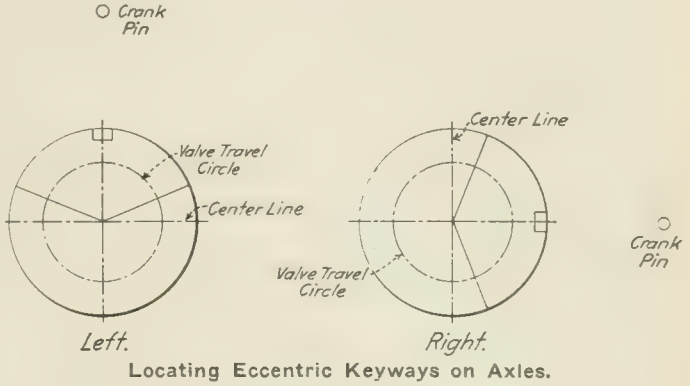
LAYING OFF ECCENTRIC KEYWAYS ON AXLES.

BY JOHN V. LE COMPTE.

Foreman, Baltimore & Ohio, Newark, Ohio.

Laying off axles for eccentric keyways can, if care is exercised, be accomplished with a degree of accuracy that will eliminate the use of offset keys. Many methods have been employed to obtain the exact position of keyways, but if the axle is new no better method can be employed than that of placing the axle on V blocks on a surface plate or on the platen of a planer. The exact center of the axle should first be obtained by means of calipers, the hole for the lathe center being plugged with soft lead. The first line drawn through this exact center, as shown on the accompanying illustration, should be one perpendicular to the bottom of the keyway for the wheel center and axle, provided this keyway is in a line between axle and crank pin centers. The next line, called the center line, is drawn through the center perpendicular to the first line. Next, draw a circle from the exact center with a diameter equal to the valve travel. In determining the valve travel many mistakes have been made by using the throw of the eccentrics. This does not necessarily equal the valve travel, for one arm of the rocker may be longer than the other, thus making the travel different from the throw of the eccentric. From both points where the center line intersects this circle, lay off on the circle, towards the crank pin, a distance equal to the lead plus the lap that is to be given the engine. Through these new points draw lines to the exact center. These lines will locate the middle of the keyways and their bottoms should be made perpendicular to them, the forward motion eccentric to follow the main pin and the back motion to lead.

In cases where mistakes in laying off keyways are made or where they have been worn and new ones are required, the main wheels are changed over, or twisted around, the left wheel on the right side and the right on the left. This, of course,



Locating Eccentric Keyways on Axles.

necessitates new keyways, as the old ones would not be in the correct location. To obtain the new positions of the keyways, draw a circle on a piece of tin the same diameter as the axle and proceed as before, obtaining the location of the keyways on the tin instead of on the axle. To locate the new keyways on the axle itself, draw a line on the inside of the wheel center from the exact center of the crank pin toward the exact center of the axle; where this line meets the axle draw a line along it, parallel to its axis. From this second line locate the keyways, by means of dividers, laying off their center lines as found on the piece of tin.

FLUE SHEET CINDER FORMATION IN LOCOMOTIVES.*

BY ROBERT JOB.

Flue sheet cinder is the technical name for a growth which forms, as the name implies, on the flue sheets of locomotive boilers, gradually covering the ends of the flues, unless laboriously removed by the fireman, and ultimately choking the draught. Under some conditions this formation never occurs, and an engine may run year in and year out without difficulty due to this source, but with certain changes the same locomotive may suddenly find a normal rate of steaming out of the question. The composition of these clinkers varies decidedly, and the following analyses of some taken from engines using different types of fuel, will give a general idea of the range which may be found:

	No. 1 Anthracite Coal. Per Cent.	No. 2 Bituminous Coal. Per Cent.
Silica	52.15	28.54
Alumina	34.51	12.30
Total Iron (figured as Fe_2O_3)	[illegible]	5.00
Total Sulphur (figured as SO_3)	0.81	4.30
Lime (CaO)	1.68	2.75
Magnesia (MgO)	0.27	0.40
	100.71	100.39

In these analyses the total iron has been figured for convenience to the sesquioxide, although a part existed in the ferrous state. Clinker No. 1 was of a greenish-red color, while the other was of a deep red due to the higher proportion of iron and to its more complete oxidation. It is interesting to note that in most cases relatively little sulphur was present in these clinkers, or "sulphur lumps," as they are often called, and the proportion of alkalies was usually low. The cinders were generally of a characteristic

*Abstract of a paper read before the American Society For Testing Materials at Atlantic City, June 27 to July 1, 1911.

structure and examination under the microscope showed that they were built up of small dark-colored particles which had fused together, resulting in a dense though somewhat porous form. Under service conditions it may be almost impossible to remove these cinders from the flue sheet owing to the more or less plastic state caused by the high temperature of the firebox. When cool they are, however, rather brittle and break with a vitreous fracture.

It was evident that the quality of the coal was of great importance, and a large number of analyses were made of a representative sample of the coal used and of the cinder found on the same run when the formation occurred. On making a comparison, it was found, in general, that the composition of the coal-ash corresponded with that of the cinder, but the percentage of iron in the cinder was always higher than in the ash from which the latter was composed. Moreover, the fact was generally developed that when the proportion of iron in the coal-ash was low, say, below about 1 per cent., or when the color of the ash was white or gray, no formation of cinder, or only a slight one, appeared upon the flue sheets, regardless of the proportion of ash present in the coal. In fact, no formation was observed with coal of this character even when the proportion of ash in the coal averaged over 25 per cent. Under these latter conditions the flues themselves became more or less choked with the light powdery white ash, "sulphur dust," as the deposit is termed, but it did not adhere to the flue sheet and no clinkering occurred. Analysis showed that the percentage of iron in these flue ashes was lower than that originally present in the coal-ash. In other words, the particles containing iron, being heavier, tended to remain behind and not to be drawn into the flues. It also developed that as the percentage of iron in the coal-ash increased, the tendency toward and the extent of the flue sheet cinder formation increased, beginning often when about 2 per cent. of iron was present in the ash. When the ash contained 2.5 per cent. of iron the clinker formation on the flue sheet was more marked, and it generally became excessive when the ash contained 5 per cent. of iron.

Throughout this paper the proportions of iron have been figured, unless otherwise stated, in terms of metallic iron (Fe) for convenience of comparison. In the course of the investigations it was thought that the excess of iron found in the cinder might be derived in some manner from the firebox itself, owing, perhaps, to the action of fumes or of moisture upon the steel, but investigation showed that under the ordinary condition of service, pitting or corrosion of the sheets within the firebox or combustion chamber did not occur, thus proving that the iron in the clinkers was present originally in the coal and was concentrated in the cinder.

From the results of the study, it appeared that the formation of the flue sheet cinders was due principally to the presence of iron in the coal-ash in proportions exceeding about 2½ per cent. Also the actual building up of the cinder was readily understood when we considered that upon shaking the grates, or even by the jolting of the engine, fine particles of ash were loosened and were then easily drawn over to the flues by even a gentle draught. The [illegible] of the firebox and combustion chamber brought them [illegible] to a partially fused, pasty condition when they contained a fair proportion of iron, and on coming in contact with the flue sheet they adhered to it and were ready to hold the particles next drawn against them, thus gradually building up the clinker.

[illegible] from the bottom of the flue sheet upward, [illegible] the fact that the particles of cinder that were [illegible] the more liable, [illegible] of course the lighter and finer ones, were drawn against and adhered to the lower part of the flue sheet. The cinder accumulated there until the [illegible] were partly closed, the draught was [illegible] and [illegible] were carried higher and higher until the flues were more or less [illegible] and combustion was seriously affected.

In the course of the investigation it was found that flue sheet cinders may not in some cases be produced even when the proportion of iron in the ash runs relatively high, the difference being due to the proportion of ash in the coal. When less than 10 or 12 per cent. of ash is present with the proportion of iron indicated above, the flue sheet cinders may be expected to form, but if with the same content of iron, the proportion of ash in the coal averages about 15 per cent., or more, the complaint is apt to be that the coal "has no heat," the reason being that so much clinker forms upon the grate that the draught is interfered with and this, in turn, prevents the particles of iron from being drawn and forced against the flue sheet to the same extent that would occur with a better draught. Also, owing to the lower temperature in the firebox under these conditions, the particles are not apt to be in a partly fused condition and they consequently merely collect in the flues but do not adhere to them.

Choking of the draught through the grates is especially liable to occur when the proportion of ash in the coal is very low, say, less than 5 per cent., with a high proportion of iron, as, for instance, 7 per cent., or more, and we know of cases under these conditions in which the clinker upon the grates was so fluid that it "ran like molasses," as the men said, sticking to the grate and effectively cutting off the draught. It has also been noted that flue sheet cinder formation is greater in simple than in compound engines, this being due to the fact that a larger number of ash particles are drawn against the flue sheet under the stronger draught of the simple engine. Also the formation is much more rapid with wet coal than with dry, this condition being readily accounted for by the dissociation of the moisture in contact with the incandescent coals into oxygen and hydrogen gases which, in connection with the draught in the firebox, produce intense heat and fuse into cinder particles, ash which contains a relatively smaller proportion of iron than that which causes clinkering with dry fuel. Owing to this condition flue sheet clinker formation is apt to be more prevalent in the winter months than in the drier season.

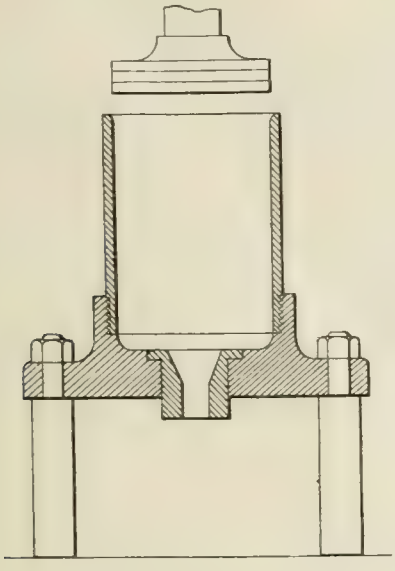
From the general statement which has been made it will be clear that the formation of flue shee cinders is an index of the fusibility of particles of the ash, and it might be thought that whatever would tend to decrease the melting point of the ash likewise might be expected to increase this type of cinder growth. The evidence obtained seems to indicate, however, that this does not necessarily follow, and the decided increase of iron which was found in the flue sheet cinders shows that this element has a large influence in promoting the formation. We have found as a matter of practice that flue sheet cinders can be avoided under ordinary conditions of service, by use of white ash coal, or coal in which the proportion of iron is less than 1.5 per cent., when figured as Fe.

Discussion.—The discussion was a brief experience meeting, in which it developed that, in some cases, the cinder formation had begun at the top of the tube sheet instead of at the bottom, a condition explained on the basis of the draft being greatest through the upper rows of tubes. It was also suggested that the condition of the ends of the tubes might also be a cause of an increase of cinder formation. For example, if the beading were to be burned off so as to leave a rough end projecting into the firebox, these rough places would afford a most efficient means of catching the particles of plastic cinder as they passed. The relationship between tube leakage and cinder formation was also touched upon, with the expressed and uncontradicted opinion that leakage was a cause of cinder formation rather than the reverse. For it had been found that, in some instances, tube leakage had stopped after the flue sheet cinder had formed and been knocked off.

On the 1st of April, 1910, President Dorner, the head of one of the Prussian railway directories, was engaged to take charge and organize the management of the state railway of Chile, some 2,200 miles, and was given leave of absence for that purpose. Apparently Chilian politics have been too much for him, and after a year's stay he returned to Germany.

GREASE PRESS.

A simple grease press in use in the Canadian Pacific roundhouse at Glen Yard, Montreal, is shown in the illustration. It consists of a 6-in. pipe that has been bored out and screwed into



Grease Press.

a cast iron base. This base receives the grease die which is slipped in from above. After the pipe is filled with the grease to be formed, the piston is forced down by air pressure, driving the grease out through the die in the base.

INSTRUCTION OF APPRENTICES AND HANDY MEN.*

BY AN OLD RAILROADER.

The machine shop foreman is the man to whom the greater part of the work in developing mechanics from raw material belongs. On the selection of this raw material and the care it is given depend the quality of workmen that will be sent out three or four years later.

Years ago it was an easy matter to get good, healthy, intelligent boys to learn the mechanical trades because there were less inducements in other walks of life. Today it is a hard matter to get a boy of any intelligence to even make a start to learn a trade, especially those trades in railway shops. Their parents do not care to see them spend four years working for hardly enough to pay their board and clothe them decently, and then face the uncertainty of steady work when the apprenticeship is completed, for even if they could afford to let them learn a trade, as a rule 90 per cent. of the roads do not want the young men when they have completed their apprenticeship. They are furloughed as soon as free to make room for the allotted number of men. Then again the annual reduction in both force and hours has a strong tendency to keep boys who would make good mechanics away and lands them in other pursuits that may not pay as well in wages per hour, but which pay far better on a yearly basis.

Very few parents want to see their boys leave them at a time when they should be getting some returns for the years of care and expense that they have been put to in raising them and giving them a schooling. It is certain that a young man when his trade is learned will want to work at it. This results in having to leave home, for, as stated above, he is not wanted in the shop that has been making money out of his labor for three or four years.

Some years ago this was not the case. A young man that paid attention to his work and showed any marked ability was given every chance to go ahead, his superiors knowing full well that in the years to come he could be depended on and would be able to fill any position. There is no such an opportunity now. Those positions are only open for college graduates or men from technical schools who can take a piece of paper and a lead pencil and show how the work should be done and the savings that can be effected. It is my experience and I believe it is so with all other railway men (I mean mechanics), that not one in fifty of the class of men mentioned can do a good shop job of any description, although they can figure the saving that may be effected on all jobs, even to the way a cotter pin should be applied and opened. Not one in twenty knows enough to figure the cost, if a saving of five minutes is affected in doing a job and a vital part is neglected in the hurry to make the efficiency man's figures good. If a wreck or breakdown occurs on the line, which is often the case, on whom does the blame fall? Not on the efficiency man. Oh, no! He is too valuable; he is saving for the company on paper at the terminal on an average of $10 per day over and above his salary, or percentage, and the company is paying out one hundred times as much due to failures and breakdowns caused by the new hurry-up methods. This is an everyday occurrence and the man that was driven to do the work so that the other's figures were made good is either suspended or discharged for inefficiency, for simply doing as he was told.

Pardon me for getting away from my subject, but I believe it will help to show why so few good and capable boys are learning the mechanical trades at the present time, particularly in railway shops. Another reason is that there are two and sometimes three classes of apprentices in nearly all shops. All three may be working at the same class of work and their wages vary as much as two to one. This is not a good incentive for the low-priced boy. Knowing that he is only getting one-half as much as the other felow, he will lag a little at first and go from bad to worse, resulting in being let out entirely. This practice has a demoralizing effect on all. The only boys that seek such employment are in the majority of cases those who cannot be made to attend school and are placed in some railway shop to keep them out of mischief. Few, if any, of this class ever complete their time.

Apprentices should be handled just as they were when they first entered school. Begin by getting their attention fixed on learning to run a machine by showing and instructing them in the various movements until they get acquainted, letting them ask questions and being always ready to give them an answer. Get their confidence and when this is done the rest is easy. Tell them that you expect them to make mistakes of various kinds, but insist that they must not forget the causes leading up to each one that they do make. By this means they will in a short time begin to make progress and then the work can be given to them.

One thing should be emphasized and that is to do the work well, even if it does take a litte more time at the start. Let speed come afterwards. Regular changes should be made from machine to machine, and at stated times, for those that do good work. This acts as a prod to those that are liable to lag or are slow due to other causes. It is with this last class that the foreman or instructor should spend his time developing their weak points and in cases even helping them along by taking the machine in hand and demonstrating how the work should be done, letting them see that you are interested in having them develop and keep up with the others.

The foreman should see that all the boys study drawing and learn to understand the reading of blue prints or sketches. It must be admitted that in a great many shops there are very few that understand blue prints or their use. This should not be the case.

The writer with hundreds of others had the advantage of learning his trade under a man, the results of whose work

*Entered in the competition on the instruction of workmen and apprentices which closed April 15, 1911.

may be seen today in the men who served time under him and who are now holding positions from foreman up to general manager, superintendent and general superintendent motive power from New York to California. Others are holding important positions in industrial concerns and financial institutions. They were taught to do every job well, even if it took a little longer time, to shirk nothing, and if a mistake was made to go at once and report it, not trying to hide it or shove the responsibility on some one else's shoulders. Those are the methods that were pursued 30 years ago and resulted in good workmen. They ought to be carried out today, instead of trying to make a boy resemble a machine by driving him at a fixed rate, so as to get the maximum output per hour, not taking any account of the quality of the work, just so it is thrown out of the machine and passed up to the other fellow.

Handy men should be handled in much the same manner as apprentices. The writer is, however, not in favor of instructing them, as it has a bad effect on the apprentices, and leaves that many less openings for them. As a rule the handy men only learn to do one class of work, and at no time can they be called mechanics, no matter how proficient they may become on any one machine or job.

SCIENTIFIC SHOP METHODS.

Tracy Lyon, assistant to the first vice-president of the Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., and formerly general superintendent of the Chicago Great Western, presented a paper on Scientific Industrial Operation, at the Congress of Technology at the fiftieth anniversary of the granting of the charter of the Massachusetts Institute of Technology, from which the following extracts are taken:

There is a new schoolmaster abroad, or perhaps he might better be called a doctor, the "efficiency engineer," who stands ready to apply his medicine in the most scientific, though sometimes impractical manner. There seems to be little doubt, however, but that scientific methods can be applied to advantage to any business, large or small, the only difference being that, in the case of very large industries, many years may be required to accomplish the task without an undue upsetting of conditions. Scientific methods involve a casting aside of precedent and established usage, the determination by systematic observation and analysis of conditions as they are, not as they seem to be, and the application of the information so obtained to individual tasks.

It has been demonstrated that a man can be taught to double or even quadruple his output, with no greater or even less physical exertion, by means of a use of tools and a distribution of effort which he unaided would be incapable of evolving. What the labor cost of an individual operation should be can only be determined by analytical time studies in which personal equation and past performances are disregarded and every move is considered. The simple application of a graphic ammeter to a motor driven machine tool may tell a surprising story of repeated delay and undeveloped capacity. It may be said on behalf of employers that such studies are sometimes discouraged, to say the least, by the workmen themselves.

In order to bring out the best and most intelligent effort on the part of most men it is necessary to establish and recognize a reasonable measure of their efficiency. To develop this efficiency to the highest degree, there must exist methods of compensation which will offer a comparatively large return for increased individual effort, an organization which will effectively plan in advance to bring together at the right time all information, tools and material required, and which will furnish adequate instruction and supervision and a carefully considered arrangement of appliances and machinery which will bring about an economical movement of the work. A very essential function of such an organization is to create a feeling of co-partnership between employer and workman and an understanding that the employer is not trying to get the most for the least wage, but is willing to pay liberally for increased output and efficiency.

Many manufacturers do not know what the real and actual cost of their product is, particularly if it is diversified, because of a lack of adequate cost accounting and because the overhead or general charges are not properly distributed, to their own detriment as well as to that of the public. This is not an easy question to solve, but there are scientific methods of accomplishing it. I believe that railways would purchase many articles they now manufacture if they had a truer knowledge of their shop costs—railway shops have no balance sheets to face and do not necessarily go out of business if they are not making money.

On one railway with whose operations I was familiar some years ago, allowances were established for the cost of repairs to equipment per ton mile, or mile run, for the cost of coal used by locomotives per ton mile, for roundhouse expenses per locomotive handled, for terminal expenses per car switched, for freight house expenses per ton of freight handled, as well as many other expenses. These allowances were based upon a more or less scientific study of what the cost should be, and each foreman and station master knew every day whether he was ahead or behind of the game. Such records and comparisons may perhaps be shown most clearly if plotted as curves. In fact I do not believe that the financial and operating details of any large and complex business can be properly appreciated and studied without the use of graphical records. By their means a field can be covered and comparisons made which would be impossible with the use of figures alone.

Scientific methods involve the use of the most expert advice obtainable, as to the selection and handling of material, the choice and maintenance of tools, the processes of manufacture and operation and the elimination of wastes.

Scientific methods would not permit factories to be poorly lighted as many are. It can be demonstrated that the cost of furnishing the very best light obtainable is inconsiderable in comparison with the benefits to be derived in an improvement in the quality of work and increased production. The same thing may be said of the cost of improving sanitary and other conditions which affect the comfort and health of the workman and of maintaining orderliness and cleanliness.

APPLICATION OF ECCENTRICS TO DRIVING AXLES.

BY JOHN V. LE COMPTE,
Foreman, Baltimore & Ohio, Newark, Ohio.

Eccentrics should be applied to the axles sufficiently tight to prevent slipping. This requires that the keys should be of sufficient width and thickness to withstand the forces to which they are subjected. In the case of axles 7½ in., or over, in diameter, the key should not be less than 1¼ in. wide and 1 in. thick, and the set screw should be 1 in. in diameter, cupped at the end and hardened so that it will cut into the axle and help prevent the eccentric from turning. An important feature that is often overlooked is that the eccentric itself should firmly clamp the axle. It may easily be made to do this by placing a piece of paper about .005 in. to .008 in. thick between the halves when they are being bored and turned for the axle fit. This will leave a small space between the halves which, when they are applied, will allow them to firmly grip the axle, as the bolts are tightened. The eccentric bolts must, however, be of good size to allow this feature to be effective.

The eccentric should be applied to the axle before it is placed under the locomotive, as more accurate fits of the keys can be obtained, the nuts and bolts may be drawn tighter, and the mechanic has more room in which to work. In every case where the distance between the driving boxes will allow eccentrics with bosses should be used, and not narrow ones, such as are often used for the back motion eccentrics; this to guard against the many failures caused by eccentrics shifting on the axles.

General News Section.

At Saltburn-by-the-Sea, England, July 1, F. Bordino, an Italian, traveled in an automobile 116.13 miles in one hour.

The American Employees and Investors' Association has established a branch organization with 2,500 members at Houston, Tex.

Announcement has been made by the St. Louis & San Francisco that its new shops at Springfield, Mo., will be operated to full capacity beginning July 1.

Flying from Paris to Sedan, June 26, Lieut. de Malherbe of the French army traversed the distance of 178 miles between these cities in 1 hour, 45 minutes, or at the rate of nearly 102 miles an hour.

In connection with the new educational bureau of the Illinois Central, W. L. Park, vice-president, has issued a circular on "The Value of Courtesy," which will be sent to about 2,000 conductors and agents of the road.

A bill has been passed by the legislature of New York and signed by the governor amending the public service commissions law by more specifically empowering the commission to regulate and fix commutation fares.

The Atchison, Topeka & Santa Fe has been exempted by the state corporation commission of Oklahoma from maintaining separate waiting rooms for colored and white patrons in its stations at Alva and Fargo. Similar exemptions had previously been granted to the road at a number of other points in that state.

The Toledo, St. Louis & Western has been advised by the Indiana railway commission that its roadbed in that state must be improved as to ballast, ties, rails, bridges and culverts if the present high speed traffic is to be continued on it. Frank W. Morse, general manager, has agreed to begin remedying the defects at once.

Rather than make orders in rate cases now pending before them which may conflict with those of the Interstate Commerce Commission, the state commissions of Washington and Oregon have asked for a conference with the interstate commission to discuss the questions involved. The conference will probably be held in September.

Referring to reports regarding increases in the pay of Pullman conductors and porters, an officer of the company says that the wages of all such employees in the service of the Pullman Company throughout the country have been advanced, taking effect June 1 instead of July 1, as reported. The increases are based on a graduated scale depending on the length of time in service.

Steps are being taken by the Union Pacific to expand and improve its hospital system by building in the larger cities new hospitals or buying established institutions, to serve which the best physicians and surgeons will be regularly employed and which will be supplied with the best equipment. Similar improvements are being made in the hospital department of the Illinois Central.

The Pennsylvania Railroad reports that on the lines east of Pittsburgh and Erie during the month of March 67,912 passenger trains were run. The percentage arriving at division terminals on time was 92, which is about 7 per cent. better than in March, 1910, when the number of trains was somewhat less. In April the percentage on time was 91.6, also a considered improvement over April of the preceding year.

Referring to the contracts recently secured by the Wells, Fargo & Company Express to take over the business of the Pacific Express Company on the different Gould lines, William Sproule, president of the Wells, Fargo & Company Express, in a newspaper interview, made an absolute denial of the reported acquisition by his company of the control of the Pacific Express Company.

The Central Railroad of Oregon has been advised by the Oregon railway commission that unless the roadbed, rails and equipment on its line from Junction, Ore., to Union are repaired, the attorney-general of the state will be advised to take the matter in hand and be asked that the road be turned over to a receiver. Officers of the road assured the commissioners that their orders would be complied with.

The following changes in the names of operating divisions of the Illinois Central went into effect July 1:

Old Name.	New Name.
Chicago	Illinois
Peoria	Indiana
Freeport	Wisconsin
Dubuque	Minnesota
Cherokee-Omaha	Iowa
Louisville	Kentucky

J. W. Walker, an engineman of the Southern Pacific, in Arizona, who has completed 25 years of service without ever having to go "on the carpet" or ever having an accident of enough consequence to require a formal report, has been advised that the company will pay expenses of a vacation trip for him and his family to any place that he may designate; and, according to the *Tucson Times*, he is going to Boston.

The merger of the four Chicago elevated railways became effective on July 1, the total deposits of stock in New York and Chicago up to June 28 having been 91 per cent. of the full amount. The stockholders of the elevated roads have until July 10 to indicate whether they will deposit under the "all-cash" or under the "cash-and-securities" plan, and the bankers have from July 10 to July 20 to make payments for the deposited stock.

With a view of reducing the smoke nuisance and educating employees in the economic value of proper firing of their engines, the Northern Pacific has arranged for J. T. Conley, a graduate of the University of Minnesota and a practical engineer of the road, to instruct engineers and firemen in the scientific firing of locomotives and to demonstrate how it should be done, the lectures being given in a special instruction train which will stop for a number of days at each of the important points along the road.

H. M. Atwood, in a Wright bi-plane, last week flew from Boston to New York, making the journey in two stages. On Friday he traversed the distance from Boston to New London in 2 hours, 10 minutes, and on Saturday from New London to New York in about 2 hours, 24 minutes, carrying as a passenger his machinist. The distance from Boston to New London by railway is 108 miles, but the aviator went by way of Middleboro and Newport and is said to have traversed a distance of 135 miles. From New London to New York the distance is about 124 miles.

The International & Great Northern has been advised that no valuation of its property in that state will be authorized by the Texas railway commission as a basis for the issuance of securities until all of its unsecured claims have been paid, this being the outcome of a visit to the commission of attorneys representing something like $3,000,000 in personal injury judgments against the road, to whom Chairman Mayfield read that part of the charter to be filed by the company which provides that it must pay its unsecured claims. T. J. Freeman, receiver of the road, has promised that the claims shall be paid as soon as possible.

As result of a conference in Norfolk, Va., between Norfolk & Western Railway officials and nine different branches of organized labor over the entire system of that road, it was agreed after the various organizations affected shall have voted upon it, that there shall be an increase of three cents per hour in wages as soon as the average monthly receipts of the Norfolk & Western shall equal the average receipts of the road for the last six months of the year 1910. This means the agreement will become effective when the average monthly receipts of the Norfolk & Western reach $3,082,000. There is a hope that this may be reached by August 1, but nothing definite may occur until October 1.

A westbound passenger train of the Pennsylvania Railroad was stopped by robbers five miles east of Erie, Pa., on the night of June 30 and shots were fired at the engineman and at passengers who got off the cars; but the express messenger and mail clerks opened fire on the robbers and, being soon joined

by some passengers, managed to drive them away before any of them had got aboard the cars. It is thought probable that the robbers, of whom there were a half dozen, were from an Italian colony living near the place of the hold-up. The train was stopped by a pile of ties fastened across the rails, but was not derailed.

The branch of the American Railway Employees and Investors' Association at Houston, Tex., has elected the following officers: President, G. W. Windsor; vice-president, J. D. Freeman; secretary and treasurer, C. J. McDonald; representative to state board, J. E. Anderson. Two representatives of each of the following roads have been appointed members of the executive committee: Houston & Texas Central, the Galveston, Harrisburg & San Antonio; the St. Louis & San Francisco, the Trinity & Brazos Valley, and the Houston Belt & Terminal; and it is expected that representatives of the Missouri, Kansas & Texas and the International & Great Northern will be appointed to it at the next meeting.

The Illinois Central has decided to offer first, second, third and fourth prizes, ranging from $50 to $15 to be awarded at the annual state fair at Springfield, Ill., for the best exhibits each of grains, forage plants, vegetables and fruits, to be brought to Springfield and displayed by farm boys from the 60 counties of Illinois through which the road operates. The boys must be under 21 years of age, are to be selected in each case through the co-operation of the county superintendent of schools; and their transportation to and from Springfield as well as their sleeping quarters and meals while at the fair, will be furnished by the road. First, second, third and fourth prizes, ranging from $200 to $60 will also be given for the best display, taking the exhibits as a whole.

The Electrical Engineering Department of the Massachusetts Institute of Technology reports that its courses of graduate study have been very successful during the past year. Prof. Jackson's lectures on organization and administration of public service companies have been attended by a class of twelve graduate students. Prof. Pender's and Prof. Wickenden's lectures have been likewise successful. The graduates in the electric engineering course were more numerous this year than ever before. This department of the institute has received a grant of $3,000 from the Edison Electric Illuminating Company to be used in investigating the relative operating reliability and the cost, of electric trucks, gasolene trucks and horse trucking, with a view to seeing what is the relative economy of the different methods in Boston.

Cost of Signal Wiring.

The cost of wires and wooden trunking for the power line, described in the *Railway Age Gazette* of June 30, page 1693, in connection with new signaling at Washington, D. C., was four hundred and thirty-five dollars per thousand feet. The error of the proofreader, in printing a lower figure ($35), must have been due to the unconscious influence of his feeling that no such large sum ought to be spent on such an inconspicuous feature of a railway! Cost figures are not very common in such articles [illegible] with them is not surprising.

New York City Subways.

The New York State Public Service Commission, First district, [illegible] contracts aggregating $16,139,427 for the construction of five sections of a subway under Lexington avenue, Manhattan, from Twenty-sixth street northward to 103rd street—something less than four miles of line.

This action of the Public Service Commission must be concurred in by the Board of Estimate, of the city, but it is understood that this concurrence is assured. The offer made by the [illegible] Rapid Transit Company two years ago for the construction and operation of certain subways [illegible] under the city's plan by the Brooklyn Rapid Transit Company has expired. Later the B. R. T. Company [illegible] to reconsider the contracts which had been rejected by the Interborough. At the present writing it appears [illegible] that the B. R. T. will be awarded contracts for all of the lines [illegible] the city desires to have built, and it is also the [illegible] will be awarded [illegible] from the south end of Manhattan [illegible] as well as sections of Brooklyn and the Bronx.

[illegible] the contracts [illegible] let to the Brad[illegible] Contracting Company and one to Charles H. Pedworth

Mails by Freight.

The plans of the post office department which contemplate sending second class mail in some cases by freight trains and which were to have been put into effect on the first of July have been subjected to further consideration and the new scheme will not be tried before September 1. What the post office department expects to do is to get the benefit of a lower cost of transportation on monthly and semi-monthly periodicals which are shipped in large quantities; and the routes over which it is intended to make the experiment are those from Buffalo and Pittsburg to Cincinnati, Chicago, St. Louis, Kansas City, Omaha and St. Paul. Thus, a magazine going from New York to Denver would go in a mail train to Buffalo or Pittsburg and thence in a freight to Omaha or Kansas City, and the rest of the way by mail train. It is expected to arrange with publishers to mail their magazines for these long journeys a little time in advance so that subscribers will receive their magazines at as early a date as under the ordinary plan.

International Railroad Master Blacksmiths' Association.

The annual convention of the International Railroad Master Blacksmiths' Association will be held at the Boody House, Toledo, O., August 15.17. Among the papers to be read will be one on Tools and Formers, by G. M. Stewart; Drop Forging, by Hugh Timmons; Flue Welding, by C. A. Sesnenbach; Frogs and Crossings, by T. F. Keane; High Speed Steel, by M. F. Gorey; Locomotive Frame Making and Repairs, by Geo. W. Foley; The Oxy-Acetylene Process for Welding and Cutting of Metals, by Geo. Hutton; Case Hardening, by W. F. Stanton; Spring Making and Repairs by J. Engels; and Piece Work and Other Methods of Having Work Done, by T. M. Ross. Reports will be received from the various committees and new officers will be elected. The secretary, A. L. Woodworth, may be addressed at Lima, Ohio.

Western Railway Club.

At the annual meeting of the Western Railway Club, held at the Auditorium Hotel, Chicago, June 27, the following officers were elected for the ensuing year: President, C. B. Young, Chicago, Burlington & Quincy; first vice-president, T. H. Goodnow, Lake Shore & Michigan Southern; second vice-president, H. La Rue, Chicago, Rock Island & Pacific.

American Railway Tool Foremen's Association.

The next convention of the American Railway Tool Foremen's Association will be held at the Wellington Hotel, Chicago, July 11-13. O. T. Harroun, Bloomington, Ill., is secretary.

Traveling Engineers' Association.

The annual convention of the Traveling Engineers' Association will be held at the New Hotel Sherman, Chicago, August 29-September 1. W. O. Thompson (N. Y. C. & H. R.), East Buffalo, N. Y., is secretary.

MEETINGS AND CONVENTIONS.

[illegible] dates of next or regular meetings.

[illegible] E. M. Nelly, [illegible] State St., Boston, Mass.

[illegible] A. G. Thomason, Scranton, Pa.

[illegible] C. M. Lee, Boston, Mass. Next meeting St. Paul, Minn., Sept. 19, 1911.

[illegible] R. O. Well, East St. Louis, Ill.

[illegible] O. G. Fetter, [illegible] Ohio. Annual Exhibit of March or September.

[illegible] H. C. Boerecker, 29 W. 39th St., New York. Next meeting Atlantic City, N. J.

[illegible] W. J. Allen, [illegible] Church St., New York; [illegible]

[illegible] C. A. Lichty, C. & N. W. Ry., Oct. 1-10, 1911, at Lem., Mo.

[illegible] L. H. Leach, Merchants' Exchange, [illegible] March 19-21, 1912, Chicago.

AMERICAN RAILWAY INDUSTRIAL ASSOCIATION.—G. L. Stewart, St. L. S. W. Ry., St. Louis, Mo.

AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago.

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—O. T. Harroun, Bloomington, Ill.; annual convention, July 11-13, Chicago.

AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St. New York; 1st and 3d Wed., except June and August, New York.

AMERICAN SOCIETY OF ENGINEERING CONTRACTORS.—D. J. Haner, 13 Park Row, New York; 3d Tuesday of each month, New York.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York.

ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago.

ASSOCIATION OF RAILWAY CLAIM AGENTS.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 22, 1912, Los Angeles, Cal.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago.

ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, 135 Adams St., Chicago.

ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 75 Church St., New York; December 12-13, Louisville, Ky.

CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk Ry., Montreal, Que.; 1st Tuesday in month, except June, July and August, Montreal.

CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLead, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

CIVIL ENGINEERS' SOCIETY OF ST. PAUL.—D. F. Jurgensen, 116 Winter St., St. Paul, Minn.; 2d Monday, except June, July and Aug., St. Paul.

ENGINEERS' SOCIETY OF PENNSYLVANIA.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Richmond, Va.; annual, Buffalo, N. Y.

GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

INTERNATIONAL RAILWAY CONGRESS.—Executive Committee, rue de Louvain, 11 Brussels; 1915, Berlin.

INTERNATIONAL RAILWAY FUEL ASSOCIATION.—D. B. Sebastian, La Salle St. Station, Chicago.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—L. H. Bryan, D. & I. R. Ry., Two Harbors, Minn.; July 25-27, Chicago.

INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, Lima, Ohio; annual, Aug. 15, Toledo, Ohio.

IOWA RAILWAY CLUB.—W. B. Harrison, Union Station, Des Moines, Ia.; 2d Friday in month, except July and August, Des Moines.

MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York.

MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago.

MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOCIATION, OF UNITED STATES AND CANADA.—A. P. Dane, B. & M., Reading, Mass.; Sept. 12-15, 1911, Atlantic City, N. J.

NEW ENGLAND RAILROAD CLUB.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

NEW YORK RAILROAD CLUB.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

NORTHERN RAILWAY CLUB.—C. L. Kennedy, C., M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.

OMAHA RAILWAY CLUB.—H. H. Maulick, Barker Block, Omaha, Neb.; second Wednesday.

RAILROAD CLUB OF KANSAS CITY.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

RAILWAY CLUB OF PITTSBURGH.—C. W. Alleman, P. & L. E., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Bethlehem, Pa.; June 13, New York; annual, Oct. 10, Colorado Springs, Colo.

RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, Box C, Collinwood, Ohio.

RICHMOND RAILROAD CLUB.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—Walter E. Emery, P. & P. U. Ry., Peoria, Ill.; September 12-15, St. Louis, Mo.

ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

SOCIETY OF RAILWAY FINANCIAL OFFICERS.—C. Nyquist, La Salle St. Station, Chicago; Sept. 12-14, St. Paul, Minn.

SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.

SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

TOLEDO TRANSPORTATION CLUB.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

TRAFFIC CLUB OF CHICAGO.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.

TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

TRAFFIC CLUB OF PITTSBURGH.—T. J. Walters, Oliver building, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

TRAIN DESPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.

TRANSPORTATION CLUB OF BUFFALO.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.

TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.; annual, August 29-September 1, Chicago.

WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

WESTERN RAILWAY CLUB.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Wednesday in month except July and August, Chicago.

WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, First National Bank bldg., Chicago.

Traffic News.

"Interstate Commerce Bureau" is the name of a concern that has been started at Portland (Ore.), and has been incorporated with a capital of $50,000, to audit freight rates, adjust overcharges and carry on a general shipping business for shippers.

To exploit the Rainier National Park, in the state of Washington, the Chicago, Milwaukee & Puget Sound has inaugurated (June 24) a new train service to this point from Seattle; two trains daily each way between Seattle and Ashford, from which point passengers are taken to Rainier in automobiles.

Contrary to reports, the Gould lines will not abolish the joint traffic office they have maintained at Chicago. It is officially announced that the office will be continued as at present, in charge of E. B. Boyd, with title of assistant to the vice-president. The Texas & Pacific is the only road that has withdrawn from the joint arrangement.

The Cumberland Gap Dispatch, a fast freight line operating over the Norfolk & Western, announces that it has arranged for through cars to be run daily from Norfolk, Va., to Pueblo, Denver, and Salt Lake, over the Missouri Pacific. Heretofore this line has sent its Colorado freight over the Union Pacific. The Cumberland Gap Dispatch takes its freight from New York and other Atlantic ports by the Old Dominion steamships.

Effective July 8, the Harriman Lines have announced reductions on all standard grades of lumber of 75 cents a ton on through shipments from Seattle, Wash., and Tacoma, and of 60 cents from Gray's Harbor, to points on the Southern Pacific in California, Nevada, Utah, Arizona and New Mexico. Rates to points south of Roseburg, Ore., will, on the same day, be reduced to the basis in effect prior to May 22, 1910.

John H. Gates, who was appointed special master in chancery by the United States court to take testimony in the passenger rate cases in South Dakota, has made a report, saying in substance that while a 2½-cent rate might be upheld as constitutional by the higher courts, a straight 2-cent passenger rate in South Dakota would be out of the question. He takes issue with the recent decision of Judge Sanborn in the Minnesota rate cases, where the value and common expense were assigned on a gross earnings basis, and made his findings in the South Dakota cases on the direct expense basis.

Condition of the Cotton Crop.

The crop reporting board of the department of agriculture estimates that the condition of the cotton crop on June 25 was 88.2 per cent. of a normal, as compared with 87.8 on May 25, 1911, 80.7 on June 25, 1910, 74.6 on June 25, 1909, and 80.0 the average of the past ten years on June 25.

Comparisons of conditions, by states, follow:

States.	June 25, 1911.	May 25, 1911.	June 25. 1910.	1909.	Ten-yr. Av.
Virginia	98	98	86	76	82
North Carolina	89	88	72	78	80
South Carolina	84	80	75	77	80
Georgia	94	92	78	79	80
Florida	96	98	87	88	85
Alabama	93	91	81	64	79
Mississippi	87	86	81	61	79
Louisiana	80	80	75	67	78
Texas	85	88	84	79	80
Arkansas	89	87	77	76	81
Tennessee	87	83	82	80	84
Missouri	90	87	80	83	84
Oklahoma	87	87	88	84	81
California	100	95	95	..	..
United States	88.2	87.8	80.7	74.6	80.0

For the purpose of comparison, the condition of the cotton crop in the United States monthly for the past ten years is given below:

Years.	May 25.	June 25.	July 25.	Aug. 25.	Sept. 25.
1910	82.0	80.7	75.5	72.1	65.9
1909	81.1	74.6	71.9	63.7	58.5
1908	79.7	81.2	83.0	76.1	69.7
1907	70.5	72.0	75.0	72.7	67.7
1906	84.6	83.3	82.9	77.3	71.6
1905	77.2	77.0	74.9	72.1	71.2
1904	83.0	88.0	91.6	84.1	75.8
1903	74.1	77.1	79.7	81.2	65.1
1902	95.1	84.7	81.9	64.0	58.3
1901	81.5	81.1	77.2	71.4	61.4
Average, 1901-1910	80.9	80.0	79.4	73.5	66.5

Car Surpluses and Shortages.

Arthur Hale, chairman of the committee on relations between railways of the American Railway Association, in presenting statistical bulletin No. 97A, giving a summary of car shortages and surpluses by groups from February 16, 1910, to June 21, 1911, says:

"The total surplus reported for this date is 165,934, a decrease of 3,072 cars since our last bulletin. Box and coal car surplus shows very little change, there being an increase of 557 cars in the former and a decrease of 577 cars in the latter. There was a decrease of 1,009 in the flat car surplus, principally in groups 3 (Central) and 10 (Pacific), and a decrease of 2,043 cars in the miscellaneous surplus. The decrease in the latter item is made up chiefly of coke cars in groups 2 (Eastern), and stock cars in group 8 (Middle Western). There are decreases in the box car surplus in group 4 (Middle Atlantic) which group also reports some shortage of this class, and in group 9 (Southwestern), where there has been some movement of winter wheat. The shortages in the Canadian group, noted in our last bulletin have increased, and with the increased shortage reported in group 4, bring the total shortage up to 2,764, of which 1,667 are box cars."

The accompanying table gives the surpluses and shortages by groups for the last period covered by the report and the chart shows total bi-weekly surpluses and shortages.

INTERSTATE COMMERCE COMMISSION.

The Interstate Commerce Commission on June 27 authorized the Carolina, Clinchfield & Ohio to carry Virginia coal to southeastern points at rates in some cases lower for the longer than for the shorter distance.

The commission announced last week its intention to begin an extensive inquiry into the business of all the principal express companies, throughout the country. This action is taken by the commission on its own motion, but complaints of excessive charges or unsatisfactory service have been received from numerous cities at various times during the past year. Immediately after this announcement came another saying that all of the principal express companies, except the Long Island, had filed tariffs, to go into effect August 1, showing reduced rates in important features of the tariffs, especially those for shipments over the lines of two or more companies, where the weight is less than 100 pounds.

Complaint Dismissed.

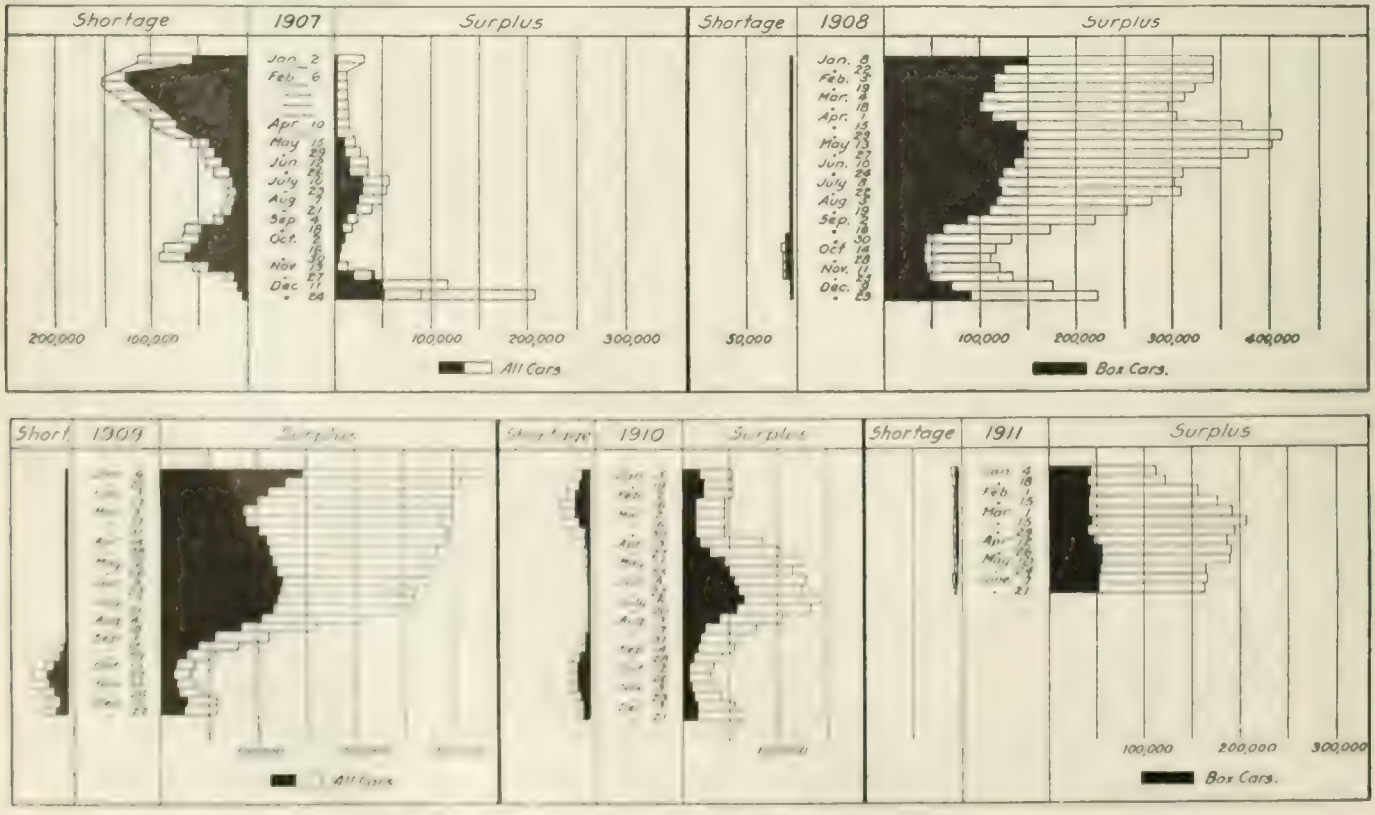
Racine-Sattley Co. v. Chicago, Milwaukee & St. Paul et al. Opinion by Commissioner Prouty.

Reparation formerly awarded having been made, no opinion is expressed on the reasonableness of the rate. (21 I. C. C., 164.)

Car Surpluses and Shortages.

Date.	No. of roads.	Surpluses Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.	Shortages Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.
Group *1.—June 21 1911	8	374	424	804	308	2,000	0	33	25	34	92
" " 21, 1911	27	2,548	116	17,524	6,493	26,681	10	22	29	5	66
" 3.— " 21 1911	26	10,549	942	37,370	4,194	53,055	0	0	0	0	0
" " 21, 1911	10	1,252	184	4,372	819	6,627	331	192	0	0	523
" " 21, 1911	19	4,960	417	3,093	1,999	10,468	18	20	0	0	38
" " 21, 1911	25	11,821	958	3,650	5,516	21,945	30	20	0	4	54
" " 21 1911	4	1,630	46	469	631	2,776	0	0	0	0	0
" " 21 1911	17	7,786	143	1,628	3,201	13,758	0	0	0	0	0
" " 21, 1911	11	1,350	549	474	862	3,235	55	1	0	0	56
" " " 1911	11	9,088	1,908	2,392	9,023	22,411	0	0	0	0	0
" " " 1911	6	1,850	96	20	1,012	2,978	1,223	212	0	500	1,935
Total	169	53,208	5,783	72,885	34,058	165,934	1,667	500	54	543	2,764

*Group 1 is composed of New England lines; Group 2—New York, New Jersey, Delaware, Maryland, and Eastern Pennsylvania lines; Group 3—Ohio, Indiana, Michigan and Western Pennsylvania lines; Group 4—West Virginia, Virginia, North and South Carolina lines; Group 5—Kentucky, Tennessee, Mississippi, Alabama, Georgia, and Florida lines; Group 6—Iowa, Illinois, Wisconsin, Minnesota and the Dakotas lines; Group 7—Montana, Wyoming and Nebraska lines; Group 8—Kansas, Colorado, Missouri, Arkansas and Oklahoma lines; Group 9—Texas, Louisiana and New Mexico lines; Group 10—Oregon, Idaho, California and Arizona lines; Group 11—Canadian lines.



Car Surpluses and Shortages in 1907 to 1911, Inclusive.

Rates on Liquor Found Unreasonable.

In re suspension of advance rates by express companies for liquor. Opinion by Commissioner McCord.

The use of arbitrary weights on the basis of charges for liquor by express companies is found unreasonable. (21 I. C. C., 199.)

Rates on Rice to North Carolina Ports.

In re suspension of advances in rates on rice and rice products. Opinion by Commissioner Prouty.

The only question involved here was that of the relation between the rates from Orange, Tex., Beaumont and Houston to north Atlantic ports. The proposed advances made the rates on rice five cents per hundred pounds higher from Beaumont and Orange than from Houston. The commission finds that the rates on rice and rice products should be the same from Orange and Beaumont by rail and ocean to north Atlantic ports, and that these rates in carloads should not exceed corresponding rates from Houston by more than three cents per hundred pounds. The present L.C.L. rate from Houston to New York is 28 cents, five cents more than the carload rates. The proposed L.C.L. rate from Beaumont and Orange is 41 cents, a spread of 13 cents. The commission holds that the difference between the carload and L.C.L. rate from Beaumont and Orange ought not to exceed 10 cents. (21 I. C. C., 124.)

Discriminations in Storage Regulations.

Swift & Co. v. Baltimore & Ohio et al. Opinion by the commission:

The tariffs of the Baltimore & Ohio provided that the import rate should not apply unless traffic was stored in bonded warehouses or delivered to the carrier at the ship side. The tariff further stated that storage would be accorded by the Baltimore & Ohio in its bonded warehouses provided room is available. The tariff provision was unjustly discriminatory, in that it provided that storage would be given when available. (21 I. C. C., 241.)

Demurrage Refunded.

Wheeler-Holden Co. v. Louisville & Nashville. Opinion by the commission:

Rate charged for the transportation of crossties in carloads from Yaden, Ky., to Cincinnati, Ohio, found to have been unreasonable. Reparation awarded. As the rate demanded was collected without tariff authority, demurrage charges accruing during determination of dispute as to rate, ordered to be refunded. (21 I. C. C., 237.)

Commission Refuses to Limit a Producer's Market.

Alabama Coal Operators Association v. Southern Railway et al. Opinion by Commissioner Meyer:

Shipments of coal to points in Georgia, South Carolina, and Florida, Birmingham, Ala., takes differentials, under Coal Creek, Tenn., varying from 15 to 70 cents per ton. The Birmingham coal operators seek to have these differentials increased. Under the conditions found here rate construction on a per-ton-per-mile basis would give to distance an exaggerated influence, resulting in relatively prohibitive rates beyond certain distances and the elimination of competition. The realms of commercial activity of a producing point can not be limited to a definite radius and all other producers excluded therefrom. Nor can differentials be computed at a fixed rate per mile. The present adjustment is not shown to be either unreasonable or unjustly discriminatory. (21 I. C. C., 230.)

Increased Coal Rate Not Proved to be Reasonable.

Victor Manufacturing Co. et al. v. Southern Railway et al. Opinion by Commissioner Meyer:

The commissioner finds that a rate of $1.95 per ton for the transportation of coal from Coal Creek, Tenn., to Spartanburg, S. C., found to be unreasonable and rate of $1.85 prescribed. Carriers left to work out proper readjustment of rates and differentials, and no order made fixing a differential to apply to the Virginia fields over Coal Creek. (21 I. C. C., 222.)

Rates on Locomotives.

In re the investigation and suspension of advance in rates by carriers for the transportation of locomotives and tenders named in a schedule filed with the Interstate Commerce Commission. Opinion by Commissioner Meyer:

Original order in this case modified to provide that for the transportation of locomotives, and locomotives and tenders, live or dead on their own wheels, charges will be on basis of a minimum total haul of 75 miles.

Important Reduction in Anthracite Coal Rate.

Henry E. Meeker and Caroline H. Meeker, co-partners, trading as Meeker & Co., v. Lehigh Valley:

Complainants buy, ship and sell anthracite coal, using the lines of the Lehigh Valley. They are not mine operators, but merely dealers in the New York market. The Lehigh Valley Railroad Company controls the Lehigh Valley Coal Company, which in turn owns large tracts of coal land. The Lehigh Valley Coal Company makes contracts with the independent operators known as percentage contracts. The Lehigh Valley Coal Company agrees to pay the independent operators a fluctuating price for their coal at the mines to be arrived at on the basis of certain percentages at tidewater. Under the contract which was in effect during 1900 the Lehigh Valley Coal Company agreed to pay coal operators 60 per cent. of the tidewater price on the highest grade of anthracite coal. Although the Lehigh Valley Railroad Company was not nominally a party to any of the percentage contracts entered into by the Lehigh Valley Coal Company, yet it made a practice of settling for the freight charges on coal purchased and shipped by the Lehigh Valley Coal Company for the differences between the amounts paid to the coal operators and the average market prices at tidewater. It will be seen, therefore, that the freight rates of the Railroad company were directly dependent on the contracts with the Coal company. In August, 1901, a new 65 per cent. contract was entered into and the Lehigh Valley Railroad Company made a systematic effort to pay back to all shippers, including the Lehigh Valley Coal Company, such amounts as had been paid during the period November 1, 1900, to August 1, 1901, in excess of the tariff rates [the 60 cent rate]. Meeker & Company refused this settlement, insisting on a settlement on the basis of the newly adopted 65 per cent. contract. The complainants contend that the payment of increased retroactive prices to the coal producers by the Lehigh Valley Coal Company was in fact a payment by the Lehigh Valley Railroad and therefore a readjustment of its freight charges on the basis of 65 per cent. contract on such coal as was shipped by the Lehigh Valley Coal Company from November 1, 1900, to August 1, 1901.

In view of the admissions on the supplemental hearing, the conclusion seems inevitable that the financial condition of the Coal company was not such as to have enabled it to pay $231,090 to the coal operators out of its own treasury, and that not only this amount, but much larger sums were advanced by the Railroad company to the Coal company to help it carry on its business. The $231,090 paid by the Coal company to coal operators was in fact made from funds advanced as cash by the Railroad company. Reparation is awarded.

Complainants insisted that the average rate per ton mile on coal ought not to exceed the average rate per ton per mile on all freight, and ask for reparation on the assumption that the higher ton-mile rate on coal is proof of the unreasonableness of the rates in question. Attempts are made to get a valuation of the property.

Complainants' contention that the rates to Perth Amboy are unreasonable is based in part upon the testimony of certain persons who were formerly officers of the Delaware, Susquehanna & Schuylkill Railroad and of Coxe Brothers & Company. For many years prior to 1905, Coxe Brothers & Company were engaged in mining and shipping anthracite coal from their extensive properties in the Lehigh region. They owned and operated the Delaware, Susquehanna & Schuylkill, a road about 28 miles in length, which reached their different collieries and connected with the Lehigh Valley Railroad at a place called Lumberyard or Stockton Junction.

L. C. Smith, former manager of the Delaware, Susquehanna & Schuylkill Railroad, testified that about 1900, he, as manager of the Delaware, Susquehanna & Schuylkill Railroad, made up

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF MAY, 1911.

Name of road	Mileage operated at end of period	Operating revenues: Freight.	Passenger.	Total, inc. misc	Operating expenses: Maintenance: Way and structures.	Maintenance: Of equipment.	Traffic.	Transportation.	General.	Total.	Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or dec.) comp. with last year.
[illegible]	[illegible]	[illegible]	[illegible]	$7,318,317	$1,116,349	$1,768,626	$157,788	$2,146,693	$190,517	$4,868,970	$2,506,447	.....	$763,055	$2,243,292	$15,989
[illegible]	[illegible]	[illegible]	[illegible]	388,313	317,306	343,499	12,408	942,031	71,796	1,717,137	871,176	.....	115,000	756,176	89,949
[illegible]	[illegible]	[illegible]	[illegible]	3,851,814	708,161	583,678	36,916	1,611,673	85,162	2,985,590	894,224	$17,159	147,385	764,168	113,198
[illegible]	[illegible]	[illegible]	[illegible]	378,376	33,003	477,446	48,960	713,739	66,996	1,639,084	819,292	3,593	93,350	729,635	70,345
[illegible]	[illegible]	[illegible]	[illegible]	316,130	15,413	28,958	4,493	79,380	4,270	131,514	4,384	11	3,790	8,185	
[illegible]	[illegible]	[illegible]	[illegible]	1,170,111	110,272	151,589	81,644	411,199	34,585	759,289	410,822	—2,737	37,000	371,095	168,132
[illegible]	[illegible]	[illegible]	[illegible]	994,850	744,013	94,607	2,407,280	131,254	4,374,804	1,581,035	14,548	245,000	1,351,687	99,748
[illegible]	[illegible]	[illegible]	[illegible]	1,461,854	1,225,187	126,603	2,170,713	193,983	5,178,010	1,778,592	13,165	249,854	1,515,573	483,865	
[illegible]	[illegible]	[illegible]	[illegible]	178,675	140,094	44,436	417,093	35,482	815,780	239,435	85	33,940	205,580	45,847	
[illegible]	[illegible]	[illegible]	[illegible]	816,744	812,124	158,693	2,022,936	138,984	3,949,481	1,003,554	5,182	206,569	791,803	309,897	
[illegible]	[illegible]	[illegible]	[illegible]	201,454	150,934	22,405	452,707	41,742	869,042	316,258	184	65,301	250,773	12,846	
[illegible]	[illegible]	[illegible]	[illegible]	308,737	423,639	69,129	1,014,488	55,732	1,871,705	573,179	4,958	80,100	488,221	117,982	
[illegible]	[illegible]	[illegible]	[illegible]	149,159	284,016	21,768	588,197	48,112	1,091,247	729,798	349	44,000	685,449	14,735	
[illegible]	[illegible]	[illegible]	[illegible]	471,684	474,997	61,682	886,799	60,563	1,955,676	1,154,988	58,951	138,078	1,078,911	124,501	
[illegible]	[illegible]	[illegible]	[illegible]	379,851	664,424	94,953	1,314,849	77,385	2,531,462	1,617,165	—3,088	120,631	1,493,446	250,676	
[illegible]	[illegible]	[illegible]	[illegible]	1,341,769	636,136	87,357	1,411,229	152,733	3,624,224	1,413,957	21,841	398,353	1,036,145	178,116	
[illegible]	[illegible]	[illegible]	[illegible]	703,875	1,088,025	107,744	1,853,351	121,844	3,868,839	1,156,730	7,002	241,572	908,306	228,136	
[illegible]	[illegible]	[illegible]	[illegible]	718,172	630,163	93,848	1,281,525	73,890	2,797,598	1,113,777	—6,968	135,000	971,809	66,401	
[illegible]	[illegible]	[illegible]	[illegible]	376,601	488,828	94,660	1,005,013	62,070	2,027,175	1,492,399	32,844	101,300	1,358,255	211,659	
[illegible]	[illegible]	[illegible]	[illegible]	851,509	786,520	91,000	1,453,208	91,552	3,273,789	998,227	11,831	175,000	835,058	162,681	
[illegible]	[illegible]	[illegible]	[illegible]	265,142	337,801	56,951	987,627	49,991	1,697,512	640,404	3,037	110,000	527,376	5,617	
[illegible]	[illegible]	[illegible]	[illegible]	258,809	274,063	53,663	644,794	42,917	1,244,246	501,369	4,233	113,149	392,153	140,476	
[illegible]	[illegible]	[illegible]	[illegible]	1,365,207	1,377,760	202,200	2,991,666	234,873	5,827,457	2,537,770	26,004	418,444	2,145,330	334,309	
[illegible]	[illegible]	[illegible]	[illegible]	717,453	668,304	23,897	2,024,673	168,029	3,602,156	1,577,212	109,591	274,000	1,411,803	196,780	
[illegible]	[illegible]	[illegible]	[illegible]	408,341	534,043	46,809	859,181	59,847	1,908,221	1,013,025	1,106	115,000	926,919	77,776	
[illegible]	[illegible]	[illegible]	[illegible]	672,887	618,289	103,985	1,701,392	76,896	3,173,449	1,918,409	14,879	254,592	1,678,696	68,831	
[illegible]	[illegible]	[illegible]	[illegible]	264,972	135,230	25,733	352,348	37,446	815,739	634,868	1,659	58,666	574,543	318,340	
[illegible]	[illegible]	[illegible]	[illegible]	181,791	113,474	46,046	496,076	40,905	878,292	492,866	3,896	54,579	434,391		
[illegible]	[illegible]	[illegible]	[illegible]	1,855,064	2,738,705	171,822	4,702,159	350,122	9,515,772	3,724,910	99,269	531,228	3,094,413	705,584	
[illegible]	[illegible]	[illegible]	[illegible]	438,317	713,860	73,626	1,358,479	90,243	2,674,525	1,445,579	1,130	182,631	1,261,818	243,476	
[illegible]	[illegible]	[illegible]	[illegible]	187,894	227,153	35,005	589,314	35,648	1,075,014	206,112	10,639	47,245	148,228	167,188	
[illegible]	[illegible]	[illegible]	[illegible]	220,392	258,147	25,035	685,777	32,926	1,232,267	423,553	.....	47,396	376,157	15,603	
[illegible]	[illegible]	[illegible]	[illegible]	157,306	147,898	15,074	295,730	23,545	639,553	595,524	218	30,000	565,307	247,935	
[illegible]	[illegible]	[illegible]	[illegible]	418,136	511,915	67,237	1,059,345	73,789	2,130,422	975,773	724	133,467	841,582	314,390	
[illegible]	[illegible]	[illegible]	[illegible]	606,080	722,899	126,948	1,742,444	150,102	3,348,473	1,475,044	26,107	183,253	1,265,684	10,231	
[illegible]	[illegible]	[illegible]	[illegible]	162,003	255,493	22,690	516,108	41,046	997,340	97,996	949	47,580	49,467	66,758	

ELEVEN MONTHS OF FISCAL YEAR, 1911.

Name of road	Mileage operated at end of period	Operating revenues: Freight.	Passenger.	Total, inc. misc	Operating expenses: Maintenance: Way and structures.	Maintenance: Of equipment.	Traffic.	Transportation.	General.	Total.	Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or dec.) comp. with last year.
[illegible]	[illegible]	[illegible]	[illegible]	$82,172,761	$11,729,567	$13,052,008	$1,642,840	$24,023,272	$1,769,397	$52,217,084	$29,955,677	.....	$2,722,840	$27,232,837	$2,230,174
[illegible]	[illegible]	[illegible]	[illegible]	29,290,325	3,656,303	4,219,496	494,028	9,634,111	765,304	18,769,242	10,521,083	.....	1,109,000	9,412,083	8,239
[illegible]	[illegible]	[illegible]	[illegible]	40,952,054	5,386,982	5,636,507	452,643	19,239,797	1,004,863	31,720,792	$66,921	1,942,669	7,355,514	2,223,214	
[illegible]	[illegible]	[illegible]	[illegible]	28,474,487	3,324,434	5,418,227	498,459	8,485,847	671,629	18,398,596	10,076,391	5,916	917,123	9,143,352	1,512,292
[illegible]	[illegible]	[illegible]	[illegible]	3,413,875	329,302	320,709	62,006	782,168	55,117	1,549,302	—135,427	69	41,690	177,048	—
[illegible]	[illegible]	[illegible]	[illegible]	13,305,195	1,602,334	2,074,576	455,871	4,991,176	379,210	9,523,167	3,782,328	21,977	399,600	3,360,751	495,442
[illegible]	[illegible]	[illegible]	[illegible]	68,506,840	8,971,936	8,569,647	1,140,517	28,515,655	1,503,379	48,702,134	19,814,206	44,007	2,872,000	16,898,199	195,866
[illegible]	[illegible]	[illegible]	[illegible]	81,284,819	11,043,208	13,312,406	1,452,430	26,385,321	2,067,198	54,260,563	27,024,356	—104,690	2,744,237	24,175,329	3,570,932
[illegible]	[illegible]	[illegible]	[illegible]	11,580,704	1,357,267	1,712,520	509,699	4,685,255	385,836	8,650,517	2,930,187	1,934	366,636	2,565,485	
[illegible]	[illegible]	[illegible]	[illegible]	89,203,935	8,546,996	8,372,615	1,735,880	23,083,188	1,524,598	43,263,277	15,940,658	102,199	2,394,348	13,444,111	1,492,306
[illegible]	[illegible]	[illegible]	[illegible]	14,874,404	1,660,870	1,728,671	259,150	5,706,085	343,412	9,698,188	5,176,216	—13,936	665,621	4,496,659	306,032
[illegible]	[illegible]	[illegible]	[illegible]	38,018,331	3,600,532	4,881,503	911,715	12,016,117	638,172	22,048,039	6,170,292	—78,868	893,548	5,197,876	1,542,436
[illegible]	[illegible]	[illegible]	[illegible]	12,205,433	1,461,349	2,755,383	243,164	6,713,492	463,895	11,637,283	7,568,150	—1,352	499,572	7,067,226	345,002
[illegible]	[illegible]	[illegible]	[illegible]	32,737,062	3,571,482	4,858,124	664,120	9,880,414	659,989	19,634,129	13,102,933	259,797	1,497,164	11,865,566	2,336,343
[illegible]	[illegible]	[illegible]	[illegible]	44,335,168	4,756,611	7,452,123	1,063,312	14,763,301	900,601	28,935,948	15,399,220	206,081	1,292,727	13,900,412	525,614
[illegible]	[illegible]	[illegible]	[illegible]	55,696,866	8,539,831	7,143,032	989,886	16,603,584	1,103,930	34,300,263	21,396,603	170,014	3,030,954	18,535,663	—1,891,254
[illegible]	[illegible]	[illegible]	[illegible]	56,194,128	6,895,605	11,371,543	1,217,509	19,659,830	1,229,241	40,373,728	15,820,400	—48,763	2,451,516	13,320,121	2,169,816
[illegible]	[illegible]	[illegible]	[illegible]	44,500,158	7,107,605	6,992,401	1,097,638	15,854,653	872,217	32,024,514	12,475,644	—61,499	1,585,182	10,828,963	—3,638,466
[illegible]	[illegible]	[illegible]	[illegible]	33,999,731	3,335,795	5,586,731	909,572	10,943,014	708,917	21,483,529	12,516,202	298,530	1,666,900	11,150,772	—749,531
[illegible]	[illegible]	[illegible]	[illegible]	49,874,243	8,335,067	8,737,421	1,036,345	16,195,425	999,537	35,303,795	14,575,448	36,405	1,626,800	12,985,053	—2,415,133
[illegible]	[illegible]	[illegible]	[illegible]	27,372,040	3,800,564	4,022,978	825,292	11,580,023	546,009	20,774,866	6,597,174	— 41,043	1,245,020	5,311,111	—2,131,315
[illegible]	[illegible]	[illegible]	[illegible]	19,811,236	2,119,100	2,887,672	488,895	7,507,783	456,829	13,460,279	6,350,937	91,433	1,121,755	5,320,615	—3,024,551
[illegible]	[illegible]	[illegible]	[illegible]	91,992,645	12,461,972	15,926,841	2,209,131	35,254,324	2,452,896	68,305,164	23,687,481	99,469	4,377,578	19,409,372	—1,768,553
[illegible]	[illegible]	[illegible]	[illegible]	56,580,574	6,294,521	6,676,176	310,917	22,474,663	1,689,345	37,445,622	19,134,952	1,262,814	3,309,000	17,088,766	—602,723
[illegible]	[illegible]	[illegible]	[illegible]	32,661,912	3,861,811	6,073,828	536,949	9,811,402	665,289	20,949,279	11,712,633	8,957	1,205,000	10,498,676	—1,460,362
[illegible]	[illegible]	[illegible]	[illegible]	52,852,579	7,148,154	7,320,499	1,013,234	19,989,751	933,962	36,405,600	23,446,979	422,691	2,958,721	20,910,949	—2,013,420
[illegible]	[illegible]	[illegible]	[illegible]	18,264,175	2,421,896	1,933,690	303,336	4,507,955	463,923	9,630,800	8,633,375	—18,907	744,143	7,870,325	—1,850,830
[illegible]	[illegible]	[illegible]	[illegible]	6,558,849	824,165	646,581	230,169	2,573,008	225,871	4,499,794	2,059,055	—40,186	349,979	1,668,890	—
[illegible]	[illegible]	[illegible]	[illegible]	144,312,118	17,903,275	27,079,337	2,042,723	53,249,037	3,725,581	103,999,953	40,312,165	—1,192,246	5,162,215	33,957,705	—6,612,082
[illegible]	[illegible]	[illegible]	[illegible]	46,613,607	5,433,576	8,085,471	857,713	16,686,172	936,341	31,999,273	14,614,334	—60,733	2,065,633	12,487,968	—2,525,615
[illegible]	[illegible]	[illegible]	[illegible]	14,644,094	1,931,628	2,331,924	424,774	6,722,876	384,066	11,795,268	2,848,826	—66,892	617,447	2,164,487	—1,655,101
[illegible]	[illegible]	[illegible]	[illegible]	17,440,119	2,557,420	2,771,107	313,559	7,384,072	401,572	13,427,730	4,012,389	.....	530,420	3,481,969	—116,576
[illegible]	[illegible]	[illegible]	[illegible]	14,383,923	1,733,153	1,458,129	164,424	3,485,470	263,105	7,104,281	7,279,642	—4,091	306,576	6,968,975	—1,846,037
[illegible]	[illegible]	[illegible]	[illegible]	35,824,313	4,349,842	6,555,352	793,119	13,475,969	731,604	25,905,886	9,918,427	—9,643	1,499,756	8,409,028	—1,519,714
[illegible]	[illegible]	[illegible]	[illegible]	55,729,530	6,885,378	8,823,207	1,414,908	19,016,234	1,632,903	37,772,630	17,956,900	—26,047	2,008,029	15,922,824	—470,635
[illegible]	[illegible]	[illegible]	[illegible]	14,865,772	1,794,866	2,858,076	235,347	6,164,152	412,249	11,464,690	3,341,082	—3,883	551,001	2,786,198	—458,043

Mileage operated on May 31, 1910—[1] 998 miles; [2] 7,638 miles; [3] 9,040 miles; [4] 7,393 miles; [5] 843 miles; [6] 1,961 miles; [7] 7,129 miles; [8] 4,550 miles; [9] 1,746 miles; [10] 3,533 miles; [11] 1,951 miles; [12] 5,849 miles; [13] 1,509 miles. [14] 3,947 miles; [15] 191 miles. — Indicates Deficits, Losses and Decreases.

a statement of cost to move one train of coal from Drifton, a mine of Coxe Brothers & Company, to Perth Amboy, including trackage to the Lehigh Valley Railroad Company, the shipping charges of that company at Perth Amboy, and the return of empty cars, which statement is filed as complainants' Exhibit No. 1.

The total cost per ton shown by this exhibit is 76.54 cents.

J. Brinton White, vice-president and treasurer of Coxe Brothers & Company, who owned the entire stock of the Delaware, Susquehanna & Schuylkill, made frequent calculations as to the cost per ton of the movement of coal from the mines on the Delaware, Susquehanna & Schuylkill to Perth Amboy, and continued these calculations until he "got down to a figure which he knew to be correct." The figure which Mr. White arrived at was 76 cent per ton; but as this 76 cents included the trackage charge of the Lehigh Valley Railroad and the shipping charges at Perth Amboy, he was of opinion that the profit of the Lehigh Valley should have been deducted from the 76 cents, if the profit could have been ascertained.

Defendant has endeavored to show the actual cost of transporting coal from the Wyoming district to the barges at Perth Amboy. Three civil engineers, William J. Wilgus, J. F. Stevens and John F. Wallace, were engaged by defendant to investigate the transportaion of coal from the anthracite region to tidewater for the purpose of ascertaining the cost thereof. They were assisted in their investigation by officers and employees of the road and by engineers in Mr. Wilgus' office. Mr. Wilgus prepared an estimate of the cost of carrying coal based upon theories and formulæ which were approved by the other engineers. His estimate is set forth in a voluminous exhibit known as "Defendant's Exhibit F-3." The exhibit contains all the details from which the final estimate of cost is deducted. The recapitulation of Exhibit F-3 is as follows:

Cost of transporting anthracite coal on the Lehigh Valley Railroad from the Wyoming district to Perth Amboy.

Items.	Perth Amboy terminal.	Main line, Perth Amboy to Coxton.	Wyoming collection district.	Total.
Operating expenses, including taxes.	$0.1189	$0.6915	$0.0866	$0.8970
Interest:				
Roadbed, tracks and structures...	.0700	.1470	.0412	.2582
Equipment	.0096	.0437	.0283	.0816
General facilities	.0012	.0045	.0010	.0067
	.0808	.1952	.0705	.3465
Depreciation:				
Roadbed, tracks, and structures...	.0071	.0034	.0009	.0114
Equipment	.0080	.0646	.0176	.0902
General facilities	.0004	.0015	.0003	.0022
	.0155	.0695	.0188	.1038
Total	.2152	.9562	.....	1.3473
Additions and betterments.....	.....	.....	.....	.0400
Risks and deficits	.....	.....	.....	.1070
Grand total	.....	.....	.....	1.4943

There are many circumstances, however, connected with the preparation of this exhibit, which seriously impair its value as evidence on the question of cost.

Mr. Wilgus testified that the figures which he used in preparing said exhibit as to the value of the roadbed, track, and structures and value of equipment were based on an examination of the road and an examination of the equipment, and that he had attempted to estimate the cost of reproduction. This work he states was done by himself and assistants in his employ. The assistant in his employ, who undertook to make an examination of the road with a view to determining the cost of reproduction, was T. A. Lang, and Mr. Wilgus testified that his calculations are absolutely dependent upon the information furnished by him by Lang.

The story of Mr. Lang's investigation as to cost of reproduction, as told by Lang himself, was as follows:

He left Perth Amboy at 1:20 p. m. on a passenger train for Easton, arriving there about 3:20 or 3:30 p. m. In going to Easton he stood on the rear platform of the train. After arriving at Easton, he did nothing more that day, as it was Sunday. The following morning at 9 a. m., he left Easton on a pony engine, which had a coach on top of the boiler. On this engine he traveled at the rate of 15 or 20 miles an hour, stopping at various points. About 5:30 p. m., of the same day, he arrived at Wilkesbarre, and stayed there all night, all the next day, and the next night. While there, he made computations in the railway company's office. On the following day, he left Wilkesbarre at 8:30 a. m. on a passenger train, and arrived at Easton about 11 or 12 o'clock. He remained in Easton until that forenoon, and then took a train for New York. While at Easton, he devoted a "few minutes" to an examination of the Delaware bridge and the Easton steel viaduct. Based upon this examination, he furnished Mr. Wilgus the data which he required as to estimated cost of reproduction of the Lehigh Valley Railroad.

Mr. Stevens testified in substance that he believed it possible for a competent engineer to get a correct approximate idea of the value of a railway by riding over it, and that he has done considerable work in estimating values by traveling over railways. He stated that he was not prepared to dispute Mr. Wilgus' figures, and that he would not guarantee them; and "that it would be worse than foolish for him to say that he had time to undertake to make a mile-by-mile estimate of the cost of reproducing the Lehigh Valley Railroad." The most that he had to say concerning Mr. Wilgus' estimate was that it was "probably conservative."

Mr. Wallace frankly admitted that his testimony given in corroboration of Mr. Wilgus' figures was a matter of purely personal judgment, based on his experience and observation. He testified that men in his line of business were continually drawing comparisons and making "estimated judgments," and that sometimes they were correct and sometimes wrong. He further stated that it was his custom to value railway property very much as a farmer would value a horse.

The estimate of cost made by Mr. Wilgus is based on the fundamental assumption that the cost of carrying coal is equal to the average cost of carrying all traffic. If this proposition be sound, it follows that by far the greater part of tariffs covering the transportation of coal are improperly constructed, for the rates upon coal are generally much below the average rates.

Moreover, it will be noted that the estimate of cost shows that the average cost of carrying anthracite coal from the Wyoming region to Perth Amboy is $1.49. An exhibit filed by the Lehigh Valley shows that its average receipts per gross ton of anthracite coal to Perth Amboy for the 10 years ending June 30, 1908, were $1.46. It would therefore follow that all anthracite coal which has been hauled by the Lehigh Valley to tidewater has been carried at a loss of about 3 cents per ton. But it is shown by reports on file with the commission that the operations of the Lehigh Valley Railroad for a number of years past have been exceedingly profitable, and as anthracite coal has constituted almost half of its tonnage, it is fair to assume that it has made a profit upon the handling of that commodity.

It requires no extended argument to sustain the proposition that the maintenance of an unreasonably high rate operates to the advantage of the Lehigh Valley Railroad Company as a dealer in coal. The record shows that the only line of demarcation between the Lehigh Valley Railroad Company and the Lehigh Valley Coal Company is one of bookkeeping. Assuming for purposes of illustration that the cost of mining anthracite coal is $2 per ton and the cost of carrying it to tidewater is $1 per ton, it follows that the cost of coal at tidewater would be $3 per ton; and if the published rate were $1 the independent operator and the railroad coal company would be on a fair competitive basis so far as the cost of mining and transportation are concerned. But as between the railway company and its coal company it matters not whether the profit comes from mining or transporting the coal. So, therefore, if, instead of the $1 rate above mentioned, the railway company were to establish a rate of $1.50 per ton, the railway and its coal company would still sell coal at tidewater for $3 per ton, standing a deficit of 50 cents per ton in the mining price and taking an equal profit in the transportation price. But the independent operator cannot recoup himself in this manner, and the best price that he could make at tidewater would necessarily be the mining price of $2, plus the carrying charge of $1.50, or $3.50; and he would enter the market at a disadvantage of 50 cents per ton as compared with the railway and its coal company. It is obvious that such an advantage would enable the railway company and its *alter ego*, the coal company, to monopolize the field of production and the selling market. Whatever the means employed, it is a fact that the railway coal company has monopolized the coal field served by it. In 1901, 47 per cent. of the defendant's coal tonnage to Perth Amboy was controlled by it and 53 per cent. by independ-

ent operators; while in 1908 the defendant controlled 95 per cent. of the anthracite tonnage over the defendant's line to Perth Amboy and the independent operators 5 per cent. During the same period complainant's shipments to Perth Amboy decreased from 147,811 tons for 1901 to 40,562 tons for 1908.

Coming now to the question of the reasonableness of the rates, counsel for defendants asserts that the rates on coal must be sufficient to produce four results, viz: (1) An income sufficient to make up for past deficiencies in current return on investment. (2) A reasonable current annual return upon the investment in the railway and transportation adjuncts. (3) An amount sufficient to provide reasonably for keeping the property up to constantly modern standards—i. e., such improvements as are necessary for public convenience and safety and to enable the railway to get business in competition with other roads. (4) An amount sufficient to provide for a return of the principal of the investment, when and as this principal becomes reduced and extinguished by the exhaustion of coal freight.

Under the first proposition defendant argues that the present rates should be sufficiently high to enable it now to earn the amount by which it has fallen short of paying a 6 per cent. annual dividend in the past, or at least as far back as 1894. It shows that a dividend rate of 6 per cent. applied to its common stock of $40,441,100 for the period from November 30, 1894, to June 30, 1908, would amount to $35,091,276; that during this period the dividends paid amounted to $7,260,264; and argues that upon a 6-per-cent. basis the common stock shareholders suffered a deficiency in dividends during this 14½-year period of $27,831,112. In the Wilgus estimate above mentioned 10 cents per ton is added to the assumed cost of carrying coal to Perth Amboy for the purpose of "making good the deficit of over $20,000,000 in dividends" for past years.

After careful study of defendant's exhibits relating to tonnage and cost of movement, as well as a painstaking analysis of defendant's voluminous exhibits respecting its past and present financial condition, we are of opinion and so find that defendant's rates for transportation of coal from the Wyoming region to Perth Amboy of $1.55 per gross ton on prepared sizes, $1.40 on pea coal, and $1.20 on buckwheat coal are unreasonable so far as they exceed $1.40 on prepared sizes, $1.30 on pea coal, and $1.15 on buckwheat. If the relative tonnage of the several sizes continues as it has in the past, the rates herein found to be reasonable would result in an average reduction in defendant's revenue per gross ton for hauling coal to Perth Amboy of about 11 cents below the figure of $1.46 for the 10 years from 1898 to 1908. As applied to 1908, the last year for which anthracite tonnage to Perth Amboy is shown in the record, the proposed rates would have resulted in reducing its operating revenue by about $247,000 and apparently 95 per cent. of this amount would accrue to the benefit of the railway coal company. By reference to the table above set forth it is at once apparent that such a reduction will have no serious effect on defendant's revenues and will afford ample allowance for interest charges, operation, dividends, and all proper reserve funds.

We are further of opinion that reparation should be awarded upon basis of the rates herein found to be reasonable upon all shipments of coal by complainants from the Wyoming region to Perth Amboy since August 1, 1907. The amount of reparation which should be awarded under our finding in this case cannot be ascertained from the exhibits now on file, and such further proceeding will be had as may be necessary to determine the amount of reparation to be awarded. (21 I. C. C., 129.)

Reparation Awarded, Notwithstanding Unclean Hands.

C. H. Sudsuky v. Illinois Central et al. Opinion by the commission:

The complainant in this case seeks reparation on a carload of junk, shipped from Hanna, Wyo., to Lake City, Col. The complainant is a partner in the firm of Louis Price and one bill of lading covered both of the cars of junk and one car of scrap iron and brass. The junk shipment was billed as scrap iron, which took a rate of $4 a ton. When the shipment arrived at its destination, the railway company's inspector discovered that one car contained junk instead of old iron, and a small quantity of other junk and the remainder of scrap iron. A rate of $5 per ton, not being the rate on a carload of junk, of which the shipment in truth consisted, was then charged. Complainant's testimony as to his preliminary inquiries of the agent relative to the rate on the junk, and his careful verification of these quotations on the very day of shipment, indicate that he was aware that one of the shipments, the one which is the subject of this controversy, would probably take the junk rate. Complainant's action in this matter, in view of his affirmative knowledge of the lower rating usually applicable on shipments of scrap iron distinguished as such from junk, and his positive statement that he was quoted a $5 rate on the shipment from Hanna, leave on the commission an unfavorable impression of his conduct in this instance, and while the commission expresses no opinion in the matter, the fact remains that had the shipment escaped inspection at destination, it probably would have been delivered to complainant as scrap iron under the $4 per ton rate, in which case it is unlikely that this proceeding would have been brought to challenge the reasonableness of the junk rate. This feature of the case will form the basis of further inquiry under the criminal provision of the statute. The commission finds that the rate charged was unreasonable, insofar as it exceeded $6 per ton. Reparation is therefore awarded. (21 I. C. C., 243.)

Lower Rates for Longer Haul Justified.

Roberts Cotton Oil Co. v. Illinois Central et al. Opinion by the commission:

Defendants maintain or participate in rates on cottonseed oil in carloads from St. Louis, Mo., and East St. Louis, Ill., to Chicago, Louisville, Ky., and Cincinnati, Ohio, which are relatively lower than the rates from Cairo Ill., to the same destinations; but the lower rates from St. Louis and East St. Louis are made by lines which do not reach Cairo, and defendants can not control the rates from those points. The rates from Cairo are not shown to be unreasonable, and defendants are not guilty of undue prejudice against that point within the meaning of section 3 of the act to regulate commerce. (21 I. C. C., 248.)

Reconsignment Charge Reduced.

Detroit Traffic Association v. Lake Shore & Michigan Southern et al. Opinion by Commissioner Lane:

The reconsignment charge of $3 per car exacted by defendants at Detroit, Mich., on bituminous coal originating at points in Ohio and elsewhere, and forwarded to various Michigan points, found to be unreasonable in itself, and a reconsignment charge of $2 per car prescribed for the future. (21 I. C. C., 257.)

STATE COMMISSIONS.

The Louisiana railway commission has been holding a series of hearings on the complaint against the service and physical condition of the Louisville & Nashville. The terminal facilities at New Orleans are especially attacked.

The Oklahoma corporation commission has decided that for a railway to issue passes to employees of baggage companies having contracts with the road for the transfer of baggage on through tickets, is not in violation of the anti-pass law of that state.

The Nevada Railroad Commission has issued an order reducing 1st, 2d, 3d and 4th class freight rates on the Southern Pacific and the Tonopah & Goldfield roads approximately 25 per cent. the reduction to go into effect August 1. The same commission has requested the Southern Pacific to appear July 12 at a hearing relative to a revision of passenger rates throughout the state.

The New York State Public Service Commission, second district, has authorized the Suffolk Traction Company to lay tracks at grade across the Long Island Railroad at Ocean avenue, Patchogue. The crossing must have approved interlocking signal and derail, and the expense of installation, maintenance and operation of the apparatus must be borne by the Suffolk company.

The Indiana Commission has issued an order (circular No. 77), calling the attention of the railways, both steam and electric, to the law requiring signals at all highway grade crossings, obedience to which has been neglected by some companies. At the session of the legislature this year a new and stronger law was passed and the commission notifies the railroads that offenders will be promptly prosecuted.

The New York State Public Service Commission, second district, has ordered the Newark & Marion to use only oil-burning

locomotives; and has refused the application of the company for an extension of three months from July 1 of the time within which it must comply with the order. The road was chartered as an electric line, but it was found that installation of electric apparatus would be too costly.

The Ohio Railroad Commission has ordered considerable reductions in the freight rates on coal from the Ohio coal field through Columbus north to Toledo. Heretofore the rate has been $1 per ton for all points north of Columbus. The commission has ordered the rates between Marion and Upper Sandusky cut from $1 to 75 cents; from Upper Sandusky to Fostoria from $1 to 80 cents, and from Fostoria, to Toledo from $1 to 85 cents. The Columbus rate was reduced from 65 cents to 60, and all rates south of Columbus were cut by five cents.

COURT NEWS.

In the Supreme Court of New York at New York City, a verdict of approximately $91,000 has been awarded against the Delaware & Hudson for loss on a fraudulent bill of lading. The suit was brought by Denike, assignee of claims of Keusch and others. It appears that the agent of the road, in collusion with shippers, had signed bills af lading for grain which never was shipped.

In the United States district court at Boston last week the Elm Farm Milk Company pleaded guilty on five of the sixty counts in the indictment which had been found against it for accepting reduced rates from the New York, New Haven & Hartford for the transportation of milk; and Judge Dodge imposed a fine of $5,000 and costs. The reports say that the railway company, indicted at the same time, pleads not guilty.

In the Circuit Court of Appeals at Little Rock, Ark., on June 26, Judge Trieber granted the state of Arkansas an appeal in the railway rate case, involving the validity of the 2-cent fares and freight tariffs of the state railway commission, which case he recently decided against the state, and ordered that tariffs fixed by the court and agreed on while the case was pending in the Circuit Court remain in force until a decision is reached by the Supreme Court of the United States.

The Supreme Court of New Jersey has decided that a manufacturer is liable for the negligence of his superintendent in instructing a workman to dress the wound of another employee. The employee had cut his finger with a pair of scissors and the superintendent told another workman to dress the finger, using carbolic acid taken from the emergency chest in the factory. Gangrene followed, and the injured man sued for damages, which were awarded him. The question involved on the appeal to the Supreme Court was whether the use of medicines found in an emergency chest in the factory was within the authority given by the superintendent to the man who dressed the injury.

The Supreme court of Indiana has sustained the order of the state railroad commission in ordering the elevation of tracks to separate the grades at a street crossing in Topeka, Ind. The railway company (the Wabash) denied the right of the commission to make such an order, claiming that the power lay in the hands of the town authorities, but the court, while holding that the town might act, holds that the railroad commission also has the power to act; and the order which was made by the commission in this case is held to have been reasonable and practicable. The right of a railway company to cross a public highway involves the duty of restoring the highway to its former condition of usefulness and safety; and if this cannot be done with the crossing at grade, then the company must elevate or depress.

In the federal court at Cincinnati, Ohio, Judge Hollister on June 30 fined three roads for keeping live stock in cars for more than 28 hours without water or stop, in violation of the interstate commerce act. Fifteen cases, for which it was fined $100 each, were decided against the Baltimore & Ohio Southwestern; three against the Queen & Crescent; and one, for which it was fined $200, was decided against the Big Four.

The Indiana Appellate Court, in the case of the Lakeshore & Michigan Southern vs. the Chicago, Lake Shore & South Bend, an electric line, has decided that an electric road is not liable for damages arising out of induced currents which interfere with the telegraph and telephone lines of a parallel steam road, unless it be shown that the electric line is not using the most improved methods to prevent induction.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

C. P. Crawford, auditor of the Erie Railroad, has been elected comptroller. J. G. Livengood, auditor of disbursements, succeeds Mr. Crawford, and C. E. Hildum succeeds Mr. Livengood, all with offices at New York.

J. F. Schaperkotter, general solicitor of the Lehigh Valley, with office at New York City, has resigned, and that position will be abolished, effective September 1. E. H. Boles has been appointed general attorney, with office at New Yorq City, in charge of the legal department.

Carl R. Gray, president of the Spokane, Portland & Seattle, has been elected also president of the Spokane & Inland Empire, succeeding J. P. Graves. C. A. Coolidge, general manager of the Oregon Electric Railway, has been appointed also vice-president, and general manager of the Spokane & Inland Empire, succeeding C. M. Graves, both with office at Spokane, Wash.

James Spicer Murray, who has been on the staff of the president of the Baltimore & Ohio, has been appointed assistant to president, with office at Baltimore, Md. Mr. Murray was born in 1871, at Baltimore, Md., and was educated at the Baltimore City College and then took a law course in the University of Maryland. He began railway work April 19, 1886, as a messenger boy in the master mechanic's office of the Baltimore & Ohio, and in 1889 was appointed a clerk in the office of the superintendent of motive power, at Mt. Clare. He was later promoted by Major H. D. Bulkley, late comptroller of the B. & O., to do special work in connection with the installation of system equipment valuation. On the completion of this work Mr. Murray was appointed private secretary to Comptroller Bulkley, remaining in that position until 1897, when he was made chief clerk to the comptroller. On January 1, 1904 he was promoted to a position on the staff of the president, to approve voucher payments and do special work, which position he held at the time of his recent appointment as assistant to president, as above noted. Mr. Murray's entire service has been with the Baltimore & Ohio.

James S. Murray

Incident to the reorganization and consolidation of the Cleveland, Akron & Columbus Railway Company and the Cincinnati & Muskingum Valley Railroad Company as the Cleveland, Akron & Cincinnati Railway Company (see item under Railway Financial news), Joseph Wood, who has been president, S. B. Liggett, secretary; T. H. B. McKnight, treasurer; and Robert R. Reed, assistant treasurer, of both companies, have been appointed to similar offices on the Cleveland, Akron & Cincinnati. S. C. Scott, vice-president of the Cleveland, Akron & Columbus, has been elected vice-president of the reorganized company, and the following officers of the Pennsylvania Lines West have had their jurisdiction extended over it: J. L. Mason, assistant secretary; J. J. Brooks, general counsel; C. B. Heiserman, general solicitor; A. P. Burgwin, assistant counsel, and G. C. Urquhart, real estate agent. John W. Renner, comptroller and J. T. Wellock, auditor, of the Cleveland, Akron & Columbus; and S. H. Church, assistant secretary of the Cincinnati & Muskingum Valley, have been appointed to similar positions on the Cleveland, Akron & Cincinnati.

Operating Officers.

W. M. Seeman has been appointed superintendent of dining cars of the San Pedro, Los Angeles & Salt Lake, with office at Los Angeles, Cal.

George E. Denklee has been appointed superintendent in charge of the accounting and operating departments of the Central Railway of Oregon, with office at Union, Ore.

Charles G. Richardson, traveling auditor of the Erie Railroad, has been appointed inspector of suburban service of the Erie and the New Jersey & New York, with office at Jersey City, N. J.

P. Laden, superintendent of the Indiana division of the Illinois Central, at Mattoon, Ill., has been appointed general manager of the Missouri, Oklahoma & Gulf, with office at Muskogee, Okla.

E. E. Lillie, superintendent of car service of the Spokane, Portland & Seattle, at Portland, Ore., has been appointed superintendent of the Spokane & Inland Empire, with office at Spokane, Wash., succeeding R. C. Bowdish, resigned.

C. T. Mason, assistant superintendent of the New Orleans, Texas & Mexico and the Beaumont, Sour Lake & Western, has been appointed superintendent, with office at Beaumont, Tex., succeeding H. Hall, assigned to other duties at Houston.

H. D. Voorhees, assistant to president Daniel Willard of the Baltimore & Ohio, has been appointed general superintendent of transportation of the Baltimore & Ohio system. A portrait of Mr. Voorhees and a sketch of his railway career were published in the *Railway Age Gazette* of May 20, 1910, page 1279.

T. H. Crump has been appointed trainmaster of the Canadian Pacific, in charge of Vancouver (B. C.) terminals, Westminster Junction and Westminster subdivision, and A. F. McIntyre has been appointed trainmaster in charge of the section from Vancouver to and including Kamloops, both with offices at Vancouver.

F. L. Sample, acting trainmaster of the Boston & Albany, at West Springfield, Mass., has been appointed trainmaster, in charge of the Albany division between Hinsdale and Athol Junction, including the Athol branch, with office at West Springfield. Charles A. O'Connor has been appointed chief train despatcher, and William B. Marshall has been appointed night chief train despatcher, both with offices at Springfield.

James B. Gilmer, assistant to general manager of the Texas Central, has been appointed assistant general manager in charge of the general manager's office, and his former position has been abolished. Ramsey M. Cox, superintendent, has been appointed assistant general manager, in charge of fire, personal injury, loss and damage and all other claims, also tax and right-of-way matters, and his former position has been abolished, both with offices at Waco, Tex.

land, Akron & Columbus and the Cincinnati & Muskingum Valley as the Cleveland, Akron & Cincinnati (see item under Executive, Financial & Legal Officers), W. B. Wood, superintendent of the Cleveland, Akron & Columbus, and Paul Jones, superintendent of the Cincinnati & Muskingum Valley, have been appointed to similar positions on the Cleveland, Akron & Cincinnati. A. B. Starr, general superintendent of freight transportation and [illegible] reorganized company. F. C. Thayer has been appointed superintendent of the voluntary relief department, and assistant superintendent of the voluntary relief department, and saving fund.

J. F. Murphy, who has been appointed general superintendent [illegible] then switchman, and in 1889 went with the Kansas City, Fort Scott & Memphis, where he filled various positions in yard service until March, 1896, when he was made yardmaster of the Kansas City Suburban Belt. He was later promoted to general yardmaster, then to terminal trainmaster, and to superintendent, leaving that road in October, 1905, to become trainmaster of the Missouri Pacific at Coffeyville, Kan. In February, 1907, he was appointed superintendent of the Memphis division, was later transferred to the Central and Arkansas divisions, and on June 19 of this year was promoted to general superintendent of the eastern district.

George S. Cooke, who has been appointed superintendent of the Grand Trunk Pacific, with office at Melville, Sask., as has been announced in these columns, was born October 27, 1875, at Montreal, Que. He was educated in the schools of Montreal, and in 1890 began railway work with the Grand Trunk System at Montreal, first as a clerk in the stationery department and then in the superintendent's and trainmaster's office. He was appointed chief clerk to the trainmaster at Battle Creek, Mich., in February, 1900, and in October of the following year was made chief clerk to the superintendent of the St. Louis, Iron Mountain & Southern. In March, 1905, he went with the Chicago, Cincinnati & Louisville, first as chief clerk to the superintendent and then to the general superintendent, and became trainmaster at Peru, Ind., in August, 1906. A year later he was made chief clerk in the engineering department of the Grand Trunk Pacific, and from October, 1908, until the time of his recent promotion he was trainmaster at Melville.

James F. Russ, whose appointment as superintendent of the Missouri Pacific, with office at Atchison, Kan., has been announced in these columns, was born August 11, 1861, at Kewanna, Ind. He was educated in the public schools and began railway work in November, 1878, in the operating department of the Pittsburgh, Cincinnati & St. Louis, now part of the Pennsylvania system. In 1884 he went with the Kansas City, Fort Scott & Memphis, and was with that company continuously, first as despatcher and then as chief despatcher, until 1892, except during the year 1891, when he was trainmaster of the New York & New England, now part of the New York, New Haven & Hartford. For three years prior to September, 1895, he was with the New York, Ontario & Western as trainmaster at Carbondale, Pa., and he was then out of railway work until April, 1900, when he became trainmaster of the Kansas City, Fort Scott & Memphis and the St. Louis & San Francisco. He was superintendent of the Chicago & Eastern Illinois for two years from March, 1903, and from 1905 to 1907 he was again out of railway work. In the latter year he was made despatcher of the Missouri Pacific, was promoted to trainmaster in August, 1908, and is now advanced to superintendent as above.

Traffic Officers.

S. G. Yerkes has been appointed agent of the Chicago Great Western, with office at Fargo, N. D., succeeding G. L. Williams, resigned.

H. E. Woodworth has been appointed a freight soliciting agent of the Southern Railway, with office at Nashville, Tenn.

R. L. Castleberry has been appointed traveling freight agent of the Erie Despatch, with office at Dallas, Tex., succeeding C. D. Young, resigned.

W. H. Shorey, passenger and ticket agent of the Wabash at Fort Wayne, Ind., has been appointed division passenger agent, with office at Fort Wayne.

P. J. Rose, contracting freight agent of the Chicago & Alton and the Toledo, St. Louis & Western, has been appointed a traveling freight agent, with office at St. Louis, Mo.

C. E. Redman has been appointed traffic manager of the Las Vegas & Tonopah, with office at Goldfield, Nev., succeeding J. H. Brown, resigned to go into other business.

[illegible] agent of the Illinois Central, with office at St. Louis, Mo., succeeding D. L. Hyde, resigned to engage in other business.

[illegible] passenger agent of the Chicago, St. Paul, Minneapolis & Omaha, with office at St. Paul, Minn., succeeding G. M. MacRae, promoted

Leo M. Schachtmeyer, chief clerk in the San Diego, Cal., office of the Atchison, Topeka & Santa Fe, has been appointed a traveling passenger agent of the Southern Pacific, with office at San Diego.

H. B. Sperry, commercial agent of the Colorado & Southern at Ft. Worth, Tex., has been appointed general freight and passenger agent of the Texas Central, with office at Waco, Tex., succeeding W. F. McMillin, resigned.

R. R. Bilter has been appointed a commercial agent of the Chesapeake & Ohio and the Chesapeake & Ohio of Indiana, with office at Kansas City, Mo., and J. Shaw Stevens has been appointed a commercial agent, with office at Los Angeles, Cal.

Effective August 1, the headquarters of C. T. Wight, division freight agent of the Baltimore & Ohio at Sandusky, Ohio, will be transferred to Fostoria, Ohio, and G. F. Leingang, chief clerk to the division agent at Sandusky, will be appointed a division freight agent at that place.

D. L. Ewing, general agent in the freight department of the St. Louis & San Francisco at Pittsburgh, Pa., has been appointed assistant general freight agent, with office at St. Louis, Mo., succeeding Charles Hall, transferred. R. B. Merrick, commercial agent at New York City, succeeds Mr. Ewing, and A. W. Von Arx succeeds Mr. Merrick.

E. R. Jennings, traveling passenger agent of the Missouri Pacific at Little Rock, Ark., has been transferred to Chattanooga, Tenn., succeeding B. K. Quick, resigned to go into other business. W. H. Glover succeeds Mr. Jennings, and H. C. Halverson has been appointed a traveling passenger agent at Little Rock, succeeding G. M. Trickett, assigned to other duties.

H. C. Webb, traveling passenger agent of the Illinois Central at Houston, Tex., has been appointed a district passenger agent; C. L. Chase has been appointed a traveling freight agent; and T. F. Bowes has been appointed a traveling freight and passenger agent, all with offices at Houston. Hugh Hardin, soliciting freight agent at Dallas, Tex., has been appointed a traveling freight agent with headquarters at Dallas. J. F. Merry, general agent at Manchester, Iowa, has retired on a pension.

J. Warren Brown, traveling freight and passenger agent of the El Paso & Southwestern at St. Louis, Mo., has been appointed southeastern freight and passenger agent, with headquarters at Memphis, Tenn., a new office. J. L. Fox, traveling freight and passenger agent at Pittsburgh, Pa., succeeds Mr. Brown. J. F. Hogan, contracting agent of the Illinois Central at Chicago, has been appointed traveling freight and passenger agent of the El Paso & Southwestern, with office at Chicago.

Edward S. Giles, who has been appointed assistant general freight agent of the Delaware, Lackawanna & Western, with offices at New York City, as has been announced in these columns, was born August 18, 1873, at Plainwell, Mich. He began railway work with the Delaware, Lackawanna & Western on October 2, 1890 as a clerk, and was later chief rate clerk, and in September, 1906, he was promoted to chief of tariff bureau, which position he held at the time of his recent appointment as assistant general freight agent.

John O. Goodsell, traveling passenger agent of the Union Pacific and the Southern Pacific at Toronto, Ont., has been appointed traveling passenger agent, with office at Detroit, Mich., succeeding A. J. Ratcliffe, deceased. Fred V. DeFriest has been appointed contracting freight agent, with office in New York City, succeeding Daniel C. Fisk, transferred, and John P. Plummer has been appointed a contracting freight agent, with office at San Francisco, Cal. Max Meadors has been appointed a contracting freight agent, with office at Los Angeles, Cal., succeeding W. J. Robinson, deceased.

George W. Stahlman, agent of the Union Line of the Pennsylvania Lines West at Memphis, Tenn., has been transferred to Nashville, Tenn., succeeding D. A. Lindsey, resigned. William C. Wood, Jr., traveling freight solicitor at St. Paul, Minn., succeeds Mr. Stahlman, and I. C. Furber, agent at Fargo, N. D., succeeds Mr. Wood. A. F. Ferguson, traveling freight solicitor at St. Paul, succeeds Mr. Furber at Fargo. Walter M. Wallace, freight solicitor at St. Paul, has been appointed a traveling freight solicitor at St. Paul, succeeding W. P. Cameron, who in turn, succeeds Mr. Ferguson. John J. Fee, Jr., succeeds Mr. Walker.

Incident to the reorganization and consolidation of the Cleveland, Akron & Columbus and the Cincinnati & Muskingum Valley as the Cleveland, Akron & Cincinnati (see item under Executive, Financial & Legal Officers), J. M. Chesbrough, general passenger agent, and F. E. Sawyer, general freight agent, of the Cleveland, Akron & Columbus, have been appointed to similar positions on the Cleveland, Akron & Cincinnati. Thomas S. Trainer, general freight and ticket agent of the Cincinnati & Muskingum Valley, has been appointed division freight agent; and R. R. Bentley, general baggage agent of the Pennsylvania Lines West, has had his jurisdiction extended over the new company.

Engineering and Rolling Stock Officers.

Millard F. Cox has been appointed mechanical engineer of the Louisville & Nashville, with office at Louisville, Ky., succeeding W. A. Stearns, resigned.

R. H. Collins has been appointed inspector of roundhouse and shop efficiency of the St. Louis & San Francisco, with office at Springfield, Mo.

N. G. Rich, roadmaster of the Missouri, Kansas & Texas of Texas, with headquarters at Granger, Tex., has resigned to accept service with another company.

J. H. Burger has been appointed roadmaster of the Southern division of the Gulf, Colorado & Santa Fe, with office at Lampasas, Tex., succeeding D. H. Watson.

G. W. Deats, general foreman of shops of the Texas & Pacific at Fort Worth, Tex., has been appointed master mechanic of that road and the International & Great Northern, with office at Fort Worth, a new position.

C. M. Hoffman, superintendent of motive power of the St. Louis, Brownsville & Mexico, with office at Kingsville, Tex., has had his jurisdiction extended over the New Orleans, Texas & Mexico, the Beaumont, Sour Lake & Western and the Orange & Northwestern.

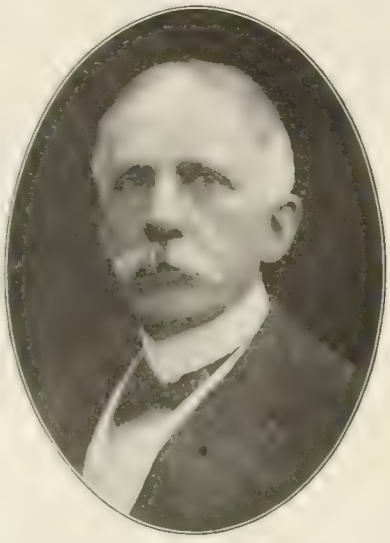
C. N. Monsarrat and C. C. Schneider, formerly engineers in the service of the Canadian Pacific, are now members of the board of engineers in charge of the construction of the Quebec bridge across the St. Lawrence. Mr. Monsarrat recently resigned the position of chief engineer of bridges of the Canadian Pacific. Mr. Schneider was designer of important bridges on that road when its line to the Pacific was built, one of these being the cantilever bridge over the Fraser river in British Columbia.

Charles E. McAuliffe, whose appointment as master mechanic of the Missouri Pacific, with office at Atchison, Kan., has been announced in these columns, was born February 27, 1871, at St. Johns, Mich. He received a public school education and in December, 1887, began work with the Grand Trunk Railway. He remained with that road until 1899, doing shop work two years, acting as fireman six years and was for four years an engineer. He then became an engineer on the Great Northern, and in 1904 was appointed a traveling engineer of the Missouri Pacific. He was promoted to assistant master mechanic at Sedalia, Mo., in February, 1911, from which position he is now advanced to master mechanic of the Northern Kansas division.

Wilmer Herbert Sample, whose appointment as master mechanic of the Ottawa division of the Grand Trunk, with office at Ottawa, Ont., has been announced in these columns, was born August 20, 1864, at Altona, N. Y., and was educated at the Plattsburg High School. He began railway work on July 20, 1882, as a fireman on the Central Vermont, and was promoted to engineer in 1886. He resigned in July, 1887, to go to the Atchison, Topeka & Santa Fe in the same capacity, and in August, 1889, returned to the Central Vermont as engineer. In February, 1901, he was promoted to road fore-

man, and in July, 1906, he went to the Northern Railway of Costa Rica, Central America, as superintendent of motive power and car departments, from which position he resigned to go to the Grand Trunk, as above noted.

As noted last week in these columns, Theodore N. Ely, heretofore chief of motive power of the Pennsylvania Railroad, retired from railway work on July 1, after 43 years of service. He was born on June 23, 1846, at Watertown, N. Y., prepared for college in the excellent public schools of that village, and graduated from Rensselaer Polytechnic Institute in 1866 as a civil engineer. Immediately after graduation he was engaged as an engineer at the old Fort Pitt foundry at Pittsburgh, experimenting with projectiles under Gen. Rodman. A year later, 1867, he was at work in the mining operations in the Monongahela river region. In 1868 he entered upon his life's work and long career in the service of the Pennsylvania Railroad as an engineer on the Pittsburgh, Fort Wayne & Chicago at Pittsburgh, from which he was soon sent as asistant engineer to the Philadelphia & Erie division of the Pennsylvania. From 1869 to 1870 he was superintendent of the middle division of the Philadelphia & Erie, and was then promoted to asistant general superintendent, a position which he held until 1873. From 1873 to 1874 he was superintendent of motive power of the same division. In 1874 he was made superintendent of motive power of the Pennsylvania Railroad division, and in 1882 became general superintendent of motive power of the Pennsylvania Lines East of Pittsburgh and Erie. From March, 1893, to the date of his retirement he has been chief of motive power, Pennsylvania Lines East and West of Pittsburgh and Erie.



Theodore N. Ely

gineers, the Institution of Civil Engineers (England), the American Society of Mechanical Engineers, the American Institute of Mining Engineers, the Franklin Institute, the American Philo- ment of Science, and other technical and scientific associations; vice-president of the American Academy in Rome, and an honorary member of the American Institute of Architects. He is president of the Eastern Railroad Association, and is a member of the executive committee of the American Railway Association and of the permanent commision of the International Railway Congress. He is a member of the board of directors of the Pennsylvania Steel Company and the Cambria Steel Com- Doctor of Science by Hamilton College in 1904.

few indeed as compared with his achievements. He never hesi-

the result. It did not upset, but ran with unexampled smoothness; and with construction revolutionized the whole country followed in his wake. This is but a single example of his work. Mr. Ely's success was so based on sound discrimination and careful consideration, that, to a wonderful degree, he gained and held the confidence of all who came in contact with him. As one of his associates expressed it, he was the balance wheel of the mechanical organization of the road; and if these same associates are to be believed it is to his influence that the wonderful team work of the various departments is largely due. No man could have gained the reputation for clear judgment that Mr. Ely possesses, among all who know him, who has not merited it; and the position which he holds in the opinions of his associates speaks volumes for the character of the man and his work.

Purchasing Officers.

C. H. Rost, district storekeeper of the Rock Island Lines, at Shawnee, Okla., has been appointed stationer, with office at Chicago, succeeding W. K. Wayland, resigned.

OBITUARY.

John Rutherford, formerly trainmaster of the Chicago, Burlington & Quincy, died at his home at La Grange, Ill., on June 29.

Franklin A. Wilson, formerly president of the Maine Central, a director in many Maine corporations and president of the Penobscot County Bar Association, died at Bangor, Me., on July 2, at the age of 78 years.

W. L. Pierce, superintendent of the Richmond division of the Southern Railway, with office at Richmond, Va., died at that place on June 29, at the age of 49 years. Mr. Pierce had been with the Southern Railway and its predecessors for 33 years.

A. F. Merrill, assistant general passenger agent of the Chicago, Milwaukee & St. Paul, with office at Chicago, died in that city on June 26. Mr. Merrill began railway work with the Chicago, Milwaukee & St. Paul in 1867, and was in the service of that road continuously until his death, having been clerk for two years, chief clerk of ticket accounts 11 years, and assistant general passenger agent since 1880.

FOREIGN RAILWAY NOTES.

The Department of Industry and Public Works has approved the definite project of the Cajon to Llaima Railway, covering a distance of about 27 miles.

The Quillacollo to the valley of Cliza electric railway in Argentina, with terminal stations at Vinto and Arani, has a total length of 56 miles. The construction of the first section of this important electric line has been completed and work on the second section, which will extend to the fertile and beautiful Cliza valley, will soon be begun. The survey of this railway extends in an easterly direction to Las Cuadras, and from there runs southward to the Cliza valley, crossing the public highway at Angostura. The completion of this much needed electric railway will greatly accelerate the development of the rich country through which it passes and will exert a beneficial influence on the agricultural and mining industries of the neighboring regions.

A retired engineer officer of the Prussian State Railway discussed before a scientific railway society the question of the relative durability of timber and iron cross-ties. The life of wooden ties of different kinds of timber, and with different kinds of preservative treatment, is pretty well known; but metal ties, though long in use, have not shown such definite results, largely because it has been found necessary to change the patterns before they were absolutely useless. But the speaker had examined and measured the wear or corrosion of many of these; he showed photographs and explained his methods, and came to the conclusion that a steel tie has no longer life than a preserved pine tie, or very little longer. The modern metal tie, he estimates, will last 16 years, while the life of the preserved timber ties is 15 years.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

THE GREAT NORTHERN has ordered 20 mikado locomotives from the Baldwin Locomotive Works.

THE MISSOURI PACIFIC has ordered 50 mikado locomotives from the American Locomotive Company.

THE LEHIGH & NEW ENGLAND has ordered 2 consolidation locomotives from the Baldwin Locomotive Works. The dimensions of the cylinders will be 23½ in. x 30 in., the diameter of the drivers will be 57 in., and the total weight in working order will be 228,000 lbs.

THE ILLINOIS CENTRAL has ordered 10 mikado locomotives from the Baldwin Locomotive Works. These locomotives will be identical with the 40 which were mentioned in the *Railway Age Gazette* of March 10; this company has also ordered 10 Pacific type superheater locomotives from the American Locomotive Company.

THE ATCHISON, TOPEKA & SANTA FE, as mentioned in the *Railway Age Gazette* of June 30, has ordered 81 locomotives from the Baldwin Locomotive Works. This order includes 24 coal burning Mallet locomotives, 17 oil burning switching locomotives, 12 coal burning switching locomotives, 15 coal burning Pacific type locomotives and 13 oil burning Pacific type locomotives.

CAR BUILDING.

THE ANN ARBOR is in the market for about 450 freight cars.

THE CHICAGO & EASTERN ILLINOIS is in the market for 4 coaches, 2 chair cars and 2 buffet lounging cars.

THE MISSOURI PACIFIC is sending out inquiries for 50 passenger cars. Specifications have not yet been completed.

THE ST. LOUIS & SAN FRANCISCO is in the market for 2 baggage cars, 3 combination mail and baggage cars, 3 coaches, 6 chair cars and 1 dining car. In addition to the above this company together, with the Chicago & Eastern Illinois, expects in a short time to buy 35 all steel exterior, wood finish interior, 70-ft. passenger cars.

IRON AND STEEL.

THE SOUTHERN RAILWAY is in the market for 20,000 tons of 80-lb. rails.

THE GREAT NORTHERN has ordered 3,000 tons of rails from the Illinois Steel Company.

THE CANADIAN PACIFIC has ordered 30,00 tons of rails from the Illinois Steel Company.

THE GREAT NORTHERN has ordered 436 tons of structural steel for a machine shop in Hillyard, Mont.

THE WHEELING & LAKE ERIE has ordered 800 tons of bridge material from the King Bridge Company.

THE LOUISVILLE & NASHVILLE has ordered 3,800 tons of bridge material from the American Bridge Company.

THE CHATTANOOGA & ST. LOUIS has ordered 1,050 tons of rails from the Tennessee, Coal, Iron & Railroad Company.

THE HASKELL & BARKER CAR COMPANY is reported to have ordered 2,500 tons of structural material to be used in its new car building plant at Michigan City, Ind., from the American Bridge Company.

GENERAL CONDITIONS IN STEEL.—Although the orders booked during the closing days of June did not quite equal those of the previous week, the opening days of July were satisfactory and everything points toward a prosperous month. Some large orders that were expected in June were held up; but they are still pending and will probably be placed this month. Export business is large, especially in street railway requirements for Central and South America. The industry continues to operate at about 70 per cent. of its capacity.

Supply Trade News.

The Hale & Kilburn Company, New York, has moved its Chicago office from the Fisher building to the McCormick building.

W. G. Willcoxson has been made sales manager of the Grip Nut Company, Chicago, with headquarters in the Old Colony building.

McClernan & Co., Chicago, dealers in iron and steel, have moved their offices from the Monadnock block to the Peoples Gas building.

The Roberts & Schaefer Co., Chicago, recently secured a contract from the Oregon-Washington Railroad & Navigation Company for designing and building two Holmen locomotive coaling stations. One plant is to be installed at the Argo roundhouse at Seattle, Wash., and is to be of 500 tons capacity with sand equipment. The other is to be installed at the new roundhouse at Tacoma, and is to be of 100 tons capacity. The approximate contract price for the above plants is $30,000.

John P. Sykes, assistant general superintendent of the Baldwin Locomotive Works, Philadelphia, Pa., has been made general superintendent of the company, succeeding S. M. Vauclain, who held that position for the past 26 years, and who has now become vice-president. Mr. Sykes was born in Charlotte, N. C., on September 25, 1860. He attended school in Delaware county, Pennsylvania, and also in Philadelphia. He also took a course in a business college. Mr. Sykes entered the employ of the Baldwin Locomotive Works in May, 1879, in the sheet iron department of the Seventeenth street shops. After serving his apprenticeship, he was rapidly promoted from one position to another, until finally he assumed charge of the tank department. Later he was promoted to the position of assistant general foreman of the same shop and soon after was made night superintendent of the entire plant. When the Baldwin Locomotive Works purchased the ground at Eddystone for its new plant, Mr. Sykes was chosen to take charge not only of the erection of the new buildings required but of all the manufacturing as well, under the title of superintendent of the Eddystone plant. After the Eddystone plant was in complete working order it was decided to transfer Mr. Sykes to the Standard Steel Works Company, Burnham, Pa., as general superintendent, which plant is owned and operated by the Baldwin Locomotive Works. Last year he was returned to Philadelphia to take the position of assistant general superintendent of the Baldwin Locomotive Works, thus relieving Mr. Vauclain of some of his duties, and now upon the reorganization of the company has been made general superintendent of the works.

J. P. Sykes.

TRADE PUBLICATIONS.

KEWEENAW CENTRAL.—This company has published a small booklet entitled Beautiful Keweenaw, which contains a map and full descriptions of the Keweenaw peninsula in upper Michigan.

VENTILATING SETS.—The American Blower Co., Detroit, Mich., has published a small booklet on Sirocco electric venti-

lating sets giving neat descriptions, illustrations and diagrams of Sirocco fans and air purifiers. Tables are included.

Paints.—Cheesman & Elliot, New York, have published the eighth edition of The Review of Technical Paints. This booklet analyzes the causes of paint decay and describes the different kinds of paints, telling to what uses they are best adapted.

Earth Handling Machinery.—The Western Wheeled Scraper Company, Aurora, Ill., has devoted a very full catalog to descriptions and illustrations of its many types of scrapers, plows, earth-handling cars and wagons, crushers, graders, etc. The booklet contains over 125 pages and list prices and dimension tables are included.

Forging and Bending Presses.—The Mesta Machine Company, Pittsburgh, Pa., has issued a well illustrated catalog of its steam-hydraulic forging and bending presses. Besides the illustrations, the booklet gives a general description, the principal advantages and the specifications of these presses. The illustrations show installations of the different types in foundries, both at home and abroad.

Electric Trucks.—The Automatic Transportation Co., Buffalo, N. Y., has published a catalog of its electric trucks for handling package freight at railway and steamship terminals and other institutions which require hand trucking about the premises. It is claimed that the operation of these trucks involves a great saving compared with hand trucking. The descriptions and the illustrations in the catalog are good.

Generators and Switchboard Panels.—The General Electric Company, Schenectady, N. Y., describes in Bulletin No. 4,832, a line of commutating pole generators in which it is claimed that commutating trouble is eliminated. These generators are built for slow and moderate speeds, and range in capacity from 20 to 150 k. w. Bulletin No. 4,846 describes switchboard panels and points out the uses to which the various types are particularly adapted.

Southern Railway.—The passenger department of this road recently completed three small booklets on North Carolina, South Carolina and Virginia. Each booklet contains about 35 pages and gives a surprising amount of information on all the principal resources, industries and distinguishing characteristics of the state. Many of the more important towns are briefly described, together with the opportunities they offer. While they are intended for the prospective homeseeker and investor, these booklets cover their field so thoroughly that they will be found of great value to all who are interested in the development of the South.

A Prussian railway has two water stations on the river Mulde. The water taken at Eilenburg leaves a slight incrustation in the boiler, while the water at Bitterfeld not only forms no incrustation, but when used in boilers which were previously foul it very soon dissolves the deposit so that it can easily be blown out, though the tubes leak afterwards sometimes. On this account the Bitterfeld station has come to be called the "engine [illegible]." Analysis of the waters at the two stations showed there was the same amount of solid constituents in each, but that the Bitterfeld water contained also some free carbonic acid gas, probably coming from springs which have an outlet near the water station. Acting on this hint the engineer, Klopsch, [illegible] a carbonic acid gas boiler, such as are kept in beer saloons there, but here are better known for their use in soda-water fountains. He fitted this with a reducing valve, through which the gas could be [illegible] freely, and attached to it under where the water pressure took a [illegible], adjusting the valve so that no bubbles escaped from the surface of the water. Since the deposit at the bottom of the tank increased, and particles of the deposit left with the water decreased, the [illegible] which had hitherto been very much decreased and could be almost entirely avoided by using it a [illegible] temperature. Incrustation of the boilers [illegible] was [illegible] effects. The working of pipes, which had been [illegible] by deposited [illegible] The pipes [illegible] of the water at these stations for the use of beer, soda and [illegible] and [illegible] which [illegible] foaming, and injured the cylinders. Mr. Klopsch thinks, therefore, that the [illegible] gas treatment should [illegible] extended trial.

Railway Construction.

New Incorporations, Surveys, Etc.

California Roads (Electric).—W. G. Kerckhoff, Los Angeles, Cal., will build an electric line, it is said, from San Bernardino west to Upland, about 22 miles, if right-of-way is granted.

Canadian Northern.—According to press reports, a contract has been given to P. Welch & Co., for building about 165 miles of the line between Hope, B. C., on the Fraser river, and Kamloops, covering the entire Fraser river canyon. Work is under way on the section from Port Mann, B. C., on the Pacific coast east to Hope, 80 miles. The contract calls for the completion of this work within two years. Between Edmonton, Alb., and Yellow Head Pass work is also under way, but there remains a section of about 250 miles through the mountains between Kamloops, B. C., and Yellow Head Pass, for which contracts have not yet been let. (May 12, p. 1132.)

Canadian Northern Ontario.—Contracts for completing the Ottawa, Ont.-Toronto line have been let, it is said, as follows: To McDonald & Chism, for work from Hurdman's bridge to the Rideau river, at Hogs Back; H. Cristin, from the river towards Richmond; to contractor Bonneville for that part from the end of Cristin's division into Richmond, and to P. J. Brennan, from Richmond, west to Smiths Falls. It is expected that work on the line will be finished this year.

Canadian Pacific.—According to press reports, bids are wanted to build a branch from Duncan, B. C., on the Esquimalt & Nanaimo, to Cowichan lake, 25 miles. The company expects to have the work finished within six months.

Esquimalt & Nanaimo.—See Canadian Pacific.

Grand Trunk.—The Southern New England, recently organized to build the Grand Trunk extension to Providence, R. I., has filed a plan of its route from Palmer, Mass., to Providence, R. I. Under the terms of the charter the line must be completed by 1915. A large terminus is to be built in the central part of Providence. There will be a bridge over the New York, New Haven & Hartford, freight yards and a tunnel under Capitol hill. (May 12, p. 1133.)

Gulf, Florida & Alabama.—An officer writes that grading work is now under way by Charles Merritt, Pensacola, Fla., on the first section, and other sections are ready to be let. The plans call for a line from Pensacola, north via Thomasville, Ala., Linden, Demopolis and Tuscaloosa to Jasper, about 250 miles. Maximum grades will be 0.75 per cent., and maximum curvature 5 degrees. There will be steel bridges over the Alabama and Warrior rivers and a station and piers, at Pensacola, Fla. The line is being built to carry agricultural products, coal, lumber, steel cotton and naval stores. R. C. Megargel, president, New York, and G. A. Berry, chief engineer, Pensacola, Fla. (May 19, p. 1187.)

Harriman, Knoxville & Eastern.—An officer writes that work is now under way by the McDowell Construction Company, Knoxville, Tenn., building a section of 17.5 miles of main line, and three miles of sidings. The grading work involves handling about 30,000 cu. yds. to the mile. Maximum grades eastbound will be 0.65 per cent compensated, and maximum curvature 6 deg. It is expected to have the work completed about August 1. The plans call for a line from Harriman, Tenn., east via Knoxville, thence to a point in North Carolina. Contracts were let July 3, for building a combined freight and passenger station at Harriman, Tenn. S. F. Hendrick, president, and W. J. Clarke, chief engineer, Harriman. (November 4, p. 887.)

Houston & Texas Central.—An officer writes that contracts are to be let soon to build from Stone City, Tex., via Caldwell to Lincoln or Giddings. There will be five steel bridge varying in length from 60 to 500 ft. each.

Idaho Roads (Electric).—W. J. Pierce, Boise, Idaho, [illegible] said to be interested in a project to build from Caldwell, Idaho, southeast to Nampa, about 10 miles. Right-of-way has been secured and work will be started soon.

KEARNEY & BLACK HILLS.—See Union Pacific.

KOOTENAY & ALBERTA.—An officer writes that work is now under way by Grant, Smith & Co., Spokane, Wash., from a point one mile west of Pincher, Alb., southwesterly, about 13 miles. The work will be heavy. The line is being built to carry coal from the Western Coal & Coke Company's mines, also wheat. L. B. Merriam, chief engineer, 125 Phoenix building, Winnipeg.

LAWTON & ARDMORE.—According to press reports, arrangements have been made with the Development Corporation of Philadelphia, Pa., to build from Lawton, Okla., southeast to Ardmore, about 80 miles, on which work is expected to be started at once. The line is eventually to be extended southeast from Ardmore to Sherman, Tex., in all about 125 miles. R. L. Robertson and J. L. Hamon, Lawton, Okla., are interested.

MINNESOTA, DAKOTA & WESTERN.—An officer writes that this company is planning to build about 150 miles of extensions. The company now operates a freight line from International Falls, Minn., south, thence west to Loman, 23 miles; also 4.5 miles between International Falls and Falls Junction, and the International bridge between Fort Frances, Ont., and International Falls, Minn., with terminals at International Falls.

NEW YORK SUBWAYS.—See an item regarding new subway in General News section.

PACHUCA, ZIMAPAM & TAMPICO.—This company, which is building from Pachuca, Mex., to Tampico, has finished the work into the Actopan district it is said, and work on the extension to Tampico will be pushed to completion. Richard Honey, a wealthy iron manufacturer and banker of Mexico is back of the project.

SOUTHERN NEW ENGLAND.—See Grand Trunk.

SOUTHERN RAILWAY.—An officer writes that this company is going to carry out some double-track work north of Atlanta, Ga., for which contracts were recently let as follows: Lane Brothers Co., Altavista, Va., from Oakwood, Ga. to Buford, 11 miles; C. W. Lane & Co., Atlanta, from Buford to Suwanee, seven miles, also from Duluth to Pittman, three miles, and to M. M Elkan, Macon, from Pittman to Cross Keys, 12 miles. The work is being carried out in two sections, one extending from Oakwood to Suwanee, and the other from Duluth to Cross Keys, there being a gap of about five miles between the two sections. The improvements include some grade and alinement revision. (May 26, p. 1223.)

TEXAS ROADS (ELECTRIC).—The Stone & Webster Engineering Corporation, which is preparing to construct an electric line between Dallas, Tex., and Waxahachie, about 30 miles, will soon finish securing the right-of-way and will then let the contract for construction work. The proposed line is ultimately to be extended south to Waco and Corsicana. Preliminary steps towards carrying out this work are now in progress. It is understood that the Stone & Webster interests will build a north and south interurban electric line that will reach from Sherman on the north and to Galveston on the south. The same interests are now constructing a line between Houston and Galveston, 51 miles, which will form part of the proposed line through the state.

S. A. Robertson, San Benito, Tex., and associates, who are constructing a system of interurban lines to be operated by gasolene motor cars out of San Benito, have enlarged their plans. The first 40 miles of the line was recently opened for passenger and freight traffic, it is said. Arrangements have been made for constructing immediately about 60 miles additional. The line is already finished to within eight miles of Brownsville. The St. Louis & San Francisco is asid to be back of the project.

UNION PACIFIC.—This company has begun work on a 34-mile extension, it is said, of the Kearney & Black Hills, from Callaway, Neb.

RAILWAY STRUCTURES.

BENTON HARBOR, MICH.—The Cleveland, Cincinnati, Chicago & St. Louis is rebuilding the six-stall roundhouse which was burned last April. Construction work [illegible]

CAPE GIRARDEAU, MO.—The St. Louis & San Francisco, it is reported, will build a $35,000 passenger station at this place.

CHAMPAIGN, ILL.—The Illinois Central has awarded the contract, it is said, for the construction of a 25-stall roundhouse and for the equipment, also for a machine shop and coal chutes.

CHICAGO.—The Minneapolis, St. Paul & Sault Ste. Marie has started condemnation suits for the property between Canal and Clinton streets, extending from Twelfth to Sixteenth streets. The property is to be used for freight tracks and a freight terminal.

CLAYBURN, B. C.—See Taft, B. C.

DAVIS ISLAND, PA.—The Pittsburg & Lake Erie is said to have awarded the contract for the repair shops to be built at this place.

FRIENDSHIP, WIS.—See Wyeville, Wis.

HARRIMAN, TENN.—See Harriman, Knoxville & Eastern under Railway Construction.

MATSQUI, B. C.—See Taft, B. C.

MEMPHIS, TENN.—The Missouri Pacific is said to be contemplating the building of a bridge over the Mississippi river at Memphis.

MILES CITY, MONT.—The Northern Pacific has awarded the contract for building a freight house 40 ft. x 120 ft., to cost about $12,000.

MORRISTOWN, TENN.—The Southern Railway will put up a new station at Morristown, it is said. The work is to be carried out by the company's men, and is expected to be finished by October 1.

NEW HAVEN, CONN.—The New York, New Haven & Hartford is building at the Cedar Hill freight yards a large reinforced concrete roundhouse. It is to be 360 ft. in diameter and will provide stalls for 43 steam or 86 electric engines. The roofed ring which houses the engine is 90 ft. wide and 30 ft. high. The central open area is 90 ft. in diameter, and in the center is a 75-ft. turntable. Each engine stall has a pit, and three have drop pits for repair work.

NEW YORK.—The New York, New Haven & Hartford is putting up a brick warehouse, two stories high, 38 ft. x 1,021 ft., at Willis avenue and 132nd street, New York. William Henderson, New York, is the contractor.

ROCK HILL, S. C.—The Southern has let contracts for building a pressed brick, tile roofed, steam heated passenger station to cost about $35,000.

ST. LOUIS, MO.—The Manufacturers Railway of St. Louis will build a union freight house and office building on Broadway and Miller street. The building is to be 60 ft. x 300 ft., eight stories high and of brick and steel fireproof construction. The terminal tracks will have a capacity of 120 cars.

SOUTH CHICAGO, ILL.—The Pennsylvania Lines West has awarded the contract for building a one and two story brick and stone freight house 30 ft. x 16.1 ft.

TACOMA, WASH.—The Chicago, Milwaukee & Puget Sound will start work at once on a dock to be built on the tidelands at Tacoma, at an estimated cost of $50,000.

TAFT, B. C.—The Canadian Pacific is asking for bids to build new stations at Taft, Matsqui, Clayburn and Vernon.

VERNON, B. C.—See Taft, B. C.

WACO, TEX.—The Texas Central's coach sheds were recently destroyed by fire, the estimated loss being $40,000, which was partially covered by insurance. This company will probably build a fireproof structure in the near future.

WALLA WALLA, WASH.—The Northern Pacific will build a new station, it is said, at Walla Walla, to cost $50,000, and is having plans made for new car shops, roundhouses and additional trackage at Pasco.

WYEVILLE, WIS.—The Milwaukee, Sparta & North Western has awarded the contracts for building one-story, 18-stall roundhouses of brick and steel construction at Wyeville and Friendship, Wis.

Railway Financial News.

Belt Railroad & Stock Yards (Indianapolis).—The company has increased its common stock from $1,000,000 to $2,000,000, and common stockholders are to be given a dividend of 50 per cent. of the new stock. The remaining 50 per cent. of the new stock will be sold from time to time to provide for improvements and additions.

Birmingham & Southeastern.—This company has made a mortgage securing $3,000,000 first mortgage 6 per cent. bonds of May 1, 1911-1961. The road runs from Union Springs, Ala., to Fort Davis, seven miles.

Bruce Mines & Algoma.—This road, which runs from Bruce Mines to Rock Lake, 17 miles, has been bought by George P. McCallum and H. Appleton, both of Sault Ste. Marie, Mich.

Central of Georgia.—Holders of certificates of deposit of the first income bonds are receiving $46.24 per thousand dollar bond for interest collected from the company for the two years ended June 30, 1909 and June 30, 1910.

Chicago, Milwaukee & Puget Sound.—See Northern Pacific.

Cleveland, Akron & Cincinnati.—This is the name of a new company which has taken over the Cleveland, Akron & Columbus and the Cincinnati & Muskingum Valley. Both of these roads are Pennsylvania subsidiaries which have heretofore been operated independently.

Chesapeake & Ohio of Indiana.—This company, which owns the "Chicago line" of the Chesapeake & Ohio, has filed a notice of an increase in its capital stock of $2,000,000, making the total authorized stock $5,000,000. In the notice the company says that it is obliged to issue certain first mortgage bonds and $2,000,000 stock against the surrender and cancellation by the holders thereof of certain other outstanding first mortgage bonds and for capital purposes.

As a result of a compromise agreement between the governor and the officers of the Chesapeake & Ohio of Indiana, the suit instituted by the governor several months ago to enjoin the company from realizing on action to mortgage its Indiana property, the old Chicago, Cincinnati & Louisville, for $40,000,000, was dismissed in the Cass Circuit Court recently. The $40,000,000 mortgage is to be cancelled and the bonds, already issued thereunder surrendered. A new mortgage securing a maximum amount of $30,000,000 of bonds at any time outstanding is to be executed by the company.

Gulf, Texas & Western.—The Texas Railroad Commission has authorized the company to register $522,000 additional bonds and $20,000 stock for improvements on the road and for extension from Megargel to Semour, 25 miles. There have been issued previously $1,700,000 bonds and $50,000 stock.

Louisiana Southern.—See St. Louis & San Francisco.

Manila Railroad.—The New York Stock Exchange has listed $996,000 additional "Southern Lines" first mortgage 4 per cent. bonds due 1939. There are now 90 miles of the Southern Lines in operation.

Marquette & Southeastern.—See Munising, Marquette & Southeastern.

Munising, Marquette & Southeastern.—This is the new name of the company which is now operating the Marquette & Southeastern and the Munising Railway. Heretofore the two roads have been operated jointly, but the two companies have had separate corporate existence. The Marquette & Southeastern runs from [illegible] to Lawson, and the Munising Railway runs from Princeton, via Lawson, to Munising, with branches to Pictured Rocks, Cusino, etc. The total mileage [illegible]

[illegible]

New York Central & Hudson River.—This company has asked the New York Public Service Commission, second district, for authority to guarantee the principal and interest on $2,500,000 4½ per cent. bonds of the Clearfield Bituminous Coal Corporation.

Northern Central.—The Scott committee, representing the non-assenting minority stockholders, has issued a circular saying that every effort is being made to prevent the lease of the Northern Central to the Pennsylvania Railroad under the terms approved by the majority.

Northern Pacific.—A press despatch dated Hoguiam, Wash., says that all of the railway terminal properties of the railways entering Gray's Harbor will be turned over to a terminal company, in which the Northern Pacific, the Oregon-Washington Railway & Navigation Company and the Chicago, Milwaukee & Puget Sound will each hold an equal interest.

Oregon & Eureka.—This road, which was formerly operated by the Hammond lumber interests, has been taken over by the Southern Pacific and the Atchison, Topeka & Santa Fe. The road runs from Eureka, Cal., to Trinidad, 39 miles.

Oregon-Washington Railway & Navigation Company.—See Northern Pacific.

Pittsburgh & Shawmut.—Hallgarten & Co.; Rhoades & Co.; William Salomon & Co.; and the Guaranty Trust Co., all of New York, are offering $3,250,000 equipment and first lien collateral 6 per cent. notes of June 1, 1911-June 1, 1913 of the Pittsburgh & Shawmut at par. The notes would be secured by $3,350,000 Pittsburgh & Shawmut first mortgage 5 per cent. sinking fund bonds due December 1, 1959; $1,250,000 Allegheny River Mining Company first mortgage 5 per cent. bonds and by the pledge of equipment to cost about $640,000.

Pittsburgh, Ft. Wayne & Chicago.—The New York Stock Exchange has listed $3,338,300 additional guaranteed [by the Pennsylvania Company] special stock. Of the proceeds from the sale of this stock, $665,737 was spent for locomotives; $711,064 for gondola and flat cars; $181,188 for passenger, box and caboose cars; and the remainder for additions and betterments to the right-of-way.

Quebec & Lake St. John.—The bondholders prospective committee have arranged to pay the interest due July 1, 1911 on the new 4 per cent. debenture stock.

South Georgia Railway.—Middendorf, Williams & Co., Baltimore, Md., are offering $250,000 first mortgage 5 per cent. bonds of January 1, 1903-1923 at 94, yielding 5.75 per cent. income on the investment. This is the total authorized funded debt of the company and is at the rate of less than $5,000 per mile. The bonds are secured by a first mortgage on 51 miles of road, running from Adele, Ga., to Greenville, Fla. The road is laid with 56 and 60-lb. rail.

Southern Pacific.—See Oregon & Eureka.

Spokane & International.—As noted in the railway officers' news columns, officers of the Spokane, Portland & Seattle have been appointed officers of the Spokane & International also. Statement by the new president is in part as follows:

"J. P. Graves, since the disposition of a controlling interest about eighteen months ago, has, by request, retained direction of the company's affairs, with the understanding that at some future date he would be relieved of the responsibility. . . . These changes in management do not mean, and should not be construed to mean, any material change in the policies of the Spokane & Inland Empire system."

F. V. Brown, of Portland, counsel for the Northern Pacific; C. A. Coolidge, vice-president; Carl R. Gray, president; and George T. Reid have been elected directors succeeding J. P. Graves, A. L. White, W. G. Payne and Clyde M. Graves. W. G. Graves, F. B. Grinnell and Aaron Kuhn remain on the [illegible]

St. Louis & San Francisco.—The company has leased the Louisiana Southern. The Louisiana Southern runs from New Orleans, south along the Mississippi to Belair, 30 miles, with a [illegible] to Shell Beach, 16 miles.

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THE very voluminous and complete annual report just published by the Connecticut Insurance Commissioner, giving the assets and form of investment of the life insurance companies doing business in that state, supplies impressive evidence of the "indirect" railway stockholder and bondholder. The returns of 28 companies inside and outside the state give total assets amounting to the great sum of $2,990,291,000. Of that amount, $1,432,114,000 is invested in "stocks and bonds." Unfortunately, the proportion in railway stocks and bonds is not summarized, but a glance at the separate investments, as grouped but not added, shows that they form a very large part. As an illustration, one old and conservative Connecticut company has 65 investments in railway stocks and bonds as compared with but 17 investments in stocks and bonds of other corporations. How literally vital is his life insurance to the holder, and the security of the corporation investment which pledges its payment at death, goes with the statement. From other directions come similar sidelights. Thus, out of Harvard University's total investments of $19,060,268, there is $5,453,059 in steam railway bonds, $1,549,880 in street railway bonds and $1,927,338 in railway stocks—$8,930,277, or nearly one-half the total investment. Or, again, in a more specific and limited case, take recent returns of the Massachusetts savings banks, showing that out of three issues alone of the New York, New Haven & Hartford those banks hold $22,499,000, or about 28 per cent. We have had occasion heretofore to bring out the immensity and variety of this indirect and popular vested interest, which the rich and poor, but especially the poor, have in the equitable treatment and rational prosperity of the railways. But the new and expressive proof of it as it appears in the annual returns of the great corporations of a fiduciary and trust character can hardly be cited too often.

THE New York *Sun*, in commenting on the subway situation in New York City, says:

"The ridiculous clamor that has been raised against one of the corporations chiefly interested in the subject has not been allowed to influence the attitude of the city. The absurd suggestions of superheated thinkers that certain men and institutions should be 'punished' have not been allowed to obscure the main purpose of all the plans and negotiations. . . ."

Without in any way attempting to pass judgment on the merits of the various proposals for new subways in New York City, it is worth while pointing out that the attitude taken by the *Sun* is one also taken at times by railway managers. The refusal of the public to grant new powers to a corporation now under the same management which has in times past abused the powers heretofore granted to it by the public is not only right and just, but, like honesty, is the only business policy that will work out to advantage in the long run. A great deal of the clamor that is aroused against the protection of railway rights by the federal courts is in reality an appeal to the courts to rectify mistakes of previous legislatures. If a railway company has been granted certain franchises and privileges the courts will see that these rights are protected, and if a mistake has been made the public who granted the franchises should properly suffer. If, however, a certain institution or certain individuals in the management of a railway company have actually disregarded the rights of the public in the management of a property, we disagree with the *Sun* in its argument that it is a shortsighted policy of "paying back" to refuse to trust them again. It is entirely wholesome that a railway management or the group of men who control a railway corporation should have to bear in mind the fact that their present attitude and acts will be held for or against them when they come to the public for new grants.

E. E. MOTE, manager of the Pacific Car Demurrage Bureau, has issued his report for the month of May, the first in which the rate on cars loaded with intrastate shipments was $3 a day, and he recommends that this sum should be made the rate on interstate shipments, thus making the practice unifrom throughout the state on all freight. The records for the single month of May are hardly sufficient to warrant a safe conclusion as to the effect of the change from $6 a day to $3. The consignees seem to have got so much in the habit of unloading cars promptly that they continue this commendable course under a $3 rate just as under a $6 rate; moreover, Mr. Mote believes that the $6 rate resulted in the provision by many consignees of additional facilities. The report gives a comparison of the results of the whole 22 months of the $6 rate, as compared with the 22 months preceding the adoption of that rate. In the earlier period, which ended with June, 1909, California agencies reported 1,673,487 cars subject to the $1 rate. Of these, 7.12 per cent. were held in excess of the free time, incurring demurrage amounting to $363,688, an average of $3.05 a car. During the 22 months since June, 1909, when the $6 rate became effective, the number

of cars reported subject to the $6 rate was 1,852,477, of which 1.06 per cent. were held in excess of the free time, incurring demurrage averaging $10.63 a car. The cars subject to the $6 rate amounted to 81 per cent. of all cars. Of the cars subject to the $1 rate, 5.68 per cent. were held over time. Notwithstanding the fact that 37.49 per cent. more cars were reported during the later 22-months period than in the preceding 22-months, the demurrage fell off 23 per cent. Taking up the question of why the railways have not before now adopted the higher rate of demurrage for interstate shipments, so as to put intrastate and interstate freight on an equality, Mr. Mote calls attention to the likelihood that the Interstate Commerce Commission might think a $1 rate reasonable.

THE press agent of a railway ought to manage all of the publicity-promoting deliverances made by the company, except in cases where a managing officer sees fit to speak to the public himself. At least, this would seem to be a reasonable position to take. The press agent is, or should be, skilful in quickly putting a statement into a shape to satisfy the public, and the need to which we refer is made manifest every day by statements emanating from railway sources and printed in the newspapers, which are in such incomplete or even erroneous shape as to show that a competent press agent did *not* have a hand in them. The importance of the press agent is shown in the following item recently printed in a daily paper:

> A [illegible] publication of the report of the wreck at L. caused much excitement and great apprehension throughout this seashore resort. The down train that figured in the collision is the big train of the day. Rumors that first reached here were to the effect that there were sixteen deaths on that train. This spread through the city, frightening thousands of friends and relatives of persons expected on that train.
>
> Following the archaic custom, the petty employees of the X. Y. Z. R. R. increased, rather than allayed, the alarm by refusing to give any information. A great crowd was at the station when the train was due. Women and girls were weeping for their husbands and sweethearts, and there was a scramble for every scrap of news. With silly foolishness, the railway men persistently declared that they knew nothing, when all the time they knew there had been no deaths and scarcely any one hurt on that train [all the casualties being on the other train]. It was an hour or more before the newspapers arrived to furnish relief to the women who were in the jam at the station, and three hours more before the passengers on that train finally [illegible].

This is from a yellow journal, and very likely is exaggerated; but there are occasions in plenty where such a statement is true in principle; where large numbers of passengers are detained, where friends of these passengers quickly hear a part of the news, and then are kept in suspense for hours before they can get the rest of it, or get erroneous statements corrected. And [illegible] the need of care in giving negative as well as positive information, and of having an expert news [illegible] superintendent's office. The very natural caution of a station agent who fears that he may tell too much is, of course, specially strong (and he feels himself fully justified), when he knows or believes that the news is not [illegible] and yet we see in this case how an expert [illegible] anxiety. The simple rule is to tell all the [illegible] about deaths and injuries, and [illegible] to tell it with signature, [illegible] and to impart the news to all of the principal stations interested. The principal stations having [illegible] the agents at these stations will be able to give the news to any [illegible] station or to any [illegible]. Then [illegible] to satisfy the public [illegible] that all the questions should be answered, but that statements should be so worded that the reader can see that the passenger agency what is it talking about, is telling all that it knows [illegible] and [illegible] can be depended on to [illegible] [illegible] circumstances to [illegible] [illegible] would not carry [illegible] [illegible] [illegible]

Hale is chairman, arbitrated this case with the result that an agreement satisfactory to all parties was arrived at, and the Chicago Terminal Transfer again signed the pier diem agreement. Early in 1907 the Long Island became dissatisfied with the reclaim being paid to it and applied to the General Managers' Association of New York for relief. At the request of that association, the car efficiency committee made a thorough investigation, as an outcome of which the reclaim on the Long Island was abandoned and a readjustment of the through rates was made which was satisfactory to all parties. At the time of this decision, it was thought that the precedent established would be followed elsewhere and that for the reclaim systems would be substituted a system of making switching roads suitable divisions of through rates; but, although this was over three years ago, little progress has been made along the line indicated. While the letter ballot just closed is the first important step toward the general correction of the situation created by the reclaim system, it will not be the last, if we may judge from the sentiment shown by the vote in favor of abolishing Rule 5.

RAILWAY AGREEMENTS AND COMBINATIONS.

ON another page in this issue is given an abstract of the report made recently by a committee appointed by the English board of trade "to consider and report . . . what changes, if any, are expedient in the law relating to agreements among railway companies: and what, if any, general provisions ought to be embodied for the purpose of safeguarding the various interests affected in future acts of Parliament authorizing railway amalgamations or working unions." This report, when its language and spirit are contrasted with the utterances of many public men in this country and the statutes of the states and the nation regarding agreements and consolidations of competing railways, illustrates how different is official and public sentiment concerning these matters in Europe from what it is in the United States. Our state and federal anti-trust laws prohibit any but the most limited concerted action by competing roads regarding rates or services. The decision of the federal circuit court in the Harriman Lines merger case may indicate that only unreasonable railway agreements and combinations violate the Sherman law. But in view of the decisions in the Trans-Missouri and Joint Traffic Association cases, the force of which as precedents in railway cases recent decisions of the federal courts cannot with any assurance be considered to have materially reduced, nobody can tell what traffic agreements or arrangements between competing lines would be held to violate that law. As to pooling, that is most explicitly prohibited by the Interstate Commerce act.

The Sherman law as it applies to railways and the anti-pooling provision of the Interstate Commerce act are regarded by most railway managers, and by practically all economists who have specialized on railway affairs, as having been, and as still being, pernicious in their effects. In many instances they have had their intended effect of fostering railway competition; and in every such case they have also had the effect of causing or aggravating unfair discrimination, which it is the main purpose of the Interstate Commerce act to suppress. In still more cases they have had the effect of hastening or solidifying consolidations of competing roads, and thereby defeating the purpose of the Sherman anti-trust law as it applies to railways.

And yet, in spite of these facts, which are familiar to every railway manager, every railway economist, and every intelligent shipper, public sentiment continues to regard laws to compel railway competition as one of the bulwarks of our economic welfare, and public men of the Bryan-La Follette-Cummins type continue successfully to oppose any amendment of these laws, which are pernicious when they are effective and are ineffective when they are not pernicious.

On the other hand, the English committee making the report which we abstract elsewhere frankly recognizes the fact that legislation to compel competition between railways is almost certain to be ineffective, and that if it is effective it is apt to do more harm than good. Its view is that when it is to the interest of railways to act in concert regarding rates and service they will be impelled by the irresistible force of economic law to do so; that when the law prohibits them from making formal combinations they will make informal combinations; and that "experience has shown that informal combinations of this kind, while likely to be of less advantage to the companies than more formal and complete unions, can destroy competition just as effectively, and, moreover, possess certain incidental disadvantages from the public point of view, from which a monopoly under a single control is free." One of these disadvantages from the public point of view is that while the informal combination can restrict competition almost as completely as a formal legal combination, it cannot perfect an organization which can so effectively reduce and keep down expenses. The unnecessary expense resulting is, as the English committee says, sure to be passed along to the public in one form or another. When it has been urged in the United States that competing railways should be permitted to enter into traffic agreements, it has been contended in some quarters that these agreements should be made subject, before becoming effective, to approval by the Interstate Commerce Commission. The British committee clearly saw and pointed out that the protection of the public requires not that the agreement or the arrangement entered into by the competing roads but that the results of it should be subject to public control. In other words, it is of no consequence to the public whether one road or a dozen roads make a rate so long as the law provides, as the law of the United States now does, that the rate, if unreasonable, may be reduced, or that a proposed advance in a rate, if unreasonable, may be prevented. "General legislation dealing with the consequences as such, independently of whether they occur as the result of agreements or not," as the British commission said, "afford a much more extensive protection than the regulation of agreements. It would" (in the United States already does) "protect the public in the case of understandings as well as agreements . . . There would be no inducement created by its adoption for the companies to effect their objects indirectly or secretly." Such an inducement is held out by existing laws in the United States.

It is greatly to be wished that the people and public men of the United States could be given a baptism of the sort of intelligence that is shown by this board of trade report. Some additional legislation is needed to empower the Interstate Commerce Commission to act equitably and beneficially in all cases regarding rates, whether made by one or a number of railways; it should be empowered to compel rates that are too low to be advanced and to prevent undue reductions in rates. The possession and exercise of this authority are essential to enable it to suppress and prevent many existing forms of unfair discrimination. Once it were given this authority, it would be able to exercise complete control over interstate rates, whether made by one road or a combination of roads. And after that there would remain no ground whatever for keeping in effect the present prohibitions of railway agreements, pools and combinations. The purpose of these prohibitions has been and is to keep competing railways from making the same rates. Was there ever a bigger piece of nonsense than laws, or attempts to enforce laws, having this object when other laws compel all rates to be made public—thereby rendering it impossible for different roads to make different rates—and also give the Interstate Commerce Commission the authority to fix rates, in the exercise of which it constantly makes the same rates for competing roads? Is there any more virtue in a rate made for all competing roads by the Interstate Commerce Commission than in the same rate when made for the same group of competing roads by the concerted action of their traffic managers?

The light of reason having at last been adopted by the Supreme Court to enable it to distinguish between combinations which do and do not violate the Sherman anti-trust law, there seems some ground for hope that we shall presently emerge from the stone

age of public sentiment regarding railway competition, and secure legislation amending the Sherman law and the anti-pooling provision of the Interstate Commerce law in a way that will accord with modern conditions and the public welfare.

THE RAILWAY EXECUTIVE OFFICERS AND THE SUPPLY MANUFACTURERS' EXHIBITIONS.

EACH year the Railway Supply Manufacturers' Association gives an exhibition of machinery and supplies in connection with the conventions of the Master Mechanics' and Master Car Builders' associations. These exhibitions have year by year grown in size and improved in character until now in their quality and magnitude they will easily compare with any exhibitions given for any similar purposes in the United States, or, for that matter, in the world. The displays are annually inspected by the mechanical officers who attend these conventions. But the mechanical officers are not the court of last resort in the matter of purchases for railways. The operating executive officers to a very large extent determine what shall be bought, how large purchases shall be and when they shall be made. The operating executives, therefore, have, or should have, a very direct and earnest interest in all the new devices that the supply manufacturers are putting on the market and in all the improvements they are making in devices already in use. And yet it is so unusual for a general manager or vice-president of a large road to visit one of these exhibitions that the coming of more than a very few of them would create a sensation of no mean proportions.

One of the last acts of the Master Car Builders' Association at its convention last month was to adopt a resolution, introduced by C. A. Seley of the Rock Island, inviting the executive committee of the American Railway Association to attend the M. C. B. convention next year, and also to consider the advisability of appointing a committee to attend the convention and report back to the American Railway Association. The *Railway Age Gazette* believes that the executive committee of the American Railway Association might, to the distinct advantage of the railways as a whole, accept this invitation. We believe it would be for the great good of the railways individually and as a whole, if not mere committees of the American Railway Association, but general managers and vice-presidents in charge of operation generally, accompanied by their purchasing agents and storekeepers, would make it a part of their annual duty to visit the mechanical conventions and the exhibitions in connection with them. It is, for some reasons, of special importance that they should annually see the exhibitions. They can learn what the conventions do by reading the reports of their proceedings; but they can get an adequate idea of what the exhibitions are, and derive from them the benefits they are capable of conferring, only by seeing them.

We present elsewhere an illustrated article about this year's exhibition, which is intended to give the executive officers some notion of what they are like. The printed page can, however, convey only a very unsatisfactory impression of them. As has already been said, they stand in quality and magnitude in the first rank of their kind in the world. They tend to stimulate competition among supply concerns in turning out new and improved devices; and the effect of the executive officers making a practice of visiting them would be to make them still better, and indirectly to increase the efficiency and economy of railway [illegible] It is not to be overlooked that whatever does tend to stimulate the competition and the [illegible] tend to increase in a very great degree the economy and efficiency of railway operation. These manufacturers turn out the equipment that is used in railway operation and the materials and supplies that are [illegible] and the superior [illegible] of their plants and sales department are largely due to the superiority of the operating methods and plants of American railways. Frequently the improvements in materials and equipment introduced by them are due to the suggestions and demands of the railway managements; but as often they are due to the genius of the engineers and the enterprise of the managements of the supply manufacturers themselves. The visits of the executive officers to the exhibitions would not only stimulate the progress being made in innumerable lines by the manufacturers, but would be a great help to the railway men in introducing improvements. They could see here more new devices and improvements in old devices in a very few days than they could see elsewhere by visiting shops for an entire year; and the information they would carry away would be invaluable in passing on the requisitions of their subordinates ,or in stimulating the latter to the adoption of ever more progressive methods and machinery.

There has been more or less criticism by the executive officers in the past of the entertainment features in connection with the conventions. Many of them seem to have the impression that these features are allowed to subordinate more serious business. Some of these criticisms have in the past been justified. But this has been where they have related to what *individual* supply men have done for *individual* railway men. The relations between individual railway men and supply men probably are now on a higher moral plane than ever before; and what the supply men as a body have done for the entertainment of the railway men as a body has usually been obnoxious to no just stricture. The entertainment furnished by the supply association's committee regularly appointed for that purpose has seldom been more than was desirable to add a pleasing flavor to the serious business done; and in point of expense and magnitude has been a mere bagatelle compared with the exhibition of equipment and supplies.

It will be worth while for the executive officers to give very serious consideration to this subject; and it is confidently believed that if they do so the number who will visit the exhibitions in future will be substantial, whereas the number who have visited them in the past has been negligible.

THE CONNECTICUT UTILITIES LAW.

CONNECTICUT has been afflicted with a railway commission which—up to the time of the present new commission, as yet untested—was weak in personnel and of a distinctively political character. Partly as a result of its attitude, and partly as an outcome of the general anti-corporation movement, active agitation for a general public utilities commission began six years ago. In the next legislature, that of 1907, the plan was practically smothered in committee. But a threat of Governor Woodruff to call an extra session resulted in the appointment of a commission to hold public hearings, draw up a bill and present it at the session of 1909. The bill, a strong measure, was duly drawn. But it and substitute measures fell between the two legislative houses after a virulent contest involving some lobby scandals. After a contest almost as bitter as that of two years ago a public utilities bill has at last passed both houses by large majorities—a "minority" bill, so called, because it received only a minority report from the judiciary committee of the legislature which had the matter in charge.

The new measure, for a New England state, at least, is somewhat unique. The old railway commission is abolished, the new commission given greater power and province. Besides steam and street railways its jurisdiction extends to electric light, gas, water, telegraph, telephone, power and express companies. With such extension of functions it is somewhat singular to find the number of commissioners limited to three, though, to be sure, with the addition of a secretary. The breadth and variety of technical knowledge called for argue in favor of several specialists. Perhaps, however, the augmented sense of responsibility of the smaller commission may compensate. But other features of the make-up of the commission are clearer in merits. Terms

of office are raised from four to six years; salaries from $3,000 to $5,000; the commissioners are to be paid from the state treasury and not by the corporations affected, as heretofore; and the old political system is rebuked, and perhaps reformed, by a proviso that makes cause for removal "active participation in political campaigns by any commissioner." Finally the old restrictions of a commission composed of a civil engineer, a lawyer and a "practical business man" are dropped and the only limitations on appointments by the governor are residence in the state and non-connection officially with a public service corporation.

Other provisions of the measure are more dubious in virtues and certainly more obscure, as well as more interesting in their future working. Primary jurisdiction over rates is pretty sweeping, following complaint, but is limited by appeal to the courts in the matter of reasonableness. These provisos of the measure have been sharply attacked by its opponents as a violation of the state constitution and the principle of non-delegated legislative power; and they are certain to be brought to a judicial test. More novel is a section in the nature of the recall. On complaint of 100 voters in the state in the form of a petition alleging commission incompetency or misconduct, the attorney-general of Connecticut must start legal proceedings and the offender or offenders removed if cause for removal is found. In view of the wide range of the commission's powers, the liability to error, the certainty that fidelity to duty will give offense and the ease with which a petition can be obtained it does not look as though the place of a commissioner would be a bed of roses.

Accidents must be promptly reported and duly investigated by the commission. After the experience of the state in street railway stock watering, a severe capitalization act was to be looked for. It has come in the shape of a section compelling stock to be paid for at par and a penalty not exceeding $10,000 fine and not more than 5 years' imprisonment visits a corporation officer guilty of participation in an over valuation in connection with the issue of new securities. False returns are penalized with $5,000 fine and 5 years' imprisonment as a maximum, and the commission is given practically the power of a court in calling for persons and papers in all proceedings. The commission has all the powers of the old railway commission not definitely repealed or superseded by the new law. It can fix proportional rates of connecting lines when there is disagreement; has full right of entry for purposes of investigation; can compel proper equipment, and order repairs; can take the same jurisdiction over trustees and receivers as over the companies, subject only to the action of the appointing court; and, in the case of the non-transportation companies, has powers largely correlative with those over street railways and the steam lines. The opportunity given for individual initiative in such cases is uncommonly large.

Had the former commission been good in personnel and had even moderately high ideals of performance, no such statute as this new one would have been enacted. The state had already laws enough for her street railways and steam roads, which laws could have been amplified readily to fit her other public service corporations. But the state and her transportation companies alike defaulted in duty. They let the railway commission become an asylum of politicians. They did not rebuke the old commission when it not only did not criticize but masked stock watering of some $15,000,000 in a single street railway corporation. They accepted the old commission's paltry plea of "lack of power," although its power over the returns of the street railway companies was complete, to say nothing of the power of protest. As the personal character of the old commission was the particular cause of the change, so will the personal character of a new commission be a prime element in the success or the failure of the more positive and mandatory law.

Letters to the Editor.

COLLEGE MEN AND RAILWAY WORK.

June 26, 1911.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

In your editorial of June 23, on college men and railway work, you deal mostly with the transportation end. Perhaps I can give one or two reasons why the graduate does not choose or stick to railway engineering.

He begins as chainman, at about two-thirds what he would get in other engineering lines. He runs errands, trims and colors blueprints, and goes out on surveys to carry the instruments. He is often reminded that the first thing for him to do to become of any use is to forget all he learned at college, and he gets little chance to show whether or not he really can do anything.

In a few years he has overtaken some—not all—of the grammar school graduates who were wont to scoff at his superior education. He now stakes out important work, and makes million-dollar plans and estimates—for which he receives the salary his classmates got at the start in other lines. But he remains the absolute property of the railway. While his better paid classmate is getting an extra vacation, he is cancelling a theater party at 4:45 p. m. in order to leave that night to make a rush survey down the line. He works evenings and Sunday to finish a plan, so construction can begin at once, and six months later he spends another Sunday refinishing the same plan. He is sent out on a special investigation without explicit instructions, and when he is half done it is called off and he never hears further of it. He spends a week figuring carefully on a location problem, and then somebody higher up glances at it and casually orders a big change, and he has no chance to defend his solution.

Several of my classmates started with railways eight years ago. One took blueprints two months, and then went into water supply, where he has got a job worth while. Another, a howling railway enthusiast when he graduated, stayed two years, and is now manager of a large construction company. I was, and am, tensely interested in railroading. And so I stayed seven years. Then I got married, and could afford it no longer, having no other source of income. In my last place one received a black mark if he was one minute late, and if one was caught conversing with a neighbor he was asked if it was company business. He could usually beg off if overtime or outside trips clashed with important private plans, but he was warned not to make private plans—and they reserved the absolute right to wire him at 11 p. m. to take the midnight to X, to learn there next morning for what and for how long.

An official on that road told me the tendency was more and more to require technical graduates for the important engineering places. But they never allowed anything for potential energy in the chap just graduated. Even at the meagre chainman's salary, they preferred a file clerk or office boy with some knowledge of the offices and routine of the road. So the graduate naturally goes where he gets some credit for his greater possibilities.

1903.

A movement has been started in Brisbane, Australia, for connecting the railways running from South Brisbane with the main system on the northern side of the river. This will mean the extension of the rails from the South Brisbane station, the building up of a bridge across the river somewhere near the North Quay, and the carrying of the lines to the Roma street station. The work will be a costly one, but it will facilitate railway management, and be a great convenience to the traveling public. It will also strengthen the case of Queensland for building the link between Tweed Heads and Murwillumbah.

THE TOLL OF NEGLIGENCE ON RAILWAYS.*

BY J. S. TUSTIN,
Freight Claim Agent, Missouri Pacific.

The payment by railways of claims for loss and damage to freight has reached, according to a recent report, the sum of $30,000,000 in one year. Any rule or set of rules, however they may be drawn, for prorating or distributing losses between carriers connected in joint service, becomes relatively unimportant as compared with the study of causes—not so much to learn the causes as to determine what can be done to reduce this tremendous expense. The lines:

"Little drops of water, little grains of sand
Make the mighty ocean and the beauteous land,"

well illustrate the way in which the countless multitude of payments, most of which are relatively small, unite to form an aggregate that now flows like a torrent.

These causes that make these payments necessary may be roughly classified as follows:

First. Causes beyond the control of a common carrier, the liability being occasioned by the principle of law which makes it the insurer of the safe delivery of goods in transit. The tendency of law is to affix a greater degree of liability as the science of transportation advances. In the early history of railways, courts decided that a common carrier was not responsible for damage to live stock because of its extraordinary character; but with the construction of cars specially prepared for this traffic, and the spread of information respecting the characteristics of horses and cattle and their fitness for rail transportation, this primitive view disappeared, as it has departed in respect to nearly every commodity which is transported. A demonstration that a thing can be done affixes a duty to do it.

We are all familiar with the cases involving loss of goods where a railway has done everything that could be done; where property has reached destination, has been delivered on the premises of consignees, has been destroyed by fire originating within mills or warehouses of the owners, and the insurance doctrine of transportation has held the carrier liable. The fire in all likelihood was occasioned by negligence somewhere, but regardless of where it is, the carrier pays. In the current discussions of reasonable freight rates we do not hear or read of a separation whereby a portion is indicated as insurance to cover unavoidable loss and a portion for transportation.

Railways must keep their necks bared to the yoke. The rigor of common law liability is not abated when a government body establishes a rate; there is no relaxation of responsibility. In theory a railway must get property to destination whether it is possible to do so or not—save the infrequent cases of an act of God and a limited number of other exceptions, which affect an inappreciable fraction of traffic.

Second. Negligence and carelessness of railway employees. Among all groups of men are to be found those who are patient and those who are not; those who have a sense of proportion and those who lack it; some whose views are broad and constructive and others who are restricted by habit; and this is as true of railway men as it is of others. There is this fundamental difference, that where a railway man fails to exercise care in his business duties [illegible] and reasonable self-control, or [illegible] property of others, the result goes to the purse-string of the treasurer and a portion has to be diverted from fuel, equipment, employment, and a satisfactory public achievement. A man engaged in other pursuits may lack one or all of these qualities without appreciable general loss.

The person with the $100,000,000 bill that is charged at the present time against [illegible] What can be said about the disappearance of goods that fail to show up anywhere within the [illegible] knowledge or in [illegible] What is credited to the account of the grocery industry, comprising

* Address delivered at the meeting of the Freight Claim Association, St. Paul, Minn., June 21.

38,067 miles, within a recent period of three months, for 16,542 entire packages which disappeared as if the earth had swallowed them? What became of these goods? Who got them to whom they did not belong? Is there a widespread purpose to take sinister advantage of opportunity? There is an uncomfortable suggestiveness in these losses. You will, I believe, sustain me in the statement that dry goods, shoes, clothing, edibles, and other valuable and convenient property that disappears is not the kind of freight that shows up in our sales of undelivered goods.

Third. From negligence and carelessness of shippers. When one of our governmental departments declared that the American merchant follows habits of "national shiftlessness" a phrase was used which applies in a substantial degree to many lines of activity. If a flimsy package is broken in transit and goods are lost, is the situation met by a railway paying for the property even if it is with the promptness of "cash over the counter?" How stands the consignee whose needs are not supplied and whose expectations are postponed? And how stands the railway whose resources are crippled?

The bias of self interest prompts some shippers to get their goods transported at a minimum cost, and from this cause we frequently have barrels that leak, boxes that break, sacks that burst—packages that will not stand the contact necessarily made with other goods and the inevitable impact of railway transportation. Enough has already been said to form the basis for a lengthy thesis on the toll of negligence. There is no way to compute the buildings that are destroyed, the number of men injured, the families that suffer and the money that is lost because of the people who are careless.

It is not my purpose to engage in a lengthy discussion of ethics but rather to emphasize that broad duty which the majority of people recognize, of eliminating carelessness and the transferring of its results as a heavy burden to the shoulders of others. It is in this view of the situation that I speak of remedial measures. Admitting the costly negligence of railway employees, there is a sense in which a class of shippers prompted perhaps by a fictitious economy, or by ignorance or indifference in one form or another, is our active co-partner.

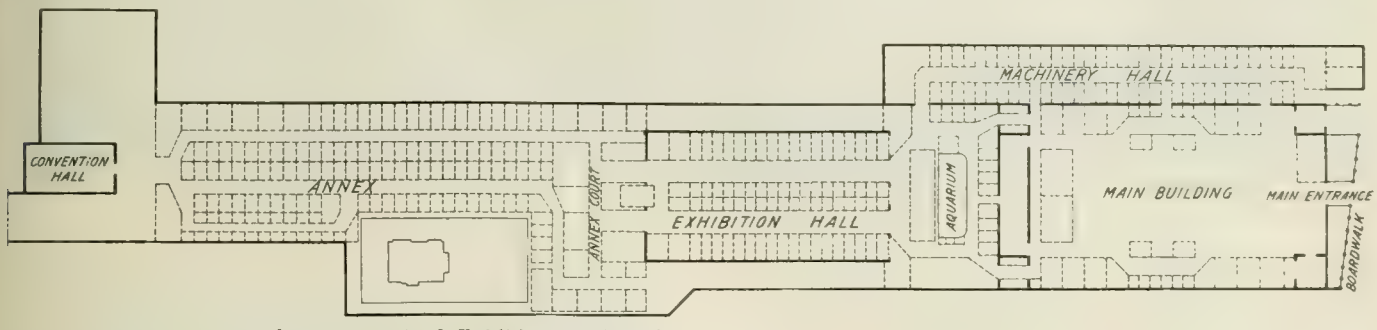
Assuming, then, that there is a duty imposed upon us to separate the sheep from the goats and that this duty is based upon broad, moral, financial and economic grounds, the first thing to be determined is the facts—not one fact—but a body of them, big enough to cause the truth to be established. Then having determined the facts, consideration is to be given to the cure.

And here comes the important question: By whom are the facts to be gathered and who is the doctor to prescribe the remedy? Can a committee of men devoting a small part of their time to this great problem work out a solution? My opinion is that it is not to be reached in this way, but rather through the patient, persistent application of a body of men, perhaps five or six, who are equipped by experience, skill and temperament, who will agree to devote themselves exclusively to it.

Three years have now elapsed since the government of the Dominican Republic assumed the full control of the Central Railroad, and each succeeding year has shown a greater profit than the preceding one. This is a most gratifying indication of the progress and sound fiscal management of the republic. According to the accounts submitted by the company for the year 1910, the total gross receipts amounted to $284,421.72, of this total, $281,517.06 were received from freight and passenger traffic. The net earning of the line for the year aggregated $73,419.40, which represents a 5½ per cent. income on the estimated value of the road, including the Santiago-Moca branch. The number of miles covered by passenger trains during the year totaled over 37,000.

EDUCATIONAL VALUE OF THE ATLANTIC CITY EXHIBITS.

These who do not attend the Atlantic City conventions may be surprised to learn of the extent and completeness of the exhibits which are made by the members of the Railway Supply Manufacturers' Association. At the recent convention there were 250 exhibitors with an exhibit space of 76,110 sq. ft. on the Million Dollar Pier. Seventy other concerns applied for space too late and could not be accommodated. In addition to the space on the pier, one large machinery exhibit occupied space across the Boardwalk from the pier, and there was a large track exhibit within two or three blocks of it.



Arrangement of Exhibits on the Pier at the Atlantic City Convention.

Practically all of the devices exhibited were for use on freight cars, passenger cars, locomotives, or in the shops, engine houses and repair yards for maintaining and repairing the equipment in charge of the mechanical department. The machinery exhibit, for instance, included a large variety of equipment varying from a small grinding wheel weighing a few ounces to a vertical turret boring mill weighing between 38,000 and 40,000 lbs. There was even a greater range of exhibits of apparatus or parts used on locomotives, these varying all the way from a small set screw to the three-cylinder compound locomotive on exhibition at the Philadelphia & Reading depot. For freight cars, the exhibits varied from a nut lock to the completed car; there was also a splendid line of material intended for use in passenger car construction and maintenance. In addition to these general classes of material there was shown a variety of small tools and other equipment, including hoists, jacks, water softeners, etc.

It would take many pages to describe the details of the exhibit in even a brief manner, but a complete list of the exhibits and the exhibitors will be found in the recent issues of the *Daily Railway Age Gazette*. The exhibits were not carelessly arranged, nor were they in the hands of men who did not understand the practical application or working of the apparatus in their charge. Much care and thought were directed to make the functions and advantages of the different devices as clear as possible, and the men in charge understood their application thoroughly and knew how to demonstrate their advantages clearly. In many cases the exhibits were in charge of men of engineering ability who had had a considerable amount of practical experience in railway mechanical departments.

Most of the machine tools were shown in actual operation; for example, a vertical turret boring mill was shown with three cutters working and removing material at the rate of about 1,700 lbs. per hour. High speed twist drills were shown in operation drilling material at remarkable rates of speed and feed. When the operation of the apparatus was more or less complicated and it was desired to show its workings clearly, or in cases where it was desirable to show the interior arrangement, the parts were shown in section, or models were used with parts cut away to show the working of the device. Two of the exhibits were equipped with stereopticons and moving

Looking Down One of the Aisles in the Annex.

An Interesting and Extensive Exhibit of Car Appliances.

pictures showing operations as they were actually performed in railway shops or repair yards. On one part of the pier demonstrations were given of a welding apparatus; in another booth an electric magnet was in constant operation picking up pieces of iron and steel.

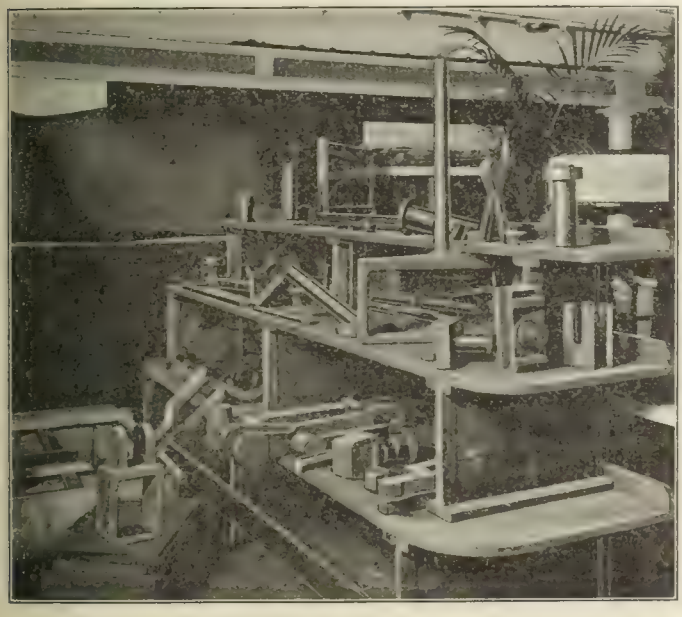
One of the illustrations shows part of an exceedingly important exhibit, judged from the viewpoint of educational value. Within recent years a tremendous advance has been made in railway blacksmith shop practice, due to the advent of forging machines. The value of these machines depends very largely upon their being in the hands of men who understand how to design the dies to be used with them. Smiths in various parts of the country have gone about this in different ways, and the exhibit above mentioned contained a large variety of the best pieces of work done by different shops throughout the country While the dies which made the pieces were not shown, the man in charge of the exhibit had visited the various shops where they were used and was either thoroughly familiar with their construction and operation, or if not, was able to advise the inquirer just where the various parts were being made, so that he could either write to the foreman for further information or visit the shop.

Another exhibit showed a locomotive stoker in operation. After a number of years of development the locomotive stoker is becoming more or less perfected and the introduction of the heavier capacity locomotives had made necessary some device of this kind. The exhibit in question was cleverly arranged so that its operation and the way in which it distributed the coal was much more evident than if it was actually in place on a locomotive.

A Corner in the Machinery Hall Showing Some of the Larger Machines.

The apprentice problem has been an extremely important one during the past few years, and among the exhibits was one of a correspondence school where three or four student apprentices were hard at work on their problems and papers. While all the exhibits did not show new devices, the greater proportion of them either showed devices which had developed during the past year or two, or recent improvements which had been made to old devices. Railway men who had tested some of the devices in their early development and had found them to be unsatisfactory could see whether they had been improved to meet their conditions. In one instance a device was exhibited by a company which had been working on it for a number of years, but had only perfected it within the last month or two. The trained engineer in charge of the exhibit was anxious to get the opinions of railway men, and it is quite possible that still further changes will be made before it is finally placed on the open market.

An effort was made in a general way to see just what class of men visited the different exhibits, and it was found that the men at the head of the mechanical departments seemed to be as much interested and spent as much time looking over them as did the younger men, who were of course inclined to



Difficult Forgings Made With Forging Machines.

spend a large amount of time in this study. One thing has made the study of the exhibits a far pleasanter matter than it was a few years ago. Before the abolition of the distribution of souvenirs, many men were inclined to give little attention to some of the exhibits, because they did not care to be placed in the undignified position of accepting or carrying about with them a lot of such souvenirs; now that this has been entirely done away with, railway men generally feel far more comfortable and are inclined to devote considerable more time to the exhibits.

General managers and higher executive officers on several roads have awakened to the tremendous advantages to be gained by having as many of their subordinates visit the convention as possible. For instance, the general manager of one road has issued orders that as far as possible all of the mechanical department officers, including the shop foremen, should at least spend a day or two at the conventions. The idea is that these men will see many things among the exhibits that will suggest a solution to difficult problems with which they are confronted, and that by examining the exhibits and talking their problems over with those in charge and with other railway men, their efficiency will be greatly increased and they will return to their work with renewed energy and inspiration.

A BRITISH COMMISSION ON RAILWAY AGREEMENTS AND CONSOLIDATIONS.

In June, 1909, a committee was appointed by the English Board of Trade "To consider and report as soon as practicable what changes, if any, are expedient in the law relating to agrements among railway companies, and what, if any, general provisions ought to be embodied for the purpose of safeguarding the various interests affected in future Acts of Parliament authorizing railway amalgamations or working unions."

This committee a short time ago made its report, which, it is believed, will be of interest to most Americans who are interested in the question of the extent to which government should seek to prevent or encourage concerted action by railways regarding rates and service. The following abstract of the report is from *The Scotsman:*

The early part of the committee's report is devoted to an analysis of the amount and character of existing competition between railway companies, and its effects both upon the companies and its effects both upon the companies themselves and the public they serve. Their investigations on this point led the committee to the following general conclusions:

(1) That the effects of the limited degree of competition still existing between railway companies are not necessarily to the public advantage, and having regard to the fact that much of the unnecessary burden which competition undoubtedly imposes upon the companies themselves, is likely in the long run to be passed on in one form or another to the public, we cannot doubt that the balance of advantage, not only to the railway companies, but also to the public, would be found to attach to a properly regulated extension of co-operation rather than to a revival of competition.

(2) That even had we come to a different conclusion with regard to the value of competition, we should have been unable to suggest any means for securing its continuance. The railway system is the creature of parliament in a sense not applicable to other industries, and it is regulated and limited by law in a manner different from other industries and undertakings. That this control is in the nature of the case necessary to the larger industries of the country is incontestable, but while parliament may enact that this must be done and that must be prohibited, past experience shows that even parliament appears to be powerless to prevent two parties, either by agreement or without formal agreement from abstaining from a course of action—namely, active competition—which neither party desires to take. Parliament can, of course, refuse to sanction bills authorizing the amalgamation or working union of two or more railway companies, and may provide that certain classes of agreement shall be invalid or even illegal, but it cannot prevent railway companies coming to an understanding with each other to adopt a common course of action or to cease from active competition.

(3) That experience has shown that informal combinations of this kind, while likely to be of less advantage to the companies than more formal and complete unions, can destroy competition just as effectively, and, moreover, possess certain incidental disadvantages from the public point of view, from which a monopoly under a single control is free.

The committee proceed: "In view of these conclusions on matters of fact we have come to the further and unanimous conclusion that the natural lines of development of an improved and more economical railway system lie in the direction of more perfect understandings and co-operation between the various railway companies, which must frequently, although not always, be secured by formal agreements of varying scope and completeness, amounting in some cases to working unions and amalgamations. We have therefore felt it our duty to refuse to adopt any suggestions or recommendations having for their object to make such arrangements difficult or impossible, and any which would make them so onerous to the railway companies as to deprive them of all the economic advantages of a

course of action, they might be able to prove would tend towards economy and efficiency in carrying out the objects for which they originally received their powers from parliament."

On the question, "What is the proper method of safeguarding the interest likely to be affected by railway combinations?" the committee make some interesting comments. They say that there are two distinct ways in which the attempt may be made to safeguard interests which might be prejudiced by agreements between railway companies. One is to require the agreement to be submitted to some public authority for sanction, as is now the case in respect of amalgamations, working unions, leases, and some working agreements, with the hope of securing that the terms of the agreement shall not of themselves unfairly affect any section of the public. An extension of this method would be to give the sanctioning authority explicit power as a condition of its approval to require that the companies entering into the agreements shall submit to such protective conditions in the interests of the public as the authority may think proper to impose. The other method is to provide a legal remedy for such evils as may be shown to be associated with the growing tendency to closer co-operation in so far as effective remedies are not provided by the existing general law of railway regulations.

"The first method was suggested by some witnesses, but it became evident to the committee in the course of the inquiry that it was impracticable. In the first place, in order to make such a plan effective, it would have to be provided that the arrangements for the reduction of competition should be submitted to the tribunal, and unless informal understandings were to be included in the scope of the procedure, the main source of complaint would be left untouched. So long as the companies concerned choose on their own responsibility to adopt the views of a conference as to what the rate between two points should be, it is hard to see how they can be prevented from doing so. Obviously the submission to a tribunal of arrangements which may be the result of a merely verbal understanding could not be enforced. Furthermore, it seemed to the committee that an adventitious control over rates and facilities on the sole ground that they were specified in an agreement would not be satisfactory, and any public control should apply equally to rates and facilities, whether they are fixed independently or by agreement. The committee cannot see that to give such a power as suggested to any tribunal would afford the public any real protection, and they arrive at the conclusion that any protection required against combined action which would deprive the public of advantages they now enjoy must be afforded by general legislation under which a remedy for such treatment would be afforded, whether it could be shown to be connected with an agreement or understanding between railway companies or not."

After discussing the second method suggested, the committee sum up as follows: "We are strongly of opinion that in so far as protection is required from any of the consequences which may be associated with railway co-operation, such protection should in the main be afforded by general legislation dealing with the consequences as such independently of whether they occur as a result of agreements or not. Such a method would afford a much more extensive protection than the regulation of agreements. It would protect the public in the case of understandings as well as agreements. It would be equally operative whether the agreement were made under existing powers or under express powers from parliament, such as an amalgamation. There would be no inducement created by its adoption for the companies to effect their objects indirectly or secretly. It would not prevent a machinery likely to be used by powerful sections of the public or other railway companies to obtain special advantages, not on merits but as a condition of withdrawing their opposition to the approval of the agreement. It would not tend to introduce a perplexing distinction of law or practice between what a company might reasonably do under an agreement and what it might reasonably do if no agreement existed."

In addition to the general conclusions given above, the committee make a number of more detailed recommendations, which are in some cases subject to limitations or conditions stated fully in the report. They include the following:

That it should be provided that where a facility or service is diminished or withdrawn it should be upon the railway company to show that the reduction or withdrawal is reasonable.

That it should be upon the railway company to justify a charge made for a service hitherto rendered gratuitously.

That the Board of Trade or the Railway and Canal Commission should in certain circumstances be given power to amend the statutory classification of merchandise traffic.

The railway companies should be encouraged to deal locally with complaints to a greater extent than is now the case.

That further facilities for making working agreements should be afforded by the amendment of Section 87 of the Railway Clauses Act, 1845.

That working agreements and pooling agreements and other agreements of an important character should be required to be published.

That the constitution and functions of conferences or other Clearing-House Committees appointed by the railway companies should be made public.

That Standing Order 145 A of the House of Commons should be extended so as to require a report on bills authorizing railway combinations, if any alteration in maximum powers of charge appears to the Board of Trade to be desirable.

That the following conditions should be applicable to companies amalgamating or entering into working unions, leases, or working agreements:

(a) The companies' systems should be deemed to be the railway of one company.

(b) The maximum rate chargeable should be reckoned continuously as if the companies were one company.

That in the case of companies amalgamating or entering into other statutory unions:

(a) The maximum charges should be revised in accordance with suggestions contained in the report.

(b) Provisions should be introduced into the act restricting dismissals of servants in consequence of arrangements sanctioned by the act, and providing for compensation to be paid in such cases, including compensation for the loss of any superannuation or pension fund benefits.

(c) Care should be taken that nothing in the act prejudices any person any pension rights or the security of any pension funds.

(d) In the absence of special circumstances, the opportunity of a proposed fusion should not be used as a lever to impose further conditions than we have suggested upon the combining companies, either in the interests of the public or other companies.

In conclusion, the committee remark: "We believe that the measures we recommend would, if adopted, go far to protect the general public against any possible abuses of the powers conferred upon railway companies, and to allay any dissatisfaction and apprehension which may at present exist regarding their action, and at the same time we feel that these measures should in the long run prove advantageous rather than the reverse to the companies themselves."

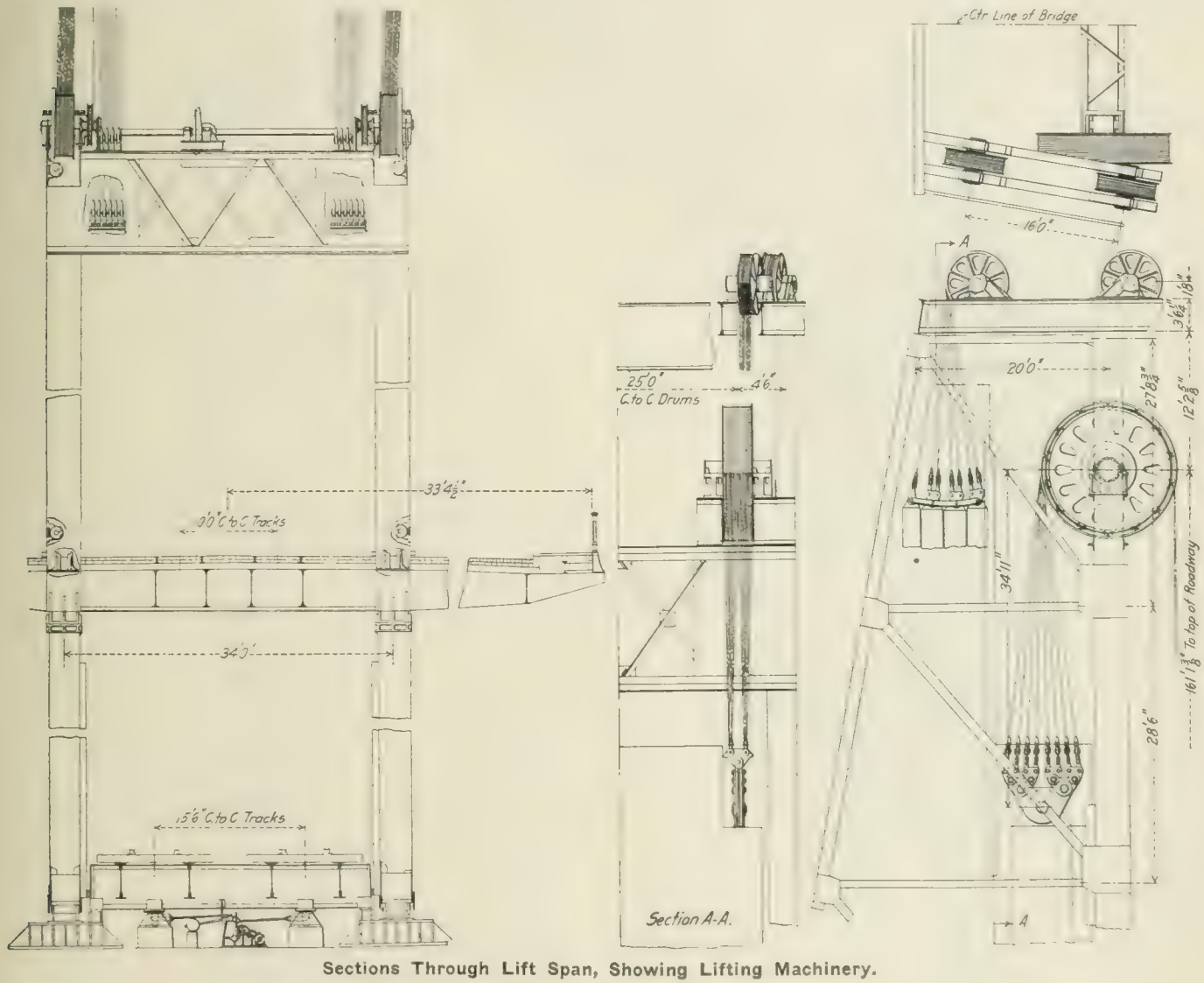
Reports from Bluefields, Nicaragua, indicate that preliminary work on the construction of the railway from the Atlantic coast into the interior of the country, has already been commenced. The proposed line will run from Bluefields to Rama by way of the Escondido river, and from Rama to San Ubaldo, a port on the Great Lake. It is also proposed to open up the Escondido river for general navigation.

OREGON-WASHINGTON RAILROAD & NAVIGATION COMPANY'S PORTLAND BRIDGE.

The Willamette river flows through the city of Portland, Ore., in a northerly direction, and discharges into the Columbia river at a point some eight miles distant. The principal business districts and important resident sections of Portland are on the west side of the river, while the larger and most rapidly growing residence portion of the city is on the east side. This condition produces a very heavy trans-river movement of highway traffic which, at the present time, is accommodated by four bridges.

The Oregon-Washington Railroad & Navigation Company's tracks lead westward through Oregon along the south bank of the Columbia river, and, as its passenger station and terminals are on the west side of the Willamette river, all trains must cross that stream. These are now accommodated by a double deck bridge having a single railway track below, and a roadway 32 ft. wide for street cars and highway traffic above, located quite near the center of the business district of Portland. This structure, locally known as the Steel Bridge, was built some thirty years ago, being the first steel bridge on the river. It is located at the narrowest part of the stream, and consists of a 340-ft. swing span, and a 310-ft. fixed span over the river, with steel trestle and through truss spans for the highway approaches at each end.

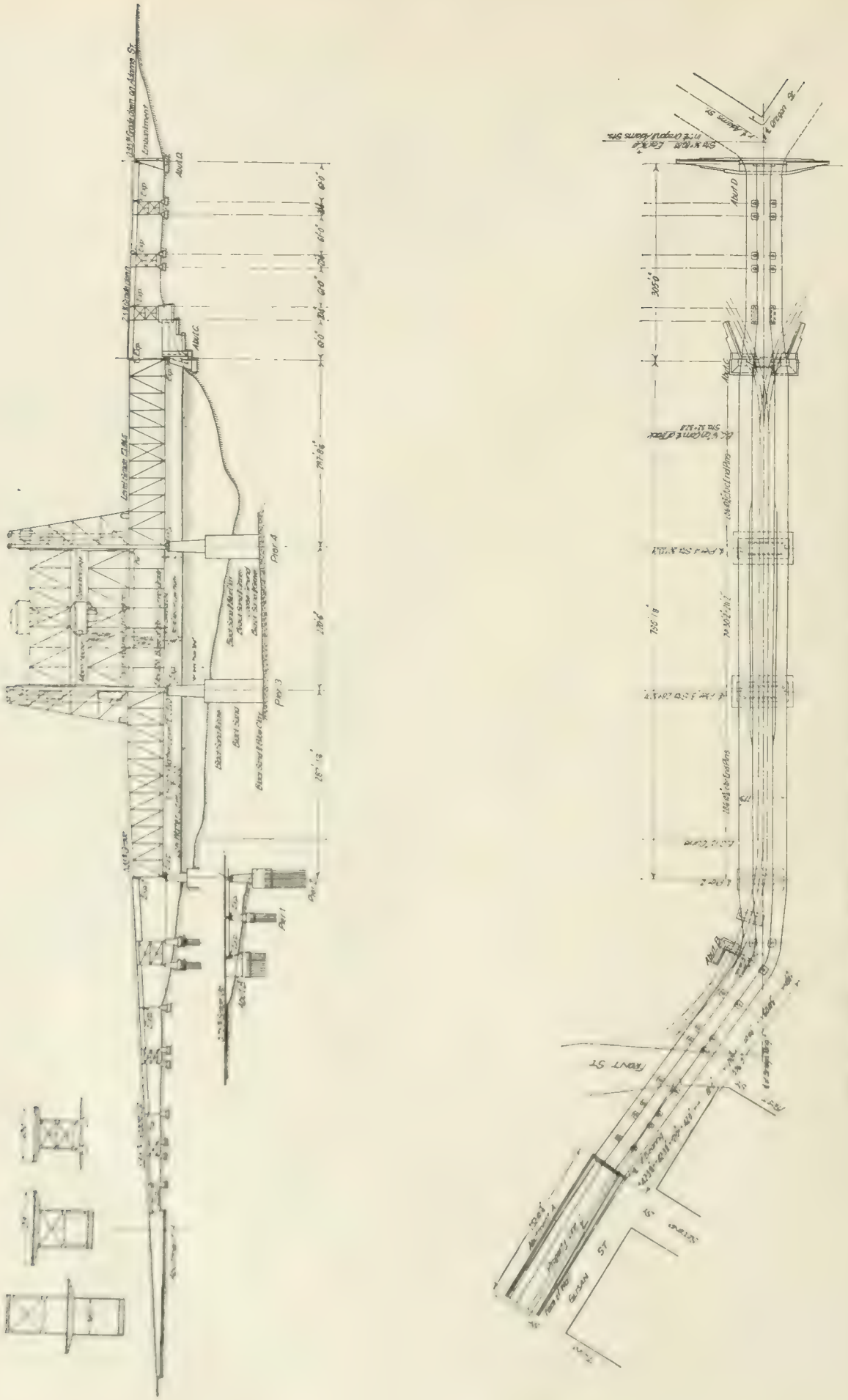
The Willamette river forms a magnificent fresh water harbor at Portland, deep enough for ocean vessels of heavy draft, and accommodates a heavy traffic of boats and vessels of every character—regular packet lines up and down both the Columbia and the Willamette, coastal freight and passenger lines, log towing steamers, lumber schooners, ocean tramps, and ships and sailing vessels of all kinds. The frequent passage of this river traffic interferes seriously with the traffic across the bridges, requiring frequent operation of the swing spans and causing repeated congestion of vehicular, street car, and pedestrian traffic. The steel bridge has a record of being opened 35,000 times in one year; or, allowing five minutes for operation (which is rarely reduced) the draw is open some eight hours out of every twenty-four. By far the larger part of the traffic on the river—perhaps 90 per cent.—consists of low, river steamboats, not requiring excessive clearance heights; and it is apparent that by constructing a bridge in which the lower deck should accommodate the railway traffic at the low level required for the terminals on each side of the river, and the upper deck should accommodate the highway traffic, so that the lower deck could be operated for the passage of small boats without interferring with the highway traffic on the upper deck, the latter could proceed almost without interruption throughout the day.



Sections Through Lift Span, Showing Lifting Machinery.

These conditions presented themselves to the officials of the railway company when, because of the deterioration of the old structure and of the necessity for providing double track facilities for a much heavier loading than the existing spans could support, the question of replacing the old bridge with a new one was taken under consideration. The structure which seemed most perfectly to accommodate itself to the existing conditions was a double action life bridge, which is now under construction.

The new bridge is about 700 ft. up-stream and approximately



Plan and Elevation of Willamette River Bridge; Oregon-Washington Railroad & Navigation Co.

parallel to the present steel bridge. The highway approaches leading to the upper deck extend from the corner of Third and Glisan streets at the west side to the corner of Oregon and Adams streets at the east side of the river. The highway approach, 512 ft. long, and the easterly highway approach 300 ft. long, consist of a roadway paved with creosoted blocks on deck girder spans supported by steel columns resting on concrete pedestals, and contain no unusual structural features. The railway tracks on the lower deck enter from the Union Station Terminals on a 15-deg. curve, they then cross the river to the east, and afterwards pass from the bridge, both up-stream and down-stream, on 16-deg. curves.

The bridge over the river consists of three riveted truss spans. The two side spans are fixed and the central or movable span is arranged to be lifted vertically between two towers supported on the piers and stayed by the fixed spans. The alinement of tracks requires that both fixed spans be of the spread type, so that the westerly fixed span, about 287 ft. long, is 34 ft. at the river end and 40 ft. 3 in. at the shore end, center to center of trusses; and the easterly fixed span, likewise 287 ft. long, is 34 ft. at the river end and 71 ft. 6 in. at the shore end, between centers and trusses. The fixed spans carry the railways on their lower deck and support the highways on their upper deck. The lifting span consists of a through truss span for the highway floor, and a lifting deck for the railway floor. The lower, or railway, deck provides for a double track railway; the upper, or highway, deck provides a roadway 70 ft. between hand rails accommodating double street car tracks, paved roadways that separate fast and slow traffic, and footways for pedestrians.

LIFTING DECK AND LIFTING SPAN.

The lifting deck consists of a usual double track railway deck, consisting of floor beams and stringers, with a lower lateral system and a bottom chord, which is suspended from the trusses of the lifting span by hangers that rise centrally inside of the truss posts when the deck is lifted. When the lifting deck is in position for train traffic its end rests on the piers in suitable shoes, and all wind and vibration stresses are carried through the lateral system directly to the masonry. Each intermediate panel point is suspended by a hanger, and the live load on the lower deck is transmitted to the trusses of the lifting span through pins in the top of the hangers, which are seated in sockets in diaphragms provided in the truss posts.

The lifting deck is held down when in train service by locks on the piers engaging the end floor beams, and by a lock over each hanger in the truss posts. All the locks engage automatically as the deck descends and all are opened simultaneously by electric power. Each pair of hangers is connected to a counterweight by eight wire cables, four per hanger, and the end floor beams are connected to a separate counterweight by four cables, two at each end. Each group of counterweight cables is connected by equalizers which distribute the load equally among them. These cables carry the dead load of the lifting deck and extend from the hangers up through the truss posts, over sheaves above the panel points of the lifting span, thence under common drums at the corners of the lifting span, thence up and over sheaves on the tops of the towers, and so to the counterweights. The pairs of drums at each end of the lifting span are connected together by transverse shafting, and the four drums are revolved simultaneously by motors and gearing placed in the machinery house in the center of the lifting span. Thus the force exerted on the counterweight cables through the friction between them and the corner drums raises and lowers the lifting deck. The operation of the lifting deck in no way affects the movement of traffic on the upper roadways.

To provide for the passage of the loftier vessels, the span supporting the lifting deck is likewise constructed to be lifted between the towers, so as to give the maximum required clearance of 135 ft. above high water. This lifting span is suspended by 64 counterweight cables, 16 at each corner, which pass up and over sheaves at the tops of the towers and thence are connected to counterweights of steel and concrete. These cables are so connected by equalizers that each one carries the same load. The lifting span is thus fully counterbalanced. As the lifting deck is likewise counterbalanced by the series of individual counterweights for each panel, the entire moving structure, consisting of the lifting deck and the lifting span, is fully balanced.

The lift span is operated by four drums, which are actuated through a train of gears by two street railway type motors. Each drum operates two pairs of ropes, one of which runs from the top of the drum over a sheave on the corner of the span and connects to the bottom of the tower post, while the other leads from the bottom of the drum under the sheave on the corner of the span and connects to the top of the tower post. All four corners are similarly connected. The rotation of the drums in one direction winds on the ropes which lead to the tops of the towers and pays off those which lead to the bottoms of the towers, lifting the span by the force exerted on the sheaves on the corners of the span. Reversal of direction of rotation of the drums brings the span back to position for service. The application of brakes on the operating drums effectively anchors the span in position for traffic, but locks are also provided at each corner, automatically engaging and further assuring the stability of the lifting span during the operation of the lifting deck.

The gearing for driving the operating drums of the lifting span is operated by two electric motors, and the gearing operating the lifting deck by two like motors; the arrangement and connection of the motors are such that it is possible to operate either the lifting deck or the lifting span with any two of the four motors. These motors are controlled in series-parallel, and limit switches automatically cut off the current and apply the brakes near the upper and lower extreme of both movements. Hand-operated brakes are likewise provided. Suitable trolley wires are supported on each tower, and trolley collectors are attached to the lifting span to supply current during movement. The lifting deck can be raised to its extreme position in 30 seconds, and the lifting span can be raised to its highest point in 90 seconds. The various locks are drawn by motors, and the entire machinery is interlocking, so that it is impossible to move the lifting machinery until all locks are withdrawn. The locks are driven automatically.

Both the lifting deck and the lifting span are guided in their movements by guides on each corner which engage on suitable tracks on the tower columns. For the deck, the moving guides are merely sliding contacts holding in both longitudinal and transverse position at one end, but only transversely at the other, thus allowing for temperature variations. The guides on the lifting span are rollers for both transverse and longitudinal guidance backed by heavy springs so that the longitudinal rollers are pressed against the guide tracks at all times regardless of the span length variation and the live load deflections of the towers. When the lifting span is rising the lifting deck is held tightly to it in immediate contact, so that when the span is reseated the guides on the deck are properly entered on their respective tracks. Tapered center castings at the bottom of the runs guide the moving deck and the moving span to exact position.

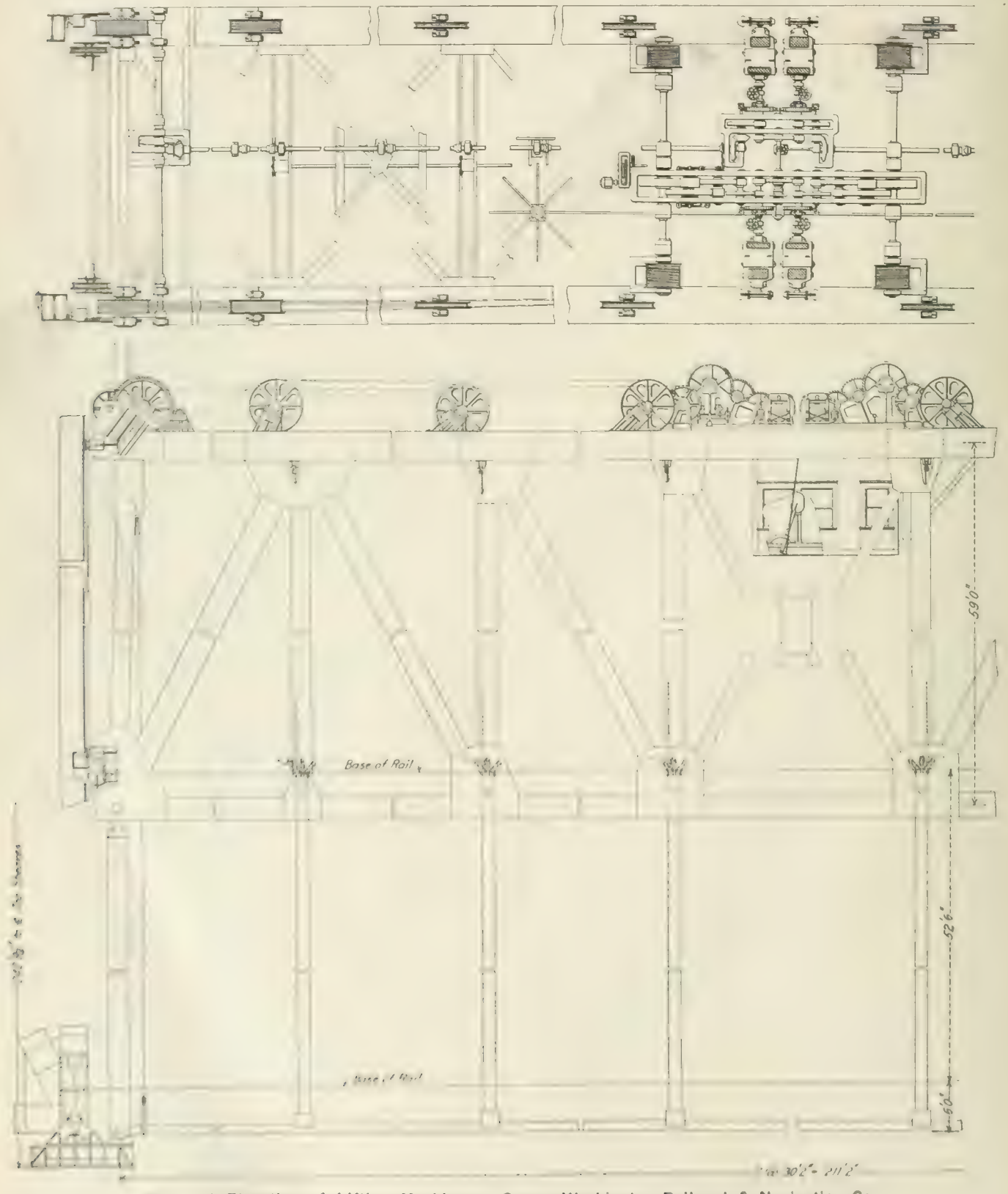
A 12-in. gas main, carrying gas at about 60 lbs. pressure, is carried over the bridge and continuous service maintained in it. This is accomplished by depending from the section of pipe lying on the top chord of the lift span two vertical sections of pipe which telescope vertical sections of larger pipe which connect to the pipes carried out from shore on the lower deck of the fixed spans. Stuffing boxes at the upper ends of the fixed vertical sections maintain the tightness of the connection. Thus the gas is free to flow uninterruptedly from shore to shore, even when the span is lifted.

SUPERSTRUCTURE DETAILS.

There are many features of the design of the superstructure which are worthy of comment, but only a limited number can be mentioned. The entire structure is built in accordance with

common standard specifications 1006 and 1012 of the railway company. The three truss spans are all fully riveted and offer unusual problems only because of their size and weight, and because of the amount of difficult detailing caused by the skews and angles. The maximum bottom chord section of the east fixed span contains 316 sq. in. of metal. All gusset plates were carefully designed for tension, compression, and shear. The camber was arranged so as to make the chords of the fixed spans horizontal under full dead load and live load, and the shop lengths of all members were so figured. The towers are vertical under dead load only on the fixed spans. The towers will, therefore, be almost vertical during the movement of the lifting span, because only a small part of the total live load can be on the fixed spans while the lifting span is being raised.

The chords for the lifting span and the lifting deck are figured to be horizontal under dead load and one-half live load, which condition will give a mean position for the variation in panel length of the lifting span between that for dead load only and



Plan and Elevation of Lifting Machinery; Oregon-Washington Railroad & Navigation Co.

that for dead load and full live load. The towers are designed for a wind pressure of 15 lbs. per sq. ft. when the lifting span is being raised, and for 30 lbs. per sq. ft. when the lifting span is down. The total load on the shoe of each tower column is about 6,500,000 lbs., which is supported on a cast steel base 12 ft. x 12 ft. 6 in. The load is carried onto the shoe through a 13½ in. pin, which is in full bearing throughout its length. This is accomplished by a steel casting between the gusset plates, which takes the load from the end posts of the fixed span, and on which the tower column rests.

The entire machinery is designed with great care, not only for operation, but also for maintenance, and means are provided for replacing all parts without serious interference. Special details of seats for jacks are provided in the cases of the large supporting sheaves and drums, so that the brasses can be replaced without difficulty should it become necessary to do so.

The machinery house is placed on top of the lifting span, is built of wood on a steel frame, and is equipped with a hand-crane for convenience in handling the machinery. The operator's house is in the lifting span, above the clearance line, immediately underneath the machinery house.

The highway deck is paved with creosoted blocks laid on creosoted planks which are supported by creosoted cross ties. The sidewalks are of untreated planks. Electric lighting is provided by clusters of lights supported at antervals of about 50 ft. in the handrails. There are the usual special lights in the machinery house, in the gate tender houses, and on the spans and piers for river traffic signals.

SUBSTRUCTURE.

The Willamette river at the site of the bridge has a maximum depth of 90 ft. below low water, and the variation from low water to ordinary high water is 21 ft. One main river pier is founded on a hard cemented gravel about 130 ft., the other about 120 ft. below low water. These piers were sunk to position by the open-dredging process. Their bases are 36 ft. wide and 72 ft. long. Each consists of a timber crib filled with concrete. The crib contains six well holes for dredging, each 9 ft. square from the top of the crib to a point 11 ft. above the cutting edge, below which point the dredging wells flare out to occupy the entire area of the crib at its bottom. The entire perimeter of the crib, its central longitudinal cross walls, and its two transverse cross walls are shod with a steel cutting edge made up of ½ in. plates inside and outside, with 6 in. x. 6 in. x ¾ in. angles at the bottom riveted together and well bolted to the timber. The lower 11 ft. of the crib are of solid timber, and, from that point, walls 12 in. thick are carried up, and the entire spaces around the dredging wells were filled with concrete as the cribs were sunk to position. After being satisfactorily founded on the cemented gravel, the dredging wells were all filled with concrete deposited through water to such a point as it was convenient to pump out, when the balance of concrete was placed in the dry. The crib proper extends upward to about 20 ft. below low water, at which point the neatwork of the shafts begin. Suitable coffer dams were connected to the cribs by large bolts, and after the shaft forms had been filled with concrete and removed, the coffer dams were unbolted and likewise removed, leaving the pier complete.

In the construction of each of these piers a substantial dock was first constructed in the river, consisting of about 100 piles well driven down, capped, and braced together. Borings were then made around the entire perimeter of the crib, at spaces about 8 ft. apart, and the elevations of the hard material at all points were determined. It was found to be on a very considerable slope, showing a difference of elevation of 22 ft. for opposite diagonal corners. When these elevations were determined, pipes were successively sunk at numerous points around the perimeter, and in the location of cross walls, and holes were drilled in the hard material to a common level some 2 ft. below the lowest elevation of the top of the cemented gravel. As soon as the drilling at each hole had been completed to the proper elevation, a cartridge of black powder and dynamite in a sheet iron case was lowered to the bottom of the hole and discharged by an electric battery. This process was repeated at such frequent intervals as it was deemed would produce a bottom uniform in character throughout the entire area of the crib. Thus the blasting for leveling the cement gravel was carried on before any excavation was made through 50 ft. of gravel and sand. In the meantime the steel cutting edges had been set up and riveted together on ways in a shipyard convenient, and enough timber put on to float the crib, which in this condition was some 30 ft. high. It was then floated into position in the dock already prepared, and other piles driven on the open end of the dock entirely enclosing the crib. Concreting in the spaces around the dredging pockets and building up the timber walls proceeded simultaneously at such speed as was necessary to settle the crib to the bottom. Dredging was carried on both by means of orange peel buckets on derricks and by the use of hydraulic jacks, consisting of a water syphon operated by large force pumps. On reaching the cemented gravel, which had been broken up by the blasting, the dredging proceeded more slowly, and had to be done by the buckets only until the crib reached satisfactory position, practically at the elevation previously determined by the blasting. The total height of each pier is about 140 ft. and each contains 8,650 cubic yards.

The west pier, supporting the end of the west fixed span, rests on piles which were sunk inside a timber crib by water jets to a satisfactory depth, and it involves no unusual features of construction.

The east end of the east fixed span rests on an abutment near the water's edge. While the extreme depth of water was only about 25 ft. the cemented gravel is practically exposed, being merely overlaid a few feet deep by loose, round boulders; and, as it is exceedingly hard, there was some difficulty in constructing a suitable coffer dam. Wooden piles, even when shod with iron points, could not penetrate sufficiently to stand upright, therefore the coffer dam was constructed by driving down two rows of old steels rails about 5 ft. apart. Waling timbers were placed inside of these rails and suitably fastened, and triple-lap wooden sheet piling was placed within and driven down to the cemented gravel. A quantity of mud and gravel pumped out of one of the river piers was then piled up on the river side of the wall, and a rich grout mortar was deposited in the coffer dam through a pipe, in order to cement the boulders together and make a sealed connection with the hard material. The remaining space between the walls was filled with clay and loam. The coffer dam was then pumped out with great success, and the work on the abutment proceeded in the dry.

Not only does the structure now being built accommodate itself perfectly to conditions of both highway traffic and river traffic, but it has also numerous other advantages. For the operation of boats on the river one wide channel is provided instead of the usual two narrow ones separated by a large pivot pier. No draw rest is required, and the boats can pass through the opening at any angle without finding it necesasry to approach in a certain line, as is compulsory when they must parallel a draw rest. The effect in the currents of the river from the two piers tends to keep the vessel in the center of the opening rather than to throw it to one side, as is the case of the swing span openings, particularly because of the large, substantial draw protection required. Many of the boats plying on the Willamette river tow very large rafts of logs, and the advantage of not being restricted to a definite course in passing through the bridge is much appreciated by the river pilots. The expense of construction and maintenance of the draw rest is saved, and the latter, because of the deep water and the current conditions, is considerable.

In addition to this, the structure as built represents a very considerable saving over the ordinary double deck swing span, which was originally contemplated. The total cost of the structure is estimated at $1,650,000.

This work is being done under the direction of John D. Isaacs, consulting engineer of the Harriman Lines; George W. Boschke,

chief engineer and assistant general manager of the Oregon-Washington Railroad & Navigation Company, and George T. Forsyth, bridge engineer. The bridge was designed by and is being built under the supervision of Waddell & Harrington, Kansas City, Mo. The foundations, now nearly complete, are being constructed by the Union Bridge & Construction Company, Kansas City. The American Bridge Company is fabricating the superstructure, and Robert Wakefield, Portland, is erecting it.

LETTERS FROM AN OLD RAILWAY OFFICIAL TO HIS SON, A GENERAL MANAGER.*

VIII.

Galveston, Texas, May 27, 1911.

My dear Boy: We were talking of the unit system of organization. There is little that is new about the system. Like many useful things in this world, it is mainly an adaptation of some very old principles and practices. From one viewpoint it is a rational extension of the simple principles of train despatching. The standard code does not attempt to supply the place of judgment in a train despatcher. It does not tell him when to put out a meet or a wait order. When his judgment dictates the necessity for any particular action, the standard code comes into play by prescribing forms, by imposing checks and safeguards, by simplifying methods, and by unifying practices. This gives greater opportunity for initiative and originality on the part of the despatcher by making routine of the detailed portion of the process. He has more time to think.

Because the unit system leaves so much to the thinking capacity of the men below, some people have found it difficult to understand. Many codes of organization attempt to cover in advance all the various cases that may come up. The unit system enunciates principles and prescribes methods, but leaves independence of action to the man on the ground. He is for the time being the judge as to what principle to apply. When men are carefully trained their first impulse is to do the right thing. This impulse has been dwarfed and deadened on many railways by artificial restraints which make a man doubtful of his authority. The unit system reverses some old presumptions and puts the burden of doubt upon him who questions the official authority.

We have to take human nature as we find it, not as we think it should be. The master mechanic or the division engineer is riding on the rear of a train, at the company's expense, and tells a young flagman that the latter did not go back far enough. If the flagman does not tell the official to go to h——, the trainmaster probably will. The trainmaster says, "This is *my* department, you have interfered with *my* man." That is the old feudal conception. He is not *my* man but the company's for service, and his own for individuality and citizenship. Let the master mechanic or the division engineer of many years' service report the flagman whose tenure may have been very brief. Human nature is such that the trainmaster, stung by an implied reflection, constitutes himself attorney for the defense. The papers grind through the baskets of the chief clerks. By and by [illegible] concerned has forgotten the incident, the papers come back with expressions of distinguished consideration and gratefully intimate that the case was not quite as bad as reported. The old official, in a measure discredited, soon stops concerning himself with flagmen. The management, the stockholders, and the public lose just as much possible protection through increased supervision. The salary and the expense account of the traveling official go on just the same.

On the Harriman Lines the master mechanic, like the division engineer, has the rank, title, and authority of assistant superintendent. Mind you, it is not assistant superintendent in charge of this and so, but just assistant superintendent. An attempt to define duties in a circular of appointment might imply that all the responsibilities not enumerated would be necessarily ex-

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cluded. So the assistant superintendent quietly speaks to the young flagman who profits by the instruction, and the incident is closed without recourse to the typewriter. For the technical brief to the Supreme Court there is substituted the rough and ready but surer justice of the police magistrate. The employee still has the right to appeal just as he had before, but seldom or never does he exercise it. There are, of course, intelligent limitations to all authority. Th mechanical assistant, or the maintenance assistant should not, for example, order the flagman to buy a new uniform. Common sense and courtesy have proved effectual safeguards against abuse of authority.

The underlying principle that responsibility breeds conservatism in action has operated to prevent those unseemly clashes of authority which many predicted. The good sense of the superintendents has served as an effectual balance wheel to maintain smooth running. The unit system does not deny or dispute the necessity for specialized talent for technical activities. It insists, however, that increased supervision of the countless phases of operation can be gained by utilizing all the official talent available. In many cases such increased supervision is a by-product. The maintenance assistant is inspecting track. The train stops. He cannot resume back inspection until the train starts. Meantime, he may be able to find time to see if the conductor receives his orders promptly, if the despatcher uses good judgment, if the station forces are alert, if the public are being well handled, if the news butcher has his wares over several needed seats in the smoking car. He may even go to the head end and tell the eagle eye how the black smoke indicates that the fire boy could save his own back and the company's good money by less liberal use of the shovel. Anything very technical requiring the presence of specialists for all these things? Of course, if a special problem develops, such as a badly adjusted shaft, it may be necessary later to get the more expert attention of a mechanical assistant. Often, however, before this stage is reached there can be rendered much economical first aid to injured operating expenses. This increased supervision, be it much or little, is clear gain for the company. It means more effort for the official, but that is what he is paid for. It is usually better in zero weather to have the old master mechanic and the old traveling engineer as assistant superintendents riding different trains on the road than to have them sitting in a comfortable office writing letters to each other about engines that failed last week or last month.

Once upon a time a traveling engineer talked through a telegraphone to a despatcher. The latter requested the former to have the freight train pull into clear to let another train by. The conductor was not in sight. He was probably in the caboose making out some of those imaginary reports about which grievance committees tell us and which are most in evidence during investigations of head-end collisions. So, this member of the ancient and honorable order of attorneys for the brotherhood told the brakemen where to head in. Whereupon with much professional profanity the trainmen declined, saying that no traveling engineer could tell them what to do The superintendent took the brakemen out of service. They got back only on request of the traveling engineer to whom they apologized. While authority was vindicated, an undesirable situation had been developed. No matter how emphatic the vindication may be, it is as bad for discipline to have authority questioned as for a woman to have her virtue impugned. Since then the unit system on that division has made the traveling engineer an assistant superintendent, and the question of authority does not arise. Out in that part of the country a fast train was pulling out of a terminal. The trainmaster was out on the road. His clerk signed the trainmaster's name to a message, telling the old passenger conductor to make a stop to deliver what to the clerk was an important letter, ran down and handed both to the conductor. The latter demurred, saying that under his running orders the stop would make him miss a meeting point. The clerk insisted and when the conductor disregarded

the message the latter was taken out of service. This was done on the old feudal theory that the trainmaster's name and position must be respected. By the same reasoning a bank teller should honor a check on which he knows the signature is forged. Since then the unit system on that division requires everyone to do business in his own name. Employees obey the instructions of men shown by name on the time card, and are not at the mercy of clerks. The old trainmaster's name is more respected because it is signed only by himself and is not cheapened by use by Tom, Dick and Harry. (Anvil chorus: "Such things couldn't happen on our road." Perhaps not, but they do just the same, in a greater or less degree.)

When a conductor reports for train orders he has a right to know that a competent despatcher is on duty. He cannot dictate, however, what particular despatcher shall work the trick and give him his orders. The unit system carries this same principle to correspondence and reports. It denies the right of the employee to dictate what official shall handle a certain letter or report, under normal conditions. The report is addressed impersonally "Assistant Superintendent," and the office decides what official is most available. As a matter of common sense the expert in that line will be utilized. In his absence, however, his feudal representative, a clerk, will not act for him. The clerk may prepare the papers, but final action can be taken only by an official. Highly technical problems are sent to the absent official on the road or await his return. Each assistant may issue instructions, in his own name, to such subordinates on his own pay roll as roadmasters under the maintenance assistant, foremen under the maintenance assistant, foremen under the mechanical assistant, yardmasters under the transportation assistant, etc., etc. Before these instructions leave the office, they should pass, like all correspondence, over the desk of the senior assistant (chief of staff) for his information and for the prevention of possible conflict and confusion. Here, again, is a principle of train despatching. All orders concerning the running of trains go over the despatcher's table. Should there not be a similar check imposed on official instructions and information imparted to hundreds of delicate, sensitive, human machines, made in the image of God?

Why are not communications and reports addressed "Superintendent"? Because there would be an implied obligation for the superintendent to act. This obligation cannot be admitted under normal conditions. Therefore, to be honest and straightforward, the address is "Assistant Superintendent." Under this system the employee knows that some assistant will see his communication, not the clerk of somebody else. If the employee desires a particular official to see his communication, he makes it personal by prefixing that official's name.

Any employee can address the superintendent by name for the same good reason that the humblest citizen can appear in his own behalf in any court in the land. Though the court is open, neither the citizen nor his attorney can normally dictate what judge shall hear his case. Authority is abstract and impersonal. The court exists if the judge is dead. The exercise of authority is concrete and highly personal. The court is silent until the judge speaks. Conversely, the superintendent as the head of the unit may address any employee direct without going through the assistant on whose pay roll the employee is carried. Common sense and the personal equation of the officials concerned indicate how far this elastic feature can be carried. Courtesy requires prompt notification of the assistant concerned. Officials have superiors, and to attempt to convey the idea that each is a feudal chief, when in reality he is not, can result only in self-deception. The practice of each division superintendent re-issuing verbatim in his own name instruction circulars from the office of the superintendent of transportation is misleading and ridiculous.

All instructions from general officers, including the general manager, should come to employees through the superintendent's office, not only to respect the integrity of the organization unit, but to preserve a history of the transaction in the authorized office of record—to get all the runs, including the general manager's special, on the right train sheet as it were. Whoever acts, whether the superintendent himself or an assistant, has at hand in one office of record full information for his guidance. You understand that the superintendent is boss. He may see any or all communications from employees as he sees fit. Where previously he instructed his chief clerk what to bring to him personally, such instruction he now gives to his chief of staff. An employee who addressed "Assistant Superintendent" may receive a reply signed by the superintendent himself. This is an honest record, not a subterfuge. Some assistant, the chief of staff, has handled the paper as well as the superintendent himself. To the subordinate the superintendent is normally an incidental representative of authority entitled to the greater respect to be given his higher rank. To the general offices, and to co-ordinate units, the superintendent is an essential head of a component unit who must not be ignored. Therefore, since there is an implied obligation for the superintendent to answer superior authority himself, all communications from superior and co-ordinate authority are addressed impersonally, "Superintendent." A railway is so extensive that the superintendent should spend at least half the time out on his division. In his absence the chief of staff is allowed to communicate with the general offices and other divisions in his own name, but "for the superintendent." The superintendent may answer from the road himself, but in any case the general offices know who has really taken action. Going down on the division any assistant may sign, subject to review by the chief of staff. Going up to higher authority only the superintendent or his chief of staff may sign. The rights of the individual assistants are preserved by permitting any one to go on record to the general offices when he so desires. He writes his letter, addresses it "Assistant Superintendent," and takes it to either the superintendent or chief of staff and requests that it be forwarded. In this exceptional case a letter of transmittal is written setting forth the views of the superintendent. A cat may look at a king. A meritorious idea should not be throttled because it does not happen to appeal to the next superior.

When a division official on any road rides a train, he does not first thing try to tell the conductor what meeting points should be made. He usually says, "Let me see your orders," which is in effect asking the conductor what the despatcher has said must be done. Protected by this vital information the official may then venture some suggestions. In the preliminary lecture explaining the unwritten laws of the unit system the new assistant superintendents are cautioned to apply the same principle. They are not to see how much trouble they can make, but how little. If the transportation assistant, for example, pulls up to a water tank at 7:20 a. m. and sees the section men just going to work, he does not jump on the foreman for being late, but quietly asks, "What are your working hours? What time does the roadmaster tell you to begin work?" The moral effect of the presence of an alert, observing official, armed with sufficient authority, becomes an asset of value to the stockholders. We have not enough officials to ride every train and cover every point. The more open, intelligent supervision we can get from each official the better should be the operation. Of course, if the officials were not experienced railway men a condition of nagging and rawhiding might result which would prove fatal. What the unit system does is to try to make potential the latent knowledge and ability which every official possesses in a greater or less degree. The old over-specialized system denies that this stored up reserve exists to any practicable extent.

The fact that the title of assistant superintendent is uniform tends to bring out the real individuality of the different assistants. Each has to have his name on the door of his private office. As we hear less and less of "my department" and more and more of "this division," the references to "the trainmaster," "the master mechanic," etc., etc., give way to "Mr. A.," "Mr. B.," etc. The

assistant superintendents have definite seniority, and when two or more come together under circumstances rendering it necessary, as at a wreck, the senior present takes charge and becomes responsible. Remember that rank and authority can be conferred by seniority in grade as well as by grade itself.

The scriptural warning that no man can serve two masters is still applicable. In our case the master is the corporation, represented at different times by various individuals clothed with authority. The conductor runs his train under the laws of the land, the policy of the president, the rules of the general manager, the bulletins of the superintendent, the assignment of an assistant superintendent, the orders of a despatcher. He collects tickets and fares as directed by the general passenger agent and reports on forms prescribed by the auditor. The lower we go in the scale the fewer the superiors with whose instructions the employee comes in direct contact. The trackman knows authority only as its exercise is personified by his section foreman until the paymaster tells him to wipe off his feet before entering to receive his check. Therefore, put out a slow flag against too fast running over such low joints as "one boss," "complete responsibility," "divided authority," etc., etc., until you feel certain just what speed they will stand.

Affectionately your own, D. A. D.

"GET ACQUAINTED" TRIPS ON THE OREGON SHORT LINE.

During the months of April, May and June, officers of the Oregon Short Line made a very interesting series of "get acquainted" trips over this road. They used a train of five cars, which was run special, and which was on the line a total of 22½ working days. The party covered 6,530 miles by rail and a little over 1,000 miles by automobile; made 117 stops, varying from a half hour to 36 hours in length, and met over 7,000 people. All departments of the road were represented, and representatives of the Pullman Company and the American Express Company were along. The local general agents of some of the road's connections also were included in the party at times. Its personnel was not the same on all the trips, as some changes were necessary in order to keep business moving at headquarters in Salt Lake City.

The following interesting recapitulation of the trips has been made:

												Total.
												1,745
												1,475
												1,340
												1,340
												570
												465
Grand Total.												7,035

In the figures of the number of people seen there are not included 475 school children who attended the meetings and who were old enough to be interested in them. The only parts of the line not covered were the following: Main line south of Kaysville, Utah; east of Diamondville, Wyo.; and west of Weiser, Idaho; the Yellowstone branch north of Marysville, Idaho, and the northwest line north of Huntington, Ore.; the Cumberland branch and narrow gage line south of Mina, Nev.

The [illegible] visits at different places was for W. H. Bancroft, vice-president [illegible] point where it was intended to stop, advising him that a special train with representatives of the various departments of the road was to be run over the line, making stops at all the larger [illegible] this railway and to increase their familiarity with conditions [illegible] adopted to enable them to cover the ground as rapidly as possible and yet have opportunity to meet everyone who may desire to see them at the various points." The agent was advised as definitely as possible, at least 24 hours in advance, of the exact time when the train would arrive, and was told that the officers would be greatly pleased to have the opportunity to meet as many of the citizens as possible. He was instructed to make known to the citizens the time and purpose of the visit and to wire E. C. Manson, general superintendent, 24 hours in advance what suggestions, if any, the people had to make as to the disposition of the railway men's time while in their city.

At the larger places the party made side trips about the town and neighborhood in automobiles, afterwards holding a business meeting. In smaller towns it usually held the business meeting only.

The trips have proved so successful that notwithstanding the time and expense involved it is believed that the plan of making them annually will be adopted by the company as a permanent policy. An officer of the roads says that they have been "an education to the railway men who participated, and in addition to familiarizing them with the territory and its needs, have brought them closer in touch with each other's difficulties and made them realize the necessity for co-operation and team work, as nothing else probably could have done. We were cordially received by the people everywhere and discussed an immense number of complaints and suggestions covering practically every phase of the business of the railway and its relations to the public. Many minor matters were adjusted on the spot and others were taken under advisement, and in still other cases requests had to be refused and the reasons why explained to the people. All this work was better and more expeditiously accomplished than by any other method would be possible. Our party was a sort of traveling general office, equipped to handle almost any railway question which might be presented.

"We found that the people were very glad to see us and were generally willing to meet us half way in the disposition of subjects in which they were interested. We found a few discontented ones who could not be placated. We located some sore spots which will need our attention in the future, but we are confident that the general effect of this visit and discussion has been to clear up a great deal of misunderstanding and to bring us closer in touch with our patrons and the public generally. It has also been an education to our local agents, who met with us and participated in our discussions with the people. A great many points the shippers complimented our agents and local force, and we were delighted to find the relations existing between our local representatives and our patrons were of the most amicable nature."

The unfinished section of the Central Paraguayan Railway, between Pirapo and Villa Encarnacion, has been completed, and railway traffic is possible now from Asuncion, the capital of the republic, to Villa Encarnacion, Paraguay, on the Upper Parana river opposite Posadas, in the Argentine Republic. Transfers will be made at the terminal stations of the Paraguayan and Argentine railway systems at Encarnacion and Posadas, respectively, by ferryboat. This enables the journey from Asuncion to Buenos Aires, or vice versa, to be made in from 30 to 35 hours. The trip from Buenos Aires to Asuncion, over the new line, takes the traveler northward through the delta of the Parana river to Ibicuy; from here through the richest agricultural section of the province of Entre Rios, Argentine republic; thence to Concordia and Santo Tome, on the Uruguay river, and up to Posadas. Here the Upper Parana river is crossed by ferryboat, landing passengers at Encarnacion, Paraguay, and from this point by rail to Asuncion, a distance of 234 miles. The Central Paraguay Railway propose to build 75 miles of new branches, one to Carapegua and another to Villeta, both situated in important agricultural sections of Paraguay.

POOR'S MANUAL FOR 1911.

The advance sheet of Poor's Manual of Railroads for 1911 (44th annual number) has been issued. The 1911 manual will contain 2,690 pages of text. The present number is again devoted exclusively to statements of the railways and street railways in the United States, Canada, Mexico, Cuba, Philippines, etc., the statements of industrial corporations having been incorporated in "Poor's Manual of Industrials," of which the second annual number was issued a month ago.

The introduction to the Manual of Railroads for 1911 shows that the total mileage of steam roads in the United States on December 31, 1910, was 242,107 miles, as against 238,356 miles on December 31, 1909, showing an increase of 3,751 miles or 1.57 per cent.

The gross earnings for 1910, as shown below, were $2,804,580,939, compared with $2,513,212,763, showing an increase of $291,368,176, or 11.59 per cent. as against an increase of $106,192,953, or 4.41 per cent. in the preceding year. The net earnings for 1910 were $919,060,312, compared with $852,153,280, showing an increase of $66,907,032, or 7.85 per cent., as against an increase of $134,351,113, or 18.72 per cent. in 1909.

The following table shows the principal earnings of all the steam roads of the United States at the close of 1910 as compared with the close of 1909:

BALANCE SHEET.

Liabilities:	1910.	1909.
Capital Stock	$8,380,819,190	$8,030,680,963
Bonded Debt	9,699,634,906	9,118,103,813
Other Bond Obligations	909,396,197	793,497,799
Accrued Liabilities	140,930,128	151,319,542
Miscellaneous Liabilities*	315,003,927	118,567,836
Bills Payable and C't Accounts	1,090,840,210	933,646,991
Sinking Funds, etc.	223,413,410	311,448,385
Profit and Loss	1,178,322,713	919,823,188
Total Liabilities	$21,839,360,776	$20,377,088,517
Assets:		
Cost, Railroad and Equipment	$15,586,829,836	$14,514,822,308
Stocks and Bonds Owned	3,518,744,560	3,084,387,008
Real Estate and Other Investments	705,676,806	907,873,063
Cash, Bills Receivable and C't Accounts	1,203,990,029	1,163,176,374
Materials and Supplies	254,774,611	213,124,839
Other Assets†	265,756,886	185,324,625
Sinking Funds	160,965,276	177,859,392
Profit and Loss	142,622,772	130,520,908
Total Assets	$21,839,360,776	$20,377,088,517

*Including in 1910 appropriated surplus and deferred credit items.
†Including 1910 deferred debit items.

INCOME STATEMENT.

	1910.	1909.
Passenger	$640,949,990	$578,243,601
Freight	1,940,335,111	1,720,863,413
Miscellaneous	223,295,838	214,105,749
Total Earnings	$2,804,580,939	$2,513,212,763
Operating Expenses	1,885,520,627	1,661,059,483
Net Earnings	919,060,312	852,153,280
Other Receipts	200,899,127	165,888,557
Total Available Revenue	$1,119,959,439	$1,018,041,837
Deductions:		
Taxes	$107,862,419	$90,790,949
Rentals:		
Interest	32,088,348	34,406,772
Dividends	30,110,624	30,199,751
Miscellaneous	39,778,489	28,633,163
Interest on Bonds	332,144,147	318,755,456
Other Interest	24,634,000	33,919,466
Dividends on Stock	275,289,173	265,162,298
Miscellaneous	106,342,424	108,312,393
Total Deductions	$948,249,624	$910,180,248
Surplus for Year	171,709,815	107,861,589

TRAFFIC STATISTICS.

	1910.	1909.
Passengers Carried	998,735,432	924,421,638
Passenger Miles	32,388,870,444	29,896,142,332
Average Distance per Passenger	32.42 miles	32.34 miles
Average Receipts per Passenger	64.17 cents	62.55 cents
Average Receipts per Passenger Train Mile	113.63 cents	111.36 cents
Tons Carried	1,817,766,030	1,635,215,800
Ton Miles	256,682,126,657	227,198,032,735
Average Haul per Ton	141.21 miles	138.94 miles
Average Receipts per Ton	106.12 cents	105.24 cents

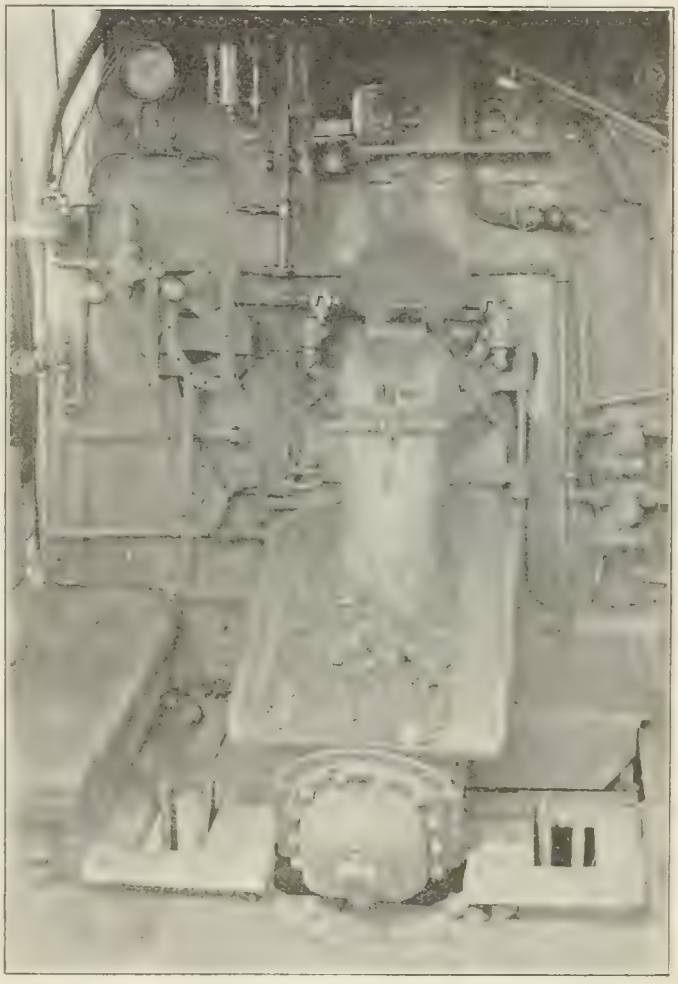
The rolling stock of the railways in recent years consisted of the following:

	1910.	1909.	1908.	1907.
Locomotives	63,030	60,601	61,030	58,301
Cars:				
Passenger	37,985	36,245	35,601	35,321
Baggage, Mail, etc.	13,173	13,449	12,341	11,952
Freight	2,297,620	2,180,324	2,176,321	2,084,214
Total Revenue Cars	2,348,778	2,230,018	2,224,263	2,131,487

The total length of the railways in the United States, including 2d track, 3d track, siding, etc., was 349,870 miles in 1910; as against 343,387 miles in 1909, 333,776 miles in 1908 and 324,033 miles in 1907.

THE HANNA LOCOMOTIVE STOKER.

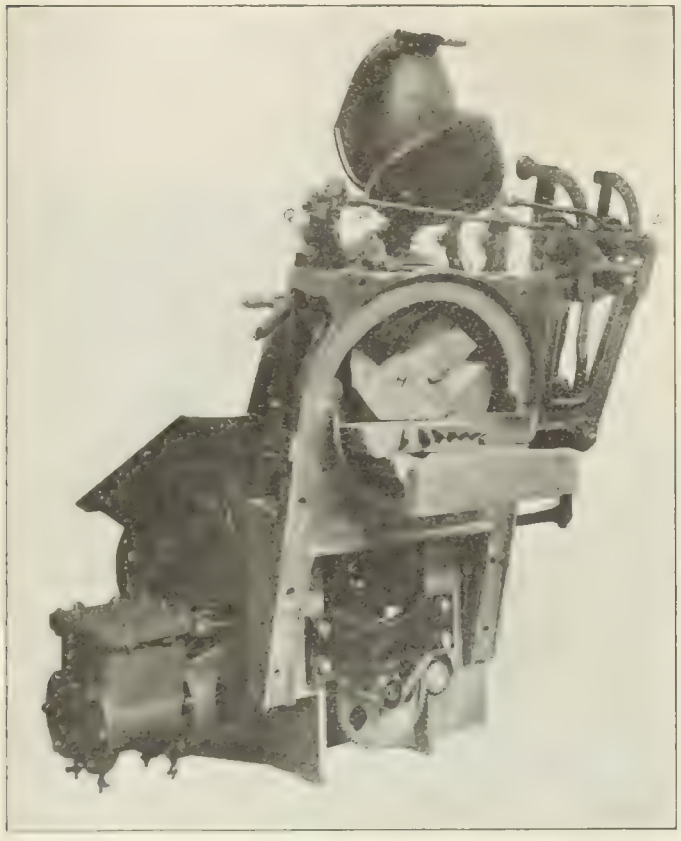
For the past five years W. T. Hanna of Cincinnati, Ohio, has been developing a mechanical stoker for locomotives. The major portion of his experimenting has been done on the Queen & Crescent Route, where a number of the machines are now in operation. The principle upon which the stoker is constructed is that of a scatter feed, operated by steam jets, with the coal delivered continuously from a hopper into which it is shoveled by the fireman. The machine takes the coal from the hopper, carries it up and drops it into the firebox, where it is blown out over the fire in an even bed. When in normal working condition there is an even distribution of the coal over the whole firebox, but if there is a change in the rate of combustion at any one point, so that a hole is being burned in the bed, certain wings can be so adjusted as to throw more coal to that one point than elsewhere, and when the threatening difficulty has been remedied, the adjustment can be put back to normal again and the regular operation resumed. Possibilities of adjustment also exist throughout the whole train of events. The speed of the feeding mechanism may be varied to meet extraordinary demands for fuel, either above or below the normal; the velocity of the steam jets can be varied to accord with the character of the coal and the distance from the back head at which it is to be placed; the direction in which the coal is blown can also be changed as already intimated. Finally, in order to avoid the



Application of Hanna Locomotive Stoker.

clogging of the tubes, and the loss of coal, due to the escape of cinders, the fine particles and lumps of coal are handled separately and are sent into the firebox at different velocities.

It will be seen, then, that the machine is a mechanical rather than an automatic stoker. It is mechanical in that it does the work involved in the placing of coal in the firebox, but is not automatic because it requires the attention of the



Front or Firebox Side of Hanna Stoker.

[illegible] of the hopper and for making the re[illegible]

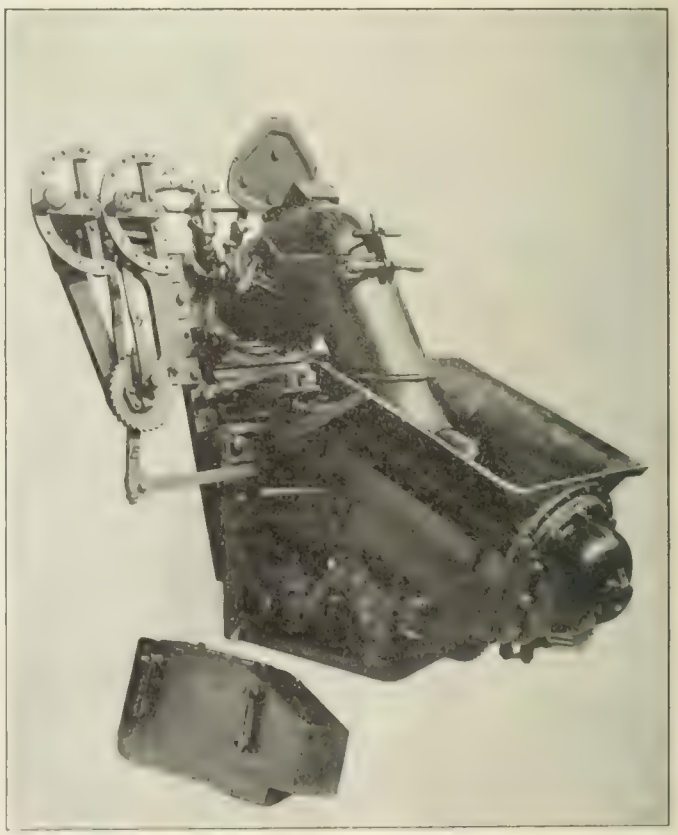
The stoker is located on the back boiler head, where it is [illegible] the [illegible] When stripped for hand firing it presents an inclined plane rising from [illegible] and out of the way at the [illegible] there is a hopper above this into which the coal is shoveled. With the ordinary locomotive the whole mechanism, inclusive of the casing, is [illegible]

SERVICE RESULTS.

A recent trip on a locomotive equipped with this stoker demonstrated its capability to maintain steam pressure over a long and hard division; a demonstration that is emphasized if we consider that the fireman who handled it had only made three previous trips with it, and that those three were the only ones he had ever made up a [illegible] He was an inexperienced man. The engine was a consolidation locomotive, weighing 199,875 lbs., of which 176,750 lbs. were upon the driving wheels. The cylinders were 22 in. in diameter, with a piston stroke of 30 in. The diameter of the [illegible] and the [illegible] The working steam pressure was 200 lbs. and [illegible] at any point on the trip, [illegible] the engine was working its hardest on the heaviest grades.

[illegible] from Oakdale [illegible] Ky., a distance of 93 miles, on the Cincinnati, New Orleans & Texas Pacific Railway. The train on leaving Oakdale consisted of 27 loaded cars, weighing 983 tons, including the caboose. The road rises on a gradient of 10.6 ft. per mile for about 5 miles. For the next 3 miles it is 26.4 ft. to the mile, and, for the next 5 miles it is 60.6 ft. to the mile. The 16 miles to the summit of the 60.6-ft. grade at Lancing was run in 45 minutes. Beyond Lancing there are three sags, each followed by rises of 60.6 ft. per mile and about 2, 4 and 1 mile long, respectively, ending at Rugby, 17 miles beyond Lancing. At Glenmary, located at the foot of the last-named grade, there was a meeting stop and a total delay of 26 minutes. This point, 15 miles from Lancing, was reached in 55 minutes, and the run up the 2 miles of 60.6-ft. grade to Rugby was made from a standing start in 11 minutes. From New River to the top of the grade, there is a continuous rise of 60.6 and 52.8 ft. to the mile for about 7 miles and this was covered in the same way.

During the whole of the climb up these hills the engineer paid no attention whatever to the steam as far as the application of the injector was concerned. One injector was started and was worked without shutting off until Glenmary was reached, a distance of 28 miles, and requiring 1 hour 40 minutes to cover. In the meantime, one injector was insufficient to hold up the water while the engine was working so heavily and the second injector was started and worked as occasion demanded. This was done seven times in that period, the time of operation ranging from one to four minutes each. In no case was there any diminution of steam pressure, and on several occasions the



Side View of Hanna Locomotive Stoker.

second injector was put on solely to prevent the safety valves from opening.

This is a fair example of the work done during the whole of the run. At Oneida, just beyond the summit, and 44 miles from Oakdale, the tonnage was increased to 1,138, and at Somerset, 93 miles from Oakdale, it was raised to 1,200 tons. On leaving Somerset there is a grade of 52.8 ft. to the mile for 6 miles; this was run with the maximum tonnage in 35 minutes.

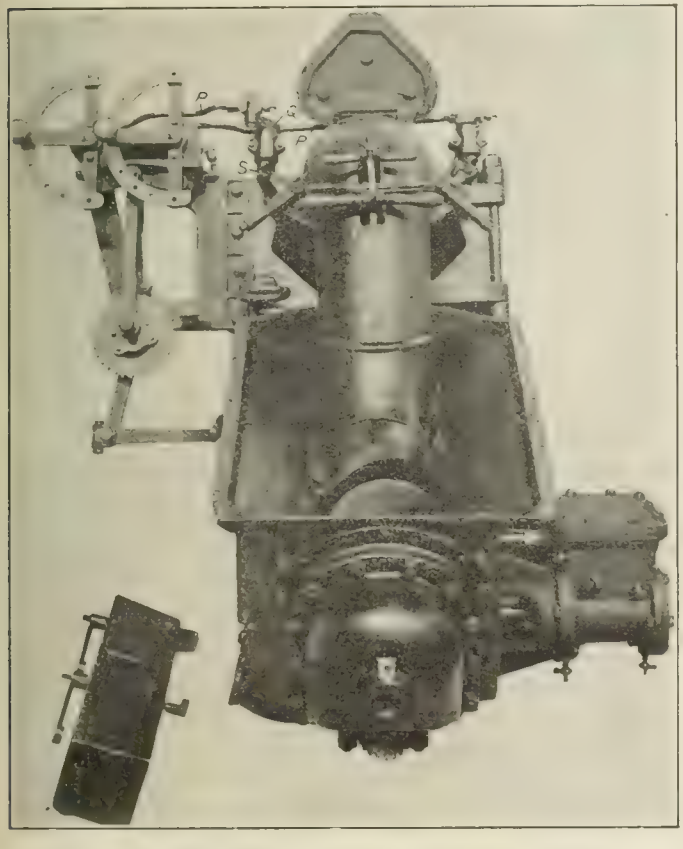
These may be taken as samples of the performance throughout the run and the statement made as to the use of the injector also holds [illegible] In no instance was there any pretense of swapping

steam for water, even when the engine was working its heaviest. One injector was kept on all of the time during which the engine was at work, and the second was started whenever it was required without the necessity of considering as to whether the steam pressure would permit it or not.

On leaving Oakdale, the tender was filled with a mixture of nut and slack coal, of which the following is an approximate analysis:

Fixed carbon	56.0 per cent.
Volatile matter	38.5 per cent.
Ash	5.5 per cent.
Total	100.0 per cent.
British thermal units per pound	13,320

This coal is especially suited for stoker work. It is fine, free from lumps and spreads smoothly over the entire grate. It was used until Somerset was reached, a distance of 93 miles. During that portion of the run, the grates were not touched or the hook used, and the bed was smooth and flat; the wing adjustment was not changed between Oakdale and Danville.

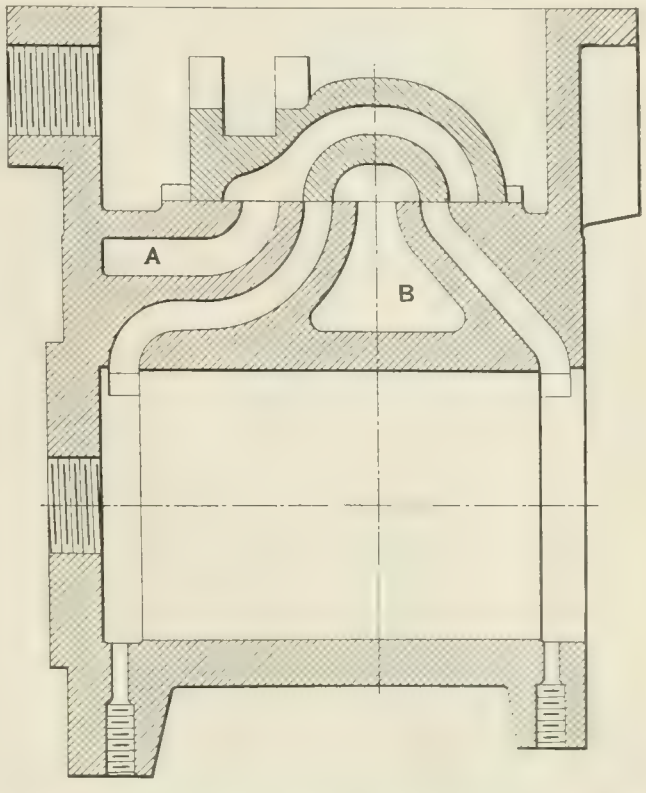


Top and Rear View of Hanna Locomotive Stoker.

At Somerset, three tons more of coal were taken on. The first two tons was of the same character as that taken on at Oakdale. The third and last ton contained a good deal of lump; and, as this was the last to be put on the tender, it was the first to go into the firebox. The effect was noticable immediately. The lumps dropped near the back sheet, and by the time Waynesburg, 19 miles from Somerset, was reached, the grates had been shaken three times and the fire hooked four times; after which, with the consumption of the lumps, the trouble disappeared and the fire was not touched again until Danville was reached. It is merely a practical demonstration of the desirability, if not of the necessity, of using a fine coal with a scatter type of stoker.

As to the smoke, it ranged between Nos. 2 and 3 of the Ringelmann charts, rarely going higher than 3, and frequently dropping well below 2. The firebox of the locomotive was a plain one without a brick arch and having only one opening for the admission of air above the fire, and this was kept closed.

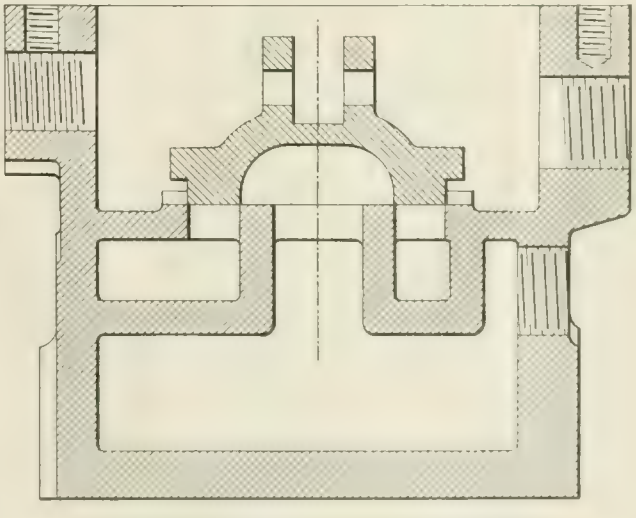
On the hills and where the engine was working the stoker was kept in action sending a constant stream of coal into the firebox at a speed varying with the demands for steam, but always in sufficient quantities to meet these demands and prevent



Section Through Engine Cylinder and Valve; Hanna Locomotive Stoker.

a fall in pressure. The stoker was started and stopped 31 times on the trip, its period of continuous action varying from 1 to 83 minutes. On the easy and undulating portions of the road the stoppages were quite frequent.

As for the work of the fireman, it was done, as has been stated, by an untrained man, and with apparent physical ease. He



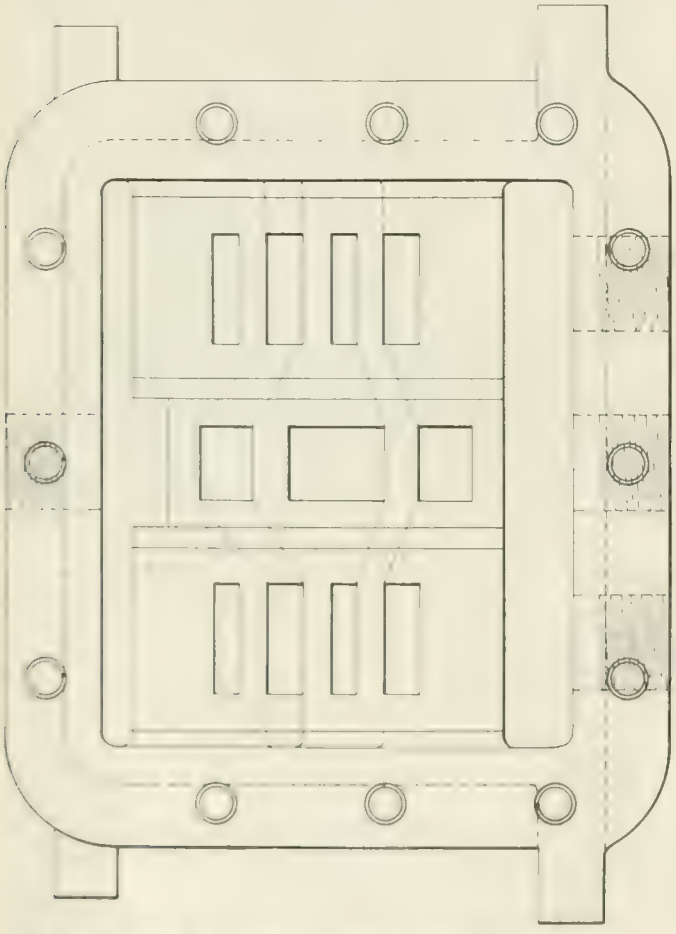
Reversing Valve; Hanna Locomotive Stoker.

was busy, but at no time was he driven in the slightest, nor did he have any difficulty in maintaining the steam pressure. The total elapsed time from Oakdale to Danville was 7 hours and 57 minutes, with an actual running time of 6 hours and 32 minutes for the 137 miles, or at a speed of almost 21 miles an

hour. Water was taken five times, and the total coal burned was between 14 and 15 tons.

CONSTRUCTION AND OPERATION.

Stoker Engine.—The motor for the moving parts is a small two-cylinder engine, having cylinders 4 in. in diameter with a piston stroke of 5 in. The engine is reversible and the cranks are set at right angles to each other. The main valves for the engine are made line and line, both inside and out; that is, they have no lap, and so take steam and exhaust it for the full length of the stroke. The reversing is accomplished by means of a reversing valve that changes the main valve from outside to inside admission. The main valve is of the double-ported type as shown in one of the engravings, and steam is admitted to it through the port *A* or through what is ordinarily the exhaust passage *B*, according to the position of the reverse valve. It is



Valve Seat of Engine on Hanna Locomotive Stoker.

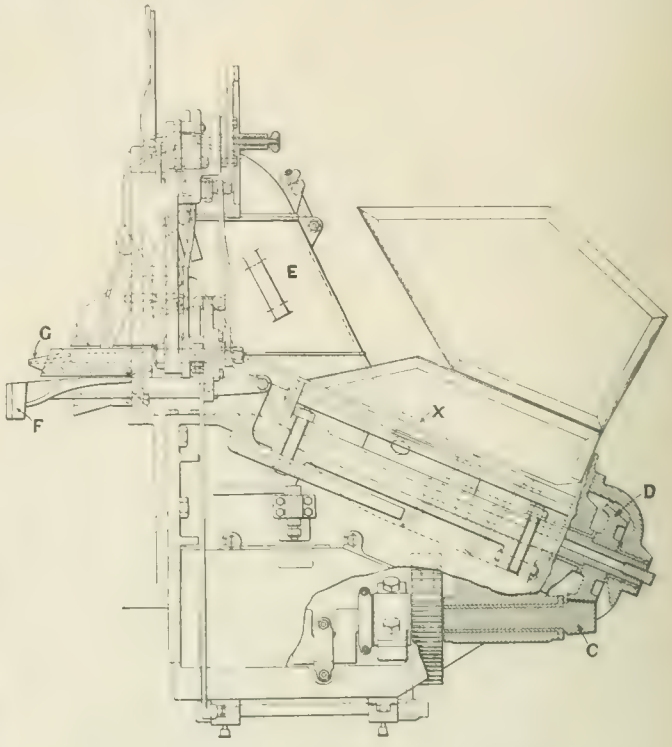
evident, therefore, that the main valve is made into an inside or outside admission valve and the engine is run in opposite direc-

Under ordinary conditions, with the steam reduced to 110 lbs. pressure, the engine runs at about 450 revolutions per minute. A pinion of 15 teeth on the engine shaft meshes with one of

operating at 450 revolutions per minute, and with gears of the

per minute. If the coal runs 44 cu. ft. to the ton this drive will deliver, allowing for slip of coal and the space occupied by the worm, about 8 tons of coal per hour, although by speeding the engine a delivery of 11 tons per hour has been effected on a test.

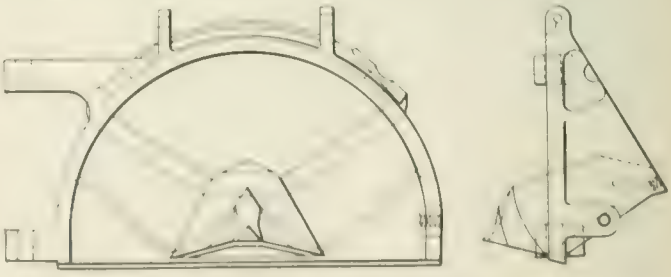
Operation of Stoker.—The coal is shoveled into the hopper, set above the worm, and so long as there is any coal there a con-



Hanna Locomotive Stoker; Side Elevation.

tinuous stream is being fed into the neck or pipe *E* that rises from the front end of the worm and extends into the firebox. The amount delivered per unit of time is, therefore, dependent upon the speed of the engine, regulated again by the fireman, who must use his judgment as to the amount of coal he puts in the hopper.

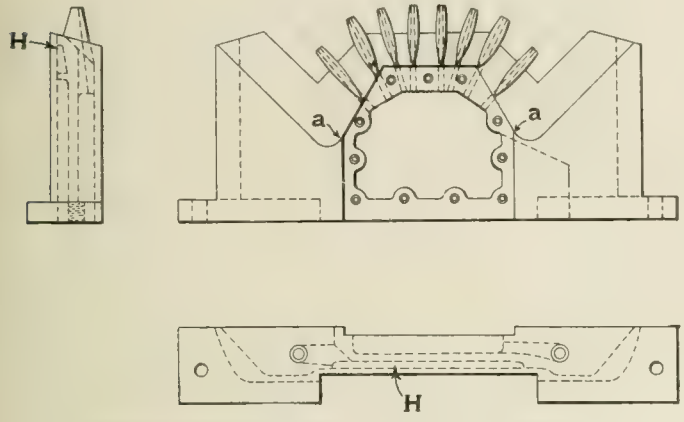
As the coal overflows into the firebox it drops down upon a distributing plate *F* that projects inwardly from the bottom of the door opening, and above which the steam nozzles *G* are placed. There are eight of these nozzles, arranged as shown in



Door of Hanna Locomotive Stoker.

the engraving, and covering a sweep of 90 degrees. The holes in the nozzles are ⅝ in. in diameter and they extend back to the upper chamber of the casting, of which they form a part. Immediately beneath these nozzles is a long slot *H*, extending along the face of the casting and down on the beveled edges to the points *aa*. This slot has a width of 1/16 in. on the issuing or outside and ⅛ in. where it opens into the bottom pocket in the casting. The steam admitted to these upper and lower pockets is wire-drawn, so that it has a pressure of 60 lbs. per sq. in. in the former and 40 lbs. in the latter, with the result that there is a corresponding variation in the velocity of the jets issuing from the nozzles and the slot.

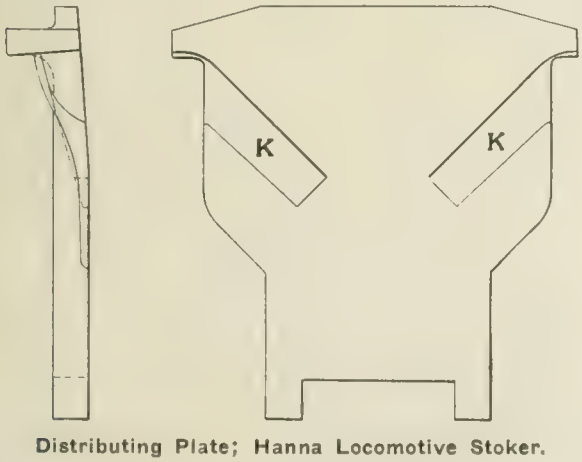
The coal as it drops to the distributing plate is of all grades of coarseness and fineness. The coarse pieces drop on the nozzles, slide along the latter and as they fall off in front, are caught by the issuing jet of high velocity and are thrown to the front of the firebox. At the same time the fine particles sift down between the nozzles and are caught by the steam issuing from the slot at a lower velocity and are not thrown so far out. There is a double advantage in this. The fine coal is not only kept to the back end of the firebox, but also away from the tubes.



Steam Nozzles; Hanna Locomotive Stoker.

A special arrangement is provided to take care of the back end, and especially of the back corners. As the coal drops down it strikes a ridge plate *H*, so-called from the ridge running up its center, and which is clearly shown in the view of the stoker from the front. The primary purpose of the ridge is to divide the stream into two parts, one to either side of the firebox. Moving up and down the sides of this ridge, one on each side, are wings that throw the coal up or down. Immediately in front of the wings the distributing plate has two grooves, *K-K*, cut in its upper surface. The coal as it is blown out by the low-pressure jet, issuing from the slotted nozzle, strikes the face of this groove and is deflected out to the sides and down to the back corners of the firebox.

It is, however, necessary that there should be a sweeping motion to the stream of coal, just as in sprinkling a lawn the



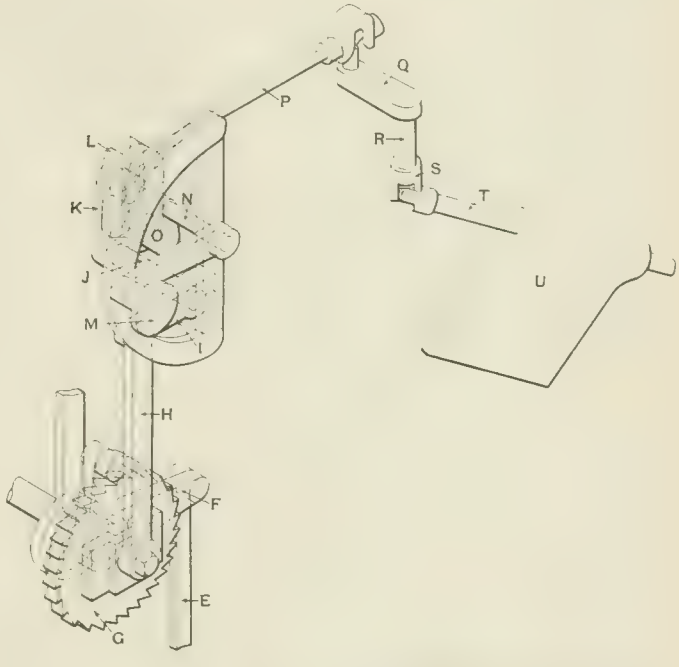
Distributing Plate; Hanna Locomotive Stoker.

nozzle is given a sweeping motion. Here the nozzles are stationary, and this sweeping action can only be obtained by varying the direction of motion of the approaching stream of coal. This is done by giving the wings an up and down motion along the sides of the ridge of the ridge plate.

In the isometric sketch of the distributing mechanism, the wings, *U*, are pivoted at the back near the top of the ridge, and at such an angle that their motion is parallel to its slope. Under ordinary working conditions these plates move continually up and down the sides of the ridge, but may be fixed at any point, if it is desired that a constant stream of coal shall be delivered into some one place. Or it is possible to so adjust their motion that they will make a partial movement down from the top and back, or up from the bottom and back.

The mechanism by which this is accomplished is shown in the isometric drawing. It shows the train of operation by which the motion of the wings is regulated and which constitutes the crux of the successful operation of the machine. The motion is as follows: An eccentric on the back gear shaft imparts a reciprocating motion to an eccentric rod, which is attached at its lower end to the end of an arm, which is keyed to a shaft beneath the engine. At the other end of the shaft is a second arm, from the end of which the connecting rod *E* conveys an oscillating motion to the bell-crank *F*, which carries a pawl upon the end of its vertical arm. This pawl, by its reciprocating motion, gives an intermittent rotation to the ratchet wheel *G*, which has 30 teeth. As the speed of the back gear is a little more than 127.3 revolutions per minute, that of the ratchet wheels becomes a little more than 4.2.

The connection *H* is given an adjustable reciprocating motion by being attached to a slot in the ratchet and so communicates



Isometric View of Distributing Mechanism; Hanna Locomotive Stoker.

an oscillating motion to the arm *I*, which through the shaft *J*, gives a corresponding horizontal motion to the upper arm *K*. This arm carries a pin fitting in a slot of a link, *L*. This link is pivoted on an arm, *O*, that is turned by the handle *M* and shaft *N*, so that the pivotal point of *O* may be carried through 180 degrees. It is evident that if the slotted link is held vertical it will be given the maximum horizontal motion by the movement of the arm *K*.

Attached to the outer end of the link is a connection, *P*, reaching to the end of the arm *Q* that is keyed to the vertical shaft *R*. At the lower end of this shaft is a universal coupling, *S*, between it and the shaft *T*, to which the wing *U* is keyed. Hence, when the link *L* is turned to its vertical position the maximum motion is given to the wing *U* and it travels up and down the full height of the side of the ridge. When the link is turned to its horizontal position the wing has no motion whatever, but stands either at the top or bottom of the ridges, according to the position of the link. To hold the plate at any other point along the face of the ridge, the pawl on the arm *F* is lifted out of contact with the teeth of the ratchet wheel, and the latter is turned by hand to bring the wings to the desired position. There are, of

course, two of these trains of mechanism, one for each wing.

If the stoker should be accidentally crippled in any way it can be readily disconnected and hand firing be used to complete the run. To do this the throat or delivery pipe is taken out and the shield above it is allowed to drop down to cover the hole through which the coal is delivered to the firebox. The hopper is lifted off and the four swing bolts that hold the upper part of the casing in place are turned back, and the case is taken away. This leaves the door free to swing back and the front clear for the motion of the fireman's scoop.

It will be seen from the drawings that the stoker is provided with a door against which it sets, and which is operable like any other door as soon as the upper parts of the stoker are removed to clear it.

From a constructional standpoint, then, the stoker provides for its own removal in case it fails and for the immediate use of the scoop for hand firing. While in service it provides for taking the coal from the hopper in which the fireman has placed it, and putting it in any one part of the firebox where it may be required, or scattering it evenly over the whole surface of the bed.

The steam required to do this work is that required to operate two 4-in. by 5-in. cylinders, running at a speed of 450 revolutions per minute, and that escaping from eight nozzles of ⅛-in. diameter each, and a 1/16-in. slot, the total discharge area of which is ½ sq. in., working under pressures of 60 lbs. and 40 lbs. per sq. in. for the nozzles and slot respectively.

To provide for the proper sizing of the coal a hood is set over the conveyor, which terminates in a knife edge, *X*. This shears off the lumps that may be carried against it and causes a smooth delivery to be made to the throat pipe.

The whole weight of the stoker and overhang is carried by the head of the boiler, to which a heavy boiler plate is bolted. The total weight of the stoker is about 1,600 lbs., to which 300 lbs. must be added for the coal that may be in the hopper.

DISASTROUS WRECK AT BRIDGEPORT, CONN.

In the derailment of the eastbound Federal Express on the New York, New Haven & Hartford, 1½ miles west of Bridgeport, on Tuesday, July 11, at 3:32 a. m., the engineman, the fireman and 11 passengers were killed and the conductor, one brakeman and 40 or more passengers were injured. The derailment was due to excessive speed through a No. 10 crossover; and of the train of one engine and nine cars, every vehicle was wrecked except the two or three rear cars, which were sleepers. About 100 ft. east of the facing point switch of the crossover was a bridge crossing a street, and the tender and first three or four cars were badly crushed, as they were forced against the farthest abutment of this bridge.

The train was 1 hour and 20 minutes late and was running at high speed, believed to have been 60 miles an hour, on track No. 2. It was to stop at Bridgeport, and therefore was to be turned to track No. 4 at this point. The engineman and fireman having been killed, it is impossible to say why the speed of the train had not been greatly reduced. The engineman was a freight runner of several years' experience, and had had experience at passenger from before. He had been on duty Monday till 3 p. m., then went home and was called at 10 p. m. to report at midnight for this run. He said that he slept but little, but how long does not appear.

An officer of the road gives the following particulars:

Both home and distant signals were disregarded. The train was prescribed a speed of fifteen miles an hour over this crossover. The distant signal is about 2,200 ft. in the rear of the home signal. The crossover, a No. 10, was recently renewed, with no change in location. The rails and frogs remained intact without serious damage, the engine jumping the rails at the second frog, or as it was entering track No. 4. The signals were [illegible] distant, and the crossovers are in the same location as they have been for not less than ten years. The four tracks are all on tangent at the point of the crossover, but the distant signal is on a slight curve. The engineer has been in the service of the company fourteen years, and for the last seven years an engineer running both passenger and freight trains on this section of this division, driving both steam and electric locomotives between New Haven and New York and Harlem River and New Haven. During the last three weeks he has pulled fourteen passenger trains in this same district, and on June 25 ran the Federal Express both east and westbound. He has been thoroughly familiar with this district for the past seven years. The movement of trains from an inner to an outer track or vice versa is a frequent occurrence with both passenger and freight. [All crossovers being suitably signaled.]

CONVENTION OF THE AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.

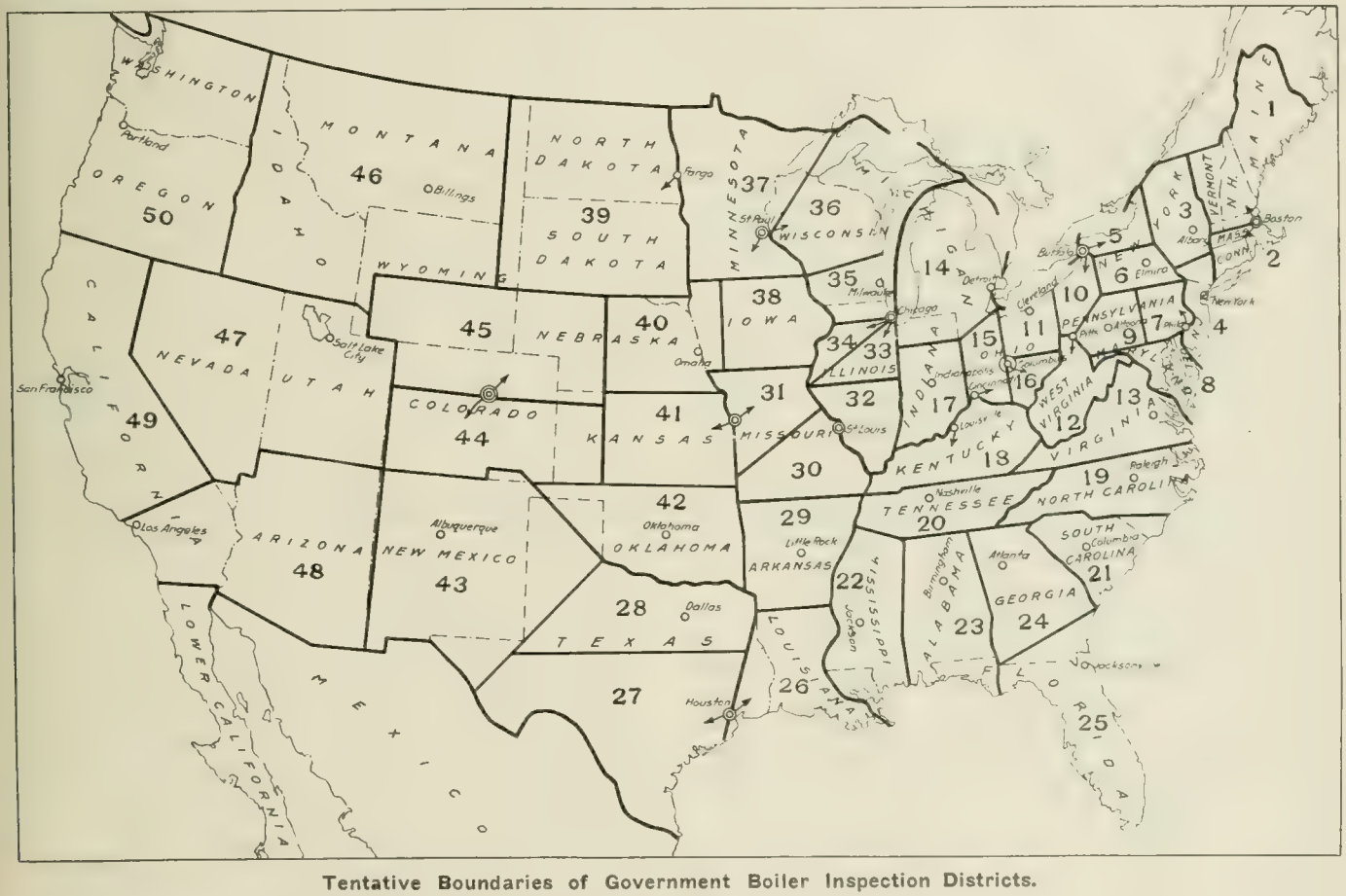
The third annual convention of the American Railway Tool Foremen's Association was opened at the Wellington hotel, Chicago, Tuesday, July 11, with a much larger attendance than last year, forty-six members being registered. M. H. Bray, N. Y., N. H. & H., presided. C. A. Seley, mechanical engineer Rock Island lines, made an address of welcome. He emphasized the importance of striving to improve the efficiency of the tool room in every detail. Tuesday morning two papers were presented, one on the Equipment of Railway Tool Rooms, by B. Hendrickson, Chicago & North Western, Chicago, and the other on the Economical Use and Care of Grinding Wheels, by H. E. Blackburn, Erie, Drunmore, Pa. On Wednesday morning there was a discussion on Standardization of Tool Steel, opened by Henry Otto, Atchison, Topeka & Santa Fe, Topeka, Kans. The following papers were also presented: Pneumatic Tools and Appliances, by A. M. Roberts, Bessemer & Lake Erie, Greenwood, Pa.; Pneumatic Flue Cutters, by J. T. Fuhrman, Great Northern, St. Paul, Minn.; Economical Manufacture of Tools for Boiler Shop Use, Gust Gstoettner, Chicago, Milwaukee & St. Paul, West Milwaukee.

James W. Kelly, first vice-president of the International Master Boilermakers' Association and boilermaker foreman of the Chicago & North Western, Chicago, made an address in which he told how the tool room foreman could co-operate with the boilermaker foreman in greatly improving the efficiency of that department. Wednesday afternoon session papers were presented on Making Dies for Forging Machines, by J. Martin, C. C. C. & St. L., and Making of Drills, by G. F. Linck, Houston & Texas Central, Houston, Tex. At the final session on Thursday morning a paper on Standardizing of Tools in Tool Rooms was presented by E. J. McKernan, supervisor of tools, A. & S. F., and also a paper on the Templet as an Aid to Facilitate Accuracy and Despatch in Locomotive Repairs, by F. E. Lugger, C. C. C. & St. L., Delaware, Ohio. At annual meeting of the Supply Association of the American Railway Tool Foremen's Association, held in the parlors of the Wellington hotel, Chicago, Wednesday, Secretary Mills reported large increase this year in the attendance of supply manufacturers and in the number of exhibitors. Affairs of association were reported in good shape and the following officers were re-elected for the coming year: President, W. H. Dangel; Vice President and Treasurer, E. C. Cook; Secretary, H. L. Mills. The exhibits were shown in a large room adjoining convention hall. Among the concerns making exhibits were the following: American Specialty Company, Chicago, "Use-Em-Up" drill sockets, automatic loose pulley oil cups, represented by H. L. Mills, Carborundum Company, Niagara Falls, N. Y.; samples of grinding wheels, literature and blue prints showing tool room grinding wheels and system of standardizing grinding throughout railway shops, represented by R. S. Marvin and C. C. Schumaker; Carpenter Steel Company, Reading, Pa., catalogues, represented by Russell Dale; Celfor Tool Company, Chicago, drills, chucks,

Celfor taper shank twist drills, concave section twist drills, flue cutters, flue sheet cutters, tool holders, lathe tool bits, boring bars and reamers, Celfor flat drills and chucks, represented by J. J. Dale and George S. Houck; Chicago Pneumatic Tool Company, Chicago, improved ball bearing drills, Boyer long stroke chipping hammers, new B K chipping hammers, Keller chipping hammers, Hayes chipping hammers, electric midget drills, improved corner drills, improved compound drills, catalogues, etc., represented by C. E. Walker, T. G. Smallwood, A. E. Conrow and J. O'Connor; Colonial Steel Company, Pittsburgh, Pa., cabinet showing steel in proper and overheated stages of heat treatment, high speed steel broken to show grain, samples of large cuts of steel, booklets, etc., represented by A. H. Ackerman and R. B. Burns; Corona Manufacturing & Supply Company, Boston, Mass., Corona sockets, represented by G. H. Bryant; Crucible Steel Company of America, Pittsburgh, Pa., catalogues and prints Rex A beading tool which has been in service six years, represented by William Stevenson; Diamond Saw & Stamping Works, Buffalo, N. Y., hack saw blades, frames and power hack saks, represented by Geo. L. Morgan; J. Faessler Manufacturing Company, Moberly, Mo., catalogues, represented by G. R. Maupin; Firth Sterling Steel Company, McKeesport, Pa., tool steels, catalogues and circulars, represented by Walter Brown, William Nelson, John J. Coleman and William R. King; Geometric Tool Company, New Haven, Conn., self opening die heads, taper cutting die head, collapsing taps, chaser or died grinders, catalogues, etc., represented by Geo. T. Case; Independent Pneumatic Tool Company, Chicago, latest improved Thor air tools, consisting of hammers, drills, reamers, etc., represented by John D. Hurley, R. T. Scott, G. C. Wilson, Van Robinson and J. J. Keefe; McCrosky Reamer Company, Incorporated, Meadville, Pa., adjustable reamers, quick change chucks and collets expanding mandrels, universal lamp brackets, drill sockets, represented by F. T. Miller; National Machinery Company, Tiffin, Ohio, die sharpener in operation, national open die head, general and special catalogues, represented by H. E. Lott and K. L. Ernst; Joseph T. Ryerson & Sons, Chicago, tool steel, drills, small tools, Gisholt and Prentice tool room equipment, literature, etc., represented by F. L. Carroll, H. B. Kennicott and Paul Harders, Scully Steel & Iron Company, Chicago, boilermakers' tools, consisting of Lucas pneumatic expanders, railway flue cutters, flue hole cutters, staybolt headers, staybolt chucks, flaring tools, wrenches, etc., represented by W. H. Dangel, H. T. Gielow and Geo. A. Cameron; Skinner Chuck Company, New Britain, Conn., independent combination and universal geared scroll lathe chucks, drill chucks, drill press vises, represented by B. F. Damon, Standard Tool Company, Cleveland, Ohio, drills, reamers, milling cutters, chucks, taps, represented by E. W. Thompson.

BOILER INSPECTION DISTRICTS.

J. F. Ensign, chief inspector of locomotive boilers for the United States government, has established his office at Washington, D. C. (1419 F street), and the two assistant chief inspectors are to have their headquarters in the West, one at Columbus, Ohio, and the other at Denver, Colo. The chief inspector has divided the country into fifty districts, and announces that on application he will furnish blanks to make the reports which are required under the rules adopted by the Interstate Commerce Commission for locomotive boiler inspection. The committee of the American Railway Association on relations of railway operation to legislation, has issued a map showing the tentative boundaries of the 50 inspection districts and the essential features of that map are reproduced herewith. It will be seen that three-fifths of the districts are east of the Mississippi river. More than three-fifths of the more than 60,000 engines of the country are east of the Mississippi river, no doubt; but in the western part of the country the size of a district is limited not only by the number of engines, but also by the distance which the inspector must travel from his headquarters to make inspections.



Tentative Boundaries of Government Boiler Inspection Districts.

General News Section.

The Post Office Department has established a new division of the railway mail service and its headquarters will be at Omaha, Neb.

The Central of New Jersey now sends its pay car over all of its lines, both in New Jersey and Pennsylvania, every two weeks.

The educational bureau, which has recently been established by the Illinois Central for the benefit of its employees, had received up to July 8, 394 applications for membership.

In a fire at Palestine, Tex., July 3, the woodwork mill and the upholstering department of the International & Great Northern car shops were completely destroyed; loss $50,000.

The Pennsylvania Company has begun proceedings in Chicago to secure considerable additional land on which to build its proposed new union station and new freight terminal.

The 800 workmen in the shops of the Atchison, Topeka & Santa Fe at San Bernardino, Cal., are now working 12 hours a day, extra work being necessary on account of the recent roundhouse fires at Seligman, Ariz., and Barstow, Cal.

T. H. Curtis, superintendent of machinery of the Louisville & Nashville, has been appointed mechanical engineer of the electrification commission of the Chicago Association of Commerce. He assumed his new duties on July 13, with office in Chicago.

The Intertsate Commerce Commission has issued revised regulations for making monthly reports to the commission of all instances where employees subject to the hours-of-service law have been on duty for a longer period than that named in the act.

Prosecutions for violation of the 16-hour law, regulating the hours of service of trainmen, have been begun by the government in the Federal court at Cincinnati, against the Cleveland, Cincinnati, Chicago & St. Louis and the Cincinnati, Hamilton & Dayton.

The Boston & Albany, the Boston & Maine and the New York, New Haven & Hartford have signified their intention of continuing the demurrage office at Boston which was established a few months ago at the suggestion of the Interstate Commerce Commission.

The Chicago & Northwestern has ordered from the Western Electric Company, telephone selectors to equip five new circuits for train despatching. This road has for several years used telephones for transmitting train orders. The new circuits will aggregate 600 miles in length

The [illegible] at Philadelphia has ordered that milk brought into the city at a temperature [illegible] at the receiving station of the Philadelphia & Reading one day last week 800 quarts were condemned and poured into the sewer.

The Governor of Connecticut has signed the law, recently passed by the legislature of that State, establishing a public utilities commission. The law provides for a "strong" commission, taking over the powers of the present railway commission and also new powers over other public service corporations.

[illegible]

[illegible] servation car, running each way daily between Chicago and Old Point Comfort, Va. The eastbound train leaves Chicago at 1 p. m., and reaches its destination the next afternoon. The Chesapeake & Ohio has made extensive improvements in the track of its line west of Cincinnati since its acquirement of that line from the old Chicago, Cincinnati & Louisville.

The Agricultural Department, co-operating with officers of the states of Maine, New Hampshire, Vermont, New Jersey and Wisconsin, is to employ patrolmen to watch forests, with a view to preventing fires. The department has for this purpose an appropriation of $200,000 and intends to make agreements with officers of other states, a condition being that the state shall expend an amount equal to that expended by the federal government.

John Kirby, a veteran train caller at the Union station in Springfield, Mass., died on July 3, being overcome by the heat. Mr. Kirby deserves special mention as a train caller who spoke with natural inflections, and who always enunciated clearly, so that the hearer never had occasion to doubt that it was the English language to which he was listening. Mr. Kirby was for many years a freight conductor on the Boston & Albany, but was retired from train service by reason of having lost a leg in an accident.

The passenger trains of the Sandusky division of the Cleveland, Cincinnati, Chicago & St. Louis now run to and from Toledo over the Toledo & Ohio Central from and to Berwick, 46 miles south of Toledo. Previous to July 1, these trains reached Toledo over the line of the Hocking Valley from Carey, which is seven miles further from Toledo than Berwick. The change follows the purchase of the Toledo & Ohio Central by the Lake Shore & Michigan Southern, thus bringing it into the New York Central system.

The Baltimore & Ohio has made an adjustment, taking effect July 1, of rates of pay of enginemen who run the heavier engines put in service on the road during the past year. These rates vary with the class of engine and in some instances the pay is increased 4 and in a few instances 6 per cent., the average increase approximating 2 per cent. The average increase granted the enginemen a year ago was 4.4 per cent., so that with the present increase the average approximates the increase in rates of pay given to other branches of the service.

The Illinois Central is electrifying the second track of the Kensington & Eastern from Kensington, Ill., to State Line. When this road was built the contract with the Chicago, Lake Shore & South Bend, leasing one electrified track to that road, provided for the adding by the Illinois Central of a second electrified track on demand of the C. L. S. & S. B. The line was built with double track, the second track being intended for steam operation. It has not been operated, however, and to meet the present demand for a second electrified track, it is being electrified.

In a letter to the state labor commissioner, Assistant Attorney-General Robertson, of Texas, has given his opinion as to the application of the state law requiring railways to maintain safety appliance inspectors at certain points and under certain conditions. According to his construction, if the total length of a road and branches equals or exceeds 40 miles, such road is subject to the provisions of the act. He is also of the opinion that the law requires an inspector to be stationed at the connection of a branch with a main line as well as at the terminus of the branch line if such places are terminal points of independent trains.

The Chicago & Eastern Illinois has changed its organization from departmental to divisional. The office of general superintendent was created and the office of engineer of maintenance of way was changed to chief engineer. The organization in its new form will be almost purely divisional, master mechanics reporting to the superintendent on mechanical matters affecting transportation, and to superintendent of motive power on all other matters and division engineers reporting to the superintendent on maintenance matters and to the chief engineer on construction and standards. The accounting department was not affected by the change.

The "Elks" of Washington and Oregon, attending their national convention at Atlantic City, N. J., came across the continent in a train of nine steel cars, said to be the first train of that character to make the complete trans-continental journey. The train left the Pacific Coast, July 4, and was run over the Chicago, Milwaukee & St. Paul and the Pennsylvania. There were two steel baggage cars; one steel sleeping car with 14 sections; four steel sleeping cars with 12 sections and a drawing room each; one 9-compartment steel sleeping car and one steel dining car. There was also a tenth car—an observation car, not steel.

Acting under the increased power recently conferred on it by the legislature, the railway commission of Illinois has ordered reductions averaging between 20 and 25 per cent. in express rates to go into effect throughout the state on August 1. The greatest reductions will be in the charges for small packages and for short hauls. The express companies have asked to be heard in regard to the new tariffs and July 19 is the date set for the hearing. Speaking of the express companies' method of making rates and that proposed by the commission, Chairman Berry said: "The companies' rate scale begins with the big packages and is graduated downward. Our scale begins with the small packages and is graduated upward, with a view of equalizing the charges as much as possible." A former attempt on the part of the Illinois commission to make similar reductions was prevented by the federal court, on the ground that the commission did not have jurisdiction, but Chairman Berry believes that with its present powers its orders will be upheld by the courts.

A meeting of interested commercial organizations and trunk manufacturers from various parts of the country was held at the La Salle hotel, Chicago, on July 10, to make formal organized protest against the plan of the railways, beginning January 1, 1912, to refuse to accept as baggage without extra charge trunks any dimension of which exceeds 40 in., to make the extra charge equal to the excess baggage rate for 10 lbs. for each inch in length over 40 in., and to refuse to accept as baggage at all trunks any dimension of which exceeds 70 in. Commercial organizations that use the large size trunks for the samples of their traveling salesmen say that the new rules will impose an undue burden on them and render many of their trunks worthless. Trunk manufacturers make the same complaint about the trunks they would have on their hands, and also say that much of the machinery employed in the manufacture of trunks would be rendered useless. Resolutions declaring the new rule of the carriers unjust and unreasonable were passed at the meeting, and a committee of nine members was appointed to confer with them and seek a compromise. An attempt will be made to have the roads accept 50-in. trunks without extra charge, reduce the excess baggage rates for larger than 50-in. trunks, and postpone any such rule until January 1, 1913. The committee is authorized to file complaint with the Interstate Commerce Commission in case a satisfactory settlement with the roads is not reached. A number of the speakers admitted that the roads were right in seeking to regulate the size of trunks, but said that any rule made by them should be reasonable.

Divisional Accounting on the Rock Island Lines.

The committee on office organization and methods of the Rock Island Lines has presented a report, advising the reinstatement of the divisional accounting system with the addition of district accountants who are to act in a supervisory capacity. The report has been approved and the new organization is to become effective August 1. The organization which has been in force in this department consisted of four district accountants, each of whom had a sufficient force in his office to handle all the accounts on that part of the system assigned to him. The disadvantage of this arrangement was that these district accountants were too far removed from the division organizations, and it was too difficult for them to keep in close touch with work being carried on at remote points. Under the new organization the accountant in the division superintendent's office will have charge of all accounts on that division and will report direct to the comptroller. In issuing instructions, however, the comptroller will deal with district accountants, of which there will be three, one in each general superintendent's office. These men will handle no details, their sole duty being to supervise the work of the division accountants.

Increases in Pay.

Shopmen of the Norfolk & Western announce that the company has increased their pay, to take effect at once, as follows: Machinists advanced 3½ cents an hour; boilermakers 2½ cents an hour; and sheet iron workers 1½ cents an hour.

The Louisville & Nashville has made a general advance of 5 per cent. in the pay of employees in the mechanical department, to take effect August 15.

Officers of the Firemen's Brotherhood announce that the Southern Railway has granted an increase of 10 per cent. in the pay of firemen and hostlers; and also has agreed to limit the number of negro firemen to a certain percentage of the white firemen. It is claimed that this will reduce the number of negroes employed.

Safety on the North Western.

R. C. Richards, chairman of the Central Safety Committee of the Chicago & North Western, reports that in the year ending June 30, 1911, the number of employees killed and injured on that road fell off 17 per cent. as compared with the preceding year, and of passengers killed and injured 28 per cent. The detail figures are:

	July 1, 1910, to June 30, 1911.		July 1, 1909, to June 30, 1910.		Decrease.		Per cent. Decrease.
	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	K. & I.
Trainmen	25	2,486	38	3,313	13	827	25.0
Switchmen	13	548	18	652	5	104	16.2
Stationmen	—	587	6	731	6	144	20.3
Trackmen	25	1,517	28	1,744	3	227	12.9
Bridgemen	3	260	3	314	-	54	17.0
Car Repairers and Inspectors	5	274	3	281	*2	7	.02
Shop and R. H. men.	7	1,213	4	1,286	*3	73	.05
Other employees	12	250	7	308	*5	58	16.8
Total employees..	90	7,135	107	8,629	17	1,494	17.2
Passengers	14	663	11	928	*3	265	27.9
Other persons	198	587	235	606	37	19	6.6
Total	302	8,385	353	10,163	51	1,778	17.3

* Increase.

The International Steel Association.

At the session in Brussels, Belgium, held last week, 160 delegates, representing the steel interests of all the steel-producing countries in Europe and America, voted to form an international association. Judge E. H. Gary, chairman of the executive committee of the United States Steel Corporation, was chairman of the congress. It was his plan that the delegates adopted. In his address to the delegates, Judge Gary said: "There should be established and continuously maintained a business friendship, which compels one to feel the same concern for his neighbor that he has for himself, which is no less a principle than the golden rule applied to business. Is it possible? If it is, it will be certain to pay." Later, Judge Gary said, in part: "The questions of regulation of prices, distribution of territory or attempting the circumvention of the tariff laws, have no more part in the congress than a bar association formed by attorneys controls the individual actions of its members or regulates the fees they may charge. I can use no better comparison than to liken the functions of the International Association of Steel Men to a bar association. Its purposes are of the same order and its powers are not greater. The association will do great good for the labor world and especially for employers and employees relations. A standard will be set for dealing with workmen and determining how they shall best be housed and control the sanitary conditions under which they will work. Again, this congress has accomplished a wonderful thing in effecting an arrangement to standardize steel products of the world. World standard sizes and specifications will do away with the thousand and one petty annoyances and expenses in the steel business."

International Mercantile Marine.

The gross earnings of this company for the fiscal year ended December 31, 1910, amounted to $38,073,596, as compared with $33,953,208 in 1909. Operating and general expenses were slightly more in 1910 than in 1909, as were also fixed charges. After the payment of these accounts, there was a surplus last year of $4,849,581 as against $1,182,335. The balance sheet

shows cash on hand of $1,575,203 and total current assets of $5,362,000. The company has current liabilities amounting to $5,329,733, of which $3,604,460 are accounts payable. In addition, there are loans, bills payable and foreign bankers' overdrafts of $3,976,467.

The number of passenger vessels now in the various services of the International Mercantile Marine is 124, to which will be added six steamers now building. Of these vessels, including those under construction, one is a training ship, 24 steamers are under 5,000 tons gross, 64 steamers between 5,000 and 10,000 tons gross, 32 steamers between 10,000 and 15,000 tons gross, three steamers between 15,000 and 20,000 tons gross, four steamers between 20,000 and 30,000 tons gross, and two steamers about 45,000 tons gross. The two largest steamers in the world are owned by this company, the Olympic, which was launched in October, 1910, and made her first voyage from Southampton, June 14, 1911, and the Titanic, her sister ship, which was launched May 31, 1911, and will be placed in the New York-Southampton service early in 1912.

President Ismay, in his comments on the annual report of the company, says that the transatlantic passenger service showed a material increase in the first and second-class movement in 1910, both east and westbound. The outlook for the present year is not quite so satisfactory, and on account of the curtailment in large development and construction work in the United States, immigration is not as large now as last year. During the first half of 1910 the freight situation was anything but satisfactory; during the latter part of the year freight conditions improved, and as this condition still obtains, the prospects are more encouraging.

Metallic Tail End Markers.

The New York Central & Hudson River, as well as the Pennsylvania, now runs trains without the familiar green flags at the tail end. The rule substituting the tail lamp for the flag as a daylight marker is now in force throughout the company's lines, for both passenger and freight trains, suggesting possibly a glut in the green bunting market. The lamp serves as a marker simply by its shape, the color being the same as before and having in the day time no significance. The Central has also made a change in the night indications of the markers, substituting yellow lights for green. So far as tail lights are concerned, the train signals will thus be no longer inconsistent with fixed signals. The signals, both daylight and night, on the front ends of engines to indicate that another section of the train is to follow, will continue to be green.

American Society of Engineer Draftsmen.

The regular monthly meeting of the American Society of Engineer Draftsmen will be held in the Engineering Societies' [illegible] July 30. A paper on The Development of [illegible] will be read by C. A. Clark, M. E., Toledo, Ohio. Walter M. Smyth, 116 Nassau street, New York, [illegible]

MEETINGS AND CONVENTIONS.

[illegible]

[illegible]

[illegible]

Traffic News.

The Chesapeake & Ohio will operate a solid through train to Richmond and Old Point Comfort over the newly acquired Chicago-Cincinnati line, beginning Monday.

Up to the 4th of July the farmers of the Imperial Valley in southern California had shipped by the Southern Pacific, twelve hundred and fifty carloads of cantaloupes.

In the four months ending June 30, the Canadian Pacific carried westward from the Atlantic Seaboard 110,000 immigrants, of whom 85 per cent. were natives of the British Isles. In 1909 the total carried was 46,000 and in 1910 about 95,000.

The Judson Freight Forwarding Company, 342 Whitehall building, New York City, has been appointed contracting and forwarding freight agent of the Pacific Mail Steamship Company on freight traffic between the Atlantic seaboard and the Pacific coast via Panama.

The Pennsylvania Railroad announces that its St. Louis line, the Vandalia, has opened a new freight station at Main street, Second street and Cass avenue, St. Louis, with a capacity of 60 cars. Hitherto the company's principal freight station for St. Louis has been in East St. Louis, Ill., across the river.

The Agricultural Department at Washington reports that in the year ending June 30, 1910, 379,290 persons attended the lectures and exhibitions given in farmers' instruction trains, run by the railways, 52 leading railways taking part in these enterprises. They used 239 cars and spent more than $90,000 in the service.

The Southern Pacific's agricultural demonstration train, which has been run in connection with professors from the University of California, giving lectures, has completed its third annual tour of the state and reports an attendance of visitors aggregating 76,236, which is considerably larger than the number reported last year.

California, as well as Louisiana, has a health promotion car. This car, in charge of the State Board of Health, was at Los Angeles during the recent convention of the American Medical Association, and since then has been making a tour of the state. It was shown also to the teachers attending the convention of the National Education Association at San Francisco.

The Pennsylvania and the Philadelphia & Reading have issued new passenger tariffs for the suburban district around Philadelphia, making slight advances in certain single fare and round trip tickets, bringing all these up to the basis of 2½ cents a mile for one way tickets and 2 cents a mile for round trip. On the Chestnut Hill branch of the Pennsylvania some of the rates have been abnormally low. Season ticket-rates are not changed.

A committee of the Transcontinental Passenger Association has announced that the fall colonist rates, to be in effect from September 15 to October 15, will be the same as those of the last spring, when the one-way fare to the Pacific coast from Chicago was $33, from St. Louis $32, and from St. Paul and Missouri river points $25. It is expected that the travel under these rates will be even heavier than during the spring colonist period when it was very large. Some of the carriers felt that the service rendered warranted an increase in the rates, and the question was taken up at the recent meeting of the Transcontinental Passenger Association in Salt Lake City.

The Indiana railway commission has set August 3 as the date for a general hearing on express rates in that state. This action is being taken under authority recently conferred on the commission by the general assembly, whereby it has power to make an inquiry into rates on its own initiative instead of waiting for complaint to be made by an interested shipper against some specific rate. An investigation of the express rate question was made by the Indiana commission in 1907, which resulted in an order making reductions of 15 to 20 per cent. in the rates, but the United States district court held that the commission had no jurisdiction and enjoined the order. Now that its powers have been increased, the data gathered at the former inquiry will be used.

General Review of Crop Conditions.

The United States Department of Agriculture gives the following general review of crop conditions:

The month of June was decidedly unfavorable for growing crops in most parts of the United States. The aggregate condition of all crops on July 1 was 10.7 per cent. below the average condition, whereas on June 1 conditions were only 2.8 per cent. under average. A comparison of the condition of various crops on July 1, with their average growing condition on July of recent years (past ten years for most crops) is shown as follows (100 representing average conditions and not normal):

Cotton 110.2, lemons 102.2, oranges 100.5.

Rice 99.0, beans (dry) 98.1, apples 97.6, pears 96.3, grapes 96.1, peanuts 96.0, raspberries 94.9, corn 94.6, cantaloupes 94.4, winter wheat 94.3, sugar cane 94.1, rye 93.6, lima beans 92.3, flax 92.1, watermelons 91.6, tomatoes 90.9, alfalfa 90.8, all wheat 89.6.

Onions 88.9, sweet potatoes 88.3, sorghum 88.0, blackberries 87.9, hemp 86.2, cabbage 85.0, tobacco 84.4, potatoes 84.1, spring wheat 84.1, broom corn 82.2, barley 82.0.

Oats 79.7, timothy 76.1, pasture 75.9, peaches 75.6, hay (all kinds) 74.7, kafir corn 74.6, clover hay 72.2, millet 69.1.

The above figures relate only to relative growing conditions, not taking into account changes in acreage. Taking into account both acreage and condition, indications are that the wheat crop will be 1.4 per cent. larger than the average production of the past five years, corn 4.9 per cent. larger, oats 12.3 per cent less, barley 11.6 per cent. less, potatoes 10.8 per cent. less, tobacco 22.7 per cent. less, flax 10.5 per cent. more, rice 5.8 per cent. more than the average production of the past five years.

The average condition of all crops in the aggregate, by states, on June 1, was approximately as follows, 100 indicating the average (not normal) for recent years on June 1:

Maine 95.8, New Hampshire 94.8, Vermont 93.2, Massachusetts 87.8, Rhode Island 88.2, Connecticut 84.0, New York 91.4, New Jersey 88.9, Pennsylvania 90.7. Average for above divisions 91.0.

Delaware 89.7, Maryland 88.9, Virginia 91.3, West Virginia 85.0, North Carolina 100.3, South Carolina 100.0, Georgia 105.2, Florida 94.3. Average for above division 99.1.

Ohio 94.3, Indiana 81.8, Illinois 92.8, Michigan 100.9, Wisconsin 100.9. Average for above division 92.6.

Minnesota 88.5, Iowa 94.9, Missouri 88.5, North Dakota 100.5, South Dakota 56.3, Nebraska 77.4, Kansas 71.3. Average for above division 82.3.

Kentucky 94.7, Tennessee 97.5, Alabama 107.5, Mississippi 104.7, Louisiana 98.6, Texas 86.0, Oklahoma 61.4, Arkansas 99.5. Average for above division 90.1.

Montana 103.6, Wyoming 97.9, Colorado 85.6, New Mexico 106.1, Arizona 103.7, Utah 97.2, Nevada 102.7, Idaho 106.6, Washington 102.5, Oregon 105.1, California 101.7. Average for above division 101.3 per cent.

Traffic Club of New York.

The Traffic Club of New York will have its annual clam-bake at Witzel's Grove, College Point, L. I., on Saturday, July 22. The steamer to carry the members to College Point will leave Pier No. 10 N. R. at 10 a. m. There will be a baseball game and races. At 2:30 p. m. there will be a clam-bake, after which the members and their guests will sail up the Sound.

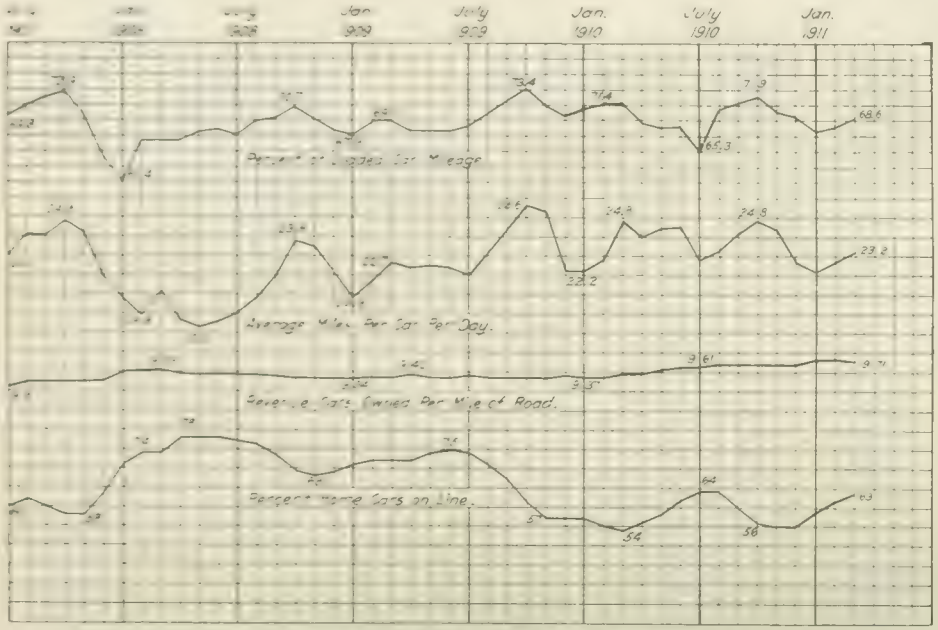
Freight Car Balance and Performance.

Arthur Hale, chairman of the committee on relations between railways of the American Railway Association, in presenting statistical bulletin No. 100, covering car balance and performance for March, 1911, says:

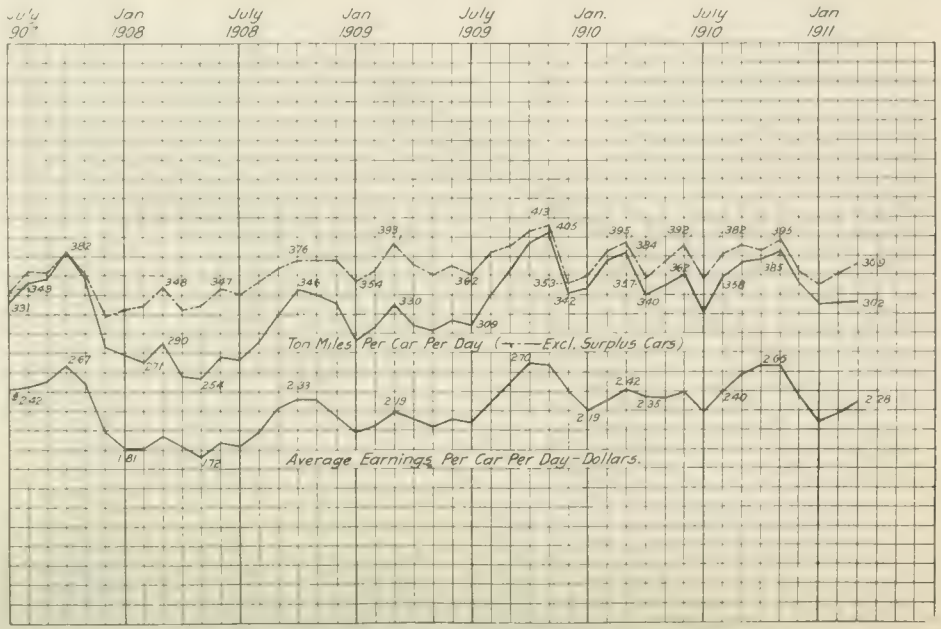
"The averages denote an improvement over February in all the items of performance, excepting the average tons per car and per loaded car, both of which decreased slightly, due probably to a difference in the class of traffic handled in the two months. Miles per car per day increased from 22.6 to 23.2 for all cars. The March average excluding surplus is 25.8. The loaded mileage shows an increase from 67.8 in February to 68.6 in March. This increase, combined with an increase in cars on home lines from 61 per cent. to 63 per cent., indicates that home cars were being utilized for loading to a greater extent than

CAR BALANCE AND PERFORMANCE IN MARCH, 1911.

	New England	N. Y., N. J., Del., Md., Eastern Pa.	Ohio, Ind., Mich., Western Pa.	Va., W. Va., No. and So. Carolina	Ky., Tenn., Miss., Ala., Ga., Fla.	Iowa, Ill., Wis., Minn.	Mont., Wyo., Neb., Dakotas.	Kan., Colo., Okla., Mo., Ark.	Texas, La., New Mex.	Ore., Idaho, Nev., Cal., Ariz.	Canadian Lines	Grand Total
	70,857	734,430	221,413	183,352	173,285	377,966	18,533	136,010	30,698	143,375	106,341	2,187,440
	61,008	148,318	340,014	114,468	130,999	265,404	7,617	91,116	33,279	65,888	71,988	1,377,893
	55,853	135,430	88,563	74,508	61,989	104,902	11,943	48,682	18,561	51,738	35,475	771,631
	70,008	108,661	141,854	190,033	162,988	370,306	19,551	139,798	41,840	117,326	107,463	2,151,514
	2,248		20,891	6,781	.....	.....	1,018	3,788	11,212	.....	1,122	.....
	59	63	66	63	58	70	41	67	76	56	68	63
	47	34	39	41	36	28	64	36	61	36	33	35
	103	97	105	104	94	98	105	103	137	82	102	98
	2,875	43,439	11,498	4,536	6,327	13,626	1,320	6,268	3,307	12,085	2,769	107,357
	84,567	733,430	44,015	194,569	169,315	383,932	20,871	146,066	45,147	129,411	110,337	2,258,871
	4.92	5.52	6.29	5.93	7.28	7.06	5.16	7.50	5.59	5.03	6.66	6.11
	1,227	30,870	1,981	3,133	2,624	6,138	495	2,719	801	2,589	2,104	35,096
	74	69	83	62	65	63	42	54	56	50	51	64
	44,521,333	5,623,376	150,929,944	132,520,754	126,993,023	272,381,734	22,105,657	89,071,100	34,877,093	133,636,882	99,553,774	1,622,793,490
	17.8	18.1	20.8	22.0	24.2	22.9	34.2	20.7	24.9	30.8	24.1	23.2
	78	65.8	66.6	66.6	71.3	70.9	74.6	68.9	62.7	70.0	75.6	68.6
	1,089,000,000	1,138,000,000	1,089,534,507	1,984,966,768	1,761,822,811	2,700,717,905	132,179,104	1,437,398,706	392,067,163	1,697,466,093	1,375,578,773	22,065,545,742
	13.9	14.4	14.3	14.6	14.0	12.5	15.8	13.9	11.2	13.9	13.8	14.2
	18.1	19.3	21.5	21.9	19.6	18.0	20.8	20.3	17.8	19.9	18.3	20.8
	326	326	354	341	339	292	560	287	280	428	401	332
	$11,000,000	$18,750,000	$12,748,487	$12,666,004	$12,340,176	$26,811,977	$2,638,362	$10,416,830	$3,295,452	$15,512,759	$9,309,911	$159,634,447
	$2.28	$2.38	$1.88	$2.38	$2.30	$2.28	$4.59	$2.47	$3.47	$3.49	$2.82	$2.36
	2.52	2.52	1.70	2.18	2.44	2.33	4.47	2.40	2.54	4.27	2.79	2.39
	2.21	2.12	1.69	2.10	2.35	2.25	4.08	2.30	2.35	3.87	2.72	2.28



Car Performance in 1907 to 1911 Inclusive.



Car Loading and Earnings in 1907 to 1911 Inclusive.

during the preceding months. The ton miles per car per day, while showing but a slight improvement (330 to 332), for all cars, increased from 359 for active cars in February to 369 in March. Earnings per car per day averaged $2.28, as compared with $2.17 the previous month. The average excluding surplus cars was $2.58."

INTERSTATE COMMERCE COMMISSION.

Reparation Awarded.

Beekman Lumber Co. v. Louisiana Railway & Navigation Co. et al. Opinion by Chairman Clements:

Damages resulting from misrouting shipments of lumber consigned to consignee, railway. (21 I. C. C., 280.)

Bon Marche v. Central of New Jersey et al. Opinion by the commission.

The charges on a carload of enamel ware from Newark, N. J., to Seattle, Wash., were found to be in excess of what the tariff called for. (21 I. C. C., 195.)

St. Louis Blast Furnace v. Virginian Railway et al. Opinion by Commissioner Meyer:

The sum of the intermediate rates for the transportation of coke in carloads from Deepwater, W. Va., to Carondelet, Mo., was less than the joint rate applied to the traffic. (21 I. C. C., 215.)

Auto Vehicle Co. v. Chicago, Milwaukee & St. Paul et al. Opinion by the commission:

First-class rate for transportation of metal automobile parts in carloads from Milwaukee, Wis., to Los Angeles, Cal., found unreasonable to the extent that it exceeds the fourth-class rate, which is prescribed for the future. (21 I. C. C. 286.)

Robertson Paper Co. v. Boston & Maine et al. Opinion by Commissioner Prouty:

Complaint seeks recovery of damages arising out of a shipment of paper from Bellows Falls, Vt., to Chattanooga, Tenn. The rate applicable to manila wrapping paper in the form in which this paper was shipped should have been applied to this shipment. (21 I. C. C., 254.)

W. O. Kay Co. v. Denver & Rio Grande. Opinion by the commission:

Demurrage and switching charges were assessed on each of two cars in which a single carload shipment had been transferred en route, because point of destination was located on a narrow-gage track. The shipment should be regarded as a one-car shipment for the purpose of assessing demurrage and switching charges. (21 I. C. C., 239.)

Clearfield Lumber Co. et al. v. Chesapeake & Ohio et al. Opinion by Commissioner Prouty:

It appears that in the past the rates on lumber on both the Lexington and Big Sandy divisions of the Chesapeake & Ohio were based on Ashland; but in October, 1909, the lumber rate from Meek, Ky., on the Big Sandy division was reduced 3 cents per 100 lbs., whereas the rates on the Lexington division were unchanged. Subsequently the Chesapeake & Ohio readjusted the rates so as to make the arbitraries the same on both divisions. Such action of that defendant is a practical admission on its part that the present relation of rates is a fair one, and reparation must be allowed on shipments made during the time there was a difference in rates. (21 I. C. C., 211.)

Complaint Dismissed.

J. H. Winterbotham & Sons v. Missouri Pacific et al. Opinion by the commission

Carload rate of 16 cents per 100 lbs. on staves from McNab, Ark., to Cairo, Ill., is not unreasonable. (21 I. C. C., 266.)

Emigrants' Movables.

A. B. Hood v. Great Northern et al. Opinion by the commission:

A mixed carload shipment by a ranchman from Portland, Ore., to Chester, Mont., consisted in part of 36 spools of barbed wire. The wire was entitled to the rate prescribed for emigrants' movables. (21 I. C. C., 246.)

Advanced Rates Reduced.

United States Leather Co. et al v. Southern Railway et al. Opinion by Commissioner Prouty:

Advanced freight rates on products of southern tanneries to northern mines is found unreasonable, and the rate formerly in force is prescribed for two years. (21 I. C. C., 323.)

Allowance in Weight for Melting Ice.

Board of Railroad Commissioners of the State of Kansas v. Adams Express Co. et al. Opinion by Commissioner Harlan:

Present rule of defendants respecting the weights at which shipments of dressed poultry are billed when packed in ice found unreasonable, and defendants ordered to establish a rule providing that shipments of dressed poultry, when packed in ice, shall be billed at 25 per cent. less than their gross weight, but in no case at less than the net weight of the poultry, as invoiced by the shipper, plus the weight of the container. (21 I. C. C. 283.)

Rate Adjustment at Portland, Ore.

Portland Lumber Co. et al v. Oregon-Washington Railroad & Navigation Co. et al. Opinion by Commissioner Prouty:

It appears that lumber from complainants' mills on the Yamhill division of the Southern Pacific Company, at Jefferson street, Portland, Oregon, is not within the switching limits, but pays higher rates than lumber from other Portland mills. Defendants should not be required to embrace complainants' mills within the switching limits of Portland, but that reduced rates should be established from such mills to certain named territories. (21 I. C. C. 292.)

Unlawful Division of Through Rate.

Beekman Lumber Co. v. St. Louis & San Francisco et al. Opinion by Commissioner Meyer:

Carriers, buying what will ultimately become company material, contract with shippers located off their lines and agree that if the vendor will bill the shipment beyond a designated junction point, where their own lines and the lines of the initial carriers meet, that, of the joint through rate, the purchasing carrier will absorb its own division, the shipper assuming only that portion of the joint through rate which accrues to the initial carriers as their division of the rate up to the junction point. This practice results in the application of a portion of a joint rate from the point of origin to point of destination, for the use of a particular shipper which is not published for the benefit of the public at large nor filed with the Interstate Commerce Commission. Contracts providing for such rates held to be in violation of law.

Nothing herein is to be construed as denying to carriers themselves the benefit of divisions of through rates on company material according to lawfully published tariffs. See *In Re Restricted Rates,* 20 I. C. C. 426. (2 I. C. C. 270.)

Confusion in Milling-in-Transit Rule.

Beekman Lumber Co. v. Mississippi Central et al. Opinion by Commissioner Meyer:

This case involves an alleged misrouting, which is really a misunderstanding of the tariffs. This report, while condemning the application of an unpublished division of a joint rate for the benefit of a shipper who sells to a railway, nevertheless estimates the total charges under that joint through rate on the unpublished division accruing to the Mississippi Central. This apparent inconsistency results from the infirmity of the tariff of the Mississippi Central, which allows for the dressing of lumber in transit at Hattiesburg, Miss., and provides that the rough weight into Hattiesburg shall be the basis for connecting-line charges to Hattiesburg, based on their proportion of the through rate, but does not state what that proportion shall be. The divisions themselves vary from and to different points of origin and destination and this is probably the practical reason for their omission. So many tariffs have this infirmity that we are unwilling to condemn this practice without qualification with respect to past transactions, but railways should understand that where a division of a rate is hereafter to be imposed on an incoming transshipment and the balance of the rate is to be imposed on a different outgoing weight, the divisions should be plainly published in the tariff. (21 I. C. C., 276.)

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF MAY, 1911. (THE MISSISSIPPI RIVER.)

Name of road	Mileage operated (June)	Operating revenues: Freight	Passenger	Maintenance of way: Way and structures	Maintenance of way: Other equipment	Operating expenses: Traffic	Transportation	General	Total	Net operating revenue (or deficit)	Outside operations, net	Taxes	Operating income (or loss)	Increase (or decrease) compared with last year

REVENUES AND EXPENSES OF RAILWAYS.

ELEVEN MONTHS OF FISCAL YEAR, 1911.

Name of road.	Mileage operated at end of period.	Operating revenues			Operating expenses: Maintenance						Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or dec.) comp. with last year.
		Freight.	Passenger.	Total, inc. misc.	Way and structures.	Of equipment.	Traffic.	Transportation.	General.	Total.					
Alabama Great Southern	309	$2,749,971	$1,023,483	$4,132,873	$537,281	$967,088	$114,002	$1,276,030	$102,824	$2,997,225	$1,135,648	—$8,027	$148,799	$978,822	—$104,798
Atlanta, Birmingham & Atlantic	662	1,878,445	558,858	2,599,004	327,102	407,768	166,091	967,941	100,798	1,969,700	629,304	.....	120,645	508,659	72,134
Baltimore & Ohio—System	4,434[1]	61,909,814	13,918,541	80,683,294	9,221,884	14,570,649	1,792,404	30,301,528	1,679,623	57,566,088	23,117,206	—122,203	2,385,498	20,609,505	—1,591,936
Bangor & Aroostook	627[2]	2,163,089	574,396	2,896,065	473,960	339,573	35,501	890,641	117,490	1,857,165	1,038,900	.....	25,724	1,013,176	—97,960
Bessemer & Lake Erie	204	6,243,203	322,741	6,664,057	782,692	1,494,946	83,697	1,899,401	120,389	4,381,125	2,282,932	.....	92,209	2,190,723	—934,490
Buffalo, Rochester & Pittsburgh	572	7,103,189	977,498	8,372,249	972,591	1,595,949	120,776	2,713,674	149,612	5,552,602	2,819,647	—1,015	196,000	2,622,632	—25,934
Central New England	277	2,478,613	321,427	2,956,886	548,775	248,183	19,114	860,619	53,247	1,729,938	1,226,948	225	149,000	1,078,173	—24,596
Central of New Jersey	631[3]	17,055,752	4,319,151	22,559,366	2,250,602	3,388,314	332,940	6,505,891	442,563	12,920,310	9,639,056	43,886	956,399	8,726,543	—120,722
Central Vermont	411	2,411,463	950,393	3,626,827	413,682	550,179	78,237	1,657,169	96,357	2,795,624	831,203	5,856	124,617	712,442	—32,771
Chicago & Eastern Illinois	965	8,742,172	1,931,473	11,375,882	1,076,254	1,867,033	259,627	4,200,900	364,143	7,767,957	3,607,925	—14,262	309,629	3,284,034	197,212
Chicago & Erie	270	3,678,768	715,845	4,844,703	515,668	996,558	219,373	2,220,390	106,471	4,058,460	786,243	.....	129,569	656,674	—147,198
Chicago, Indiana & Southern	329	3,046,080	258,066	3,394,233	470,829	685,131	93,984	1,305,206	97,467	2,652,617	741,616	—783	150,193	590,640	—280,823
Chicago, Milwaukee & Puget Sound	2,020[4]	11,523,939	1,364,945	13,252,515	924,677	1,408,945	327,927	4,802,489	161,728	7,625,766	5,626,749	2,119	478,534	5,150,334	—
Chicago, Milwaukee & St. Paul	7,511	41,404,869	12,797,062	59,793,732	7,346,928	8,293,993	1,160,149	25,967,988	1,017,998	43,787,056	16,006,676	168,728	2,436,084	13,739,320	—2,099,760
Chicago, Rock Island & Gulf	471[5]	1,885,496	639,550	2,698,023	402,497	207,098	99,687	991,822	89,266	1,790,370	907,653	—2,951	77,180	827,522	49,955
Cincinnati, Hamilton & Dayton	1,014[6]	6,302,225	1,522,828	8,733,701	744,251	1,563,214	252,729	3,993,913	232,940	6,787,047	1,946,654	.....	340,351	1,606,303	91,825
Cincinnati, New Orleans & Texas Pacific	337	6,467,807	1,530,555	8,442,564	937,008	1,729,415	223,682	2,503,084	197,702	5,590,891	2,851,673	—17,036	238,817	2,595,820	—390,222
Cleveland, Akron & Columbus	212	1,745,174	526,071	2,427,533	435,271	412,796	32,144	806,931	42,840	1,729,982	697,551	.....	96,500	601,051	64,564
Colorado & Southern	1,173[7]	6,499,940	1,425,102	8,397,916	939,905	1,654,901	137,302	2,661,140	244,908	5,638,156	2,759,760	—16,076	271,700	2,471,984	—268,654
Cumberland Valley	162	2,068,881	587,862	2,781,897	439,000	365,293	50,743	892,313	73,409	1,820,758	961,139	2,969	60,590	903,518	—153,240
Denver & Rio Grande	2,567[8]	15,867,929	4,679,516	21,494,138	2,424,622	3,796,533	531,448	7,412,603	543,070	14,708,276	6,785,862	—30,298	788,200	5,967,364	—287,171
Duluth & Iron Range	191[9]	6,108,096	285,749	6,502,451	750,917	589,122	7,085	1,446,936	138,619	2,932,680	3,569,771	—8,879	306,978	3,253,914	—1,497,071
Duluth, Missabe & Northern	316[10]	8,556,400	441,267	9,068,490	1,102,624	1,000,207	18,750	1,503,532	154,892	3,780,005	5,288,485	48,061	443,113	4,893,433	—2,630,869
Duluth, South Shore & Atlantic	612	1,827,217	874,337	2,853,120	448,757	323,758	109,917	1,095,081	75,818	2,053,331	799,789	8,006	195,871	611,924	—122,123
El Paso & Southwestern Co.	901	5,412,754	889,179	6,634,538	821,227	887,386	118,562	1,890,263	246,195	3,963,633	2,670,905	—18,471	210,479	2,441,955	50,716
Elgin, Joliet & Eastern	83[11]	6,943,964	81	7,354,775	877,692	1,429,302	44,793	2,372,589	177,166	4,901,542	2,453,233	.....	185,000	2,268,233	—712,729
Evansville & Terre Haute	310	1,524,031	659,794	2,426,088	303,970	323,008	60,463	798,556	72,714	1,558,712	867,376	—7,853	107,893	751,630	—687
Florida East Coast	583	1,989,807	1,383,084	3,897,114	472,423	526,035	71,628	1,228,188	87,319	2,385,593	1,511,521	—2,098	158,141	1,351,282	102,849
Fort Worth & Denver City	454	3,037,060	1,540,136	4,811,973	448,334	778,181	65,669	1,509,944	162,404	2,964,533	1,847,440	—13,411	112,609	1,721,420	—168,355
Galveston, Harrisburg & San Antonio	1,338	6,991,420	2,624,345	10,135,500	1,319,140	1,531,599	315,527	3,720,129	323,490	7,209,885	2,925,615	—28,973	329,909	2,566,733	176,031
Georgia	307	2,002,104	813,076	3,000,473	369,934	453,730	115,294	1,231,528	79,281	2,249,767	750,706	.....	22,613	728,093	14,871
Grand Rapids & Indiana	587	2,823,584	1,531,028	4,695,002	609,707	790,736	133,604	2,074,864	162,914	3,771,825	923,177	—1,587	263,014	658,576	—241,886
Gulf, Colorado & Santa Fe	1,537[12]	7,617,952	2,815,291	11,214,287	2,018,124	1,717,291	269,185	4,463,344	351,639	8,819,583	2,394,704	.....	348,390	2,046,314	518,181
Hocking Valley	350	5,376,621	798,632	6,589,161	813,934	1,057,431	96,768	2,152,697	191,386	4,312,216	2,276,945	.....	313,517	1,963,428	—463,033
Houston & Texas Central	789	3,990,323	1,521,231	5,894,292	834,916	699,720	202,481	2,423,080	239,699	4,399,296	1,494,996	—8,031	200,767	1,286,198	37,127
Iowa Central	559	2,588,142	504,394	3,235,196	391,365	537,626	77,509	1,347,885	95,436	2,449,822	785,374	.....	107,289	678,085	61,024
Kanawha & Michigan	175	2,448,127	325,490	2,835,633	316,142	508,180	25,393	791,173	77,543	1,718,431	1,117,202	- 69	83,075	1,034,058	373,568
Kansas City Southern	827	6,737,275	1,523,062	9,231,230	895,002	1,266,370	288,947	3,124,280	347,181	5,921,780	3,309,450	.....	327,264	2,982,186	239,575
Lake Erie & Western	886	3,962,179	822,863	5,059,991	837,351	966,884	164,626	1,997,224	135,165	4,101,250	958,741	.....	206,130	752,611	—402,407
Long Island	395	2,882,584	5,803,465	9,124,542	1,087,442	1,256,740	180,029	4,356,624	256,793	7,137,628	1,986,914	626,375	528,087	2,085,202	—563,848
Maine Central	932	5,030,368	2,682,555	8,233,136	1,294,618	1,228,758	78,746	3,149,319	278,825	6,030,266	2,202,870	15,133	416,101	1,801,902	—552,129
Minneapolis & St. Louis	1,027	3,277,315	1,111,227	4,701,128	483,176	624,350	119,302	1,900,053	162,106	3,288,987	1,412,141	- 462	210,584	1,201,095	14,123
Missouri, Kansas & Texas of Texas	1,348	5,921,839	3,449,605	9,996,752	1,510,698	785,329	254,772	4,888,734	380,974	7,820,507	2,176,245	—10,167	247,429	1,918,649	463,571
Missouri Pacific	3,921[13]	15,939,407	4,280,577	22,558,409	3,737,082	3,722,998	647,917	10,641,232	779,966	19,529,195	3,029,214	—30,597	904,500	2,094,117	—
Mobile & Ohio	1,114	7,482,813	1,326,060	10,266,269	1,193,236	1,766,185	353,276	3,568,227	381,789	7,262,713	3,003,556	—14,432	276,460	2,712,664	74,517
Morgan's La. & Tex. R. R. & S. S. Co.	404[14]	3,264,525	1,120,684	4,662,482	649,551	564,737	126,175	1,628,079	150,508	3,119,050	1,543,432	16,016	212,667	1,314,749	11,918
Nashville, Chattanooga & St. Louis	1,230	8,051,041	2,597,442	11,371,864	1,734,233	2,076,002	388,705	4,066,743	271,605	8,537,288	2,834,576	—10,151	257,123	2,567,302	—127,136
New Orleans & North Eastern	196	2,473,129	569,743	3,270,144	325,561	485,623	102,456	1,172,689	126,564	2,212,893	1,057,251	—1,076	98,187	957,988	41,201
New York, Chicago & St. Louis	561	8,403,238	1,444,076	10,226,567	1,132,587	1,330,344	548,140	4,330,356	178,428	7,519,855	2,706,712	- 18,994	335,320	2,352,398	—943,602
New York, Ontario & Western	546	6,686,882	1,494,048	8,497,466	998,010	1,358,684	119,732	3,341,180	191,516	6,009,122	2,488,344	—53,107	195,000	2,240,237	47,869
New York, Philadelphia & Norfolk	112	2,466,857	382,068	3,073,778	359,725	535,985	46,745	1,193,217	124,370	2,260,042	813,736	.....	84,150	729,586	—183,388
New York, Susquehanna & Western	152	1,883,073	547,415	2,726,409	303,417	249,229	21,105	995,850	44,817	1,614,418	1,111,991	13,564	129,029	996,526	186,537
Norfolk Southern	608	1,825,127	692,909	2,697,260	307,724	318,855	53,614	840,050	148,719	1,668,962	1,028,298	2,794	65,700	965,392	—
Northern Central	468	9,101,665	2,083,385	11,862,496	1,958,084	2,229,303	179,728	5,540,777	272,703	10,180,595	1,681,901	5,762	371,093	1,316,570	- 919,124
Northwestern Pacific	376	1,249,397	1,560,716	3,042,251	542,685	464,724	32,628	1,149,851	101,741	2,291,629	750,622	.....	122,700	627,922	—101,404
Pecos & Eastern	351	2,372,003	658,820	3,266,376	452,509	548,069	65,549	1,394,337	65,883	2,526,347	740,029	.....	105,378	634,651	- 210,853
Philadelphia & Reading	1,022	32,455,386	6,408,809	40,675,104	3,579,221	7,498,605	462,500	13,029,458	750,609	25,320,393	15,354,711	287,773	926,088	14,716,396	1,098,299
Rutland	468	1,724,084	1,044,693	3,130,399	404,301	490,507	78,111	1,237,876	76,943	2,287,738	842,661	.....	113,506	729,155	—45,060
St. Louis, Brownsville & Mexico	501	1,052,726	552,136	1,739,263	441,898	135,960	26,979	635,007	88,268	1,328,112	411,151	.....	52,000	359,151	60,982
St. Louis, Iron Mountain & Southern	3,313[15]	18,319,871	5,691,372	26,089,087	3,786,331	3,545,810	610,040	9,042,900	843,900	17,828,980	8,260,107	—42,749	878,490	7,338,868	— 330,812
St. Louis Southwestern	797[16]	5,571,582	1,280,475	7,166,727	766,288	1,128,301	291,638	1,796,673	247,741	4,230,641	2,936,086	— 7,180	231,508	2,697,398	147,926
St. Louis Southwestern of Texas	703	2,714,306	925,577	3,874,256	959,380	808,279	119,348	1,718,727	183,881	3,789,615	84,641	- 2,275	105,726	33,360	208,125
San Pedro, Los Angeles & Salt Lake	1,105[17]	4,610 042	2,487.887	7,558,884	1,348,869	1,261,448	342,389	2,805,183	191,073	5,948,962	1,609,922	— 54,601	297,711	1,257,610	716,662
Southern Pacific Co.	6,187[18]	48,677,505	29,190,854	83,729,951	10,383,723	10,370,507	1,796,920	22,988,610	2,534,747	48,074,507	35,655,444	127,631	3,238,354	32,544,721	4,109,898
Spokane, Portland & Seattle	551[19]	2,979,397	1,115,172	4,312,782	502,691	319,564	54,045	1,093,705	136,733	2,106,738	2,206,044	—3,861	387,200	1,814,983	952,237
Texas & New Orleans	458	2,423,803	980,321	3,611,520	665,351	645,286	80,944	1,443,255	105,891	2,940,727	670,793	11,153	135,282	546,664	—246,038
Toledo & Ohio Central	444	3,803,599	584,795	4,606,889	671,066	637,951	75,820	1,596,683	90,272	3,071,792	1,535,097	—1,705	212,003	1,321,389	127,742
Toledo, St. Louis & Western	451	2,823,569	419,935	3,459,912	417,764	505,130	98,384	1,240,682	101,244	2,363,204	1,096,708	.....	156,800	939,908	—193,102
Union Pacific	3,473[20]	33,138,864	10,110,397	47,333,013	5,189,421	5,324,644	1,095,625	12,350,330	1,173,129	25,133,149	22,199,864	—54,431	1,704,004	20,441,429	—1,589,491
Virginian	827	6,421,127	2,211,629	9,626,156	1,288,835	1,765,719	294,328	3,873,771	218,550	7,441,203	2,184,953	.....	305,294	1,879,659	—30,910
Wabash	474[21]	2,959,652	233,575	3,290,529	375,567	571,826	56,296	878,919	85,356	1,967,964	1,322,565	54,584	166,056	1,211,093	785,731
Western Maryland	2,515	18,604,964	6,757,496	27,381,390	3,280,911	4,454,150	843,391	11,003,370	822,466	20,404,289	6,977,101	—21,106	840,981	6,115,014	—807,721
West Jersey & Seashore	353	1,674,433	3,565,325	5,582,436	873,065	673,188	163,035	2,333,603	116,038	4,158,929	1,423,507	—53,803	252,776	1,116,928	141,719
Wheeling & Lake Erie	457	5,247,868	557,365	6,210,411	686,905	1,229,661	88,274	2,221,423	152,240	4,378,503	1,831,908	32,304	227,104	1,637,108	—127,628
Yazoo & Mississippi Valley	1,372	6,895,544	2,548,040	10,077,602	1,808,325	1,410,202	164,420	3,225,203	262,866	6,871,016	3,206,586	—3,754	378,204	2,824,628	1,028,587

Mileage operated on May 31, 1910—[1] 4,460 miles; [2] 546 miles; [3] 668 miles; [4] 1,463 miles; [5] 486 miles; [6] 1,036 miles; [7] 1,248 miles; [8] 2,553 miles; [9] 168 miles; [10] 293 miles; [11] 781 miles; [12] 1,518 miles; [13] 3,883 miles; [14] 348 miles; [15] 3,287 miles; [16] 773 miles; [17] 979 miles; [18] 6,076 miles; [19] 420 miles; [20] 3,411 miles; [21] 444 miles. — Indicates Deficits, Losses and Decreases.

Their's Not to Reason Why

Switzer Lumber Co. v. Texas & New Orleans et al. Opinion by Commissioner Meyer:

A carrier is liable for damages resulting from a disregard of a shipper's specific routing instructions, even though it sends the shipment via a route taking a lower rate to the original billed destination. A strict compliance with routing instructions relieves a carrier from liability for misrouting, and it is no part of a carrier's duty to speculate on the reasons which actuated such instructions and to assume that they do not express the shipper's desire. (21 I. C. C., 290.)

Some Expressions of Opinion on Tap Line Railways.

Manufacturers' Railway Company et al. v. St. Louis, Iron Mountain & Southern et al. Opinion by Chairman Clements:

The Manufacturers' Railway, which serves the Anheuser Busch Brewing Company and a number of other industries in south St. Louis, asks that the railways entering St. Louis shall be compelled to make divisions of the rate with it. The commission has had before it on many occasions questions involving terminal carriers, tap lines, etc. In disposing of cases involving these important issues it has been found impossible to lay down any general rule of action. The commission necessarily must consider all the features of each particular case presented and base its conclusions on a careful application of the law to the facts.

The Manufacturers' Railway operates about 20 miles of track, of which 2¼ miles are classed as main track and the remainder as side track, switches and yard track. The company owns and operates four locomotives and employs about 110 men. The majority of the stock of the company is owned by the same interests owning a majority of the stock of the Anheuser Busch Brewing Association. From 1888 to 1908 the Manufacturers' Railway leased its property to the St. Louis, Iron Mountain & Southern, but refused to renew the lease on the ground that the operation by the Iron Mountain was unsatisfactory and inadequate, and this was the universal testimony of all the shippers who were heard. Beginning in 1904, when it was first decided not to re-lease the property, and up to the present time, a large amount has been spent on the extension and improvement of the property. Testimony was introduced to show that only 10 per cent. had been necessary for the purpose of serving the brewery. Two-thirds of the trackage of the Manufacturers' Railway has been built solely for the purpose of serving the public, while the remaining one-third is used in serving both the brewery and the public.

As to the question of whether or not the Manufacturers' Railway is a common carrier, it is not within the authority of the commission to pronounce any railway not to be in fact or in law a common carrier if by the tests and principles of the common law it would be held to be such. The right of such a railway to participate in through routes and joint rates and share in the earnings of such rates with others is a wholly different question and one clearly within the purview of the statute and under the jurisdiction and control of the commission. The commission will not outlaw any common carrier and thus put it out of business or deny its use to the public so long as it is willing to perform its functions. Payment to the Manufacturers' Railway, therefore, of a reasonable portion of the St. Louis rates for the terminal service rendered by it is not unlawful. In view of the peculiar features of this case, it is highly important that the allowance to the Manufacturers' Railway Company and the services rendered by that company to its patrons should be equitably adjusted, and the duty and responsibility [illegible] allowance or division in order that they shall not make themselves liable for unjust discrimination. The record before the [illegible] determination of reasonable division. No order will be entered [illegible]

Commissioner Lane concurring:

I am in agreement with this report to the extent that it decides [illegible] difficulty that we have had in deciding this case, even to the extent that it is decided here, arises out of the fact that the [illegible] the law to separate terminal from transportation charges or re-[illegible]

The situation in St. Louis is simply this, so far as it has been revealed herein: The line carriers have combined and established a terminal which includes a great body of tracks, stations, warehouses, industrial spurs, and other terminal facilities. These are availed of by the carriers entering the city on an agreed basis. It is proposed by these lines that this terminal shall be a monopoly and that the rates of freight stated in the tariffs shall include delivery within this terminal. They canceled the allowance to the Anheuser-Busch road, the plant herein, because they feared that a rival company was being developed. So long as the beer people confined themselves strictly to hauling their own cars, or those of affiliated institutions, an allowance was made for delivery or receipt of cars as going to or coming from the brewery plant, which approximated $200,000 a year. This was in reality a cartage allowance, and the railways seemed to have no doubt about their right to make it until by its extensions the Manufacturers' Railway threatened to become a rival. Then came the simultaneous cancellation of these allowances; and while this case has been pending one by one the carriers have given way to the very forceful demands of the brewery people who own the railway, so that immediately after the issuance of this report the old order of things will be re-established. Then the commission will have to take on itself the determination of the question as to what the allowance should be and whether it should be extended to the brewery people who own the railway or not. I cannot but believe that the solution of this question of terminal allowance for industrial delivery can only come when we have separated the line charge from the terminal charge. If a shipper is not to avail himself of the terminal facilities of a main line carrier, it does not seem fair that he should be required to pay the full amount that is paid by one who uses these terminals.

Commissioner Harlan dissenting:

I am unable to concur in the views of the majority.

As is well known many large industries, as a part of the equipment necessary to the economical conduct of their business, have been compelled to install rails in and about their plants and to operate them with their own locomotives. Customarily the cost is charged up directly to the industry. But when the traffic is large enough to induce the regular lines to compete for it the common practice is to incorporate a railway company under the local law, and, in form at least, to commit the operation of the plant tracks and equipment to it. The industry thus puts itself in a position, through its subsidiary company, to receive, under color of right, a switching allowance or a division out of the rate. Ordinarily there is no outside traffic for the subsidiary road to move, but in some cases other industries can be served and some traffic is moved for them. By way of illustration of what is actually done under the pretense of legal authority it may be well to refer to the brewery of the Lemp Brewing Company in the immediate neighborhood of the Anheuser-Busch Brewing Company. It is a large industry, but relatively small when compared with the Busch brewery, its traffic amounting to but 10,000 or 12,000 carloads a year. It is situated on the hills of South St. Louis and the streets leading down to the river front are of an unusually severe grade. To meet the difficulty involved in getting its traffic to and from the regular lines on the water front it has abandoned the use of horses and wagons and has built an inclined track from its plant down the hill. The grade is so severe that a locomotive can not be used; instead there has been devised a powerful drum operated by a stationary engine by means of which, with steel cables, cars are pulled up from and let down to the tracks of the regular carriers. The drum and cables and stationary engine have been incorporated as the Western Cable Railroad Company, and as a matter of fact it actually moves cars up and down the hill for some immediate neighbors of the Lemp Brewing Company at a charge of $2 a car. It is scarcely reasonable to call this contrivance a railroad within the meaning of the act to regulate commerce, but as a matter of fact within the past few days tariffs have been filed by one or two of the regular lines providing an allowance to that company on the theory that it is a railroad and that its track is an addition to the public rail facilities of the city of St. Louis. In the vicinity are other industries, some with a traffic of from 1,000 to 2,000 carloads a year, which is hauled back and forth to the lines of the regular carriers by horses and wagons. They get no allowances from the carriers and have to bear their own burdens.

There seems to be a general movement throughout the country to rid interstate transportation of what must be regarded as a

manifest wrong and inequality. This is shown by the recent action of the trunk lines in laying before us a statement of the industries, which, through their subsidiary railway companies, have been receiving allowances and divisions which it is now proposed to cancel. While protests were made by some shippers against this proposed action, it was a notable feature of the conference that the protests were based not on the claim of a right to receive divisions and allowances through their subsidiary railroads but altogether on the theory that the few exceptions proposed by the carriers in their statement did not differ in principle from other cases and that unlawful discriminations would result from the recognition of those cases as exceptions.

The Anheuser-Busch Brewing Association and the Manufacturers' Railway Company are owned in the same general interest. The brewery, as in the case of the Lemp Brewery, is also on the hills of South St. Louis. It covers 35 city blocks, or about 126 acres. Its various malt houses, brew houses, warehouses, shops, and other buildings are very numerous. Its traffic is said to amount to one-thirtieth of the entire inbound and outbound tonnage of the city of St. Louis. During the year preceding the hearing the freight handled for it by its subsidiary railway company approximated 40,000 carloads. There can be no doubt, therefore, and I do not understand that the point is controverted at all, that the various tracks and sidings in and around the various buildings and leading to different parts of the 126 acres are nothing more nor less than a part of the equipment that has been found necessary in the economical management of the brewery, and therefore in every real and just sense of the word is a mere plant facility. (21 I. C. C., 316.)

Conference Rulings.

Before the expiration of two years a delivering line discovered and at once refunded an overcharge; upon demand made by it after the two years had expired a connecting line declined to repay its share on the ground that the statute of limitations had run. In such cases the statute does not run as between carriers. 306.

Overlooking a higher through rate charges were collected on the sum of the intermediate rates. After two years had expired the through rate was reduced to that basis and still later the balance of the through rate legally in effect on the date of the shipment was collected. On presentation of the claim some months later, it is held, that it was barred by the statute, and that the case is controlled by *Blinn Lumber v. Southern Pacific,* (18 I. C. C., 430.) 307.

A railway employee on leave of absence for the purpose of filling a term in a public office, or to engage in other business, is not entitled during such period to free passes either for himself or his family. 308.

Carriers may not disregard the fourth section (long and short haul clause) in order that passenger fares may be stated in multiples of five. 309.

In determining whether the provisions of the fourth section are contravened, mileage, commutation, party rate, and half fares for children should be compared only with fares of the same character. 310.

Under section 22 interstate lines may carry free or at reduced rates property for county authorities. 311.

Terminal companies must file statistical reports as required by the commission. 312.

The law requires the carrier to collect and the party legally responsible to pay the lawfully established rates without deviation therefrom. It follows that it is the duty of carriers to exhaust their legal remedies in order to collect undercharges from the party or parties legally responsible therefor. It is not for the commission, however, to determine in any case which party, consignor or consignee, is legally liable for the undercharge, that being a question determinable only by a court having jurisdiction. 314.

The fourth section does not apply when the more distant point and the intermediate point are in a foreign country; nor when the point of origin and point of destination are both in the United States and the intermediate point is in a foreign country. 318.

A carrier may not lawfully issue free interstate transportation to one not otherwise entitled to it in order to enable him as a witness to attend a proceeding in court unless the carrier is a party thereto or has a direct legal interest in the result. 319.

In arranging for the purchase of a chemical compound to be used in locomotive boilers it was understood that the chemical company would give to the engineers and firemen the necessary instructions for using the compound and that the carrier would furnish passes to an instructor for that purpose: The instructor is not entitled to use free transportation under Conference Ruling No. 208-*b*. 320.

Under a lease in which a nominal rental is reserved, a private person has erected a grain elevator on land belonging to an interstate carrier. This arrangement constitutes an undue preference. 325.

STATE COMMISSIONS.

The Board of Railroad and Warehouse Commissioners of Illinois are to begin on July 19 an inquiry into the rates and practices of express companies under the law which places express companies under the jurisdiction of the commission.

The New York Public Service Commission, Second district, has ordered the surface railways of New York City to give transfers at 151 points where they were discontinued after the dissolution of the Metropolitan Street Railway System and the New York City railways.

The Nevada railway commission, in a case brought by the business men of Reno, has ordered reductions of about 25 per cent. in the class rates of the Nevada-California Railway and the Tonopah & Goldfield. Investigations are also being made by the commission into the passenger rates charged by the Southern Pacific in that state.

After extended hearings on the coal rate questions, the Oklahoma corporation commission on July 5 made a new order, making reductions in the present rates, but placing them on a basis higher than they were on under its previous order, which was recently enjoined by the federal court. The roads are required to file tariffs in accordance with the new order by July 27, the order becoming effective July 31. The new rates will be on a straight mileage basis, and a graduated scale is provided, changing for every 5 miles up to 100 miles and every 10 miles from 100 to 400 miles, and ranging from 25 cents a ton for 5 miles on coal, coke and slack to $2.30 on coal and coke and $1.93 on slack for 400 miles, a lower rate throughout being made for slack.

COURT NEWS.

In the Federal court at Indianapolis, Ind., the Baltimore & Ohio Chicago Terminal Railroad has been fined $1,100 for violation of the safety appliance law.

At Philadelphia, July 6, the Philadelphia & Reading paid to the Federal authorities the sum of $40,219, being the fine and costs imposed on it for illegally cancelling demurrage charges on cars of freight consigned to the Bethlehem Steel Company. The Reading and the Lehigh Valley railways and the steel company have now paid $120,000 in fines imposed by the court in this proceeding.

The Interstate Commerce Commission has appealed to the Supreme Court in the case of its order forbidding railways to make lower rates for the transportation of coal consigned to railway companies than on coal for other parties. The case was carried by the railway to the Commerce court, which took a view opposite to that of the commission and issued an injunction forbidding the enforcement of the order.

The government has begun suit in the United States Circuit Court against the Lehigh Valley Railroad, to test its right to control the Lehigh Valley Coal Company and other coal companies, the contention of the government being that the coal companies, being wholly or substantially owned by the railroad company, are devices for evading the commodities clause of the Interstate Commerce Law. It is charged that the railroad company has compelled the coal company to contract at a loss for coal of other operators, this coal being sold to the railroad company and the loss to the coal company being offset by the excessive profit taken by the railroad company in the transportation of coal, certain coal markets being thereby controlled.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

B. F. Bush, president of the Missouri Pacific, has been elected also president of the American Refrigerator Transit Company at St. Louis, Mo., succeeding C. S. Clarke, resigned.

C. G. Nelson, formerly special accountant of the St. Louis, Brownsville & Mexico, has been appointed auditor of the New Iberia & Northern, with office at New Iberia, La.

Morris McDonald, vice-president and general manager of the Maine Central, has been elected also vice-president of the Portland Terminal Company; and George W. York, treasurer of the Maine Central, has had his authority extended over the Portland Terminal Company, both with offices at Portland, Me.

William Hough, formerly second assistant auditor of the Pullman Company, is now first assistant auditor, succeeding James F. Bird, deceased. F. L. Simmons, auditor of receipts, succeeded Mr. Hough and L. M. Bradish succeeded Mr. Simmons. George S. Seymour is third assistant auditor, all with offices at Chicago.

Charles P. Crawford, who was recently elected comptroller of the Erie Railroad, with office at New York, as has been announced in these columns, was born at Salamanca, N. Y., and was educated in the common schools. He began railway work on January 1, 1881, as a clerk in the freight office of the Erie at Salamanca, and during the next ten years was consecutively freight clerk, ticket clerk and chief clerk. He was then for a short time contracting agent of the West Shore Fast Freight Line at New York, and returned to the service of the Erie in August, 1893, as traveling auditor. In July, 1899, he was made chief clerk to auditor of disbursements, and from January 1, to June, 1902, was assistant chief clerk to auditor. He was then to April, 1903, chief clerk to auditor, and was subsequently for three months auditor of disbursements of the same road, and on July 15, 1903, he was appointed auditor of the Erie Coal Company. Mr. Crawford was promoted to auditor of the Erie Railroad on January 1, 1904, which position he held at the time he was elected comptroller, as noted above.

Operating Officers.

C. W. Ford has been appointed general superintendent of the Grand Junction & Grand River Valley, with office at Grand Junction, Colo., succeeding J. H. Brinkerhoff, resigned.

J. F. Gannoway, chief despatcher of the Spokane, Portland & Seattle, has been appointed trainmaster and chief despatcher of the Spokane & Inland Empire at Spokane, Wash.

T. A. Downs has been appointed trainmaster of the Illinois Central, with office at Princeton, Ky., succeeding to the duties of L. E. McCabe, assistant superintendent, promoted, and the office of assistant superintendent is abolished.

Michael Lowman, chief despatcher of the Cumberland Valley at Chambersburg, Pa., has been appointed trainmaster, succeeding Thomas B. Kennedy, transferred. C. H. Feldman succeeds Mr. Lowman, both with offices at Chambersburg.

E. M. Wise has been appointed general manager of the Missouri & North Arkansas, with office at Eureka Springs, Ark., and N. J. Groves, trainmaster, has been promoted to assistant superintendent in charge of transportation, with office at Leslie, Ark.

A. W. G. Clark has been appointed trainmaster on the British Columbia and Alberta divisions of the Canadian Pacific, in charge of the [illegible] Lardeau, B. C., and Field, including Field terminals, with offices at Field, succeeding A. N. McIntyre, transferred.

[illegible] in charge of the operating organization of the Pere Marquette in which the Chicago terminals become a part of the Grand Rapids district, [illegible], superintendent at Grand Rapids, Mich., has had his jurisdiction extended over them, and the office of superintendent of terminals at Chicago has been [illegible]. W. A. Hawker has been appointed trainmaster of the Chicago division south of Holland, Mich., including Chicago terminals, La Crosse division and Benton Harbor branch, with office at Benton Harbor, Mich. W. H. Romoser, trainmaster at Grand Rapids, will have charge of the Grand Rapids terminal, the Chicago division as far south as and including Holland, and the Muskegon and Big Rapids divisions. Charles Harsch has been appointed a general agent, with office at Chicago.

Louis Eugene McCabe, whose appointment as superintendent of the Illinois Central at Mattoon, Ill., has been announced in these columns, was born August 12, 1867, at Rochester, Iowa. He received a common school education and began railway work in 1881 as a telegraph operator on the Chicago, Rock Island & Pacific. The next year he went with the Chicago, Milwaukee & St. Paul as a telegraph operator on the Iowa division, where he remained two years, and during 1884 and 1885 held a similar position on the Atchison, Topeka & Santa Fe. From 1886 to 1901 he was a despatcher, having been with the Rock Island, the Santa Fe and the Texas & Pacific. He was made a chief despatcher of the Southern Railway in 1902, and in 1903 went with the Illinois Central, with which road he has been consecutively despatcher, chief despatcher, traveling chief despatcher, trainmaster and assistant superintendent, from which latter position he has recently been advanced to superintendent.

Louis E. McCabe.

Traffic Officers.

J. C. McNamara, traveling passenger agent of the Lake Shore & Michigan Southern at Youngstown, Ohio, has been appointed general baggage agent, with office at Cleveland, Ohio, succeeding J. T. Burrows, retired. W. G. Knittle, general agent in the passenger department at Grand Rapids, Mich., succeeds Mr. McNamara, and his former office has been abolished. W. R. Lynch, general agent in the passenger department at Cleveland, has been appointed traveling passenger agent in that territory.

F. C. Reilly, general freight agent of the Chicago & Eastern Illinois, at Chicago, has had his jurisdiction extended over the St. Louis & San Francisco and other Frisco lines, with office at St. Louis, Mo., succeeding E. K. Voorhees, who has been appointed first assistant general freight agent. A. S. Dodge has been appointed general agent of the traffic department, with office at St. Louis, in charge of special duties relating to the solicitation of traffic which may be assigned to him by Vice-President Biddle.

George H. MacRae, who has been appointed general passenger agent of the Chicago, St. Paul, Minneapolis & Omaha, with office at St. Paul, Minn., as has been announced in these columns, began railway work with the Chicago, St. Paul, Minneapolis & Omaha as a clerk in the auditing department at St. Paul, and in 1890 was made chief clerk in the ticket auditing department. Three years later he was made chief clerk in the general passenger department, and in January, 1897, was appointed assistant general passenger agent, from which position he has just been promoted to general passenger agent, as above.

H. D. Waldron, whose appointment as general passenger agent of the Maine Central, with office at Portland, Me., has been announced in these columns, was born June 16, 1857, at Portland, and was educated in the high school of his native town, graduating in the class of 1876. He began railway work in November, 1877, as a telegraph operator at Brunswick, Me., a busy junction point. Mr. Waldron had previously served between one and two years as commercial operator with the Western Union. During the next three years he was telegraph operator and ticket

agent at Brunswick and at Waterville, two of the Maine Central's busiest points, and in 1880, returned to Portland as chief clerk in the passenger traffic department. He remained in that position until 1890, when the accounts having been transferred to the accounting department, he was appointed auditor of passenger accounts, remaining in that position until June, 1908, when he returned to the passenger traffic department as assistant general passenger agent, which position he held at the time of his recent appointment as general passenger agent.

Engineering and Rolling Stock Officers.

L. L. Ashton has been appointed assistant roadmaster, District 1 of the Canadian Pacific, succeeding J. Todd, resigned.

Thomas B. Kennedy, trainmaster of the Cumberland Valley, has been appointed assistant to engineer, with office at Chambersburg, Pa.

W. J. McKee, master mechanic of the International & Great Northern at Mart, Tex., has been appointed master mechanic of the Texas & Pacific, with office at Gouldsboro, La., succeeding Charles M. Babcock, resigned.

W. B. Ott, assistant engineer motive power of the Pennsylvania Railroad, at Altoona, Pa., has been appointed master mechanic at the Trenton (N. J.) shops, succeeding H. H. Maxfield, transferred. M. J. Davis, assistant master mechanic at Altoona, succeeds Mr. Ott, with office at Altoona.

G. J. Kennedy is now assistant engineer of maintenance of way of the National Railways of Mexico, with office at Mexico City, Mex., and the following are division engineers: M. Ovando, Aguascalientes; W. W. Johnston, Chihuahua; M. F. McNab, Tampico; Isidoro Romo, Mexico City; L. W. Miller, Monclova; R. Fabella, Pueblo; Philo Burkholder, Oaxaca; C. R. Armstrong, Tonala, and F. T. Fulkerson, Tierra Blanca.

The mechanical engineering department of the St. Louis & San Francisco having been transferred from Springfield, Mo., to St. Louis, where it will be in charge of W. C. Nixon, vice-president, and his assistant, W. H. V. Rosing. D. M. Knox, mechanical engineer of the Missouri Pacific at St. Louis, has been appointed mechanical engineer of the St. Louis & San Francisco; and H. P. John, heretofore mechanical engineer at Springfield, has been transferred to St. Louis as chief draftsman.

Richard N. Durborow, whose appointment as general superintendent of motive power of the Pennsylvania Lines east of Pittsburgh, Pa., and Erie, with office at Altoona, has been announced in these columns, entered the service of the Pennsylvania Railroad in February, 1879 as an apprentice in the West Philadelphia shops. In September of the following year he was transferred to Altoona and upon the completion of his apprenticeship he entered the mechanical engineer's department at Altoona. In March, 1890 he was appointed inspector in the West Philadelphia car shops, since which time he has been consecutively, October, 1892, assistant general foreman; November, 1895, acting master mechanic, and March, 1896, master mechanic at West Philadelphia. In May, 1900 he was appointed superintendent of motive power of the Philadelphia, Baltimore & Washington, and in August of the same year was made superintendent of motive power of the Buffalo & Allegheny Valley division. In October, 1901 he was made superintendent of motive power of the Eastern Pennsylvania division, which position he held at the time of his recent appointment as above noted.

R. N. Durborow.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

THE ERIE, mentioned in the *Railway Age Gazette* of June 23 as being in the market for 35 mikado locomotives, 5 Pacific-type locomotives, and 20 switching locomotives, has withdrawn from the market until after August 1.

THE ST. LOUIS NATIONAL STOCK YARDS, reported in the *Railway Age Gazette* of June 30 as having ordered one 60-ton six-wheel switching locomotive from the American Locomotive Company, advises that it has ordered two.

THE SIOUX CITY TERMINAL has ordered 1 six-wheel switching locomotive from the American Locomotive Company. The dimensions of the cylinders will be 19 in. x 24 in., the diameter of the driving wheels will be 50 in. and the total weight in working order will be 114,000 lbs.

CAR BUILDING.

PROCTOR & GAMBLE, Cincinnati, Ohio, are in the market for 100 tank cars.

THE HAVANA CENTRAL, Cuba, is in the market for from 300 to 400 sixty-ton box cars.

THE CANADIAN NORTHERN has ordered 200 box cars from the Canadian Car & Foundry.

THE BUFFALO, ROCHESTER & PITTSBURGH has ordered 3 coaches from the Pullman Company.

THE ANN ARBOR has ordered 450 steel underframe box cars from the Western Car & Foundry Company.

THE BOSTON ELEVATED is said to be making inquiries for 50 steel car bodies. This item is not confirmed.

THE CHICAGO, BURLINGTON & QUINCY has ordered 5 all-steel 60-ft. postal cars from the Standard Steel Car Company.,

THE LEHIGH VALLEY has ordered fifteen 60-ft., and ten 70-ft. steel baggage cars from the Standard Steel Car Company.

THE NORFOLK & WESTERN has ordered the specialties for 500 50-ton gondola cars, which will be built in the company shops.

THE NORTHERN PACIFIC has ordered 1,000 steel underframes from the Western Car & Foundry Company to be used on new box cars.

THE ST. LOUIS & SAN FRANCISCO has ordered 8 all-steel mail cars from the American Car & Foundry Company, to be used on the Chicago & Eastern Illinois.

THE ERIE, mentioned in the *Railway Age Gazette* of June 30 as being in the market for 3,300 gondola cars and 25 passenger cars, has withdrawn from the market until after August 1.

IRON AND STEEL.

THE CANADIAN NORTHERN has bought 9,000 tons of structural steel.

THE IOWA CENTRAL has ordered 3,800 tons of rails from the Illinois Steel Company.

THE CHESAPEAKE & OHIO has ordered 8,500 tons of rails from the Illinois Steel Company.

THE BALTIMORE & OHIO has ordered 7,000 tons of rails from the Cambria Steel Company.

THE MINNEAPOLIS, ST. PAUL AND SAULT STE. MARIE has bought 3,500 tons of structural steel.

THE MEXICO & NORTHWESTERN has ordered 3,000 tons of car building material from the Illinois Steel Company.

THE LOUISVILLE & NASHVILLE has ordered 3,800 tons of structural material from the American Bridge Company, to be used on the Kentucky division between Covington and Paris.

GENERAL CONDITIONS IN STEEL.—The steel mills are again operating at about 68 per cent. of their capacity after the shut down last week due to the national holiday and the repair season. Orders are now coming in faster than they have for months. If the crops are good a sharp improvement is looked for in September and it is expected that more steel will be produced during the last six months of the year than during the first.

Supply Trade News.

The Bullard Machine Tool Company, Bridgeport, Conn., has made Harry Ellis, Jr., Mutual building, Richmond, Va., its direct representative in the territory surrounding Richmond and extending to the West Virginia line.

E. V. Dexter, acting manager of the lubricating department of the Waters Pierce Oil Company, St. Louis, Mo., has been made manager of the railway department of this company, with office in St. Louis. Mr. Dexter was purchasing agent of the Chicago & Alton from 1903 to 1908, and purchasing agent of the Mexican Central from 1908 to 1909.

The monthly report of the United States Steel Corporation shows that the unfilled tonnage on June 30 was 3,361,058 tons. This compares with unfilled orders of 3,113,187 tons on May 31; 3,218,704 tons on April 30; 3,447,301 tons on March 31; 3,400,543 tons on February 28; and 3,110,919 tons on January 31, 1911. The June unfilled tonnage statement of the Steel Corporation, which showed an increase of 247,871 tons over the preceding month, was more favorable than was expected. It had been generally believed that there would be but little change.

The General Electric Company, Schenectady, N. Y., has sold to the Union Switch & Signal Company, Swissvale, Pa., all of its patents relating to railway signaling, together with its stock and manufacturing equipment in this line of work. The Union company is now prepared to furnish the signaling apparatus heretofore supplied by the General company. While this sale does not include accessory apparatus, such as switchboards, rectifiers, motor generator sets, generators, etc., the Union company will now be able to offer General Electric accessory appliances to effectively supplement its lines of signal material when making complete signal installations.

The Roberts & Schaefer Company, Chicago, was awarded the contract last week by George J. Ray, chief engineer of the Delaware, Lackawanna & Western, with office at Hoboken, N. J., for the designing and building complete in operation, of a 600-ton reinforced concrete Holmen coaling station for installation at Binghamton, N. Y., the approximate contract price being $28,000. This company has also secured during the past week contracts for three 600-ton fireproof Holmen coaling stations for installation on the line of the Baltimore & Ohio, at Warwick, Ohio, LaPaz junction, Ind., and Rowlesburg, W. Va., the approximate contract price being $70,000. This company has also been awarded contracts for two 300-ton balanced bucket type coaling stations for installation on the new line of the Chicago & North Western, at Wyeville, Wis., and Friendship, these plants being located on the Milwaukee, Sparta & North Western. The approximate contract price is $25,000.

Judge Cross, of the United States Circuit Court, district of New Jersey, has rendered a decision denying the petition of the Byerley & Sons Company, Cleveland, Ohio, for an injunction to restrain the Standard Asphalt & Rubber Company, Chicago, from continuing alleged infringements of certain patents of the Byerley firm. The standard Asphalt & Rubber Company some time since brought suit in Chicago against the Byerley firm, alleging that it was infringing patents belonging to the Standard company. Byerley's suit against the latter was brought subsequently. In denying the Byerley firm's motion for an injunction Judge Cross assessed it the costs of the action. He said that the Standard Asphalt & Rubber Company is operating under two patents, issued October 24, 1899, to George F. Culmer and [illegible] Culmer, one covering the process of making asphalt [illegible] and the other covering the making of the product. The Court said that the Byerley patent is essentially a distillation [illegible] three or four different kinds made by as many different experts were to the effect that there is absolutely no distillation in the Culmer process, and furthermore, that the [illegible] and product are essentially and materially different [illegible] Byerley. Infringement, the Court said, must be shown by clear and convincing testimony, and without indicating [illegible] in any way the relative [illegible] of the case to the other court in which it is pending, it concluded [illegible] that the complaint did not contain the [illegible] of proof.

Railway Construction.

New Incorporations, Surveys, Etc.

Ardmore, Duncan & Lawton.—An officer writes that contracts are to be let within 30 days to build from Lawton, Okla., via Duncan, to Ardmore, about 100 miles. There will be four small steel bridges, and 10 short trestles. The line is being built to carry agricultural products, asphalt, oil, lumber and coal. A. N. Bullitt, Lawton, Okla., is chief engineer.

Arizona Eastern.—An officer writes that grading work is now under way by the Grant Brothers Construction Company, Los Angeles, Cal., from a connection with the Phoenix & Eatsern at a point 2.1 miles south of Mesa, Ariz., south through townships 1 and 2 South, range 5 East. The line, which is to be 11.9 miles long, will have maximum grades of 0.5 per cent. and maximum curvature of 3 deg. The improvements include putting up some station buildings. Epes Randolph, president, and L. H. Long, assistant chief engineer, both of Tucson. (June 23, p. 1674.)

Boston & Maine.—A survey for an electric railway to the summit of Mount Washington, N. H., is being made. The line, when completed, will wind about the mountain and will take the place of the old cog-wheel road which has been in operation for many years. The construction of a big hotel on the summit of the mountain is also projected.

Brownwood North & South.—See St. Louis & San Francisco.

Canadian Northern.—Announcement has been made that the Canadian Northern has secured financial backing for building the connecting lines to complete the through line from the Pacific to the Atlantic, also that the company would enter Montreal through a tunnel and will build a large central station in Montreal. (July 7, p. 64.)

The contract recently let for building a 164-mile section to Kanloops, B. C., it is said, has been given to P. Welch, Spokane, Wash., and to the Northern Construction Company, Winnipeg, Man. Sub-contracts have been let for the work as follows: Aylmer Brothers & Henning Vancouver, B. C., from Hope to Yale, 14 miles; Burns & Gordon, Spokane, Wash., Yale east 14 miles; George Chew, Spokane, 6.5 miles; George Cunningham & Co., Greenwood, B. C., 5.5 miles to Boston Bar; W. P. Tierney & Co., Vancouver, 11 miles; A. Griffin & James Welch, 19 miles to Lytton; Grant, Smith & Co., Seattle, Lytton to Spence's Bridge, 23 miles; Twohy Brothers, Portland, Ore., from Spence's Bridge for 41 miles; and to Grant, Smith & Co., a section of 30 miles to Kanloops. The work will be heavy, part of it being through solid rock along the steep and narrow canyons on the Fraser river. There will be about three miles of tunnels, two of which will have a total length of 2,000 ft. (July 7, p. 64.)

Chicago, Burlington & Quincy.—An officer writes that this company is constructing double track from Concord, Ill., to Beardstown, 12 miles, and from Beardstown to Astoria, 16 miles. All this work is parallel with present alinement and the grading is being done by the company's men.

Plans have been made, it is said, to build from Guernsey, Wyo., southwest to Salt Lake City.

See Union Pacific.

Chicago, Marseilles & Peoria.—Organized in Illinois with $5,000,000 capital to build from Chicago to Marseilles, Streator and Peoria. Charles M. Nichols, of New York City, is interested.

Chicago & Northwestern.—This company has begun operating an extension of the Norfolk Junction-Colome line to Wilmer, S. D., which is toward the Rosebud Indian Reservation, 11 miles from Colome.

Clear Lake.—An officer writes that bids will be asked for in August to build from Upperlake, Cal., northeast to Lakeport, about 15 miles. There will be a 200 ft. steel bridge and a 450 ft. tunnel on the line, also station buildings at Lakeport. Charles [illegible] president, Upper Lake, and C. R. Rankin, chief engineer. (June 2, p. 1,296.)

El Paso & Southwestern.—According to press reports, bids are wanted for grading a section of 44 miles between Fairbanks, Ariz., and Tucson. (June 30, p. 1714.)

Erie Railroad.—This company plans to complete the double

tracking of its entire line between New York and Chicago. This work, which will require the construction of about 465 miles of additional second track, will be apportioned over several years and only those sections which are imperatively needed will be constructed in the current fiscal year. The entire Cincinnati division east of Marion, Ohio, will be double tracked this coming year when improvements now authorized and under way are completed. There has just been completed on this division 9.7 miles of second track between Sherman and Sterling and 4.4 miles between Nankin and Ashland. Contracts have been let for the construction of 3 miles of second track between Tallmage and Hills, 5.4 miles between West Salem and Polk, 2.7 miles between Barberton and Sherman, 9.2 miles between Creston and West Salem and 6.5 miles between Milton and Summit. On the Meadville division 4.2 miles of second track was recently completed between Braceville and Windham, and work is now under way, construction an additional 5 miles between Ravenna and Point and 1.6 miles between Brady Falls and Dent. (May 19, p. 1,186.)

GRAND TRUNK PACIFIC.—An officer is quoted as saying that bids for building the gap of 410 miles between Tete Juane Cache, B. C., 50 miles west of Yellow Head Pass, and Aldermere, in the Bulkley Valley, will be called for at once. The main line now has been extended 200 miles west of Edmonton, Alb., to a point near the Athabasca river, and less than 35 miles from the summit of the Rockies at Yellow Head Pass. The rails will be laid across the summit in the autumn. In about two years the eastern and western sections will be connected. Then will follow the building of a branch line into Vancouver. The company also will make an early start on the construction of a dry dock at Prince Rupert, as well as other terminal improvements, to cost $3,000,000. An officer writes that bids are to be let August 15. The work will be heavy, involving the handling of about 125,000 cubic yards a mile. Maximum grades will be 0.4 per cent. There will be six steel bridges and two tunnels. Bids will not be asked for the steel work. The plans include putting up sub-stations and roundhouses. (April 14, p. 925.)

GREAT NORTHERN.—A contract has been given to Guthrie & Co., St. Paul, Minn., it is said, for track and bridge construction from Princeton, B. C., to Coalmont, 15 miles. The plans call for putting up six bridges.

A contract is said to have been given to Coughren & Waldson to grade 25 miles of line down San Poil valley from the terminus of the Spokane Falls & Northern at Republic, Wash. It is understood that the Great Northern will build this year from Republic south to Clark at the mouth of the San Poil, about 60 miles.

IDAHO NORTHERN RAILWAY.—A contract for a northern extension has been let, it is said, to the Utah Construction Company and the work will be started this month. The contract calls for building 58 miles of grade from Emmett, Idaho, to Smith's Ferry. The line will pass through Montour and Horseshoe Bend. No provision has been made for the contemplated extension to Payette lakes, 101 miles north of the present terminus at Emmett, although the survey is completed. It will take about a year to build the extension. E. O. and W. Wattis of Ogden will have charge of the building operations for the Utah Construction Company. Sub-contracts are to be let at once and several hundred men employed as soon as material arrives in Nampa.

INTERCOLONIAL.—This company is planning to build an extension from Halifax, N. S., to Guysboro county. Bids are to be asked for the work in the near future.

MISSOURI PACIFIC.—According to press reports, contracts have been let to List & Gifford, Kansas City, Mo., to build a new short line on the St. Louis, Iron Mountain & Southern between Bridge Junction, West Memphis, Ark., and Marianna, 45 miles.

NORTH FORK.—Work is to be begun soon on a line from recently opened coal fields near Hotchkiss, in Delta county, Colo., west to Delta, eight miles. Connection will be made at Delta with the Denver & Rio Grande. The directors are James B. Pearce, Thomas F. Dillon, Gilbert N. Prentiss, Will E. Pearce and L. E. Ross.

OREGON SHORT LINE.—The Utah Construction Company, who has the contract for building from Richfield, Idaho, to Camas Prairie, has sub-let 10 miles to Turber & Smith, Maynard, Idaho, and 25 miles to Eggleston & Matthew, Denver, Colo.

PACIFIC RAILWAY & NAVIGATION CO.—This company, which is building a 91-mile line from Hillsboro, Ore., west to Tillamook, expects to have the line finished by September. The J. W. Sweeney Construction Co. and Robert Wakefield, both of Portland, are the contractors. The work includes piercing 13 tunnels, the longest to be 1,437 ft. There will also be 36 bridges. The maximum grade will be 3 per cent. and the maximum curvature 15 deg. (December 23, p. 1,205.)

PITTSBURG & SHAWMUT.—This company, which is building from Knoxdale, Pa., to Freeport, 100 miles, it is said, is planning to build a branch from Nicholson's Run, seven miles south of Kittanning, Pa., to North Butler.

RED OAK & NORTHEASTERN.—See Wabash Railroad.

SANTA FE, PRESCOTT & PHOENIX.—This company has completed arrangements with former Senator Clark, of Montana, it is said, to build a line from a point near Cedar Glade, Ariz., to a point near Jerome, the site of the new United Verde Copper smelter, 40 miles. The line may eventually be continued south to Camp Verde, and thence to a connection near Dewey with the Bradshaw Mountain Railroad.

ST. LOUIS & SAN FRANCISCO.—Chairman B. F. Yoakum has confirmed a report that the St. Louis & San Francisco has taken over the Brownwood North & South now under construction, north from Brownwood, Texas. He has also closed negotiations to extend the 'Frisco line south from Brady, Texas, to a connection with the San Antonio & Aransas Pass, about 100 miles, which will give the former an entrance to San Antonio and establish a new north and south line through western Texas.

SOUTHERN PACIFIC.—According to press reports, construction work is to be started soon on a line from Hamilton City, Cal., south to Colusa, 37.5 miles. Plans are said to be under consideration for an extension south of Colusa to a point on the main line of the Southern Pacific. Two routes are under consideration, one from Colusa, via Sycamore, Grimes and College City to Harrington, and the other from Colusa directly south to Arbuckle. (March 24, p. 711.)

SPOKANE FALLS & NORTHERN.—See Great Northern.

TEMISKAMING & NORTHERN ONTARIO.—An officer writes that work is now under way on a branch building from Iroquois Falls junction, Ont., to Timmins, 33.5 miles. Track has been laid on 28.5 miles. The work is being carried out by day labor. The branch is being built to serve the Porcupine gold mining camp. Maximum grades will be 1 per cent. and maximum curvatures 6 deg. There will be an important trestle over Frederick House river.

TENNESSEE & KENTUCKY STATE LINE.—This company is asking for bids to build from Hazel, Tenn., west along the Tennessee-Kentucky state line, about 15 miles. The company was incorporated in Tennessee with $80,000 capital and is building the line to develop timber lands and the Ball and Sagger clay fields. The company will use 56 or 60-lb. relaying rails. Charles C. Tennis, chief engineer, Pittsburgh, Pa. J. N. Hill, J. W. Williams, W. T. Jackson, C. V. McCampbell and J. T. Turnbow, Hazen, Tenn., are interested.

UNION PACIFIC.—This company and the Chicago, Burlington & Quincy, it is said, are racing for an entrance into the newly developed dry farming section southeast of Cheyenne, Wyo., and both companies are preparing to run feeders into that territory. It is reported that the Union Pacific will extend its Crow Creek branch in northern Colorado from Briggsdale to the main line in Pine Bluffs, 60 miles. The Burlington will build a connection from the line in northern Colorado at Greeley, to the line near Hudson, practically paralleling the Union Pacific's new line.

WABASH RAILROAD.—Construction work has begun, it is said, on the Red Oak & Northeastern, which is to form a connecting link and a feeder for the Wabash. The first part of the line to be built will be from Imogene, Iowa, where it touches the Wabash system, to Red Oak, 13 miles. Later the line will be extended northeastward from Red Oak to a terminus not yet decided upon. The line will be completed to Red Oak within 90 days.

RAILWAY STRUCTURES.

Aberdeen, So. Dak.—The Chicago, Milwaukee & St. Paul will build a two story brick passenger station 50 ft. x 300 ft., a brick freight house 28 ft. x 400 ft., and an engine terminal to replace the structures which were recently destroyed by fire. Plans for the work have been completed and construction is now under way. It is estimated that the entire group of buildings will cost about $200,000.

Elizabethport, N. J.—An officer writes that work is now under way by the John W. Ferguson Company and the Phoenix Iron Company on additions to the freight car repair shops at Elizabethport. There will be a building 179 ft. x 600 ft. for freight car repairs, a lumber shed 80 ft. x 200 ft., planing mill 80 ft. x 300 ft., paint shop 50 ft. x 200 ft.; also a dry kiln, paint storage building and extension to the power house. All the buildings will have steel frames, with brick and concrete walls.

Everett, Wash.—The Great Northern will ask for bids at once, it is said, for the construction of terminal buildings at Everett. The estimated cost is $150,000. (March 10, p. 483.)

Galveston, Tex.—The Gulf, Colorado & Santa Fe is receiving bids for building the following: A 16-stall, brick roundhouse equipped with an 85-ft. turntable, to cost about $46,000; a brick storehouse, $17,000; power house, $6,200; sand house, $6,000, and machine and blacksmith shop, $9,500. It is expected that some water tanks also will be erected. Work will be started about the middle of July.

Hillyard, Wash.—The Great Northern has let the contract for building a machine shop 200 ft. x 360 ft., to cost about $100,000.

Homer, La.—It is understood that the Louisiana & North Western is planning to rebuild the shops at Homer, which were destroyed by fire.

Marysville, Cal.—The Northern Electric Railway, it is said, will build new shops at Marysville.

Minkler, Cal.—The Atchison, Topeka & Santa Fe Coast Lines have given a contract to C. A. Fellows, Los Angeles, for putting up a concrete station to cost $7,500, at Minkler; also a contract for putting up a concrete station at Piedra, near Fresno, to cost $3,500.

Montclair, N. J.—The Montclair council has approved the plans of the Delaware, Lackawanna & Western for improvements to be made in Montclair. The plans call for a new passenger station and the elimination of three dangerous grade crossings. It is understood that the railway company will double-track the line from Bloomfield to Montclair.

Palestine, Tex.—The woodwork and upholstering shops of the International & Great Northern, it is reported, were burned on July 3, with an estimated loss of $50,000.

Pasco, Wash.—The Northern Pacific will build an engine terminal to include a thirty-six stall roundhouse, machine and boiler shop, coal dock and repair shop to cost about $350,000.

Piedra, Cal.—See Minkler, Cal.

Pittsburgh, Pa.—The Pittsburgh & Lake Erie has let contracts for building a 200-ft. extension to the train sheds at the [illegible] station in Pittsburgh, and work is to be started at once. The American Bridge Company will furnish the structural work, and the Lucius Engineering Company will do the erecting.

Princeton, B. C.—See Great Northern, under Railway Construction.

St. Louis, Mo.—The Columbia Terminal Company of St. Louis will build a freight station to cost about $20,000.

[illegible] has let a contract for the construction of a station at Springville, to cost $6,000.

[illegible] reported in the Railway Age of May 19, is planning to build a passenger station [illegible] 40 ft. by 134 ft. and one story high. It is to be of pressed brick and terra cotta construction.

Railway Financial News.

Boston & Maine.—See Worcester, Nashua & Rochester.

Buffalo & Susquehanna.—William Saloman & Co., New York, have bought from the company and resold $500,000 5 per cent. receivers' certificates of July 1, 1911-July 1, 1912. The certificates were issued to provide funds to pay off $511,000 receivers' certificates due July 1, 1911. The court's order authorizing these certificates provides that the total issue having an equal lien shall not exceed $750,000.

Chicago & Alton.—At the executive committee meeting on July 11, no action was taken on the semi-annual dividend on the prior lien stock. This is considered equivalent to passing the dividend, which is a 4 per cent. annual cumulative dividend. The dividend on the preferred was recently passed.

Erie.—Drexel & Co., Philadelphia, Pa., have bought $6,000,000 equipment trust 4½ per cent. notes, maturing in series semi-annually during ten years.

Kansas City, Ft. Scott & Memphis.—William Salomon & Co., New York, are offering the unsold portion of the $2,688,000 refunding mortgage 4 per cent. bonds which were sold by the company to retire $2,055,300 Kansas City, Ft. Scott & Gulf 5 per cent. bonds which matured June 1, and to redeem equipment trust bonds.

Maine Central.—Stockholders have voted to increase the capital stock by $5,004,300, making the total authorized stock $10,000,000. Stockholders are offered the privilege of subscribing before August 7, 1911, at par, for one share of new stock for each share of old stock held.

The *Wall Street Journal* says that it is proposed to reduce the dividend from 8 per cent. to 6 per cent., to be paid on both old and new stock commencing with the present fiscal year.

Of the $25,000,000 Maine Central 50-year 4 per cent. refunding mortgage bonds recently authorized by the stockholders, $12,000,000 are to be sold and the money, together with the money received from the sale of the new stock, will be used to pay off consolidated mortgage bonds and notes amounting to $15,484,000, which mature April 1, 1912.

Maine Central.—John F. Hill, of Augusta, Me., has been elected a director, succeeding F. A. Wilson, deceased.

National Railways of Mexico.—A press despatch from Mexico City says that Pablo Macedo and Jose Signoret have resigned from the board of directors, and Leandro Fernandez and J. B. Estanol have been elected to suceed them.

New Orleans, Fort Jackson & Grand Isle.—A mortgage has been filed securing $5,000,000 bonds. It is said that negotiations have been undertaken for the sale of these bonds.

New York Central & Hudson River.—The New York Public Service Commission, Second district, has authorized the company to guarantee principal and interest $2,500,000 4½ per cent. bonds of 1911-1932 of the Clearfield Bituminous Coal Corporation. The entire stock of the Coal Corporation is owned by the New York Central, having been bought for the purpose of securing a permanent supply of coal.

St. Louis & San Francisco.—The $4,000,000 7-year 4½ per cent. notes of 1905 have been called for redemption at par on August 1, 1911. The payment for these notes is to be made from the proceeds of the $7,000,000 general mortgage bonds which were sold last April through Speyer & Co. to Paris bankers.

Virginia Anthracite Coal & Railway.—The sale of this road was set for June 29, but no higher bid was made than $125,000 and the receivers declined to sell the road at that price and adjourned the sale until August 29.

Worcester, Nashua & Rochester.—A circular which accompanied the semi-annual dividend of $3 per share paid July 1, says: "The lease of this road to the Boston & Maine is to be canceled and no further dividends will be paid. The Boston & Maine assumes all the liabilities of the company and will pay $150 per share for the outstanding capital stock.

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SAMUEL M. FELTON, lately returned from Europe, being questioned by a Chicago reporter on the never-ending Chicago problem, the smoke nuisance, suggested that the locomotive firemen might promote both their own and the public's welfare by sending a man or men to Europe to study the art of firing. There can be no doubt that Mr. Felton saw skillful firing in England, and there can be no doubt that as a veteran railway manager he knows the firemen's brotherhood pretty well. In the nineteenth century anyone aiming to improve locomotive service would have gone most naturally to the railway manager; if the firemen needed instruction or exhortation, the way to accomplish the desired end would be through the manager. In the twentieth century, however, things are different. In suggesting an appeal direct to the firemen, Mr. Felton is following the example of the highest authority, the president of the United States, and the president follows the example of his predecessor; also of Mr. Fagan. Both Mr. Roosevelt and Mr. Taft have gone direct to the "rank and file" for counsel in matters concerning railway operation, more often than to railway officers. (Suppose the president should follow that rule in dealing with the army and navy!) But, whatever one may say in regard to the practical wisdom of the course indicated, no one can say that it is not fair to the firemen to "put it up to them." Other brotherhoods can take a lesson also. The Order of Railway Conductors might attack the chronic scandal of dishonest fare-takers. To cure that evil would be doing a valuable public service. A valuable public service will be done also whenever the Brotherhood of Railroad Trainmen shall demonstrate the economy of the "full crew" laws, which it has induced several hundred legislators to vote for.

THROUGH the monthly magazine published by the Pere Marquette, the management of this railway recently made a very full statement to its officers and employees regarding its financial condition and appealed to all on its payroll to co-operate in improving its service and increasing its gross and net earnings. It was shown that, while the road's capitalization is comparatively low, it is not prosperous, this being largely due to the fact that a considerable portion of its mileage, which was formerly logging lines, is not self-supporting. It was pointed out that its operations for the last fiscal year resulted in a deficit of $1,830,000; and that nevertheless it has to pay the same wages as its prosperous competitors. It was stated that, in spite of these conditions, the management believes if a proper effort to effect economies be made by each person connected with the road during the present fiscal year, it will be possible to show a small surplus at the end of it instead of such a large deficit. Many railway managements have to some extent adopted the policy of taking their employees into their confidence regarding the business of their roads, but few have been so frank as the management of the Pere Marquette. The results ought to be good. By placing before the employees the actual facts it is almost certain to secure better co-operation from them in keeping down expenses. Mere general statements that a large concern like a railway is unprosperous are apt to be received with skepticism by those who daily see it handling a large business, but who seldom consider the fact that a large business means large expenses, as well as large earnings, and that it is only the margin between them that keeps off bankruptcy. Furthermore, by laying the facts before employees an influence is pretty sure to be indirectly exerted on public sentiment. Railway employees are constantly coming into contact and talking with their neighbors, and the information that is given to them regarding the business of the road is sure to be passed along to others who are not connected with it. If every railway in the country would each year issue to its employees a frank and full statement, couched in simple and direct language, showing exactly what the condition of its business has been during the preceding year, how large a share employees are getting of its earnings, how large a share the stockholders are getting, the

relatively small cost of railway transportation compared with the value of the services rendered, and the various ways in which employees could with very little additional trouble and effort save large sums to the company, the results probably would be highly beneficial.

ONE of the many important points brought out in the hearings before the Securities Commission, of which President Hadley, of Yale, is chairman, is the totality of the ignorance of the general public, and even of the investing public, in the entire subject of the safety, desirability, equity in earning power, etc., of railway companies' securities as investments. This fact is not new to any one dealing in bonds or stocks, and even if the commission, in its report to President Taft, emphasizes this fact to the utmost, it is doubtful whether it will make any particular change in actual conditions; but it is worth while pointing this out in connection with a charge that is often brought against the railways that they themselves should sell their securities directly to the general public and save for the company and the stockholders the substantial commissions that are granted to bankers for underwriting these issues. As a matter of fact, the average small investor, if left to himself, could not make even an approximate estimate of the security or equity behind his holdings. He buys a certain bond or share of stock of a certain company, because it is recommended to him by a banker or bond house whom he knows and in whom he has confidence. It was the universal testimony of bankers before the commission that their customers relied far more on the reputation of the banker or bond house offering securities than on the customer's own knowledge of the property itself. This is natural enough. A man can't be a chemist because he has to buy drugs from a drug store, but the point is that no one complains because the manufacturing chemist does not sell his goods direct to the public, but allows two to three or four middlemen's profits to intervene. The general public isn't supposed to have all the qualifications of an expert druggist, but the intricate science of investment is assumed to be the common knowledge of the great American public by the stockholder who brings an injunction suit to compel his company to sell its securities directly to the public without allowing any middleman's profit.

IN construction news this week there is mention of a 30-mile line that is to be built by the Consolidated Coal Company from one of its properties in Letcher and Pike counties, along the southwestern border of Kentucky, to a connection with the Chesapeake & Ohio at Selby, Pike county, Ky. The more than ordinary interest that attaches to this news arises from the fact that it is understood that the Baltimore & Ohio is to take over this line, after the construction company—the Big Sandy & Elkhorn—have completed it, at a price which will represent construction cost and interest. This will give the B. & O. a little piece of road 30 miles long but nearly 100 miles away from the nearest B. & O. line. The Chesapeake & Ohio has a branch line running down almost due south from Ashland, on its main line on the Ohio river, to Elkhorn City, 134 miles, and it is this branch that the Carolina, Clinchfield & Ohio has been building north to connect with. The C., C. & O. has got as far as Dante, in Virginia. Dante lies right down in a pocket of the high mountains, so that to get further north it will be necessary for the C. C. & O. to build an enormously expensive tunnel, [illegible] north through the tunnel, the freight earnings would pay the [illegible] therefore, the C. C. & O. will build a line up the mountain with [illegible] nect with the C. & O. at Elkhorn City. President Stevens, of the C. & O., has been quoted as saying that the C. & O. would lease the C. C. & O., and this is probably substantially correct, providing, of course, that the C. C. & O. can build its lines through the difficult country between Dante and Elkhorn City. At the time the C. C. & O. was building north to Dante it was estimated that the output of the Clinchfield corporation's coal mines would be 2,000,000 tons a year. If any great part of this went over the Elkhorn branch of the C. & O., it would in itself make a very busy line, but if in addition to this there is to be 3,000,000 tons delivered to this branch each year by the Big Sandy & Elkhorn, it is pretty safe to assume that there will have to be considerable double-tracking done to that line of the Chesapeake & Ohio. The acquisition of this isolated 30-mile line by the Baltimore & Ohio, with the attendant control of a heavy tonnage of coal, has other points of interest beside the business that is to be given the C. & O. branch. When the Baltimore & Ohio bought the Cincinnati, Hamilton & Dayton, the Chesapeake & Ohio was delivering to the C. H. & D. road something in the neighborhood of a million tons of coal a year for Toledo and the Lakes. With the acquisition of its own line—the Hocking Valley—to the Lakes, the C. & O. had it in its power, and would presumably find it advantageous, to turn over a good part of this tonnage to the Hocking Valley by way of the Kanawha & Michigan, rather than give it to the C. H. & D. If the B. & O. is able to originate and route a great tonnage of coal from a newly developed region in Letcher county, it can more than supply the deficiency caused by any withdrawal of C. & O. coal, by routing its Big Sandy & Elkhorn coal over the C. & O. branch as far as the Ohio river, and there possibly building a bridge, as suggested in our construction news, across the river and sending its coal to Toledo over the C. H. & D.

THE MALLET LOCOMOTIVE.

IT may be well to preface what follows with the statement that it must not be taken as an expression of editorial opinion, but merely as an echo of some of the tentative opinions or suggestions that are in the air regarding the Mallet compound locomotive. This type of locomotive has been in extended service for too brief a period to have demonstrated its superiority or inferiority on all points. It has, however, established itself as an economical factor in train operation in certain places and to such an extent that its owners are firmly convinced that it is the proper machine to use in the service in which it is employed. On the other hand, there are those with whom conditions have been so different that it is regarded with but scant favor, especially where an attempt has been made to use it in regular road work.

That it has its limitations there is no doubt, and if it had developed into a machine of all-around efficiency would be little short of marvelous, for there probably never will be another locomotive that will occupy the place that the old 4-4-0 engine did in the days of low capacity cars and short trains.

The criticisms that have been raised regarding the Mallet locomotive are not those of mechanics, but of economics. It is not a question in the minds of railway managers as to whether it will do its work, but as to what may be the limitations of its efficiency, and as to whether, all things considered, it is a cheaper machine to operate than the other type which it is replacing.

In the first place, the Mallet locomotive is usually, if not invariably, heavy, and it has been found that a track moderately well ballasted and laid with 60-lb. rails is no place for the Mallet. If used in such a place, it will distort the track and bend the rails, and if its speed is raised beyond the low limits of pusher service it will be a source of constant anxiety. Therefore, before the Mallet is purchased the track standard must be raised to a point to meet it. In one instance, at least, where this was not done, a Mallet has been sent off the line and put to work where conditions are more in accordance with its requirements.

As to its effect on track, we are still in the tentative stage of inquiry, through which we have passed with all of the principal [illegible]

lubricator, use of steel castings and the like, where we had a mass of commendatory and condemnatory testimony bundled together and uttered simultaneously, because the conditions under which the contradictory opinions were formed were, in themselves, contradictory. So when one trackman says that the Mallet has no more effect on track than any other locomotive, while another announces that it is absolutely destructive, we must look to a difference in locomotives or tracks to account for it. However, this much is certain, that we know about as little as to the track stresses set up by the Mallet or any other locomotive as it is possible to imagine, and until they are investigated we must work in the dark to a great extent. The only thing that we have any inkling of is that there seems to be a probability that the Mallet does set up greater track stresses than ordinary locomotives, due, in part, to one unit running backward and thus acting like a mogul or consolidation running backward. We do know that the rail stresses are greater than when the same engine is running ahead, and to this must be added the possible increase due to the method of coupling the two units.

Again, the Mallet, as a road engine, has been criticized on the basis that its normal coal consumption while working at its maximum, is more than the average fireman can handle. This is, probably quite true, especially when applied to the heavier sizes; but, as was indicated in the Master Mechanics Convention, this need hold no longer, because it has been demonstrated that the mechanical stoker is now quite sufficient unto the task; still there are those to whom the demonstration has not yet been made, and with them the objection holds.

Another objection has also been raised to the Mallet as a road engine that is more intangible and depends for its soundness entirely upon practice, which can only be determined from an examination, in detail, of the train despatcher's sheets, in which the running time of the Mallet is compared with that of consolidations and other heavy locomotives. The objection is that the Mallet is capable of hauling trains of such great length and weight that, in order to avoid break-in-twos and the crushing of cars, they must be started and stopped so slowly and with such care that an excessive amount of time will be lost in getting over the road, and that these delays impede other traffic to such an extent as to outweigh the advantages of high tonnage. This is an objection raised by an officer of a road on which there are a number of Mallets, so that it has at least the merit of being based on experience.

The most serious arraignment of the Mallet has come from the agnostic, the popular man from Missouri, who wants to be shown things most difficult to show, and is of so intangible a nature as to appear almost academic. The criticism offered is that a Mallet locomotive is essentially two locomotives to start with, and, in addition, it carries some extras not found in the ordinary machines, such as superheaters, reheaters, feedwater heaters, flexible steam and exhaust pipes, sliding bearings for the boiler and other minor matters, all liable to derangement. And if any one of these extras, as well as any of the ordinary locomotive components, are out of order, the whole locomotive, costing not quite twice as much as an ordinary machine, must be laid up. The point raised, then, is this: Is there any real saving in operating costs if interest on the first price of the locomotive is charged against it for the period during which it is laid up? How does the lost time of the Mallet compare with the lost time of the Mikado or consolidation? And, if this lost time were to be reckoned, what would be the economic results? There is very little data bearing on this point, and yet it is one that should have great influence in deciding as to how, when and where the Mallet should be used, and it is one upon which data should soon be forthcoming so as to give some idea as to what these intangible costs may be.

This position is taken by men who stand somewhat aghast at the high maintenance cost of the Mallet. It is recognized that its repair bill should be higher than that of an ordinary locomotive, because it consists of practically two engines. But when the cost runs up to from 24 to 30 cents a mile, with the consolidation standing at from 10 to 11 cents on the same division, it does seem high. Then when we revert back to our old eight-wheelers and remember their costs of from 3 to 4 cents, the Mallet actually staggers us.

The point desired to be emphasized here is the fact that all men are not yet satisfied that the Mallet is an economical proposition, and to suggest lines along which its efficiency and operation should be investigated. Of course these things will develop in time, and the design will survive or perish according as it is fit. But this ultimate fate can be hastened by making a determination of these points. If it were to be done, it is quite probable that such modifications of design would be suggested as to improve efficiency and remove the doubts that still exist in the minds of some as to whether it should be used or not.

THE RAILWAYS AND THE TARIFF.

TWO years ago Congress passed the Payne tariff bill, so-called. Save a few special interests it satisfied no one. No reduction of the cost of living followed, and even the provision for free hides brought no reduction in the cost of shoes to the consumer. The natural and logical result followed. The new tariff became a national issue in a constituency of many millions of voters smarting under the price of commodities of prime necessity; and the next congressional election returned a great opposition majority to the House of Representatives, and all but reversed the more stable Senate—indeed quite reversed it if the matter of a dependable party majority and the inertitudes of the "insurgent" element are taken into account. Thus the tariff question instead of being settled has become profoundly unsettled. Men may differ on the question in the abstract. There is the wide gulf fixed between the absolute free trader who deems a high protective tariff a compact with Satan and the ultra-protectionist who attributes to high protective duties every economic virtue. But high protectionist and free trader alike must join with the great body of moderates in their views as to the direct effect on the business of the land of tariff uncertainties.

The unfortunate result of the situation in its bearing on the railways is that they became a target hit from two directions. The railway, in its economic character, has its analogies to the individual—that is to say, it is necessarily with producer and consumer. It produces transportation, which is, at bottom, rather a commodity than a service. Certainly it is not a service in quite the sense of that rendered by a wage earner at one end of the scale and, say, a professional man like a lawyer, at the other. From the other viewpoint, as a consumer, the railway has some obvious analogies to the individual; but, while similar in principle and in kind, it vastly outranks him in degree and in variety. Its range of consumption is well-nigh illimitable. It consumes labor in a hundred forms. There is hardly a commodity that can be named that does not enter into it as a going concern. It touches not only the raw material, but the manufactured product, and reaches out in lines that are often hard to trace directly. One might not, for example, think at first of the railway as consumer rather than producer of the mechanism of the farm. But when one reads of a company like the Canadian Pacific not only selling the land for the incoming settler, but supplying it with buildings and implements, the scope of the railway becomes more fully realized. And it may be added that probably in much larger degree than in the case of the average individual does the railway buy and, directly or indirectly, consume the commodities which the national tariff affects—and, as to price, affects upward.

But besides its more general relation to prices, there is another vital difference between the railway as a producer of transportation and the man or industrial corporation who produces something else. Within certain limits the man or industrial can readjust prices. The railway is denied that readjustment. In the former case, tariff changes can in one form

or another be met, whether it involves lower prices compensated for by extension of trade, or contraction of business; but in the latter case, that of the railway readjustment is hard, if not impossible. It is, for the present at least, refused by federal authority control of the price of its product—transportation. It is true that the greater corporations have now begun to feel federal interference more sharply. But, as yet, the actual results are indefinite, while in the case of the railways they have been very definite indeed. And, as regards tariff revision and the big corporations, there is still greater indistinctness. Where the railways must stand still and endure, the industrials retain considerable freedom of action. We shall know more when the courts interpret the word "reasonable."

But the main consideration in this question of the relation of the railways to the tariff reverts to the broad and sweeping character of the railway business. Other interests are specialized and tariff changes may affect them up or down. But the railways, as a whole, reflect general conditions. The particular railway may carry more of one kind of a commodity than another. We have coal roads and grain roads and cotton roads. But there is not a railway, however short, that has not its general business too; and, taken in its entirety, this general business is the major factor in railway traffic and returns. When, as recently, the greatest lumber company in the Northwest owing to nebulous tariff conditions cuts its shifts of men 50 per cent.; or "Schedule K" lowers production of the woolen mills; or, on the other hand, Canadian reciprocity promises enlargement of railway traffic; the matter of tariff adjustments in *some* shape of at least moderate continuity and fixity becomes from the railway point of view the prime desideratum. Other interests, whether individual or corporate, have the same feeling and motive. But with the railways, hit hardest by tariff uncertainties, the argument for the economic fixities becomes peculiarly cogent.

NEW BOOKS.

This is the first edition of a manual which aims to give a concise analysis of accounts of the principal railways in the United Kingdom, India, North America and South America. The editor's introduction lays down the general principles which should guide an investor in making a study of statistics published in the manual, and lays particular stress on the lack of statistics for English railways. The analysis of the standing of each company includes a condensed income account showing earnings and expenses in the last ten years, and also gives the mileage operated, [illegible] A balance sheet as of June 30, 1910, is also included. With these figures is a short "analysis" of the financial position, history and traffic possibilities of each one of the roads. The editor says that, as far as was possible, the figures were taken directly from the annual reports of the companies themselves.

The book is intended to contain nothing which can be easily obtained from other publications, of which a list is given. The [illegible] never heretofore been brought together in one publication. That is to say, its value lies in the wide extent of information rather [illegible] however, as can be judged from the analysis of the American roads, although not conservative in method of statement. The book

Letters to the Editor.

WIDE FIREBOXES.

New York, July 10, 1911.

To the Editor of the Railway Age Gazette:

In the interest of historical accuracy, as well as in justice to the memory of James Milholland and John E. Wootten, I beg leave to correct an error of fact in the following statement of the notice of Theodore N. Ely, appearing in your issue of July 7:

> "It was Mr. Ely that took the first step, alone, against the protests of many by whom he was surrounded that has led to the development of the large locomotives of today. While builders and engineers considered that the end had come, that the locomotive had reached the limit of its power, because of the restrictions current construction put upon the size of the firebox, Mr. Ely lifted his whole boiler into the air, set his foundation ring on top of the frames, widened his firebox and gave the machine a new lease of life. Many and dire were the predictions made as to the instability of the new design. But we all know the result. It did not upset, but ran with unexampled smoothness; and with construction revolutionized the whole country followed in his wake."

As a matter of fact, the design recited in the foregoing excerpt was originated and put in practice by James Milholland, on the Philadelphia & Reading in 1857, and a large number of similar locomotives were constructed and operated by him. The same design, but with a full width firebox, was reproduced and built by John E. Wootten, commencing in 1877. In a paper on Wide Firebox Locomotive Boilers, which I presented to the Western Railway Club at the meeting of November, 1895, and which appears on pages 96 to 128 of Vol. 8 of the Proceedings, I made the following statements: "Lateral increase of grate area was, as we shall see, essayed at an early date, but the wide firebox proper, by which is meant one which is located entirely above the wheels, and extended laterally beyond them for a substantial distance, was not put into practice until 1877, when the first Wootten boiler was built by the Philadelphia & Reading. The standard narrow firebox had, however, before that date, been widened to the extent of about 6 in., by making its width equal to the distance over the frames and placing it on top of the frames. This construction, which is now almost universally used in standard type locomotive boilers of large size, and particularly in anthracite coal burners, was one of the many improvements devised by the late James Milholland, then in charge of the motive power department of the Philadelphia & Reading, and was introduced by him on the engine Vera Cruz, a 15-in. passenger engine, built in that company's shops in 1857, and which had the then large grate area of 24.5 sq. ft. While this firebox is not properly within the class of wide fireboxes under consideration, it may be of sufficient interest, as a piece of history, to be illustrated, and is shown in Figs. 1 and 2."

The correctness of these statements has never been questioned, and I again submit them as matter of history. The earliest application of this construction which was made on the Pennsylvania was in the class K passenger engines, the first of which, No. 10, was built in or about 1880, and was illustrated in the *Railroad Gazette* of October 28, November 4, 11, and 18, 1881, and in *Recent Locomotives*, edition of 1883. It will, therefore, appear that Mr. Ely did not take the first step in this design, and I am satisfied that he would unhesitatingly disclaim having done so.

J. SNOWDEN BELL.

The acting premier of Australia estimates that the 4 ft. 8½-in. line which the state means to construct alongside the present 3 ft. 6-in. line from Perth Kalgoorlie to meet the Federal Port Augusta railway, will cost $7,250 per mile. The existing earthworks will be widened, but the broad gage will be entirely separate from the narrow. A proposal to take the broad line from Belmont direct to Fremantle southward along the Swan [illegible] under consideration.

THE EFFECT OF GRADES ON OPERATING COSTS.

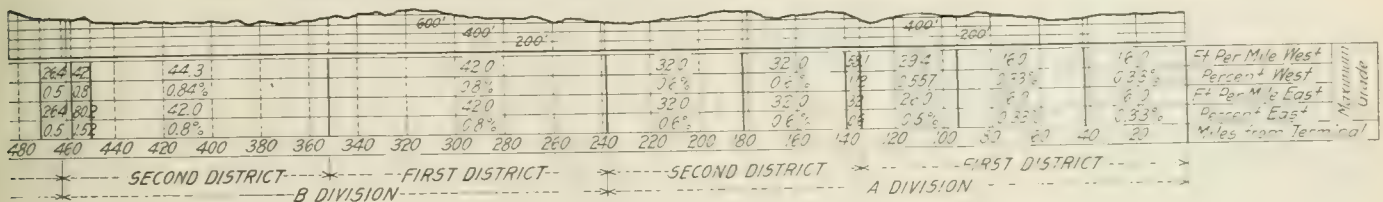
BY C. J. MORRISON.*

Each railway in the United States doing an interstate business is required to file uniform reports of its entire business, physical, operating and financial, with the Interstate Commerce Commission. There are, however, a number of facts which are not reported to the Interstate Commerce Commission, but which it is essential to know if one is to make any comparison between operating cost of two roads. The accompanying profiles are intended to in part supply some of this missing data.

When we turn to the bulky annual statistical tome issued by the Interstate Commerce Commission, we find a thousand pages teeming with closely printed and confusing tables of almost useless data and summaries, while much information, essential to any clear picture of physical and operating conditions on the railway properties in the United States, is omitted. In 1909, however, it is worth while noting that there is some improvement in this respect.

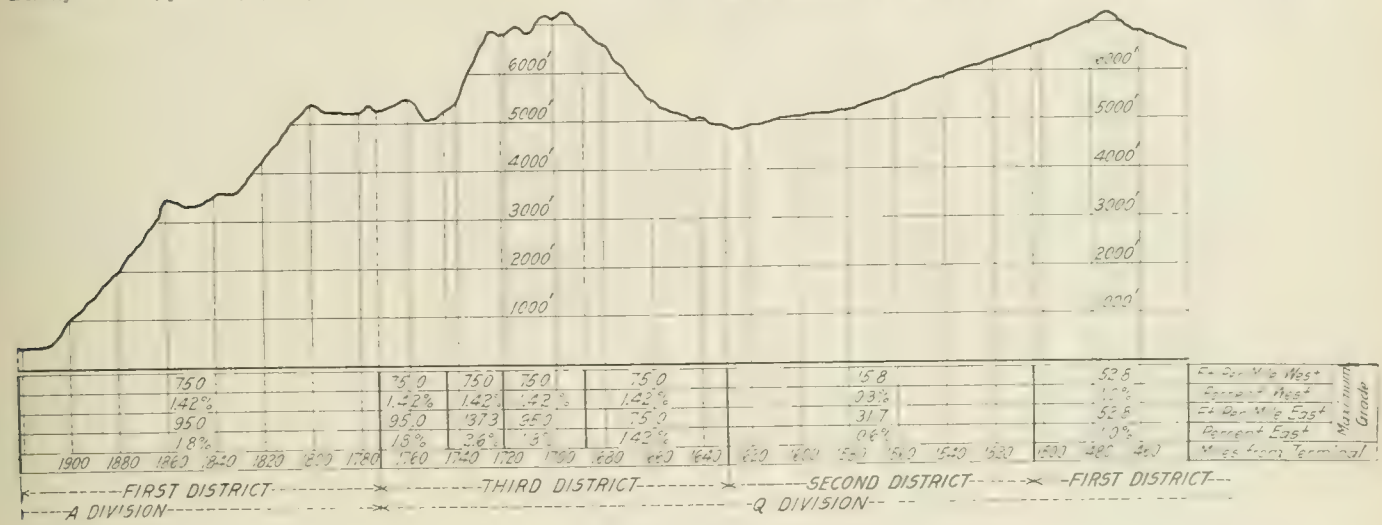
In a previous article in the *Railway Age Gazette* the writer went at some length into the comparative costs of maintenance of equipment on different roads, and it was pointed out there that when judging maintenance of equipment expenditures there are many items that must be taken into consideration other than the locomotive mileage operated, etc. This is equally true of maintenance of way. In both the maintenance of way and maintenance of equipment the topography of the country governs to a large extent. In a comparatively level country, locomotives of medium size, with large driving wheels, are able to run at fairly high speeds. Locomotives in a mountainous district are much heavier, are equipped with smaller driving wheels and must run at slow speeds, thus increasing the maintenance of equipment cost. These [illegible]

COST OF FREIGHT LOCOMOTIVE REPAIRS AND FUEL IN LEVEL AND MOUNTAINOUS COUNTRY FOR 12 MONTHS PERIOD.



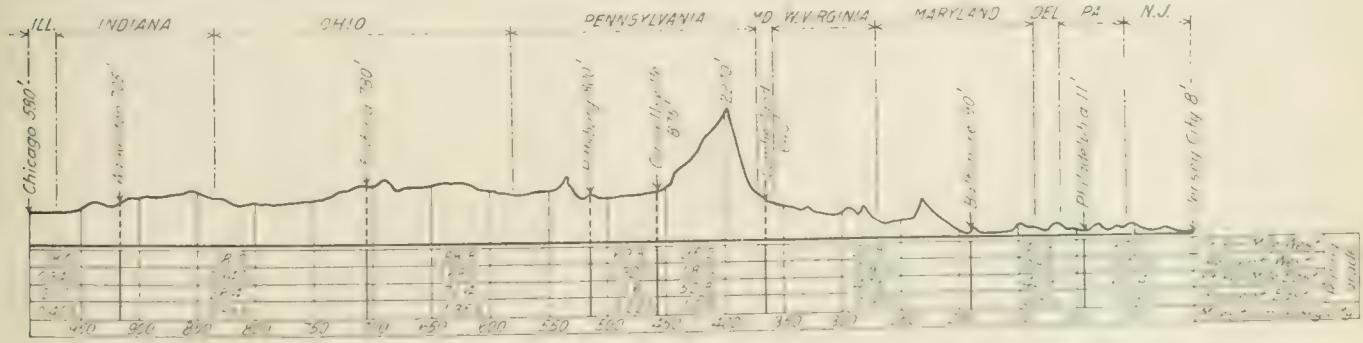
Level Country.

1,000 gross ton miles	5,300,827	Total cost of locomotive repairs and fuel	$1,396,729
Density of traffic, per mile, 1,000 g. t. m.	6.884	Cost of locomotive repairs and fuel per 1,000 g. t. m.	0.264



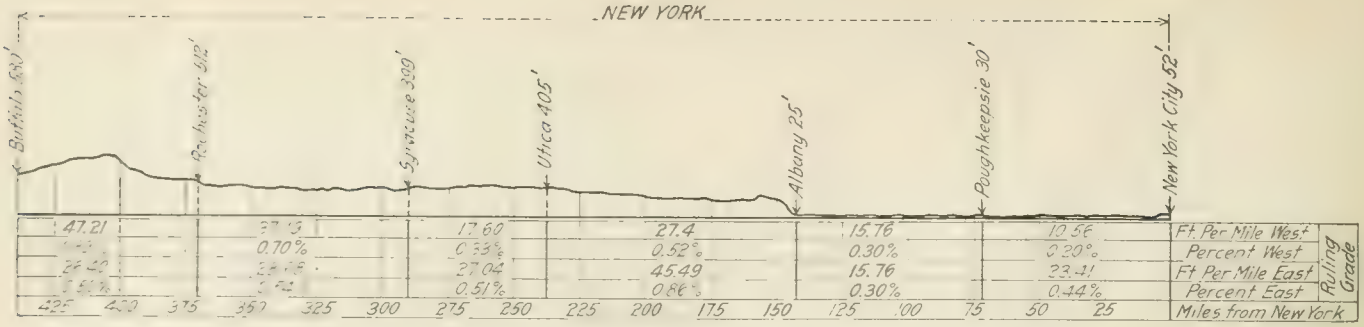
Mountainous Country.

1,000 gross ton miles	4,049,015	Cost of locomotive repairs and fuel per 1,000 g. t. m.	[illegible]
Density of traffic, per road mile, 1,000 g. t. m.	4,049	At traffic density in level country, increased cost of repairs and	
Total cost of locomotive repairs and fuel	$1,069,182	fuel would be	$1,[illegible]

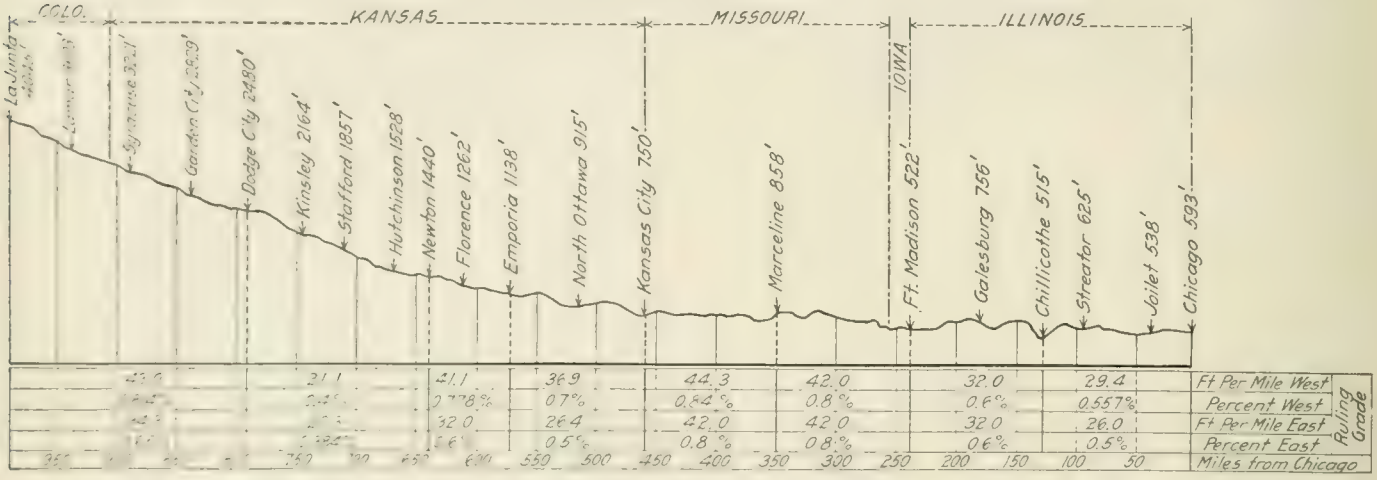


Profile of the Baltimore to Chicago Line of the Baltimore & Ohio with New York Connection.

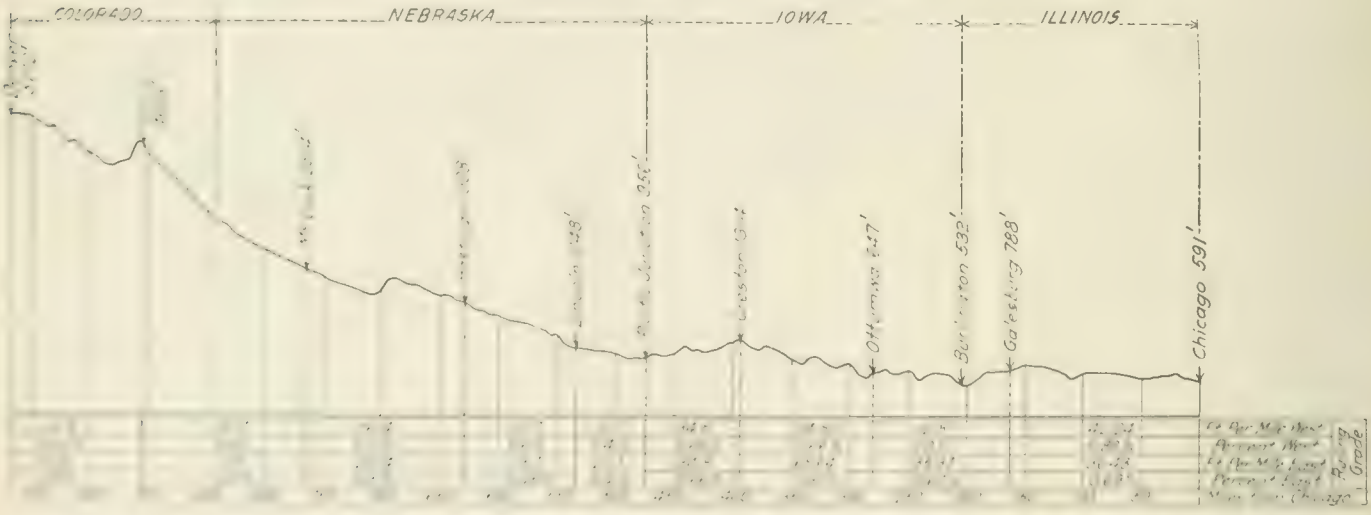
*Working in connection with a number of [illegible] Mr. Morrison is manager, Department of Efficiency Organization, Sanderson & Son, New York.



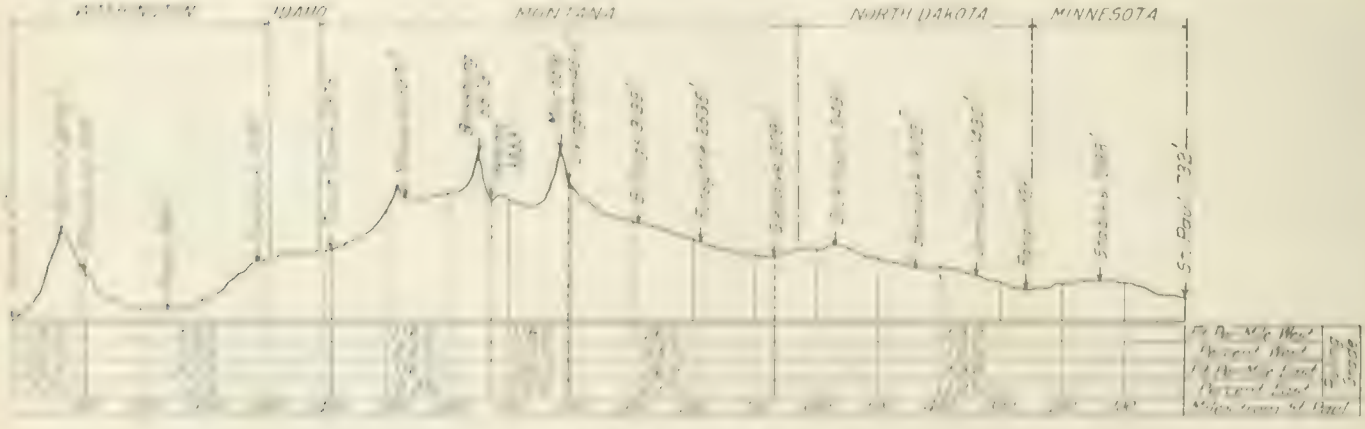
Profile of the New York Central & Hudson River; New York to Buffalo.



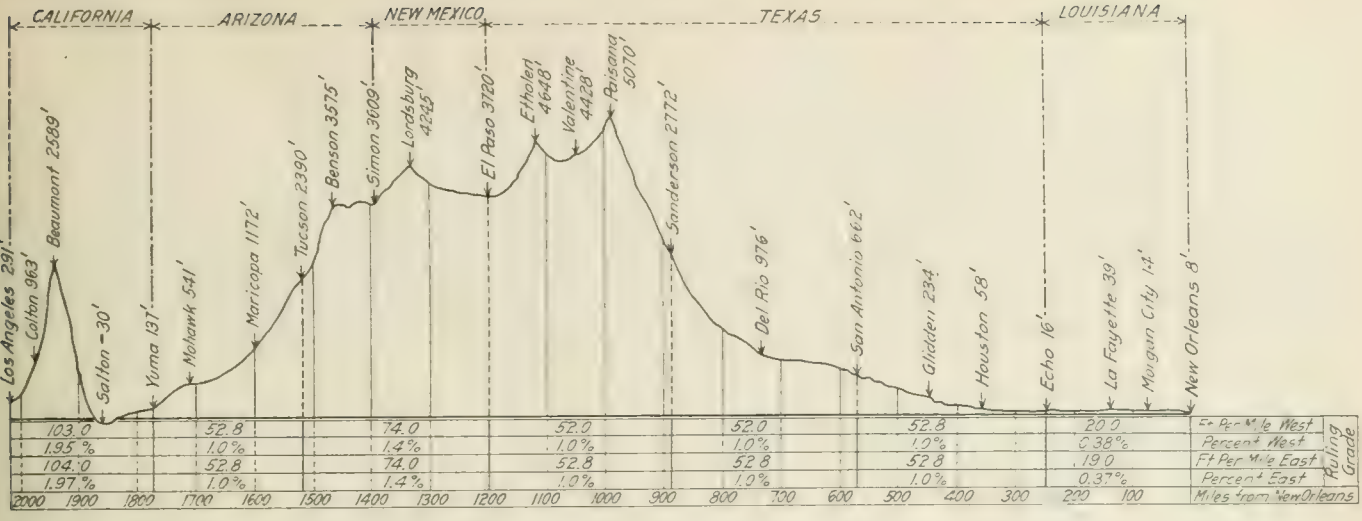
Profile of the Atchison, Topeka & Santa Fe Line from Chicago to La Junta.



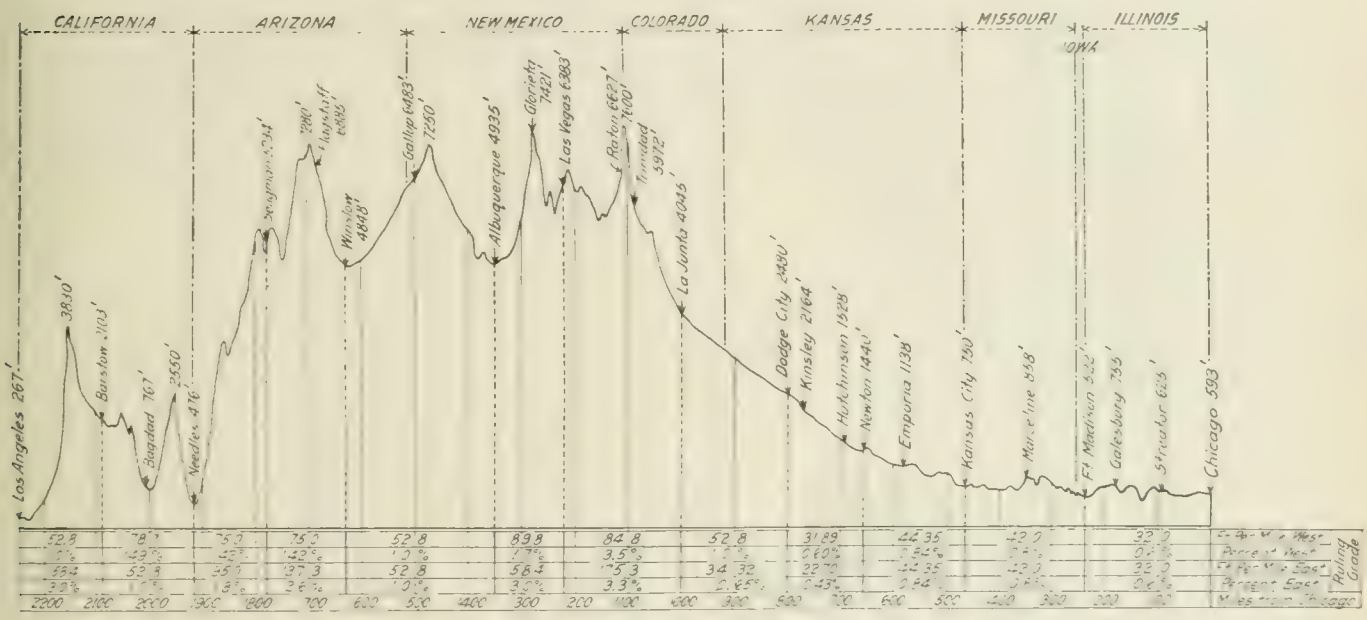
Profile of the Chicago, Burlington & Quincy.



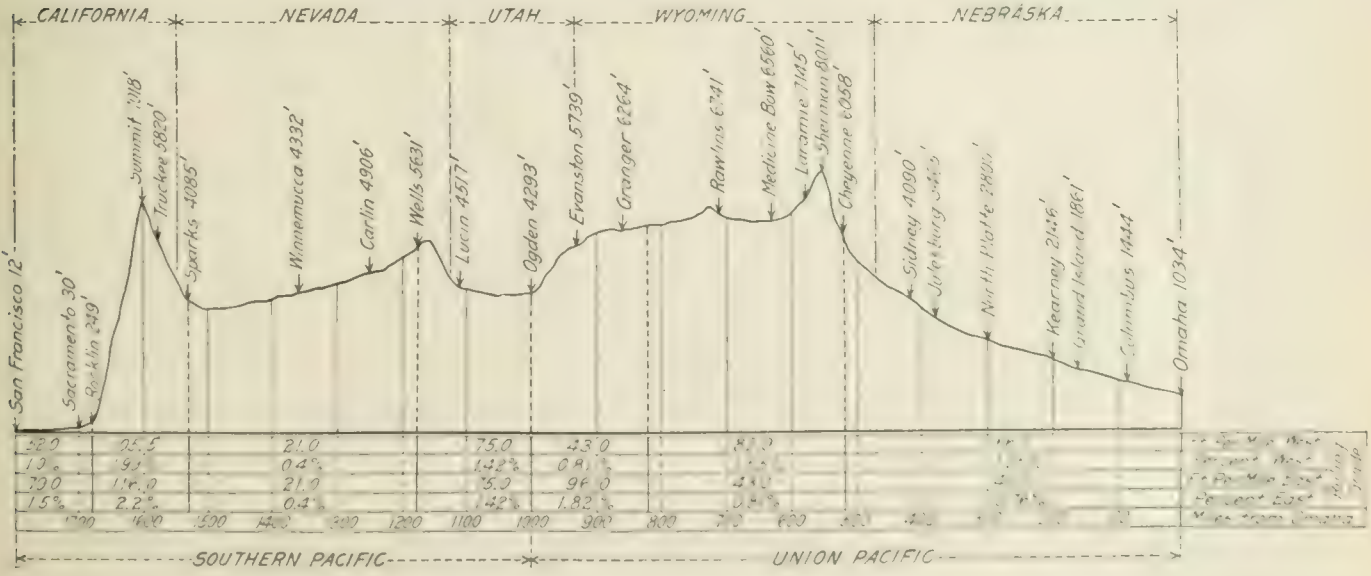
Profile of the Northern Pacific.



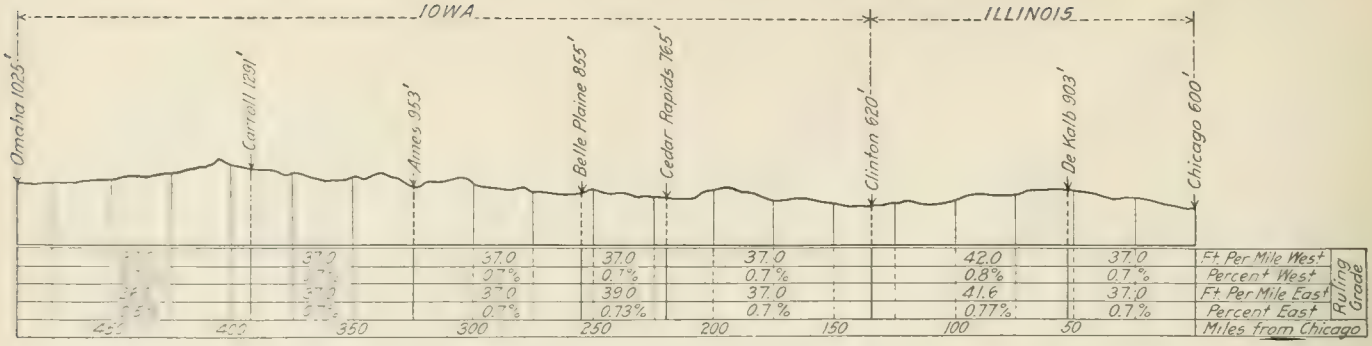
Profile of the Southern Pacific and Sunset Lines.



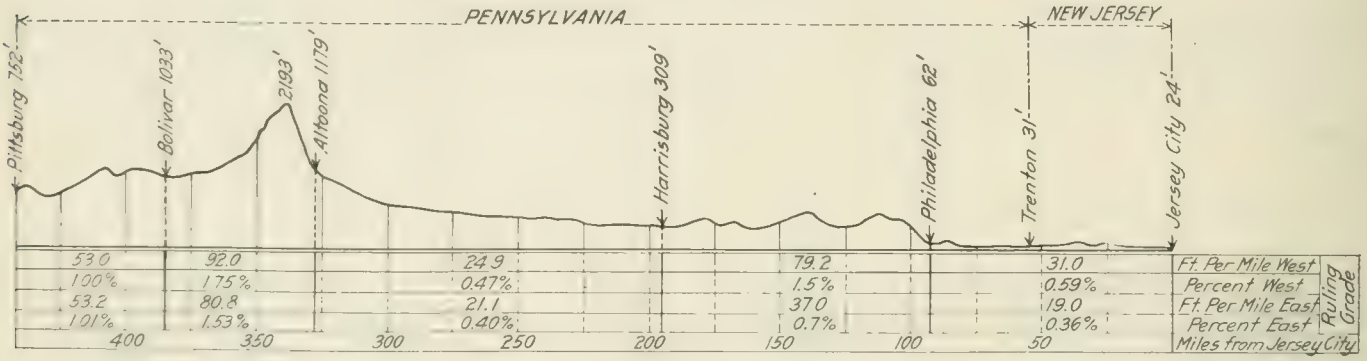
Profile of the Atchison, Topeka & Santa Fe; Chicago to Los Angeles.



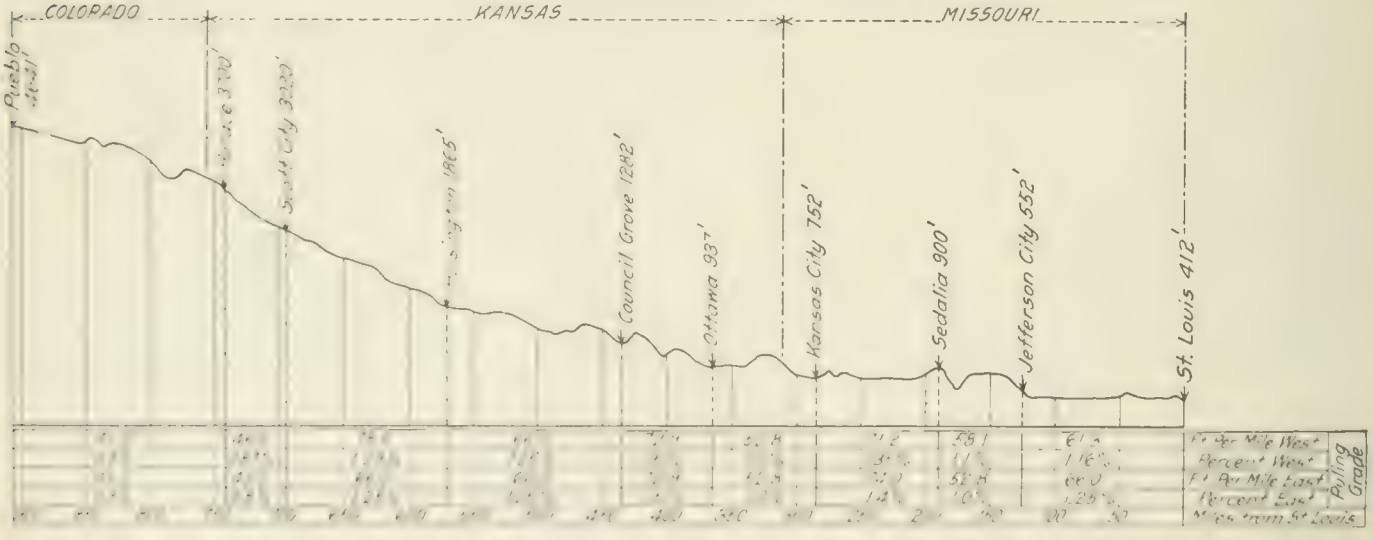
Profile of the Union Pacific-Southern Pacific Line from Omaha to San Francisco.



Profile of the Chicago & North Western.



Profile of the Pennsylvania Railroad.



Profile of the Missouri Pacific Main Line West.

[illegible] to the United States. Profiles [illegible] published in the annual report to the stockholders, the new Chicago Great Western being a notable exception. Neither are profiles given in the annual report of the Interstate Commerce Commission. The profiles that we publish, therefore, are intended to be of some service in any analysis of maintenance costs that may be based either on the reports of the railways to their stockholders or on the figures compiled by the Interstate Commerce Commission.

To give some idea of how largely operating costs are affected by the topography of the country, two lines, one through mountainous country, and the other in fairly level country, are [illegible]

The cost for locomotive repairs and fuel is thus 59 per cent. greater for the mountainous districts than for the level districts, although compound locomotives are used and shop practices and supervision of fuel are the same on both territories. [illegible] would be necessary to bring the grades of the mountainous districts down to those of the more level districts.

[illegible]

	Level Country.	Mountainous Country.
[illegible]	[illegible]	4,049,015
[illegible]	770	1,000
[illegible]	6,884	4,049
[illegible]	$899,689	$647,886
[illegible]	[illegible],040	1,051,296
[illegible]	$1,956,[illegible]79	$1,699,182
[illegible]	[illegible]	$648
[illegible]	1,05[illegible]	1,051
[illegible]	$1,044	$1,699
Cost of repairs and fuel, 1,000 g. t. m.	$.264	$.420
[illegible]		$41,646
[illegible]		59.1 per cent.
[illegible]	[illegible]	[illegible]
[illegible]		$3,858
[illegible]		$1,189

[illegible] 1,189 x 1,000, or. $1,189,000

LETTERS FROM AN OLD RAILWAY OFFICIAL TO HIS SON, A GENERAL MANAGER.*

IX.

CHICAGO, June 3, 1911.

My dear Boy: It has doubtless occurred to you how worthless as evidence are many of the office files. How can any one tell a year afterward whether the general manager or the superintendent ever saw the telegram on which his name is typewritten? On most roads any one of a half dozen or a dozen people may have dictated the message. How much better, as under the unit system, to have every man doing business in his own name! He can then supplement the written record with much more intelligent recollection of events related to the transaction. We dictate the most important telegrams, which pass unquestioned, without an autograph signature. This is common sense and just as it should be. When an unimportant letter is written somebody has to get out a pen and sign some name or other. How inconsistent. Why not, for certain kinds of correspondence, let the stenographer typewrite the name of the dictating or signing official, and then authenticate with the office dating stamp or a private seal mark? The office dating stamp should be kept under lock and key in official custody in order that it may be used for authentication, like the seal of a notary public. To save the labor of constant signing I predict that some time we may go back to individual personal seals, carried on a finger ring or a watch fob. That is the way they authenticated documents at a time when the gentry felt themselves above learning to read and write.

If you have occasion to dictate a message over the telephone from your house at midnight, do not let the operator imitate your autograph signature, but have him print your name with a pen, pencil or typewriter. Also, take good care to have such messages sent to you afterward for you to check. Your time is valuable, but it cannot be put to better use for the company than in insuring the integrity of your individual transactions. It may be that no record whatever is necessary. With all our craze for accumulating files we do not record many telephone conversations. You must be the judge as to whether a record for your office is necessary, and in such exceptional cases state your wishes at the time. The farther down the employee the more zealous is he to escape possible censure by preserving unnecessary information. What we need is one complete record of a transaction rather than so many partial records. Many of the telegrams sent from a superintendent's office should, after sending, go to the main file room for consolidation with related papers under a subjective classification. It is more logical to file certain classes of messages by days in date order. For example, messages relating to train movements should usually be filed in date order since they are supplementary to the train sheets of that particular day, and the date would be the determining factor in tracing the transaction afterward. These two distinct classes of messages should be filed, the one under a subjective classification, the other under a serial classification. The good, old-fashioned way of rolling together all the messages of the day and cording them in a pile on the top shelf was all right in the day of wood burners, but falls short in this day of higher pressures. Remember, too, that the telegraph office is a part of the same establishment. Wherefore, make a carbon copy of every telegram that is going down the hall to be transmitted.

If you wish to get real busy and cultivate patience, try to introduce a uniform filing system in all the offices on the road. Every fellow will tell you that the system in his office is best. The acid test is: "Will your system fit the president's office?" and the stereotyped reply is, "You see we are very different. Our local conditions are peculiar." So it falls out that when the agent writes his superintendent about office furniture, for example, the agent, if it is a big station, gives the subject a file number. The superintendent gives it a second number. If perchance the general superintendent, the purchasing agent, the general storekeeper, the general manager, and the president should happen to get hold of the papers, each office would affix a different number. You might have on the same railway as many as seven different file numbers for the same subject. Remember that all filing systems are arbitrary. Whether you designate office furniture as seven, eleven, twenty-three, or forty-four, it rests in the breast of somebody to say what that designation shall be. It is like numbering trains, cars and locomotives, we take some arbitrary basis from which we build up a logical classification. Formerly, trains, cars and locomotives were given serial numbers in the order of creation. So were letters in an office. Now the proposition is too big and we assign series of numbers for classifications which are more or less self-suggesting. Any number of men have tried to work out a filing system based on the Interstate Commerce Commission classification of accounts. Any number of men have soon encountered limiting conditions which seem to preclude a satisfactory solution.

If you had time, I do not doubt your ability to work out the best kind of a filing system, but you have not the time. If you had lived before George Stephenson you might have invented the locomotive, but George beat us all to it. If you had time you could work out a table of logarithms, or a table of trigonometric functions. Life is so short that it is better to use the tables that other people have prepared. By the same token, if I were you, I would save my company money by adopting Williams' Railroad Classification. It is an expansive, but not expensive, decimal system suitable for everybody from the station agent to the president. Among the roads that have taken it seriously are the Baltimore & Ohio, the Delaware & Hudson, the Pennsylvania, and the Harriman Lines, not such a puny lot. Others say of it as of the unit system of organization: "We are watching its development with much interest." In either case, if the stockholders and directors are complacent, you and I have no kick coming as to the number of years over which this inactive watchfulness may extend.

The manifest advantages of a uniform filing classification are the time saved in avoiding duplication of numbers, and the practical familiarity possible to officials and employees of all grades and locations. When a man is promoted or transferred, he does not have to learn a new filing system. Instead of the whole burden of filing being upon a file clerk, everybody can be helping to preserve the integrity and insure the efficiency of the system. It is not necessary to sit up nights and memorize filing numbers. Take the matter seriously and in a short time you will unconsciously absorb the most important numbers, just as you get trains, cars, and locomotives in your head. Officials frequently have a disproportionate and exaggerated sense of the value of their own time. They are paid to think from their presumably wider understanding. If the official by one minute's thought can dictate the file number and later on save several hours of search in the file room, it is his duty to do so. All over the country file clerks tell me their troubles. The burden is, "If you will get the officials to respect the files as much as we respect the officials, it will all be easy." You know, my boy, that there are a whole lot of things that deserve to be taken just as seriously as we take ourselves. Consider this standard code of train rules again. With all its defects and shortcomings it is a vital force. Because it is standard it gains a respect as a result of lifelong drill and discipline of employees, regardless of changes in location or assignment. Therefore standardize your files, and interest your officials. Rank imposes obligation, or *noblesse oblige* as the French say.

It is a much easier matter to start a new filing system than is generally supposed. Just begin. It is not necessary to renumber the old files. Give new numbers to all the old stuff that comes in and in a month or two you will probably absorb nearly all that is of current interest. Then store the remainder of the

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old stuff as a dead file under the old system. Most of the old you will never need, but if you do, as occasion arises, locate under the old system and transfer to the new.

If you are putting up a new office building or re-arranging an old one, try and locate the main file room next to the telegraph office. Or put one over the other so that quick communication can be made by some such device as a chute, dumb waiter, or pneumatic tube. Telegrams received can then be hurried to the file room and related papers attached, when desirable, without taking the valuable time of an official to send to the file room for them. Here is a place for a really rational conservation of official time. The effect of effort should be in proportion to its intelligence and intensity rather than to its amount.

Experts long ago established the fact by time studies, and otherwise that flat, vertical filing cases are the most efficient and economical. There are a number of satisfactory makes on the market. Like selecting a typewriter, it is largely a matter of personal preferment. The way to beat another man at his own game is first to sit in, play and learn. Gamblers would become extinct if all men lived up to this advice. Most railway officials regard organization as an exception to this precept because, as I said before, nearly every man flatters himself that he is a born organizer. Before you raise the stakes too high in trying to beat another man's game of organization, better first sit in and play in his way.

Do not be afraid to trust outlying offices, like those of your superintendents, to run their own files. Have them inspected as often as may be necessary to insure uniformity and efficiency. Do not forbid their adding numbers as emergencies arise. Assemble these new subjects periodically, say once in six months, for standardization, and amplify the working numbers if necessary. You must allow for differences in the human equation. Some men are strict constructionists, and some are broader. Some men classify under a few subjects, while others subdivide to a greater degree. You know the old story of the man who was indexing and feared that something might be overlooked. So under the caption, "God," he put the cross reference, "See Almighty God." Without a retrospective study of actual performance you cannot well say just how many sub-numbers shall be used in a given office, any more than you can determine in advance how many train orders a certain despatcher should put out under the standard code. Among the advantages of using a card index for running a file is that by counting the live cards we know the number of subjects in actual use. This is not inconsistent with book numbers, the book then being used as a reference encyclopedia from which subjects are entered on cards as fast as each necessity arises.

Remember that while immutable principles must eventually triumph over local conditions, much depends upon considerate application. The local condition didn't just happen, but had its origin in some good reason, good or bad, perhaps once convincing but now outgrown. Sometimes the reason is so vital as to be a principle in itself. In our beloved Southland there are local conditions of society which do not obtain elsewhere in this country. True Southerners thank God that human slavery has been abolished. They are striving earnestly and successfully to adjust conditions created in the birth pangs of a social revolution. Well managed railways like the Louisville & Nashville adjust their working policies to these basic conditions. Nearly a decade ago Samuel Spencer, as president, felt that the [illegible] and a rotation of types. Both excellent things in themselves but, as experience showed, easily overdone and carried to an irrational degree. With native talent at hand for the developing he imported to the proud old civilization of his birth some rough and ready brethren of the western prairies. These earnest men [illegible] They were long on art, but short on science. Demoralization and wrecks, attributed to inadequate facilities, cost the road much public confidence, cost the stockholders hundreds of thousands of dollars, and finally, in an awful tragedy, cost the able president his useful and honored life. Fate accorded to outraged sociology and her smaller sister, organization, terrible and undeserved retribution. For, barring this one mistaken policy, Samuel Spencer was an earnest patriot and a constructive railway statesman. As a youth he served in the Confederate army. Through life devotion to his flag was a passion. As a man and a gentleman his character was unblemished, his integrity was stainless. Peace to his ashes. Success to the Southern. Its great traffic strength, actual and potential, rests on the broad foundations laid by Samuel Spencer. Prosperity to the railways. By constant search for the lessons of human efficiency to be drawn from such experiences as these, they prove their broad claim to scientific management.

Affectionately, your own,

D. A. D.

FREIGHT CLAIMS PROMPTLY SETTLED.

There has been a revolution in freight claims; bills for loss, damage and overcharge are adjusted in 30 to 60 days, where formerly there were delays of many months. This we have on the authority of the Railway Business Association, George A. Post, president, which has been investigating the subject, and has printed a pamphlet to tell about it. The association has made inquiries of shippers and associations all over the country, and reaches the unequivocal conclusion that by the co-operative action of the railways, the shippers and the government, a "national grouch" has been transformed into a fast spreading satisfaction.

J. M. Belleville, chairman of the freight claims committee of the National Industrial Traffic League, says that he has had no real complaints from the members of his league for more than a year. The railway claim agent who formerly spent his energies in interposing technical objections and who deemed it his chief duty to prevent the settlement of claims, just or unjust, has been subdued and is being rapidly exterminated Marked improvement in the settlement of claims began about five years ago, and during the last two years progress has been phenomenal and extremely gratifying. This is largely due to the policy of shippers in co-operating with the railways instead of entering suits in the courts. Shippers have improved their methods of packing goods; they mark packages more legibly and intelligently, and in case of loss or damage furnish the legal proofs promptly. Mr. Belleville's association has issued many circulars instructing shippers in these matters. Straight overcharge claims are now settled inside of 30 days, and a number of large concerns report that for the year 1910 all claims of all kinds were settled on an average in less than 60 days.

Testimony in this same general line is quoted from J. S. Lincoln, St. Louis; E. L. Fairbanks, manager of the freight claim department of the Pacific Coast Shippers' Association; E. J. McVann, manager of the traffic bureau of the Commercial Club of Omaha; F. C. Broadway, traffic manager of the Missouri Lumber & Land Exchange Company, Kansas City; P. W. Coyle, Business Men's League, St. Louis; J. W. Hicks, Chicago; N. B. Kelly, Philadelphia Chamber of Commerce, and others. The Chicago, Burlington & Quincy is named as one of a number of roads which notify patrons of overcharges developed in checking billing. The Chicago Association of Commerce has made a canvass of shippers, and finds all but a very few expressing marked satisfaction. An exception is noted in the fact that within the last year the action of the Interstate Commerce Commission, in forbidding payment before liability is established, has checked the improvement that was going on. Chicago shippers report that there is still need of improvement at small towns where the consignee is not so well informed and the railway representative has less authority. Sears, Roebuck & Co., Chicago, report that the amount of unsettled claims against railways is only one-tenth the former amount. Members of the Traffic Club of Pittsburgh say that not for several years has any shipper who is a member of the club had a controversy before the Interstate Commerce

Commission with a railway which is a member of the club. In the southwestern states a confidential canvass among station agents shows that almost without exception shippers are better satisfied than formerly. In New York City neither of the three commercial bodies has found it necessary to establish a freight claims bureau. The most difficult claims to deal with are those connected with shipments of fruit and produce; but the president of the Fruit and Produce Trade Association of New York reports a great improvement, and it is admitted that much of the trouble in the past has been due to the carelessness of shippers in marking and billing their goods. Receivers of cotton in New England reported a decided improvement. A large manufacturer in Boston reports that his claims against prominent roads have been reduced in six years 65 to 84 per cent.

The editor of the pamphlet goes on to describe what is necessary to be done both by railways and by shippers to continue and to improve the good work, giving advice to both sides. Reference is made to the work of Mr. Richards of the Chicago & Northwestern in improving the conduct of the men in the freight houses and on the freight trains of that road. Mr. Gatchell of the Southern Railway, Mr. Nash of the Delaware & Hudson, Mr. Barlow of the Erie, Mr. Kenly of the Atlantic Coast line, and Mr. Levy of the St. Louis & San Francisco have done good work in this direction.

TRAIN ACCIDENTS IN JUNE.[1]

Following is a list of the most notable train accidents that occurred on the railways of the United States in the month of June, 1911. This record is based on accounts published in local daily newspapers, except in the case of accidents of such magnitude that it seems proper to write to the railway manager for details or for confirmation.

Collisions.

Date.	Road.	Place.	Kind of Accident.	Kind of Train.	Kil'd	Inj'd.
2.	Penn.	Downington.	rc.	F. & F.	0	0
5.	C., R. I. & P.	Peoria.	xc.	P. & F.	1	2
5.	Tennessee Cent.	Nashville.	xc.	P. & F.	0	15
*7.	N. Y., N. H. & H.	Fairfield.	rc.	F. & F.	4	0
9.	Atch., T. & S. F.	Domingo.	bc.	P. & F.	1	20
20.	Central Vt.	Randolph.	xc.	P. & F.	0	20
21.	Tennessee Cent.	Mill Creek.	bc.	P. & F.	2	20
23.	Kanawha & M.	Athens, O.	bc.	P. & F.	2	0
24.	Kansas C. Southern.	Kansas City.	bc.	F. & F.	0	2
†28.	Phila. & Reading.	Philadelphia.	xc.	P. & F.	1	21

Derailments.

Date.	Road.	Place.	Cause of derailm't.	Kind of Train.	Kil'd	Inj'd.
1.	Missouri Pacific.	St. Louis.	See below	F.	1	3
†2.	M., St. P. & S. S. M.	Vergas.	washout.	P,	1	3
5.	Grand Trunk.	Lennon.	wind.	F.	0	0
6.	Atlantic C. L.	Jacksonville.	open draw.	P.	0	1
*7.	St. Louis & S. F.	McBride.	bridge.	F.	1	2
12.	G. C. & S. F.	Houston.	d. switch.	P.	1	1
†12.	Col. Spgs. & C. C.	No. Cheyenne.	unx.	P.	1	0
18.	Louisville & Nash.	Whitewood.	washout.	P.	1	8
19.	Boston & Maine.	Plymouth.	unx.	P.	0	0
20.	Chi., R. I. & P.	McFarland.	unx.	P.	0	4
24.	Southern	Salisbury.	unx.	F.	1	1
27.	Chi., M. & St. P.	Bardwell.	unx.	P.	2	10
28.	Chesapeake & Ohio.	Aden.	unx.	P.	1	1
30.	Southern Pacific.	Tunnel, Cal.	acc. obst.	F.	2	1

Other Accidents.

Date.	Road.	Place.	Cause of Accident.	Kind of Train.	Kil'd	Inj'd.
2.	Penn.	Columbus, Ind.	b. rod.	P.	1	0
2.	Union Pacific.	North Platte.	boiler.	F.	3	0
14.	Atch., T. & S. F.	Walong.	powder explos.	F.	0	0
27.	Southern Pacific.	Mescal.	fire.	P.	0	0

[1] Abbreviations and marks used in Accident List:
rc, Rear collision——bc, Butting collision——xc, Other collisions——b, Broken——d, Defective——unf, Unforeseen obstruction——unx, Unexplained——derail, Open derailing switch——ms, Misplaced switch——acc. obst., Accidental obstruction——malice, Malicious obstruction of track, etc. boiler, Explosion of locomotive on road——fire, Cars burned while running——P. or Pass., Passenger train——F. or Ft., Freight train (including empty engines, work trains, etc.)——Asterisk, Wreck wholly or partly destroyed by fire——Dagger, One or more passengers killed.

The collision at Fairfield, Conn., on the 6th involved four trains. An eastbound freight which had run past a distant and a home block signal set against it crashed into the rear of a preceding freight at full speed, and coals from the firebox set fire to the wreckage. The wrecked cars fell over all of the four main tracks, and two westbound freights, one on each of the two westbound tracks, were derailed by the wreck, though the engineman of one of them succeeded in pulling a part of his train past the derailed cars of the eastbound train before they had fallen far enough to foul the westbound track. About 20 cars were demolished, and the fire was not extinguished until the arrival of the town fire engines. Five trainmen were killed and 3 injured. From the testimony given at a coroner's inquest, it appears that the engineman at fault (who was killed) was using steam at the moment of the collision, and that torpedoes and fuses had also been properly placed to protect the leading train, which had been stopped on account of a hot journal. The coroner, in his finding, says that the engineman was a normal, healthy person, that he had been in the employ of the road for several years and that he had not been overworked.

The train derailed on the Boston & Maine at Plymouth, N. H., on the 19th was the "Canadian Pacific Express" from Montreal to Boston; and the train was running at about 50 miles an hour on a straight line. Every one of the six cars ran off the track, but no person was seriously injured. An officer of the road says:

According to the best evidence obtainable, the tender first left the track, and the six cars followed it, the engine remaining on the rails. The roadbed is of coarse gravel and was in first-class condition; ties good and sound, rails of 85-lb. pattern, laid in 1910 and well spiked. Nothing to criticise could be found in the roadbed, ties or track. The engine was of the Pacific type, in perfect condition, having been in service about two months. Thorough expert examinations have determined nothing as to cause. The train ran about twice its length, when it was brought to a stop without serious damage to anything or injury to anybody.

The derailment at Vergas, Minn., on the 2nd occurred at 11 p. m., and was due to a washout. The passenger killed was in a private car, being the wife of L. S. Berg, president of the New Orleans, Mobile & Chicago; and Mr. Berg himself was injured. Eight of the eleven cars in the train ran off the track and three of them were burnt up. The derailment at McFarland, Kan., on the 20th is reported as due to some cause undiscovered. Four cars were derailed, including two sleeping cars and the private cars of Vice-president Melcher and General Manager Sweet. Both these men were slightly injured, as were two other officers.

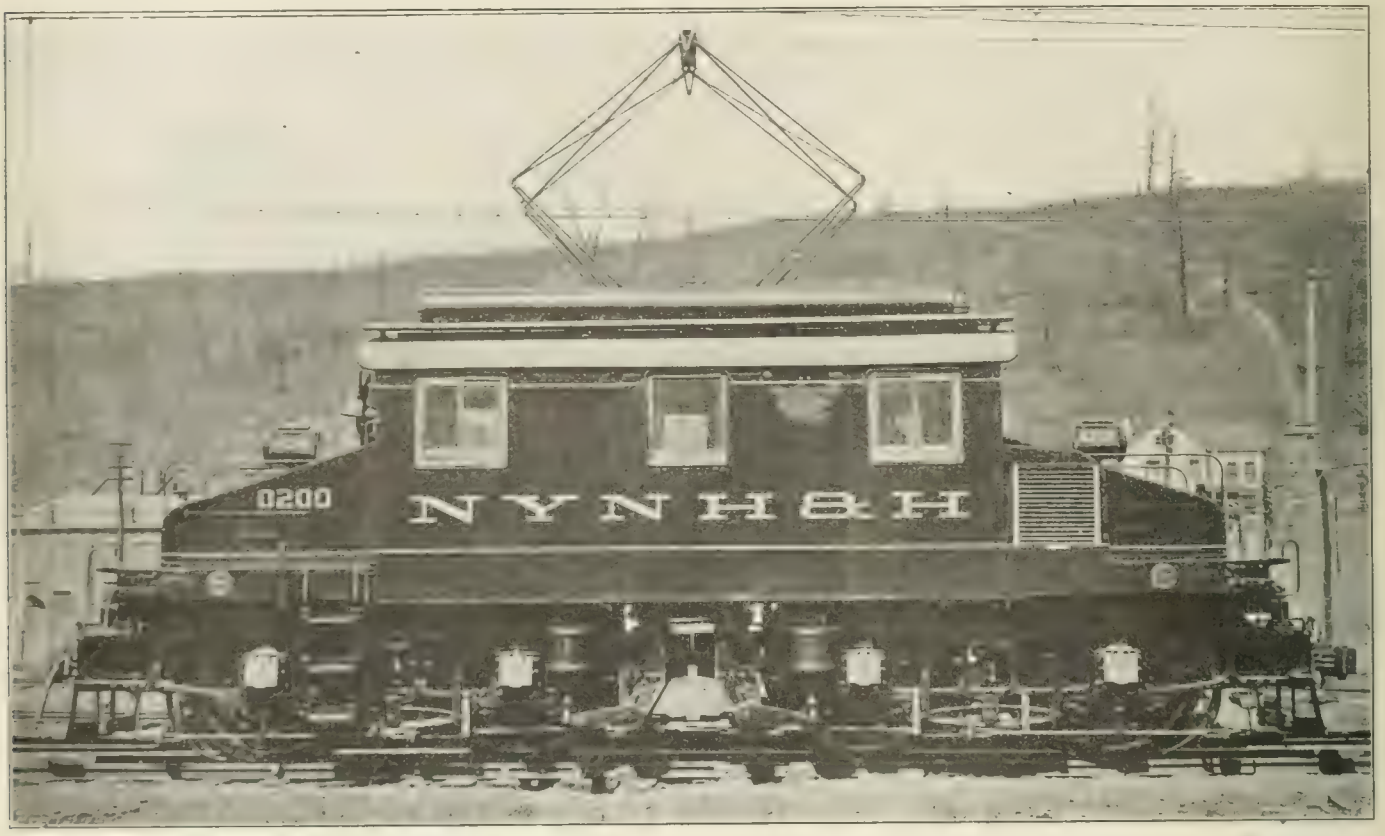
The derailment at St. Louis on the first was due to the sudden stoppage of a long freight train by the application of the emergency air brakes; the slack was taken up so quickly that five cars in the middle were pushed out on one side. These cars fell against a building and killed a man who was walking along the track. The engineman had applied the brakes in emergency because of fear that his engine would run over a woman and a little girl who had suddenly stepped on the track a short distance in front of him to get out of the way of a train on another track.

Electric Car Accidents.—Of the 22 electric car accidents reported in the newspapers as having occurred in the United States in the month of June, none seem to have been attended by fatal results, but there were several in which the injured persons numbered 20 or more.

Canadian.—One passenger was killed and 25 injured in the derailment of an express train of the Grand Trunk at Newcastle, Ont., on the 16th; and two trainmen were killed and four injured in a butting collision of freight trains on the Canadian Pacific. This was on the 19th, and occurred somewhere near Appele, Sask.

ELECTRIC SWITCHING LOCOMOTIVE; NEW YORK, NEW HAVEN & HARTFORD.

A new type of electric locomotive for switching service has recently been delivered to the New York, New Haven & Hartford by the Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., who applied the electrical features, while the Baldwin Locomotive Works supplied the mechanical parts. This locomotive is of special interest, not only in some of its structural features, but because of its being the first articulated truck electric locomotive of large capacity built in this country exclusively for switching operation in the heavy freight yard service of a trunk line.

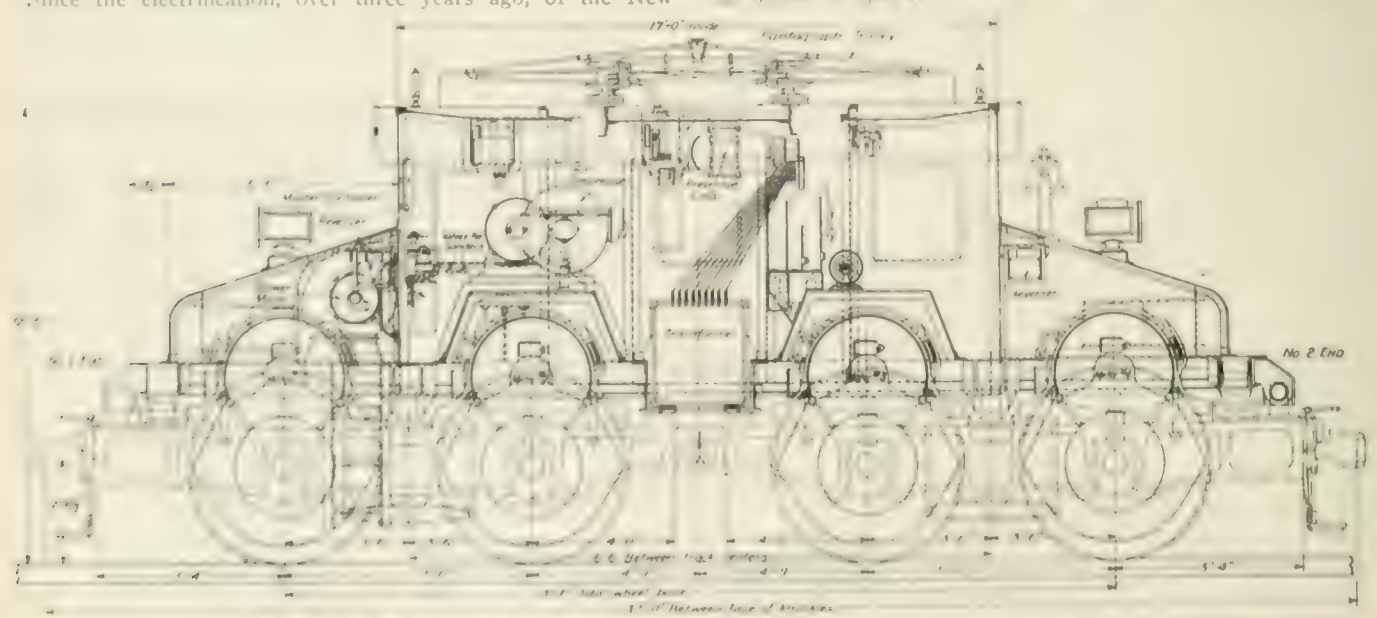


Articulated Truck Electric Switching Locomotive.

Since the electrification, over three years ago, of the New York division from Stamford, Conn., to Woodlawn, N. Y., New Haven passenger trains have been electrically operated; but the Harlem River division and the Mott Haven yards, together with most of the freight service on the main line, have been operated by steam power, as formerly. The electrification of the Stamford yards is completed and that of the Harlem River division and the Mott Haven yards is under way and will be in operation this summer. In the near future all traffic, on the New York end of the main line and on the Harlem River division will be electrically handled.

In making a study* of steam switching locomotives at the

* From a paper presented by Mr. Murray before the American Institute of Electrical Engineers at Toronto, Can., and abstracted in the *Railway* [illegible]



Heavy Service Electric Switching Locomotive; New York, New Haven & Hartford.

Harlem River yards with a view to replacing them by electric locomotives, William S. Murray, electrical engineer of the New Haven said: "In switching, yard speeds can be greatly increased by the use of an electric switcher of very much less engine capacity than was used in the steam switching. On account of the low average rate of energy required for their operation, the central power station will deliver at a far higher efficiency the power necessary to the electric switching locomotives than that obtained from the power plant individual to the steam switching engine itself. Immediate application of this statement is seen in the ratio of the pounds of coal burned to the number of horse-power-hours developed, which was 6.4. Increasing this by the coal burned during the idle hours of the engine, it approximates 8. It has been demonstrated that the ratio between the coal burned for operating passenger trains by electric locomotives, rather than steam, is 1 to 2. In a case of switching engines, this rate is

Electric Switching Locomotive; New York, New Haven & Hartford.

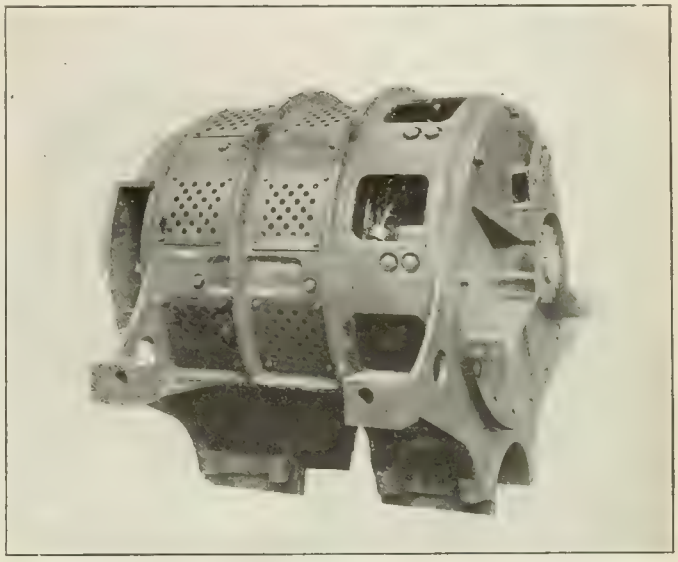
much greater, a figure of 1 to 3 being conservative. This in a measure accounts for the introduction of this new type of electric locomotive.

The new locomotive is a 79-ton, single-phase machine of the articulated truck type, with a central steeple-type cab, the tractive effort being transmitted through the truck frame. The motive power is a quadruple equipment of Westinghouse No. 410, single-phase, double geared motors, with HB (hand operated) Westinghouse unit switch control.

Mechanical Features.—The truck frames are of cast steel, located outside of the wheels and joined at their ends by bumper girders and at the middle of each truck by truck bolsters. The cab has hooded ends and is mounted over center pins so arranged as to relieve the cab structure from draw bar and buffer strains. Its weight is carried by eight spring loaded friction plates. The cab roof and hoods are removable and the motors, air compressor, etc., are arranged for convenient handling. The pedestal jaws in the side frames are fitted with flat shoes. The trucks are strictly interchangeable.

The semi-elliptic springs are of the New Haven standard type, and, as far as practicable throughout the new design the New Haven standard practice for mechanical features has been adhered to.

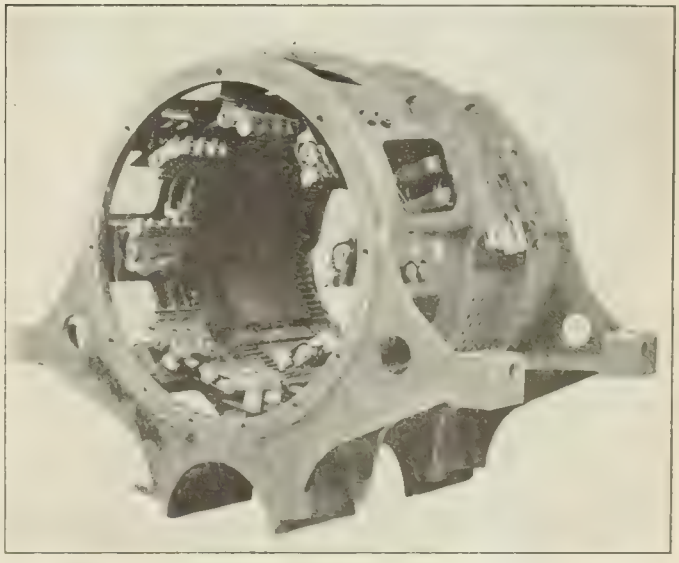
The driving wheels are 63 in. in diameter and are arranged for a flexible spring drive through gears. The gears are



Motor for Electric Switching Locomotive.

mounted on a quill supported in journals carried by the motor frames, the quill having sufficient clearance for the axle movement, similar to those of the New Haven and Boston & Maine "four motor freights." The gear ratio is 17 to 101. The motors are rigidly mounted on spring-borne parts of the frame directly over the axles.

Electrical Features.—The motors, four in number, are for straight single-phase operation on alternating current of 25



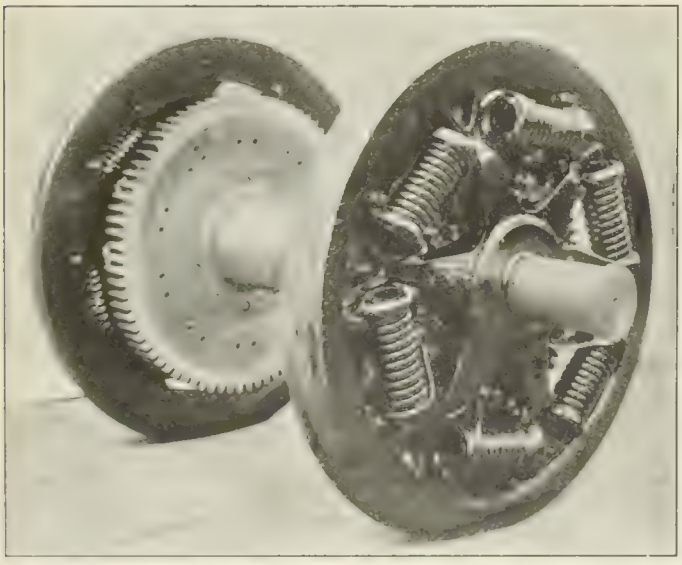
Motor Frame for Electric Switching Locomotive.

cycles and are arranged for forced ventilation. Their hourly rating is approximately 900 amperes at 190 volts, with a continuous capacity of 650 amperes at 190 volts. In general construction the motors resemble the 403-A motors of the Boston & Maine locomotives, but are smaller. Since they are to be used only on the New Haven tracks, provision for operation on direct current is unnecessary, and, while the motor is of

the well-known Westinghouse series compensated type, the compensation is by induction. The compensating winding is short circuited upon itself and is not in metallic connection with the rest of the windings. This type of connection eliminates all voltage strains to ground in the compensating windings, but cannot be used for direct current operation.

The motor frames are of cast steel and the general construction follows Westinghouse standard practice. An electrically operated blower set, located in the hood at one end, furnishes forced ventilation for the motors and materially increases the capacity. The ventilating openings, or louvres, shown in the hood at one end are for the air supply. The control is of the unit switch type, with electro-pneumatically operated switches arranged to connect the motors to suitable taps [illegible] a main transformer energized by the 11,000 volt line current is taken from the line by an overhead pantagraph trolley of the New Haven standard type, which with the bell, whistle and sanders is electro-pneumatically operated by push buttons conveniently located on the master controller.

The running gear, frames, cabs, and mechanical parts were designed by the engineers of the New York, New Haven & Hartford, the Baldwin Locomotive Works, and the Westinghouse Electric & Mfg. Company, and these parts were built at the Baldwin Works in Philadelphia; the air brake apparatus was supplied by the Westinghouse Air Brake Company; the entire electrical equipment was built and the locomotive assembled at the Westinghouse Electric & Mfg. Company's plant at East Pittsburgh. An order of fifteen more locomotives of the same type has been placed.



Driving Wheels of Electric Switching Locomotive.

current; and it is particularly flexible for switching purposes. Three starting notches and seven running notches are provided.

The following are the principal weights and dimensions:

[illegible]	[illegible] lbs.
[illegible]	[illegible] lb.
[illegible]	[illegible]
Total length inside knuckles	37 ft.
[illegible]	[illegible]
Total wheel base of locomotive	23 ft. 6 in.
[illegible]	[illegible]
[illegible]	[illegible] lb.
[illegible]	[illegible]
Rated horsepower	500
450 ton trains to be handled and shifted in hourly service.	
[illegible]	[illegible]
cases, quill, and drive details	13,831 lbs.
Maximum armature speed	900 r. p. m.

[illegible] at each end of the cab. The control current for the electro-[illegible]

COUPLER AND DRAFT EQUIPMENT.

The M. C. B. committee on coupler and draft equipment was instructed by the association at its recent convention to prepare a design of a temporary coupler to provide the end-ladder clearance on existing equipment required by the United States Safety Appliance Standards, and submit it to the executive committee, after which it is to be submitted to letter ballot for adoption.

As a matter of information in connection with the requirements of the Federal Safety Appliance Act, which becomes effective July, 1911, the committee calls the attention of the members to the following excerpt from the law:

"No part of car above end sills within thirty (30) in. from side of cars, except buffer block, brake shaft, brake wheel, brake step, running board or uncoupling lever shall extend to within twelve (12) in. of a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler horn against the buffer block or end sill, and no other part of the end of car or fixtures on same above end sills, other than exceptions herein noted, shall extend beyond the outer face of buffer block."

With respect to the equipment of cars in service July 1, 1911, the following extensions are granted:

"(d) Carriers are not required to make changes to secure additional end-ladder clearance on cars that have 10 or more inches end-ladder clearance, within 30 in. of side of car, until car is shopped for work amounting to practically rebuilding body of car, at which time they must be made to comply with the standards prescribed in said order.

"(e) Carriers are granted an extension of five years from July 1, 1911, to change cars having less than 10 in. end-ladder clearance, within 30 in. of side of car, to comply with the standards prescribed in said order.

"(g) Carriers are not required to change the location of handholds (except end handholds under end sills), ladders, sill steps, *brake wheels* and brake staffs on freight-train cars where the appliances are within 3 in. of the required location, except that when cars undergo regular repairs they must then be made to comply with the standards prescribed in said order."

[illegible] COUPLER COMMITTEE CONCERNING EXISTING EQUIPMENT.

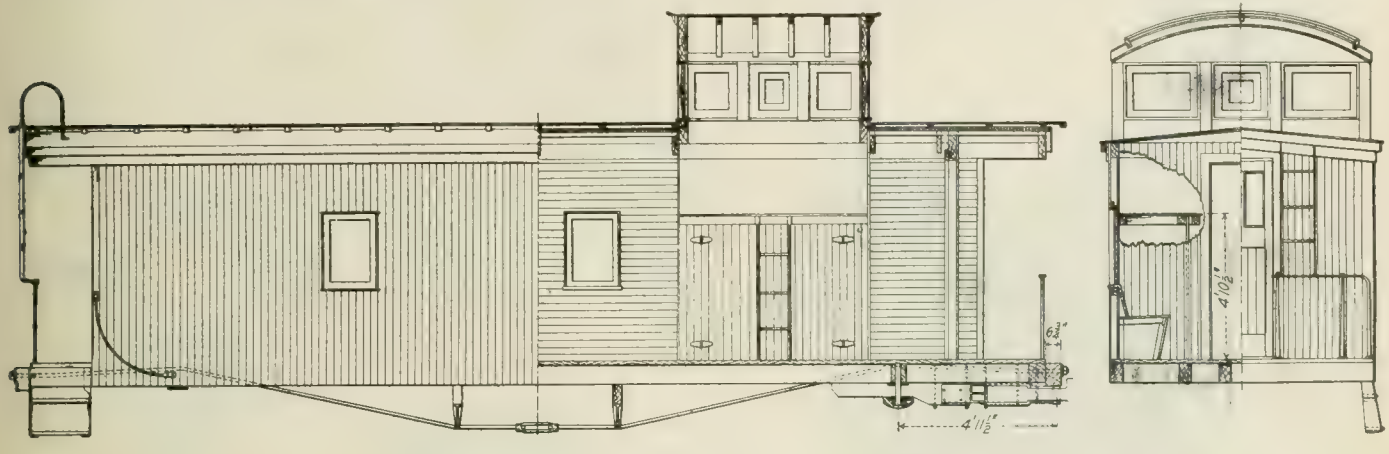
		Total amount in inches of additional end [illegible] required.	Inches the head is recommended to be lengthened, based on latest standard of 9 [illegible] (See Sheet M. C. B. [illegible])
[illegible]	Steel and steel underframe...		
	Wooden underframe.....		
	Steel and steel underframe...		
	[illegible]		
	Steel and steel underframe...		
	[illegible]		
	Steel and steel underframe..		
	Wooden underframe.....		

In order that the committee may learn the requirements of the various roads, so that a standard temporary automatic coupler can be designed to meet the requirements for end-ladder clearance, the accompanying table is submitted. It is desired that this table be filled out, so that the committee may proceed properly. This subject entails very considerable study, and, therefore, in order to be considered, this information must be in the hands of the committee not later than August 1, 1911. This circular of inquiry is signed by R. N. Durborow (Penn.), chairman; F. W. Brazier (N. Y. C.); C. W. Wildin (N. Y. N. H. & H.); C. H. LaRue (C. R. I. & P.); H. C. Trimyer (S. A. L.); F. F. Gaines (C. of Ga.), and F. H. Stark (Pa. Coal).

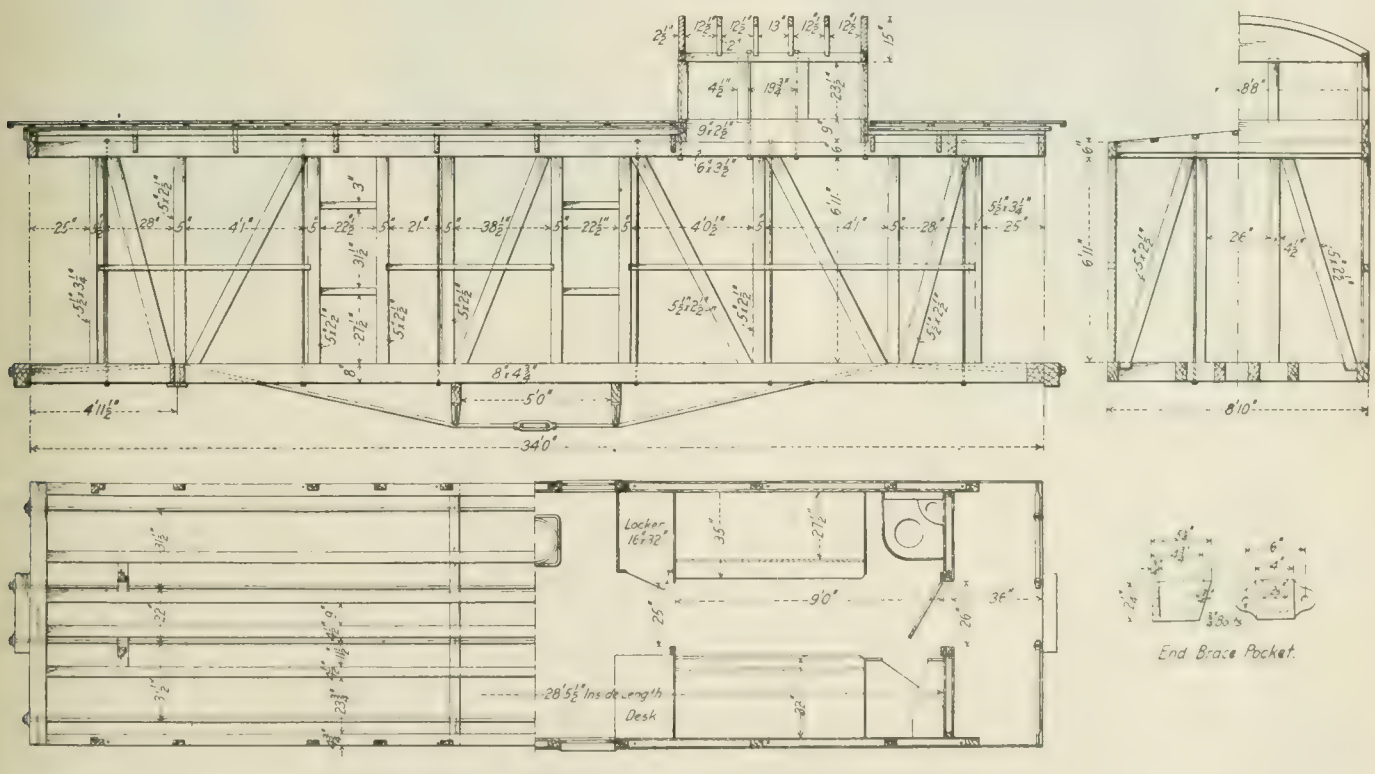
Press dispatches from Santo Domingo, the capital of the Dominican Republic, say that the work on the railway between that city and El Cibao will soon be begun. The contractors of the Sanchez-La Vega Railroad, who will also build this line, have agreed to the government's suggestion to commence the work of construction within the shortest possible time. The works will begin simultaneously at Santo Domingo and at La Gina, near San Francisco de Macoris.

CABOOSE CARS MADE FROM BOX CARS.

The Wabash Railroad has devised an economical way of making caboose cars from 34-ft. box cars, the average cost of the transformation being much lower than the cost of the standard 28-ft. caboose. The drawings show the general construction of these cars. It will be seen that the general superstructure is not greatly changed, the corner and end posts of the box car being set back from the face of the end sill 36 in., providing ample platform room. The center and intermediate sills are 4½ in. x 8 in., and the side sills 4¾ in. x 8 in. The latter run continuously to the end sill, not being cut out for the steps, thus making a simple and strong platform. The side framing is made up of 5-in. x 2½-in. posts and braces, the original construction being altered only by the addition of windows and doors. A roomy cupola is built, rising about 40 in. above the roof, which, with the windows, gives the caboose sufficient light. The lookout platform is 4 ft. 10½ in. above the floor. The car has a head room of about 7 ft., and is equipped with the general furnishings of a caboose, including lockers, seats, bunks, etc. The inside is finished with narrow matched boards laid horizontally. The steps have wrought iron



Elevation and Section of 34 Ft. Caboose Car; Wabash Railroad.

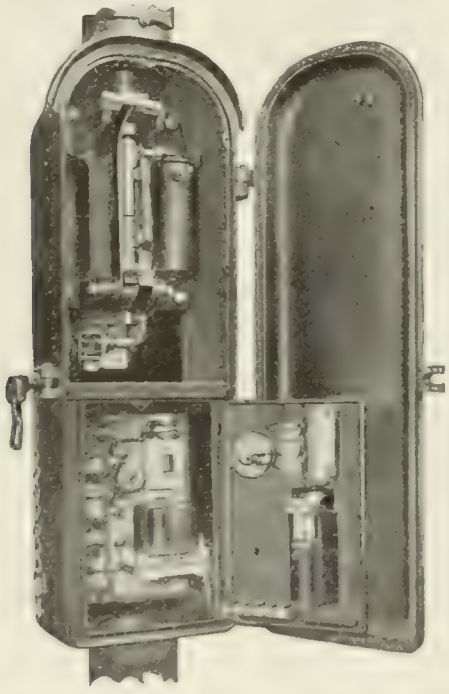


Framing and Arrangement of Caboose Car; Wabash Railroad.

sides, 5/16 in. thick, and 1¼-in. oak treads. For additional comfort to the trainmen, the trucks were altered to give a more flexible action, making the car ride much easier.

SEMAPHORE TO BE OPERATED BY SELECTOR.

The accompanying illustration shows the mechanism of a train order semaphore to be actuated at a distance by selective apparatus, such as is used in making telephone calls, which has been brought out by the Union Switch & Signal Company and the Western Electric Company, acting in conjunction. The semaphore mechanism, the selector instruments and the telephone equipment are all mounted in this one box, which is fixed about 4 ft. above the ground, in the iron post supporting the



Semaphore Mechanism, Selector and Telephone.

signal, being a part of the post. The signal mechanism is contained in the upper part of the box and is covered by an inner door through which projects a handle to be used by the trainman in restoring the signal to the operative position after he has received an order. The selector apparatus gives a distinct answer back after the signal has been put into the stop position. The telephone transmitter and receiver are mounted on the outside of the door of the lower part of the box. All of the metal parts of this apparatus have a black finish.

FOREIGN RAILWAY NOTES.

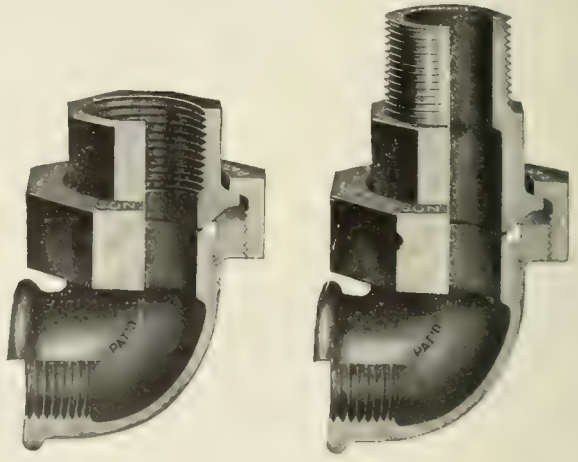
[illegible] Colombia, at Envigado, department of Antioquia, was formally opened. The new depot is located at 5 miles from Medellín.

At the close of 1910 the capital invested in the railways of [illegible] in state railways. On December 31, 1909, the amount invested in [illegible] appropriation of $11,996,700, national currency, for the development of state railways.

COMBINED UNION AND ELBOW.

Unions and elbows combined which have the strong features of the straight and swing unions, have recently been put on the market by the Jefferson Union Company, Lexington, Mass. These new union elbows are made both all-female, and male-and-female; they save both elbow and expense, and do not require a gasket. The all-female elbow takes the place of two pipe-joints that are somewhat troublesome to make, and three ordinary fittings; namely, a straight union, a nipple, and an ordinary elbow. Better results are obtained when there are fewer joints, as there are just so many less chances for leakage, and with the Jefferson union elbows these joints are reduced. The male-and-female elbow saves three pipe-joints, and takes the place of a straight union, of two nipples, and an elbow. The joints avoided by this combination are even more difficult to make than those for which the all-female elbow is a substitute.

With these union elbows absolute alinement of the elbow and pipe on the two sides of the elbow is not required, no matter which style of union is used. The Jefferson ground spherical brass-to-iron joint is used, which is relied on to make a tight



Jefferson Union Elbows.

joint without the use of a gasket. In addition, there is a large amount of play between the nut of the union and the swivel end, making the union easy to apply even when the alinement is not exact. The construction of the nut, and its adjustment to the swivel and the brass seat ring, are the special features peculiar to Jefferson unions. The brass ring is turned from seamless brass tubing, so as to be free from the blow holes and imperfections, which may occur in cast metal. The Jefferson ring sets in a recess away from the runway of the pipe, with an iron wall on each side, and is thus secured against loosening on account of the difference in the expansion and contraction of the iron and brass.

The pipe ends are made of malleable iron, which will not stretch, and they are threaded with Briggs standard taper pipe threads. The nut threads are coarse enough to allow of rapid adjustment, and as they are coated with graphite, both for lubrication and to prevent their corrosion, the union may always be easily disconnected after it has been in use. The Jefferson Union Company is prepared to furnish both 90-deg. and [illegible] deg. unions.

A railway is soon to be built from San Juan, Bolivia, to the town of Jachal. The route is through one of the most fertile portions of the province of San Juan, while the town of Jachal, situated on the Jachal river, is an important wheat-producing and milling center. In the neighborhood there are extensive areas which are devoted to grape culture and the production of barley, cotton, and flax.

Maintenance of Way Section.

THE competition on Bridge Kinks, which closes August 1, should interest all having to do with the maintenance of such structures. This contest includes all methods of handling problems commonly arising in making repairs or renewals of either timber or permanent bridge structures, and the judges will give special attention to those contributions describing methods or devices capable of general application. A first prize of $25 and a second prize of $15 will be awarded the best two contributions, and all others published will be paid for at our regular space rates. All contributions must be in the hands of the Civil Engineering Editor of the *Railway Age Gazette,* 417 South Dearborn street, Chicago, not later than August 1.

WHILE the importance of the general subject of track drainage has been recognized of late years, the best methods of providing drainage, especially in the more difficult cases, are not so well understood. One can see many instances of money being spent year after year in an endeavor to maintain track in good condition, where, if but a portion of the expenditure made were properly applied on drainage, the defects that cause the trouble would be permanently remedied. Again, in many cases the problem is given up as hopeless after one or perhaps two methods have been used without success, while the difficulty may be that the remedy properly suited to the particular case has not been tried. No one method of drainage can successfully be applied to all varying conditions. Certain methods are best adapted to certain conditions, but are not effective under other conditions. The *Railway Age Gazette* desires to draw out different methods of successfully draining wet embankments or cuts, and announces a "Drainage" contest. This contest will include all methods of handling different track drainage problems, and special attention will be given those methods capable of the widest application. All contributions should clearly describe the local conditions before the drainage was undertaken, as well as the method adopted in detail. If other methods were tried before one was found effective, the reasons for the failures will be instructive. Prizes of $25 and $15 will be awarded for the best two contributions, while our regular space rates will be paid for all others accepted for publication. All contributions must be in the hands of the Civil Engineering Editor, *Railway Age Gazette,* 417 South Dearborn street, Chicago, not later than September 1.

NINETEEN contributions were received in the contest on "How the Roadmaster Can Promote Efficiency," which closed July 1. The judges, H. G. Hetzler, president of the Chicago & Western Indiana, H. J. Slifer, general manager of the Chicago Great Western, and E. P. Bracken, assistant general manager of the Chicago, Burlington & Quincy, all of whom are practical track men and careful students in this field, went through the papers very carefully and awarded the first prize to J. W. Foote, division engineer, New York, Susquehanna & Western, and the second prize to Robert H. Orwig, supervisor of the Cumberland Valley Railroad, Chambersburg, Pa., both of whose papers are published in this issue. Other papers were submitted by: E. R. Meredith, supervisor P. & R., Coatesville, Pa.; F. M. Patterson, assistant engineer C. B. & Q., Chicago; J. F. McNally, assistant superintendent A. T. & S. F., Chanute, Kan.; S. B. Peter, roadmaster St. L. & S. F., Pittsburg, Kan.; B. A. West, roadmaster A. T. & S. F., Pueblo, Colo.; W. G. Dungan, roadmaster C. B. & Q., New Orleans, Neb.; M. Ganley, roadmaster A. T. & S. F., Argentine, Kan.; W. H. Kofmehl, roadmaster C. M. & St. P., Elgin, Ill.; D. C. Lawton, division engineer A. T. & S. F., Newton, Kan.; J. Burns, roadmaster Michigan Central, Bay City, Mich.; B. James, supervisor C. & E. I., Marion, Ill.; G. LeBoutillier, division engineer Pennsylvania, Cincinnati, Ohio; F. W. Rizer, assistant engineer C. B. & Q., Chicago; J. A. McRae, refrigerator inspector, Union Pacific, Grand Island, Neb.; R. P. Trabue, roadmaster N. C. & St. L., Nashville, Tenn., and J. E. Crabbs, roadmaster C. & N. W., Chicago; and will be published in this and succeeding issues. The contest was very successful, and brought out a large number of very good ideas of practical value to men concerned in track work.

THE point made in one of the papers submitted in the efficiency contest and published this week, that section foremen should be encouraged to cultivate the acquaintance of and amicable relations with the farmers along the line, deserves to be emphasized. The importance of the influence of the section foremen, both in promoting friendly relations with the adjacent farmers and in securing traffic, are not fully realized, and largely for this reason their indifference toward the railway's neighbors has been allowed to increase. In making an inspection over his line recently, in which he took the foremen with him over their respective sections, a prominent officer of a western line asked the different foremen who owned the land adjoining the right-of-way at numerous different points, and in but one instance, in a trip of about 1,200 miles, did he find a foreman who was thoroughly acquainted with the land owners. By taking proper preventative measures and at the same time securing the co-operation of the farmers for the purpose of warding off fire, overflow and livestock claims, the section foreman can gain far more results for the company than can all the claim agents on the road after claims are filed. The good will of the farmers immediately adjacent to the right-of-way is dependent more on their relations with the section foremen than on their acquaintance with the station agents or other employees. The influence that the foremen may exert in securing business for the road is well emphasized by the following letter, recently sent out under the head of "Cultivation," by the general manager of the Chicago Great Western to the section men and bridge men along that line: "More than any other class of employees, you have the opportunity of close contact with the farmers, who are producing today that which means tonnage, and therefore revenue for the railway company, tomorrow. Have you ever thought of cultivating the farmer while he is cultivating his fields? A friendly chat over the fence, a wave of the hand as you pass by, may mean a shipment of corn or cattle—just because you were interested in him. For your company's welfare, as well as for your own sake, cultivate the farmer!"

THE general manager of a large Western road has just completed an inspection trip over his entire system, on which he stopped to talk with each section foreman personally about his work and to encourage him to maintain his track to the best possible standard. In his conversations with the foremen he impressed on them the idea that they are a responsible part of the railway organization, and that efforts towards economy on their part are fully as important as in any other department; and he assured them that for each five cents per day each of them saved the company their general manager would save for it an equal amount. Such talks will undoubtedly accomplish savings for the road, not merely by impressing on the men the necessity for care, but by establishing a spirit of common interest between them and the higher officers, and thereby causing them to take increased interest and show more loyalty in their work. Any foreman can save the company a nickel a day if he will try, and he is much more apt to try when the higher officers stop their trains occasionally to talk with him about his work than when they go by at full speed. The work of the track foreman is at best monotonous. He ordinarily comes in contact with no superior officer other than the roadmaster and the division engineer, except, possibly, occasionaly the division

superintendent. This state of affairs naturally results to a certain extent from the growth of a road; the duties of the higher officers are so increased that they cannot meet the men personally as they used to without making a special effort. But just as soon as the employee loses this contact with his superiors he tends to lose his personal interest in his work; and when he loses this he becomes a mere part of the machine and he does his work mechanically and with a great loss in efficiency. The day when the section foreman spoke and thought of the road as his road is probably gone for good; but a partial return to the state of affairs when he comes in closer contact with his superiors will materially increase the loyalty and efficiency of this class of employees. The example of the general manager referred to above might be followed generally with beneficial results.

ANY plan involving an increase in pay for track labor is apt to encounter opposition from railway managers, and unless a radical change be made in selecting such labor this opposition is fully justified. Under present conditions a flat increase for all track labor would very likely result in no increase in efficiency. But if track work should be classified between skilled and unskilled—in other words, as semi-skilled—labor, and a schedule of wages should be made, based on this distinction, it is possible that there could be secured for it a class of workmen that cannot be obtained at prevailing wages, but that would be worth the increased rate necessary to get it. For instance, if a small extra gang was able to do the more careful and difficult track work, such as handling frogs and switches. and its members were given to understand that their chance to earn the increased rate was contingent upon good service, it is believed that good results would be obtained. English-speaking men should be selected for such a gang, and it could be utilized as a training school from which to supply foremen. The practice of the Union Pacific in maintaining a "school gang" illustrates the point. If a good class of men cannot be obtained locally, the gang could be recruited from the regular extra gangs, this being held out as an incentive for the more ambitious. The average roadmaster is pessimistic as to the worth of the foreign laborer, and does not fear that the waiting list from this class will be overcrowded. It is probable that the Italian and Greek will always be with us in track work, but it is not at all certain that they will ever become as proficient in those parts of it requiring skill and judgment as the English-speaking men they have displaced. There is, on the other hand, almost a certainty that these foreigners are not the material from which the best foremen, supervisors and roadmasters are made. If they are to be used only for such work as they are capable of doing—work that is not attractive to the intelligent laboring man—the rate of pay of the semi-skilled workman should be based on his efficiency as compared with the Italian. If in this way 50 per cent. more efficiency could be secured for an increase of from 25 to 35 per cent. in wages it certainly would not be a bad investment. It is at least worthy of a careful trial.

CONTEST ON COST DATA.

IN the past the roadmaster or supervisor who was able to maintain the best riding track was considered the most efficient. The cost incurred was but little considered. The tendency [illegible] depended very largely on his being able to secure from his superiors [illegible] what he considered an adequate amount of track material, or not succeeds, on the [illegible] method of expending to his maintenance [illegible] as well as other intended for authorized con- [illegible] work. It had been a practice to reserve for [illegible] funds to be expended late in the year and immediately [illegible] a large amount of heavy construction expenditure, [illegible] was impossible.

With the increasing appreciation of the value of knowledge of the cost of work, one is somewhat surprised to find the absence of detailed cost data regarding maintenance. Less cost data has been kept in the track department than in any other department of railway operation, and it is largely for this reason that track work has been so expensive. Operating officers, who have approximate transportation costs at their finger tips, can only guess, in an indefinite way, at the cost of putting in a switch or tamping a tie. There is the same lack of definite data among those directly in charge of maintenance work, which largely accounts for the high and widely varying unit costs. When one does not know the unit costs of his work, and does not have this feature impressed on him, he will not spend such time endeavoring to reduce them. It is only when he sees such data in front of him and his attention is called directly to it that he studies it. To be of value, this data should be kept closely up to the work, so that the officer in charge can know what it is costing while he is actually doing it. It does a roadmaster very little good to learn some time during the winter what his tie renewals cost him the preceding June. At the same time, to be practical, this data should be compiled in a way to require a minimum of clerical work and consequent expense. The method described by Mr. Dungan in this issue is giving good results under the conditions under which he is using it.

We desire to learn the extent to which the keeping of cost data is carried on, and also the extent to which the data is furnished the men on the work. To secure this information, we announce a contest on "Methods of Keeping Cost Data in Maintenance of Way Work." This competition will include all methods of keeping cost data in maintenance of way work and getting it before the men who are doing the work. The plan should be given in detail as well as the results secured, and the amount and cost of clerical work involved should also be given. A first prize of $25, and a second prize of $15 will be awarded the best two contributions, while we shall pay at our regular space rates for all other contributions published. All contributions must be in the hands of the Civil Engineering Editor, *Railway Age Gazette*, 417 South Dearborn street, Chicago, not later than October 1.

THE FUNCTION OF THE EXTRA GANG.

ONE of the most perplexing problems the engineer or roadmaster in charge of track work has to solve is the determination of the proper use to be made of the extra gang. This problem is continually growing more complex as the supply of labor for extra gangs is so rapidly changing from native to foreign. "In the good old days" the extra gang laborer was the aristocrat of the track. This cannot be said today. Too often now the extra gang is regarded as an evil. But, if an evil, it is still very often a necessary one. The problem is to use it to the best advantage, where it must be used at all, and to so arrange the work as to do without it in many cases. While local conditions of course govern the amount of work which can be done by section forces, much which it was formerly considered necessary to do with an extra gang is now done by increasing the section forces, and still other work can be done to advantage in this way.

It will be conceded that relaying of rail requires the use of an extra gang, as does also the first raise in heavy reballasting work. On the other hand, if enough satisfactory men can be secured for section forces the final raise in ballasting and the dressing up of the track can, many times, be done to better advantage by a section gang. In the first place, the extra gang foreman is mainly interested in surfacing as many feet of track per man per day as is possible, for he knows that his output is watched. Under such conditions it is not to be wondered at if he sacrifices thoroughness to speed, especially as he is not held responsible for the track after his gang has left it. The very nature of an extra gang makes it impossible to get uniform results. With a large gang it is impossible to watch the tamping as care

fully as should be done. On the other hand, the section foreman with a smaller gang can pay close attention to the tamping and, having men who are more permanent, he can teach them to do this tamping in a thorough manner. Such foremen should insist upon and teach their men to do the tamping uniformly, for if one tie is tamped less than another swinging track and bad surface will soon develop. A section foreman has every incentive for seeing that the work is done well, knowing that slipshod methods will result in trouble for himself in the end. If the first raise has been made to a good surface it will be a help rather than a detriment if the finishing gang does not follow too closely for the delay will give the new ballast a chance to settle, and when the final raise is made it will be on a good foundation.

The proper size of the gang for the work to be done is not in general given the attention it should receive. Too often extra gangs are formed of the same size regardless of the class of work they are intended for. A careful study should be made of the number of men required for any particular class of work. For instance, in planning on a steel gang the number of men should be so arranged that all parts of the work will move at the same speed, and no one group should either be delayed waiting for men ahead of it to get out of the way, or be allowed to kill time waiting for others to catch up. Too few or too many men in a gang cause an economic waste. In very many cases no distinction is made between the size of steel and ballast gangs in sending out men, although to secure the best results the ballast gang should be smaller than the steel gang. In handling ballast there are not as many details to be handled in sequence requiring the splitting up of the gang, and the amount of supervision necessary is much greater.

The efficiency of a ballasting gang, especially if composed of foreign labor, is very closely dependent upon the supervision of the foreman, and, as a rule, the larger the gang the less are the results per man. A careful study of the proper size of the gang for different classes of work should enable a roadmaster or a supervisor to effect material reduction in his unit costs, and the subject is worthy of the most serious consideration.

ENGINEERING ARTICLES SINCE JUNE 16.

THE following articles of special interest to engineers and maintenance of way men, and to which readers of the engineering and maintenance of way section may wish to refer, have appeared in the weekly issues of the *Railway Age Gazette* since June 16:

Missouri, Kansas & Texas Freight House at St. Louis.—The structural details, the mechanical devices for handling freight, and the method of operation of the new freight house at St. Louis, which represents the most advanced practice in the mechanical handling of l. c. l. freight, were described in an illustrated article on page 1647 of the issue of June 23. An editorial on the operation of this plant on page 1643 of the same issue.

Engineering Education.—Review of the proceedings of the 18th annual meeting of the Society for the Promotion of Engineering Education. June 23, page 1645.

The standard of maintenance on American railways as affected by the wage increases for the past 18 months was commented on editorially on page 1677 of the issue of June 30.

The Madeira-Mamore Railway.—P. H. Ashmead, who was chief engineer of the Madeira-Mamore Railway from 1908 to 1910, gives a brief history of this project and a description of the interesting engineering features connected with the building of a road under peculiarly difficult conditions. June 30, page 1684.

Ratchet Track Wrench.—The National ratchet track wrench was described and illustrated on page 1700 of the issue of June 30.

American Society for Testing Materials.—The report of the 14th annual meeting of the American Society for Testing Materials, held June 27 to July 1, appeared on page 7 of the issue of July 7. The report of the convention was commented on editorially on page 3 of the same issue.

College Men and Railway Engineering.—The advantages and disadvantages of railway engineering for the young graduate are commented on by one of the "Class of 1903," in a letter to the editor, on page 71 of the issue of July 14.

Oregon-Washington Railroad & Navigation Company's Portland Bridge.—The details of the substructure and superstructure and of the operating machinery of the new double deck lift bridge which the Oregon-Washington Railroad & Navigation Company is building over the Willamette river in the city of Portland, Ore., are described in an illustrated article in the issue of July 14, page 77.

THE USE OF RAIL ANCHORS.

The subject of the creeping of rails is not a new one, but the best means for preventing it is a very live question with railway maintenance of way officers today. It is the general opinion that the development of the best device or method for stopping creeping is still in an experimental stage. The tendency toward creeping is increasing, because of the disproportionate increase of the weight of motive power and equipment as compared with that of the track itself. For this reason, even on the best maintained roads, some device is necessary to stop the movement of the rail. Evidences and results of creeping can be seen on most track, for while some form of rail anchor is used on all important roads, with three or four exceptions, in many cases the devices used are not so arranged, or so placed, that it is possible to get the greatest practicable benefit from them.

CAUSES OF RAIL CREEPING.

The creeping of rail is the result of a wave action set up in the rail during the passage of a train. Being in sections, 30 or 33 ft. long, the rail does not act as a continuous beam which would back into place after the passing of the train, but each section, to a large extent, acts independently of the others, adjusting itself at the splices. This creeping is much intensified

Ties Bunched and Ballast Piled Up.

where the joints are not bolted tightly, while at the same time if the bolts are tightened so as to prevent any movement or adjustment, the stresses exerted in the rail are much intensified. The tendency of the rail is to move forward with the train, while the amount of creeping depends very largely on the condition of the roadbed and track. The more solid the roadbed, and the heavier the track structure, the less is the creeping. A heavy rail laid on good ties with plenty of good ballast in the track will resist a strong tendency toward creeping, while under the opposite conditions of light rail with little or no ballast, and with a heavy traffic, the rails will move very much. The amount of creeping also depends very largely on the condition of the roadbed. It is greater on embankments than in cuts, and it is especially marked on soft embankments across marshy ground. In some instances in the muskegs of Canada this movement reaches several inches with the passage of a single train.

Creeping proceeds in the direction of the heavier traffic, and for this reason is much greater on double track, where the traffic is all in one direction, than on single track, where the tendency to move in one direction is resisted by the traffic in the opposite direction; and, other things being equal, only the net balance of traffic affects the movement of the rail. For this reason it is very often necessary to adopt measures to prevent the creeping of the rail following the construction of a second track, where previously there had been no tendency to move. Other conditions being equal, the movement on single track will usually be down grade, while on double track this movement

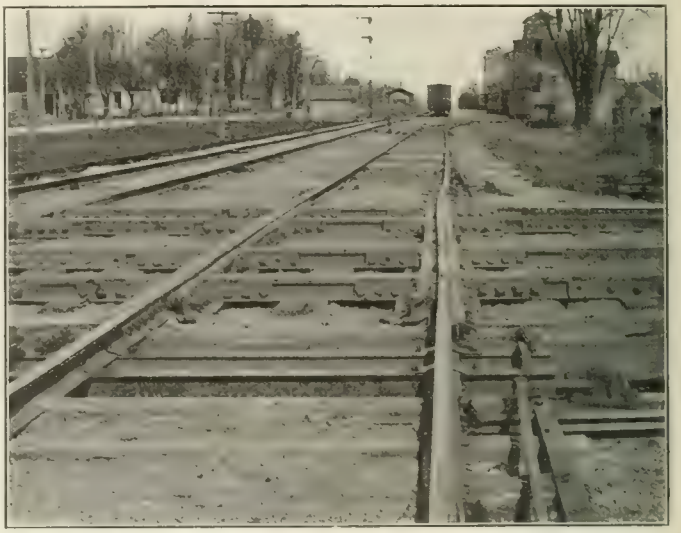
is increased on a descending grade, owing to the faster speeds on the descending grades and to the more frequent application of brakes. In some cases, on a single track, the rail creeps up grade for some distance from the foot of the hill, owing to the high speeds at which the trains travel in making a run for the hill. The outer rails on curves usually move more than the inner rails, owing to the greater pressure exerted on the high rail, although the lower rail frequently moves the most when the elevation of the curve is too great. One sometimes finds that one rail creeps one way, while the other creeps in the other direction, although when this occurs it can usually be attributed to the presence of curves turning in opposite directions at the ends of the stretch under observation. An example of this occurs at the bridge over the North Platte river on the Union Pacific at North Platte, Neb., where the north rail moved west and the south one east, until anchors were applied recently.

Creeping is greatly increased during hot weather. At this time the rail is highly stressed, owing to the expansive action and the additional stress resulting from the movement of the train. This latter load is quickly applied and acting in one direction provides sufficient force to start motion in that direction, which, once started, affords relief from the expansive stresses as well. Another reason for the increased creeping in summer over winter is that in winter the roadbed is frozen

Kinking of Track at Switch; Six Months After Adjustment.

remedy must be continually repeated. A great part of the track work in the South in summer, where careful measures are not taken to prevent creeping, is due to this one cause.

The most general source of trouble caused by rail creeping is the pushing of ties out of line and the bunching of them, which is illustrated in one of the accompanying photographs. With the joints and angle bars now generally used, the practice is to slot-spike the joint ties. Any creeping of the rail drags these ties off their bed and makes a low joint. Rail can creep but a short distance before it becomes necessary to straighten and respace the ties as well as to tamp them up carefully. A danger which must be guarded against with the dragging of the ties



Crossings Dragged Out of Line; Seven Months After Being Lined.

is that of tight gage, which naturally results from the sloughing of the ties.

The common effect of creeping at switches is kinking of the track at the points, as illustrated in one of the photographs. A great deal of trouble is often met at crossings, especially if one or both lines are double track, the tendency being to drag the adjacent crossings out of line in opposite directions, and in this way double the effect in rough-riding track. This is clearly shown in an accompanying illustration. Radical measures are often necessary to arrest all movement at interlocking plants and drawbridges where any small movement of the rails throws all adjustments out.

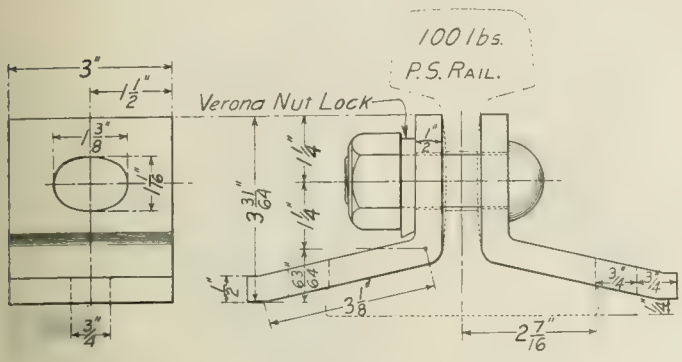
The extent to which the rails should be anchored on bridges or trestles is a somewhat disputed question. In such places the tendency to creep is excessive, for here there is greater vibration than on a solid roadbd. Most roads allow the rail to move freely on trestles and concentrate their efforts to stop this movement on the embankments at either end, fearing that if the movement be but partially stopped on the trestle it will pull the structure out of line. On the other hand, if enough anchors are placed on the trestle to stop all movement the result will be greater security against damage, for if the rail is allowed to run freely an occasional tie will be pulled out of line, owing to tight spiking, even though the joint ties are not slot-spiked. One large road is this year beginning the practice of placing anchors on all trestles.

Economy in Use of Anti-Creepers

It is quite generally agreed that a device which will stop rail creeping will reduce the expense of maintenance very materially. The cost of spacing the ties occasioned by it alone reaches a large amount in the year, as does the increased attention and work required at bridges, crossings and interlocking plants. On one important double track line of the Chicago, Milwaukee & St. Paul the records show that required an expenditure of from

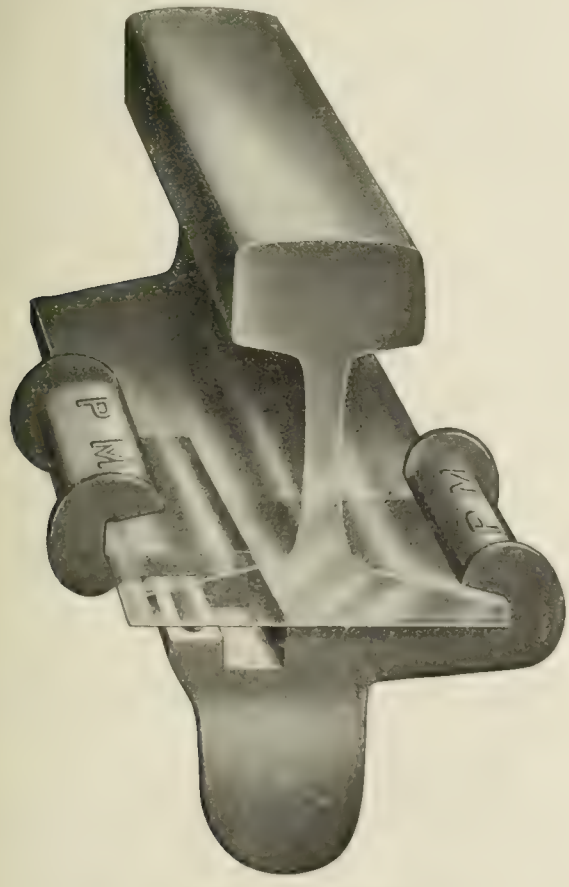
$100 to $200 per mile per year to readjust the position of the joint ties which had been forced out of place by the creeping of the rail, in addition to the extra labor required to maintain the track in proper surface. Another large road estimates that about 20 per cent. of its track labor on sections where creeping is evident, is employed in overcoming the effects of rail creeping.

Where the rail is inclined to creep it is economy to put on



Standard Anti-Creeper; Pennsylvania Lines West.

enough anti-creepers to arrest the movement entirely. With the more common arrangement of staggered joints these anchors should first be placed on the ends of the joint ties opposite the joint in order that the tie may be kept in line. Frequently this will stop the creeping, but with more serious cases further anchors should be placed at the quarter points, care being taken to see that both ends of the same tie are anchored. In especially bad places it is sometimes necessary to place eight or ten anchors on each rail. On a stretch of track on the New York Central between Rome, N. Y., and Greenway, and also in the Oriskany swamps between Rome and Utica, the tracks formerly crept from 5 to 12 ft. in a year. At these points it was necessary in some instances to place five or six anchors per rail before the movement was stopped.



P. & M. Anti-Creeper.

In all cases the origin of the creeping should be found and anchors placed at such point to arrest the movement at the start rather than attempt to stop it at some distant point where its effect has been noticed. For instance, an attempt should not be made to arrest the movement of rail running down grade by placing sufficient anchors at the foot of the grade to stop the movement at this point, for the natural tendency then will be for the track to buckle above the anchors. On the contrary, sufficient anchors should be distributed from the top of the grade down to overcome the tendency towards creeping as it arises.

Requirements of Successful Rail Anchors.

A large number of devices have been designed to stop rail creeping. With a desire to find out how many of these are being used, and the results being obtained from their use, the *Railway Age Gazette* sent a letter to some 20 leading roads of the country, asking what anchors they had used and the results secured, believing that the publication of this information would be of benefit to all men studying this subject and would enable them to see what anchors are standing the tests of actual service. At the present most of the roads are experimenting to a greater or less degree with most of the anchors on the market, and the results of the trials already made will, it is believed, be of value to others who are beginning to study the subject.

L. & S. Anti-Creeper.

Q. & C. Anti-Creeper.

In addition to being able to stop creeping, the requirements for a rail anchor are:

That it should be economical in first cost.

That it should be easily applied.

That it should be strong enough to withstand the stresses placed upon it.

That it should be simple in construction, with few parts to break or become loose.

That it should require the minimum attention.

It is also necessary that the device grip the rail firmly at all times and not loosen if the pressure against the tie is released and the rail creeps backward a little. It frequently happens that the contraction of the rail during the night or the reversing of traffic will draw the anchor back a little from the tie. Under such conditions certain anchors—although satisfactory while bearing directly against the time—lose their grip and fail to grasp the rail when it again moves forward, or loosen and fall off. The consensus of opinion seems to be that there is not now any device which entirely fulfills all these requirements, although some more nearly do so than others. There is no track appliance which is so apt to be neglected as the rail anchor, and for this reason there is a growing demand for such development of these devices as will make them nearly self-maintaining.

In using any rail anchor, and, in fact, any device on the track, care should be taken by the officers in charge to see that it is properly applied. In most instances, new devices are sent out to the roadmaster, supervisor or foreman without any directions as to their application and with no one to show them how to

apply them. As a result, many times the device is put on wrong and in a short time a failure is reported, when, as a matter of fact, the fault is with the method of handling rather than with the device. As a matter of economy, a road can well afford to maintain an inspector to instruct the trackmen how to use and maintain the different new track appliances, whether they are being tried experimentally or have been adopted as standard; for the gain in results from these devices, in which the money has already been invested, will pay the inspector's salary several times over. Some roads have adopted this plan, but it should be a more general practice. In some cases the supply firms have put on inspectors of their own, who endeavor to be on hand whenever any of their appliances are being put in service, the frequent turning of an unfavorable report into a favorable one justifying the expense.

TYPES OF RAIL ANCHORS.

Probably the simplest form of rail anchor used is the section of an angle bar bolted to the rail. Old angle bars are cut up into lengths varying from 3 to 5 in., and are slotted for spikes and drilled for bolts. They are fastened, one on each side of the rail, the same as an angle bar, and are slot-spiked to the tie. They possess an advantage over the other devices in that they are low in cost of maintenance and require but little attention, although they become noisy unless the bolts are kept tight. They possess an added advantage in that they will retard creeping in either direction. The serious objection to them is the cost of application. The rail has to be drilled on the track, for the bolt, which is a slow and expensive job, frequently costing alone as much as some other anchors. With the more general use of open hearth rail, the cost of drilling is greatly increased and is in many cases resulting the abandoning of this type of anchor. Also, when once the rail is drilled the location of the anchor is permanently fixed while other anchors may be placed at any point bearing against any solid or well tamped tie. Some men object to this device on account of the weakening of the rail

Positive Rail Anchor.

[illegible] gives results equal to those of any other creeper, although it is, of course, more expensive.

[illegible] into two classes, wedged and bolted, depending on their method of securing their grip on the base of the rail. The [illegible]

these have been withdrawn from the market, and the reports we have received indicate that there are now but two or three such types in use, it being complained that the bolts in most of such anchors are hard to keep tight. For this reason they require careful inspection and maintenance. As with any bolt in the track, constant passage of trains tends to loosen them, and when one becomes loose the grip on the rail is lost. There is also difficulty frequently in tightening the bolt where brine drippings fall from refrigerator cars.

Vaughan Anti-Creeper.

One of the widely used anchors is the P. & M., a two-piece device of the wedge type which engages the outer edges of the base of the rail, the pressure against the tie increasing its grip on the rail. It is simple to install, and when once properly placed the percentage of failures is low. Among the roads using it are the New York Central, the Michigan Central, the Missouri Pacific, the Santa Fe, the Louisville & Nashville, the Burlington and the Illinois Central. Out of the total number of roads reporting, representing over 63,000 miles, good results were reported on this anchor from 49,000 miles.

Another widely used anchor is the Vaughan, also of the two-piece wedge type. This consists of a yoke extending under the base of the rail, with only one end reaching over the base, while the other engages in a slot in a shoe which rests against the tie. The movement of the rail forces the anchor at an angle with the rail until it grips it securely. A successful use of this anchor is reported, among other lines on the Missouri Pacific and the New York Central lines. Out of the 63,000 miles covered by the reports, over 15,000 miles reported favorably on the anchor.

Still another wedge anchor is the new Positive. In this design a number of changes have been made over a previous anchor of the same general type. This is a one-piece anchor and secures its hold on the rail by gripping the top and bottom of the base of the rail rather than the edge. While the new design has been on the market only a few months, and no conclusive opinion as to its merits can be obtained at this time, the results from roads covering 12,000 miles, show that it is satisfactory so far.

The Dorpmueller is a German anchor used to some extent in this country, but is composed of several pieces and is more complicated. It has been used with good results on the New York Central and the Missouri Pacific.

Of the bolted anchors the L. & S. and the Q. & C. are practically the only ones still being used to any great extent. The L. & S. consists of two bearing surfaces facing against the tie on opposite sides of the base of the rail and held in contact with the rail by a bolt. It is used extensively on the C. M. & St. P., where it has proved satisfactory, where it has been given proper attention. Roads representing 15,000 miles reported favorably on the L. & S. anchor. The Q. & C. has one bearing surface against the tie and is fastened to the rail by a hook bolt. Good results were reported for this device on roads representing 11,000 miles of track, including the Missouri Pacific and the [illegible]

ROADMASTERS' EFFICIENCY COMPETITION

FIRST PRIZE—MAINTENANCE OF WAY EFFICIENCY.

BY J. W. FOOTE,

Division Engineer, N. Y. S. & W., Jersey City, N. J.

The investigation and successful experiment of Frederick W. Taylor, Frank B. Gilbreth, and others of the same school of practical and scientific economy, have called the attention of thinking people to the possibilities of very large savings when work is handled scientifically. While the iron and brick trades have profited by their efforts and other industrial trades have been systematized, practically nothing has been done in the maintenance of way departments of railways to arrive at a standard basis of practice and standard units of cost. The operation of trains has been charted and definite results determined on a scientific basis and shop work has been improved scientifically, but the track work, which is really one of the largest items of expense that our railways have to bear, has been allowed to drift along somewhat as the iron and brick trades were allowed to drift along for years before the teachers of scientific management made definite rules to further efficiency.

It is true that progress has been made in the efficiency of maintenance of way work, but this progress is rather haphazard and spasmodic without definite rule or principle. While nothing definite has been done to standardize track work, yet the tendency is towards economy and improvement by means of greater efficiency.

This is necessary for two reasons: first, scarcity of efficient foremen; and second, inferiority of foreign labor compared with native labor of the early days of railroading. The first problem—that created by the scarcity of good foremen—should, I think, be met and solved by carrying in each gang a first man or assistant foreman who shall be educated and instructed to take the place of the foreman. The personality of the supervisor or roadmaster is a powerful agent for the successful accomplishment of this education. An efficient supervisor instructs his foremen along similar lines so that all under him think as one and act as one. I have seen miracles performed by a supervisor whose character is summed up in his utterance, "I don't want a foreman from some other division or some other road; I make my own after my own pattern." Under such a man the fundamental principles of scientific management is carried out, viz., the education of the laborer to do work economically. The solution of the second problem will follow when the first is accomplished. An efficient foreman always develops a powerful and efficient gang. Even the foreign laborer is quick to discover the strength or weakness of a foreman and his work is done well or poorly according to his opinion of "the boss."

To my mind the burden of economy in track work rests with the man in direct charge of the foreman, and such a man is successful in so far as he gets "on the ground" with the actual work and sees that it is done properly and cheaply. The roadmaster or supervisor who does his business from his desk or from the rear of a train is misdirecting his efforts.

An effective means towards increasing efficiency is the practice of holding staff meetings, in force on many roads. On the New York, Susquehanna & Western staff meetings are held, first, by the superintendent and his staff, monthly; second, by the division engineer, with his supervisors, master carpenter and signal supervisor, monthly; and third, by the engineer maintenance of way, superintendent, division engineer, supervisors and track foremen, twice a year. The superintendent's staff meeting tends to a better understanding of operating and maintenance of way problems and consequently a correct solution of same. It creates a unity of action of the several different and oftentimes warring departments of the division. At these meetings the maintenance of track receives its own proper discussion with beneficial results. The division engineer's meetings outline a uniform and standard practice in the season's work and the results are invaluable for improving unity of effort, organization and proper accomplishing of work speedily and cheaply.

The foremen's meetings at the end of the winter and summer seasons, respectively, bring the foremen together with two very beneficial and money saving purposes; first, the impression is conveyed forcibly to the foremen of the sympathy of the management towards them which is an encouragement and incentive to increased efficiency; second, by discussion and instruction. Standard practices in their work are explained in detail so that maximum units of cost of various classes of work are determined and the most economical methods decided upon to suit varying conditions. Along this line of endeavor a printed book stating the standard practice on various classes of work is given each foreman for his guidance. This is a step towards the standardization of track work, and is a gain in efficiency and a beginning of scientific management in maintenance of way work.

While these staff meetings are beneficial the real education of the foremen rests with the supervisor and the real "missionary" work must be accomplished by him. The lessons taught in the staff meetings must be demonstrated and explained to the foremen on the ground.

Wonderful results have been attained over old conditions by improved tools, power ditchers and hoists, motor cars and speeders. The simple example of increased efficiency by the use of a spot board over the old system is but a step towards better results. It is sometimes hard to convert one of the old school to modern ideas, but here it is that the supervisor, if he is a true educator, accomplishes what staff meetings cannot perform. The use of speeders for lampmen, resulting in reducing the number of lampmen by six men with an annual saving of over $2,000 per year on one sub-division alone is another example of what modern appliances are accomplishing towards the economy of labor and material. Many other examples could be given.

I believe that, eventually, scientific management of maintenance of way labor will accomplish startling and undreamed of saving in money, by the application of piece work or contracting of various work. On the Erie the contracting of painting and minor carpenter repairs has been put into effect with decidedly favorable results. Under the old system, if repairs to a station or other building were required it was necessary to send a carpenter to that point by train, consuming sometimes practically a whole day in minor repairs that could be performed in less than an hour of actual work. Under the contract system a local contractor makes the repairs, after his bid for same has been approved by the division engineer, and he is paid at once by the agent from his station funds. This is applied to work not amounting to more than $25. This same principle is to be applied to the renewal of ties this season, thereby securing a uniform rate per tie as against a varying and uncertain unit as heretofore, and eventually, no doubt, the rules of scientific management will cover all points in maintenance of way expenses, when the natural tendency of the laborer to do things the wrong, the longest and the most exhausting way will be overcome and when the laborer will be educated in the everyday details of his work.

SECOND PRIZE.—HOW THE ROADMASTER CAN PROMOTE EFFICIENCY.

BY R. H. ORWIG,

Supervisor, Cumberland Valley, Chambersburg, Pa.

This is certainly a subject that cannot be treated in few words, but assuming first that you have an efficient roadmaster, the following few remarks cannot go amiss.

A roadmaster should treat his position as if he owned the railway; as if all the money spent came out of his pocket. If this were really the case, the first thing he would do would be to get rid of the drones and try to get men that would give 100 per cent. service. The roadmaster should get rid of all men out of whom he is not getting what he considers the greatest amount of good work. It is certainly not economy for a railway company to have a certain percentage of men on the section who are too old for real work just because "they were good men when they were young." Places as crossing watchmen or other easy positions should be found for them, or they should be relieved and pensioned and their places filled with younger men. The roadmaster certainly cannot get 100 per cent. service out of 60 per cent. material. This may seem to some a harsh way to start, but it is the only way if he expects to get results.

A roadmaster's duty is to get a certain amount of work done in the best way in the shortest time and at the least expense to the company. He could not do this if he had poor tools—if he had six good tamping picks and four worn out picks being handled by ten good men, he could not be expected to get as much work done as if he had ten good picks handled by ten good men. Then why should he have six good men with six good picks and four poor men with four good picks? If he tries to keep the tools 100 per cent., why not the men? I simply mention this to show that efficiency is simply a man proposition; they should be the best you can get for the wages you pay.

After the roadmaster has gotten rid of his drones and poor men, among them several foremen, there is then considerable work in bringing his men to his way of working and thinking. When he gives a foreman a piece of work to do, he should tell him how to do it and give him the reason for doing it that way. The foreman may have had a method of his own, which he studied out himself, or which he saw someone else use, and yet not have any particular reason for using it. The next time the roadmaster orders the foreman to do the same kind of work, it will not be necessary to give the reason, as the foreman has already learned this. This method will gradually lessen the roadmaster's work and establish uniformity, which is bound to bring results. He should teach the foremen to ask questions as to why certain work is done in a certain way. By knowing the reason for doing the work that way the foreman can work intelligently. The roadmaster should study the foreman and in turn have him study the men.

The trackwalker should not only be a very observing man, but one on whom the foreman can rely, as he is a man that can save the company each day many times the amount of his wages. He should be a picked man, in line for promotion as foreman, and receive a higher wage than the other men in the gang. There is no truer adage when applied to maintenance work than "a stitch in time saves nine." In other words, the trackwalker can report a low place in the track just beginning to show signs of being low, spike in a rail that is just beginning to spread, and do much other work, which, if it were neglected, would require the entire gang later to put into proper shape. It is necessary to have good trackwalkers.

The foremen should not be given more men than they can work to advantage, since a foreman can get out more work with a large gang and can accomplish more with six men than with ten. This is important and should be watched closely. Because a foreman can get in 20 cars a day with five men it does not follow that he can put in 60 ties with ten men. If he can, it saves the pay of one foreman; if he cannot, it loses money.

Foremen should arrange their work so that their men may start actual work in the morning when they arrive where the work is to be done. Too frequently after a gang of men arrives at work in the morning the men stand idly about while the foreman goes over the track and points out the places he intends to surface or marks the ties he wishes to replace. A foreman, by arranging his work properly, can do this the previous evening before the men quit work, which will allow them to start in as soon as they arrive in the morning.

Newly made foremen always have a fear of the material and other reports that they must send to headquarters; the time books and distribution of time are a nightmare to many new foremen. The constant worry about the "office work" often keeps good men from doing their best work on track. This can easily be overcome by requiring the men, while they are assistant foremen, to make out the different reports, first with the foreman, and afterwards by themselves, every alternate month. In this way they become familiar with the forms and start on this work as foremen without the above mentioned fear. The roadmaster must teach system and call attention to small things; when the foreman takes care of the small things, the question of looking after the larger matters follows easily

The foreman should be made to feel his responsibility. He has a big job, but does not always appreciate it. By making him feel his responsibility, his pride in his work and his desire to do things well are increased, from which nothing can result but benefit to the railway.

Healthy criticism of work is always welcome and should always be made when the roadmaster is alone with the foreman. He should not be "called down" in the presence of the men, and not at all if it can possibly be helped. Of course, should a foreman show a careless trait and continually make the same mistakes, the only course left is to discharge him.

When the foreman does any work well or shows original ideas, the roadmaster should tell him about it, in the presence of his men, so that they too may share in the pleasure that they are bound to feel.

As a parting remark, the roadmaster should never "nag." Nagging is chronic with some men and brings us back to the first suggestion as to how to secure efficiency in the foremen—first have an efficient roadmaster.

THE ROADMASTER'S RELATIONS WITH HIS FOREMEN.

BY J. F. M'NALLY,

Asst. Supt., A. T. & S. F., Chanute, Kan.

It is not my intention to describe a specified course of instruction for roadmasters and foremen to follow, but to deal with the subject in a general way and make some suggestions that I have absorbed in dealing with men during my 33 years' experience as a track man.

Instruction to section foremen must, to a large extent, be individual; therefore, in making an analysis of the essentials of such instructions, I find that in order to secure the best possible results the roadmaster must, first, know the foreman; second, gain his confidence; third, have a mutual understanding with him along all lines of his work.

The first requirement for successful instruction is a knowledge of the foremen, and, in order to gain this knowledge, the roadmaster must be a good judge of human nature. He should be able to size up his man at a glance or in casual conversation with him. A roadmaster should never antagonize his foremen. He should meet them as often as possible and go over the section with them; talk about the work that is needing attention, pick out the weak places and ask their opinion as to the best method of putting these places into good condition. He should let the foremen understand that he knows that they have opinions on these subjects, and then if their opinions agree

with his, tell them so; if not, advise them how it should be done. There is no question that roadmasters can save considerable money for their company and also much time of the foremen by handling matters in this way.

Section foremen worry whenever there is a change of roadmasters. It does not make any difference how long they have worked for the company; they dread a change, providing of course, they worked in harmony with the former roadmaster.

The first thing a new roadmaster should do is to go over his division on a motor car instead of on trains. This gives him an opportunity to get acquainted with the foremen and talk with them in regard to the different kinds of work to be done, and if he thinks that it is necessary to make any changes, he can explain them to the foreman so he may understand more readily just what is wanted. He should also give the foreman to understand that he has no followers and, as long as they do their work satisfactorily, their positions are secure.

A short time ago, a general superintendent was going over the division on which a new roadmaster had been appointed. He met one of the old foremen, shook hands, and passed a few pleasant words with him, and said on leaving, "How long have you had charge of this section?" Mike spoke up very promptly, pointing to the new roadmaster, "If he will let me stay until next month, I will have had charge of this section 32 years and have never had a wheel off." It is needless to say that Mike is still on the job. It can readily be seen how some foremen feel about a change of roadmasters. This foreman, after working 32 years, and always giving good service, was wondering what the new roadmaster was going to do with him. It simply confirms the former statement that roadmasters must gain the confidence of their men. It is not always an easy matter to do, but it can be done by talking to them.

It is surprising how some of the foremen become interested in the suggestions offered by the roadmaster, and it is not long before a confidential relationship is established between the two. It simply remains for the roadmaster to give a square deal, in every case, that is, to be square with the men and with the company that they are all serving. He should show the men that he is their friend at all times and should encourage their confidence at every opportunity, giving them the best advice at his command, even if it is necessary to go out of his way to do so. I will even go farther and say that it is the duty of the roadmaster to know, to a great extent, how his men spend their idle time around town, and if it is found that they are not spending it to good advantage, he should talk to them in a pleasant way, explaining that it is because it is to their mutual benefit that he is taking the liberty of advising them.

In many of our smaller towns, the station agent and the section foreman are the only local representatives the railway company has, and for this reason, the roadmaster should be very careful in chosing his foremen. He should make an effort to select a man of good moral character and one who is a respected citizen in that community. No business can succeed without the confidence and respect of the patrons, and as the section foreman is the company's representative, he should be a man of good judgment and one who will make friends in the community in which he lives. He should try and cultivate the friendship of the farmers on his section and by so doing he can save money for the company each year. For instance, he can more readily secure permission from the farmers to make fire guards, and assistance from then in running these fire guards through their farms. He should encourage the farmers to give permission to make substantial fire guards, as by so doing he will not only protect the property of the farmer, but also of the railway.

A good section foreman is one of the most valuable assets of the railway, as he can save more money each year than almost any other employee. The roadmaster should pick out young men of good character and educate them as to the best methods of performing the duties of a section foreman and should teach them to economize in their work. He should, as far as possible, pick out men that are not afraid of work, and who, in his opinion, will assist the men in performing their duties. A man of this kind will accomplish more work each day than a section foreman who stands around with his hands in his pockets and has a continual grouch.

A roadmaster should be kind to his men and should never pass his foreman without speaking a word of encouragement to him. At times, a foreman will get discouraged and a kind word will make him feel that his work is appreciated. I would suggest that roadmasters treat their foremen in the way they would like their superiors to treat them.

It is not always possible to get good foremen, and when they are secured, it is to the advantage of the company to keep them. The section foreman should always be glad to see the roadmaster come over his section, as he can ask questions about the different kinds of work and the manner in which the work should be done. The roadmaster can then explain the duties better than by staying in his office and writing long letters.

A roadmaster should spend but little of his time in the office. He should be out on his division every day, and if he has any important or special work to do, he should personally see that the foreman understands how the work should be done to the best advantage and the least expense to the company.

If a roadmaster should have a foreman in his employ who is not doing a sufficient amount of work with the number of men he has employed, he should talk to him, and in a great many cases he can make suggestions which will enable the foreman to increase the amount of work.

It is not advisable to be making changes in foremen, as when a foreman gets acquainted with the bad places on his section, he can do more than a new man.

This supervision and close attention to duty will enable a roadmaster to maintain good track at a low cost.

WEEKLY PROGRESS REPORT FOR SECTION FOREMEN AS A MEANS OF INCREASING EFFICIENCY.

BY W. G. DUNGAN,

Roadmaster, C. B. & Q., Orleans, Neb.

During the present season the writer has been furnishing the section foremen a weekly progress report, showing each foreman what he did and what every other foreman did the previous week, and the unit costs of each kind of work. This report acts as an incentive to each man to keep his unit costs down, and also serves to impress upon him the importance of the cost item. It tends to keep the men at one kind of work more steadily, and to avoid the waste of time changing from one kind of work to another and affords a basis for comparing the work of the different gangs. Such a report gives the roadmaster valuable cost data for the different kinds of track work, something about which most of us have rather vague ideas when it comes to unit costs. The plan has not, as some might think, caused the foremen to slight their work for the purpose of making a good showing on paper. They have taken kindly to the scheme and are always anxious to get the report Monday morning to see how they line up with the "other fellow." If a man's unit costs run higher than the average, he is usually anxious to make an explanation without being asked. The unit cost of renewing ties has been materially reduced from the figures of the first few weeks. The cost of getting out these reports is a very small item. One man (in this case, the writer) will figure the unit costs and make 27 copies in about three hours. The foremen make a telegraphic report Saturday night showing hours worked and ties renewed during the week.

Instructions are issued insuring uniformity of work. For tie renewals, ties are to be full spiked, roadbed dressed to standard section and old ties piled. These items are included in the unit cost of tie renewals. The distribution of ties is figured

as a separate item. The section foreman's surfacing shows the hours worked, the number of ties tamped, and the distance covered during the week. The distance covered indicates the lineal feet of track surfaced, lined, and dressed to standard section. The unit cost is figured on the basis of the number of ties tamped. As will be seen from the attached sample report, the cost of tamping a tie is somewhere near a uniform quantity, regardless of the distance covered.

When the ditches are cleaned, the road's standard dump box is taken as a unit of measurement. The section foreman's report shows the number of hours worked, the number of boxes of dirt moved and the distance covered. The distance covered means lineal feet of track ditched on both sides. It would be desirable to include the length of haul, but it was thought best not to tax the foremen with keeping track of this item. Of course, there will be a variation in the way the boxes are filled, and the information will not be exact from an engineering standpoint. However, it affords some basis of comparison and the writer believes a comparison, even based on approximate quantities, is better than no comparison.

The full benefit of these reports will not be realized until the second year, when we will have the previous year's figures as a guide. The reports have an immediate effect, because they are furnished while the work is in progress, and not, like most railway statistics, several months after the work is finished and forgotten.

Surfacing report for week ending May 26:

Sec.	Ties Tamped.	Hours.	Cost per Tie.	Distance.
T 1	[illegible]	40	.0500	140 feet
T [illegible]	434	130	.0484	720 "
T [illegible]	[illegible]	136	.0392	930 "
T [illegible]	317	80	.0410	1020 "
T [illegible]	239	80	.0544	600 "
U [illegible]	531	140	.0423	1290 "
U 2	575	225	.0640	2400 "
U 3	[illegible]	240	.0654	1620 "
U [illegible]	531	160	.0593	2190 "
U 5	702	180	.0441	1320 "
T [illegible]	369	180	.0851	1800 "
T [illegible]	613	210	.0554	1740 "
T [illegible]	615	235	.0622	1540 "
T [illegible]	217	180	.1382	2160 "
T [illegible]	537	180	.0558	1440 "
T [illegible]	710	225	.0517	1950 "
T [illegible]	567	200	.0573	1620 "
U13	[illegible]	220	.0720	.... "
T [illegible]	[illegible]	240	.0665	1050 "
T [illegible]	580	215	.0608	1380 "
[illegible]	[illegible]	287	.0634	3160 "
Average ..			.0608	

HOW THE ROADMASTER CAN PROMOTE EFFICIENCY.

BY B. A. WEST,

[illegible], Topeka & Santa Fe Pacific, Colo.

The following plan has been in practice for the last three years on the Colorado division of the Santa Fe, and is considered by the local officers as one of the best ever tried:

All the foremen are brought together twice a year, once during the summer and once during the winter. They spend the day discussing important subjects pertaining to their work, such as making temporary repairs to switches, frogs, track and telegraph lines, repairing washouts, handling wrecks, surfacing and lining track, inserting ties, handling of foreign laborers, manner of keeping reports and time, and any special work with which they may have difficulty. The roadmaster tells them the turn conditions have taken in the financial affairs of the railway company and suggests, for instance, why reductions of forces are necessary at times when the road may be [illegible]

These meetings not only stimulate up the foremen, but give [illegible] to get a day off once in a while and see how the neighbor roadmaster has made [illegible] In this way he gets pointers he would never have secured had he remained at home.

These meetings have established a spirit of [illegible] in the maintenance of way department. [illegible]

HOW THE ROADMASTER CAN PROMOTE EFFICIENCY.

BY J. J. BURNS,

Roadmaster, Michigan Central, Bay City, Mich.

The efficient management of American railways demands the best efforts of men scientifically educated in the several specialties. Each succeeding year marks some advance along these lines. The reign of the rule-of-thumb railway officer will soon be ancient history. Railway maintenance is an exact science, and only scientific management can survive the severe tests of increasing competition in this era of high priced materials and low priced transportation.

The roadmaster must meet his share of this ever increasing demand for ability. He must be a constant student, as he is a constant teacher. He not only can, but must, promote efficiency by the constant exercise of a diplomacy rare among men outside of professional diplomatic service.

The roadmaster must be a just judge. He must be an observant student of human nature. He must so handle his section foremen as to keep their many responsibilities constantly before them. He should avoid issuing arbitrary orders. The art of arguing a foreman into admitting that he can spare a dozen rails or a half hundred ties off his yearly estimate is far in advance of an arbitrary order to "cut it out." This reasoning places the foreman in a responsible position; it appeals to his judgment; it increases his worth as an employee responsible for the road's safety.

Comparative cost data are most important in handling section forces. Given the detailed cost per mile of track covering each section separately for the preceding month, a roadmaster can do more good by talking comparative costs with his foremen than by all the general economy schemes combined.

Comparative detailed cost data shows at once which foreman is economical, and which one is extravagant, and in what particulars. A rivalry in true economy is instantly created among the foremen. Thus the spirit of economy and resulting efficiency is instilled into the users of material, tools and labor.

MAINTAINING THE FLOOR OF A LONG STEEL VIADUCT.

BY A. W. CARPENTER,

Engineer of Structures, New York Central & Hudson River.

A viaduct on the New York Central & Hudson River, about one and one-quarter miles long carrying four tracks, has a ballasted steel trough floor with three lines of supporting girders, one line of girders being located between the inside tracks and one line outside of each outside track. The troughs, which are of rectangular section and about 15 in. wide and 16 in. deep, were originally provided with protection from corrosion by painting and by filling the bottoms with a "binder" consisting of a mixture of hot coal tar pitch and asphalt with sand and gravel. This binder was made about two inches thick at the centers of troughs (center line between outside pairs of track) and sloped to the ends of the troughs where openings were provided for drainage. The binder was also sloped up the sides and ends of troughs a few inches. The binder was applied on the shop coat of paint and field coats of paint were applied on the surfaces of troughs not covered by the binder. These included the upper 12 in. or more of the inside vertical surfaces of the troughs. The troughs were filled with ballast to the tops except the spaces occupied by the ties under the rails, the bottoms of which are placed somewhat below the tops of the troughs. The side and bottom surfaces of the troughs are inaccessible except when the ties and ballast are removed.

Some time ago the paint protection of the steel surfaces of the viaduct, especially of the floor troughs, had given out and it was decided to put on a special painting force to repaint the entire viaduct, including the interior surfaces of the troughs. The latter required the removal of the ties (temporarily supporting the rails on tops of troughs), the removal of the bal

last, the scraping, cleaning and coating of the metal and the replacing of ballast and ties. The work was done under an exceedingly heavy traffic and every tie on the structure (about 10,000) was removed and replaced, together with the ballast under it, and the surfaces cleaned and given two coats of paint except where protected by the binder. The binder in the troughs was in good condition and protecting well the steel which it covered.

For certain reasons these new coatings, on the tops of troughs, especially, were soon damaged or became ineffective and about three years later it was necessary to again take steps to preserve the metal from corrosion. The paint coating of the insides of the troughs was also found to be failing again. To go all over the work of three years before, removing and replacing all the ties, was very serious, especially as meanwhile the tracks had been electrified and electric third rails added.

About this time it became necessary to begin the renewal of ties on a large scale and a plan was devised of handling the preservation work in combination with the tie renewals. When each tie was renewed, the track men removed and cleaned the ballast in its trough. The cleaning of the ballast is essentially necessary on this type of viaduct in order to promote drainage. While the troughs was open and the trackmen working on the next tie and troughs, the bridge men could come in, clean the surfaces and coat them with one coat of a heavy, quick-hardening coating, which is expected to preserve the metal until the tie is again renewed. The ties last four or five years on this viaduct.

In addition to the advantages mentioned above, it has been found that on account of the ties not being removed consecutively, the extensive bracing of the tracks previously required when the ties were removed and the troughs coated consecutively, is no longer required. This plan also gives more room for storing and cleaning the removed ballast so that, whereas formerly it was necessary to run out a work train every night to remove the rejected portion. Now it is only necessary to use the work train on an average of once a week.

The saving in combining the work of removing the ties and ballast is estimated at approximately $10,000 for one complete tie renewal over the viaduct, or a reduction of two-thirds of the cost of independent work in going over the viaduct in one operation to coat the troughs for preservation. Besides there is a saving in delays to train movement and a reduction in the chances for accidents.

SECOND TRACK CONSTRUCTION ON THE PENNSYLVANIA BETWEEN INDIANAPOLIS AND RICHMOND.

The Pennsylvania Lines, Southwest System, are now completing 25.9 miles of very heavy second track work on the Indianapolis division, between Richmond, Ind., and Indianapolis. East of Richmond the traffic between Pittsburgh and St. Louis is divided between two lines, while all this traffic passes over the one line west of Richmond. As a result the density of traffic west of this point is much greater than east of it. With the present business the train movements between Richmond and Indianapolis average about 50 trains daily, 20 being scheduled passenger trains, of which some often run in more than one section. In addition to this dense traffic, the grades are heavy, and in one or two places there is sharp curvature. Previous to the beginning of this work there was but 6½ miles of second track between Richmond and Indianapolis, a distance of 68 miles, and this was through the terminals.

In determining on the present improvements, the desire was to relieve the worst places first, and with this in view, reconstruction and second track work was authorized between Richmond and Dublin, 17.6 miles, and from Dunreith to Knightstown, 8.3 miles, in June, 1909, work being begun the following month. The heaviest construction work in these two sections is caused by the reduction in the ruling grade and the elimination of grade crossings wherever possible. This ruling grade was formerly 1.1 per cent., and is now being lowered to 7 per cent. compensated. With the completion of the work now under way, the maximum between Richmond and Indianapolis will be reduced to .9 per cent momentum, this maximum existing on stretches not yet rebuilt, and the present tonnage rating of 1,350 tons will be materially increased. In many localities a .7 per cent. grade might not be considered low, but in view of the fact that this line crosses the Ohio river drainage low down and at right angles, and that the securing of this .7 per cent. grade required the moving of earthwork averaging over 71,000 yards per mile, it was not considered an economy to lower the grade further. Out of the total of 25.9 miles of work undertaken, the grade line was changed on 21.3 miles; in many places very radically. The longest single change of grade was made at Knightstown, where the grade of the old line was revised for over 6 miles. The maximum raise in grade was made through Cambridge City, where the new track is 26 ft. above the old one; while the greatest depres-

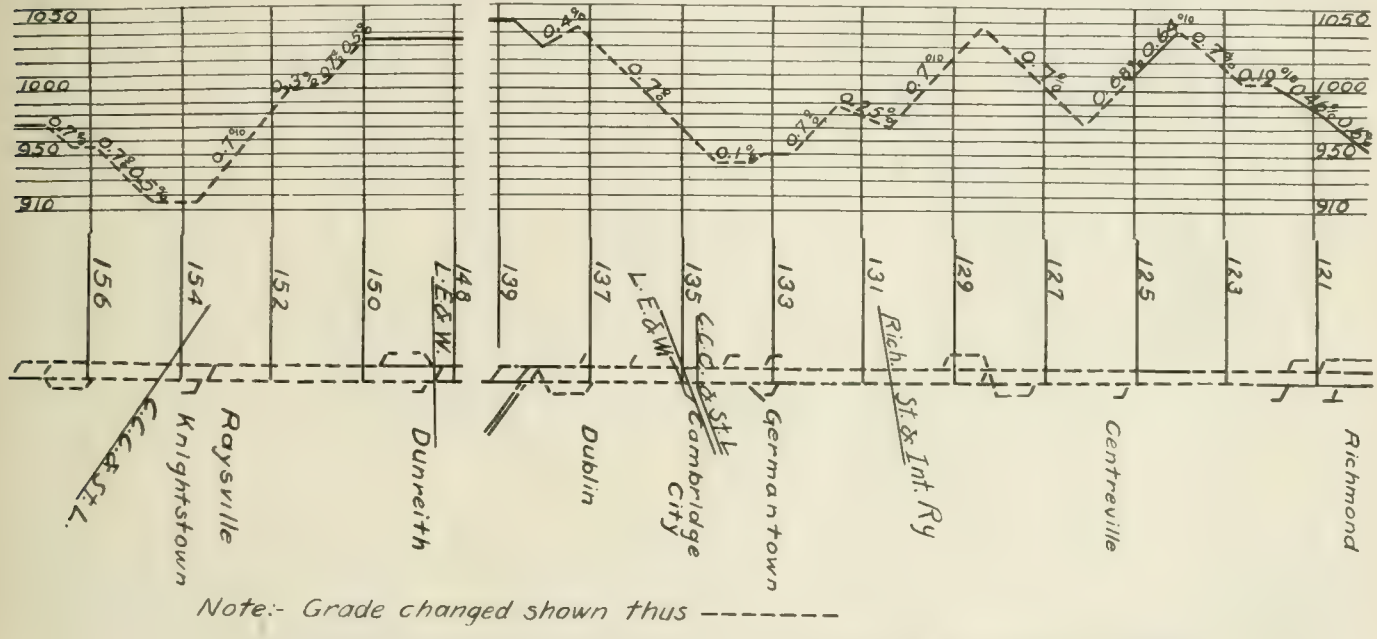


Fig. 1—Condensed Track Layout and Profile of Second Track and Grade Reduction Work.

sion was at Jackson's Hill, about 8 miles west of Richmond, where the track was lowered 22 ft., and 600,000 yds. of earth were removed from one cut.

The longest ruling grade established is 2.56 miles in length, at Cambridge City, while there are 13.52 miles of 7 per cent. grade out of the total of 25.9 miles. Wherever the grade was changed to any extent the new line was built for double track on an offset far enough removed from the old line to enable the new work to be completed without any interference with traffic, the old line being abandoned when the new line was put into service. With the exception of this offset location, but little change was made in the alinement, except at one point east of Knightstown, where a 3 deg. 50 min. reverse curve and a 1 deg. 52 min. curve swinging around a hill are replaced by a 1 deg. curve on a cut over one mile long, going through the hill and saving 120 deg. of curvature and 880 ft. in distance.

The total estimated amount of earth work is 1,850,000 yds., and is all being moved by contract, the contractors using steam shovels with small cars and donkey engines. The grading is now [illegible] and will be entirely done within a few weeks. All embankments are built with a 36 ft. crown and a base of 48 ft. is provided in all large cuts, allowing for a 6 ft. ditch on each side. Vitrified sewer pipe varying in size from 6 in. to 18 in. is laid below the cut ditches and back filled with engine cinders to provide for the sub-drainage. In but one case the contractor hauls material across the main line at grade, this being about one mile west of Knightstown, where the material from the cut west of town was needed for the high embankment extending through the village, and in which cut standard gage grading equipment was used. Because of the frequent and high speed passenger trains, it was necessary to fully protect this crossing, which is formed by two turnouts from the main line. Derails connected by pipe lines with the switches were installed at the clearance points on the construction tracks, while block signals bolt locked with the switches were erected for main line trains. A main line conductor is in charge of the crossing during the working hours. All main line trains are required to approach the crossing under control and to secure in addition to the block indication a hand signal from this conductor before proceeding.

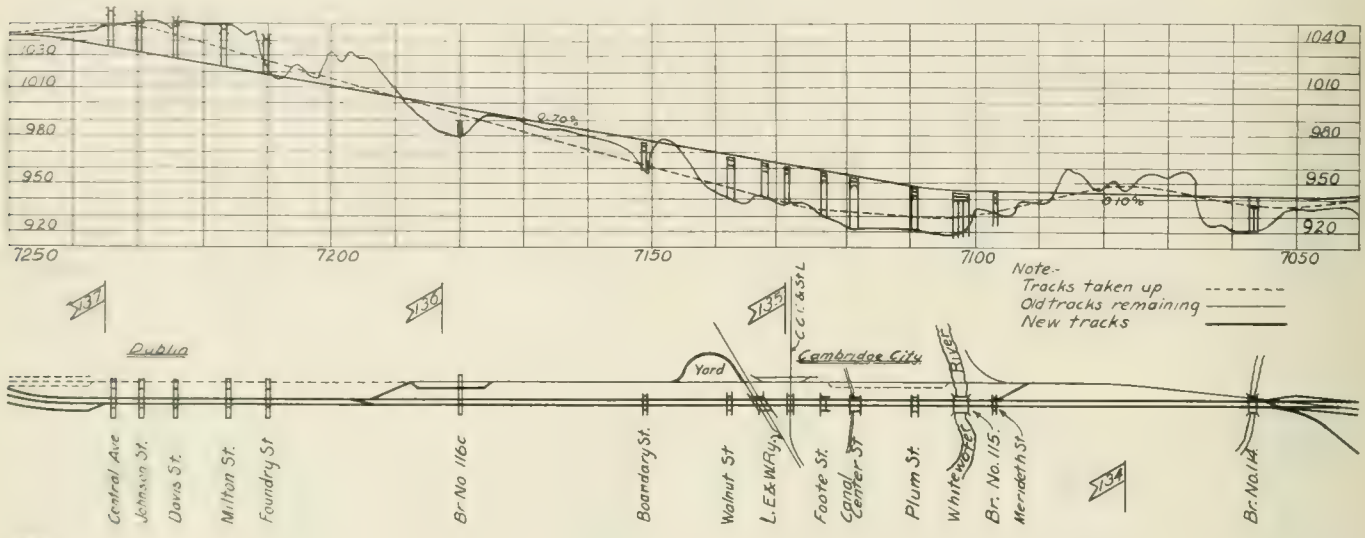


Fig. 2—Track Layout and Profile from Dublin Through Cambridge City.

Fig. 3—Sodding Cut East of Cambridge City.

The contractors are required to excavate to the required cross section and to trim the cuts up neatly, no back filling on the slopes being allowed. Following the excavation all slopes in cuts are sodded in accordance with the Pennsylvania System standard practice. This sod is bought by contract, delivered in strips 6 ft. long and 1½ ft. wide, and is placed by company forces. Boards held in place by pegs are placed on the slope longitudinally with the cut, at intervals of about 6 ft., to hold the sod in place until it gains a hold on the bank, as shown in one of the figures. With the exception of a few places where the sod was placed too late to secure a footing before frost, all that placed last season passed through the winter in good condition and has protected the bank from erosion. The ditches in these cuts are open and in good condition, and required no cleaning out this spring, in strong contrast with cut ditches ordinarily found on new work, which require frequent cleaning for two or three years. This sod costs from 5 to 6 cents per square yard delivered, and the labor of handling and placing it amounts to about 7 cents, making a total cost for the sod in place about 13 cents per square yard. In several of the cuts wet spots or springs appeared on the sides following the excavation. At these points before the sod was placed a 3-in. tile drain was laid a few inches below the surface, tapping the spring and extending to the cut ditch. Following this, the sod was placed as described.

In connection with this reconstruction work, grade crossings have been eliminated wherever possible, in accordance with the general policy of the road to do away with all grade crossings on new work where feasible, even if there exists a possibility that at a later date the expense of such work would be divided with the county or village. A considerable part of the change in grade was made to accomplish this object. The new line is elevated above the streets through Knightstown and Cambridge City, and depressed through Dublin, 17 crossings being eliminated at these points alone. In all, 25 street and highway and two railway crossings are done away with by the construction of four overhead and 16 under-grade crossings and the vacation of five highways previously crossing at grade. In addition, old wooden structures at 4 overhead and 2 under-grade street and highway crossings are replaced by permanent structures.

Next to the heaviness of the work considered as a whole, the thing which strikes one's attention is the number of openings provided for streams and highways and the high-class of structures erected. Concrete is used throughout without reinforcement of any kind, except that in certain foundations some old rails were inserted. Where possible arches have been built, but where the head room is limited, concrete abutments with steel trough floors are substituted. At Dublin, where the streets are carried overhead, the bridges are of the reinforced concrete girder type shown in Fig. 4. Nineteen arches in all have been built, with spans ranging from 10 ft. to 66 ft., while 13 bridges of the steel trough floor type were built of spans ranging from 30 ft. to 70 ft. Three plate girder bridges were also built, with spans ranging from 40 ft. to 70 ft. The largest structures are three triple 60 ft. arches over streams at Centerville, Cambridge City and Knightstown, each of which contains over 5,000 yds. of concrete. Over 71,000 yds. of concrete in all were required, this work being contracted in connection with the grading.

Special structures were required at a number of places where

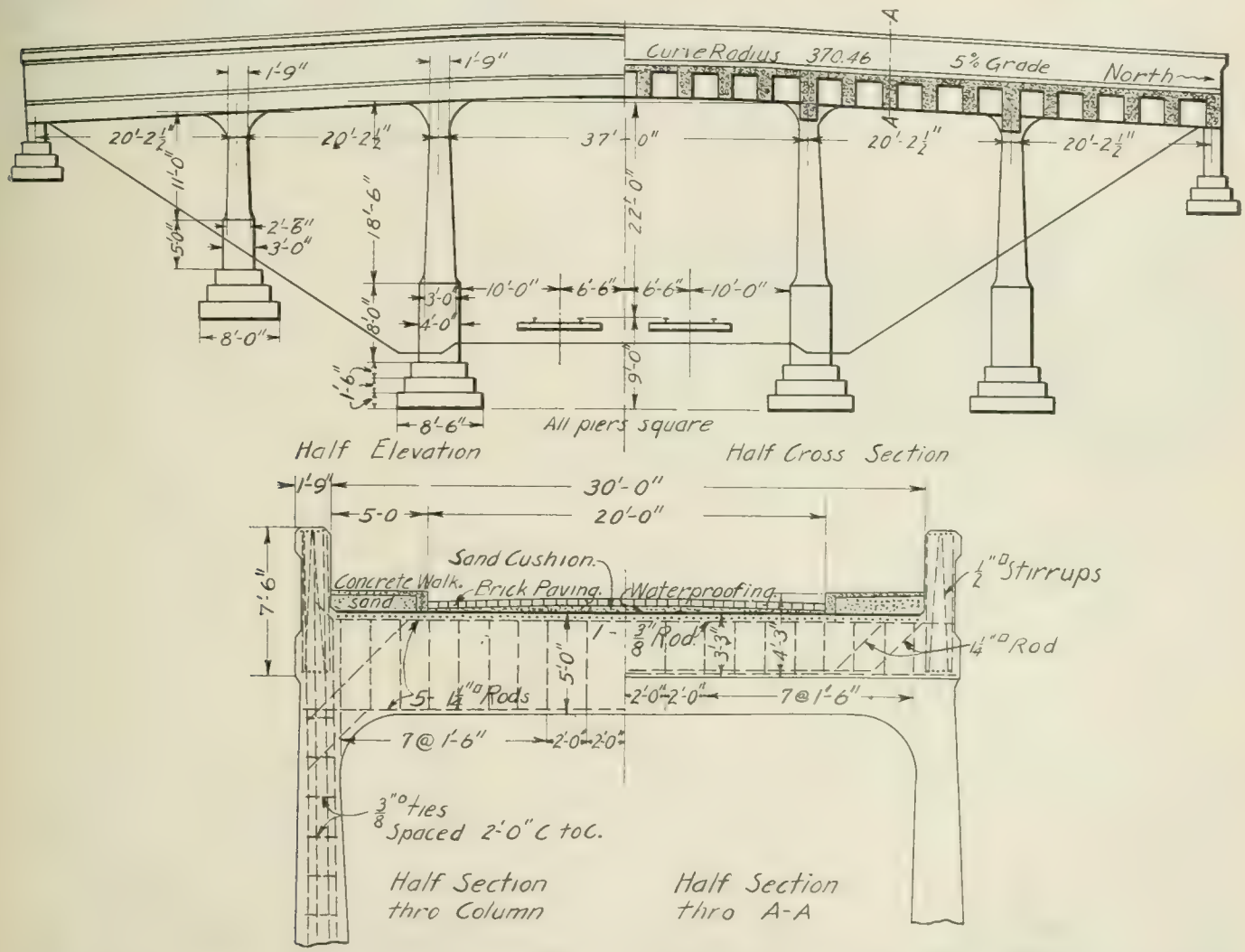


Fig. 4—Elevation and Section of Overhead Bridges Through Dublin.

Fig. 5—National Road Subway at Raysville, Ind.; Pennsylvania Railroad.

Fig. 6—60-Ft. Skew Arch and Centering Over Center St.; Cambridge City.

this line crosses the National road, an old turnpike constructed from Washington to St. Louis before the railways reached this part of the country. It is interesting to note that this road forms the main street through the cities of Wheeling, W. Va.; Springfield and Columbia, Ohio; and Richmond and Indianapolis, Ind., as well as of the many smaller villages through which the lines passes. Because of the importance of this road, county officials were very particular in making agreements with the railways for the new crossings, requiring large open-

one of the illustrations is an example of several such structures built. At Dunreith the commissioners rejected a proposal of the railway company to lower this road 7 ft. and elevate the tracks the same amount to do away with the grade crossing.

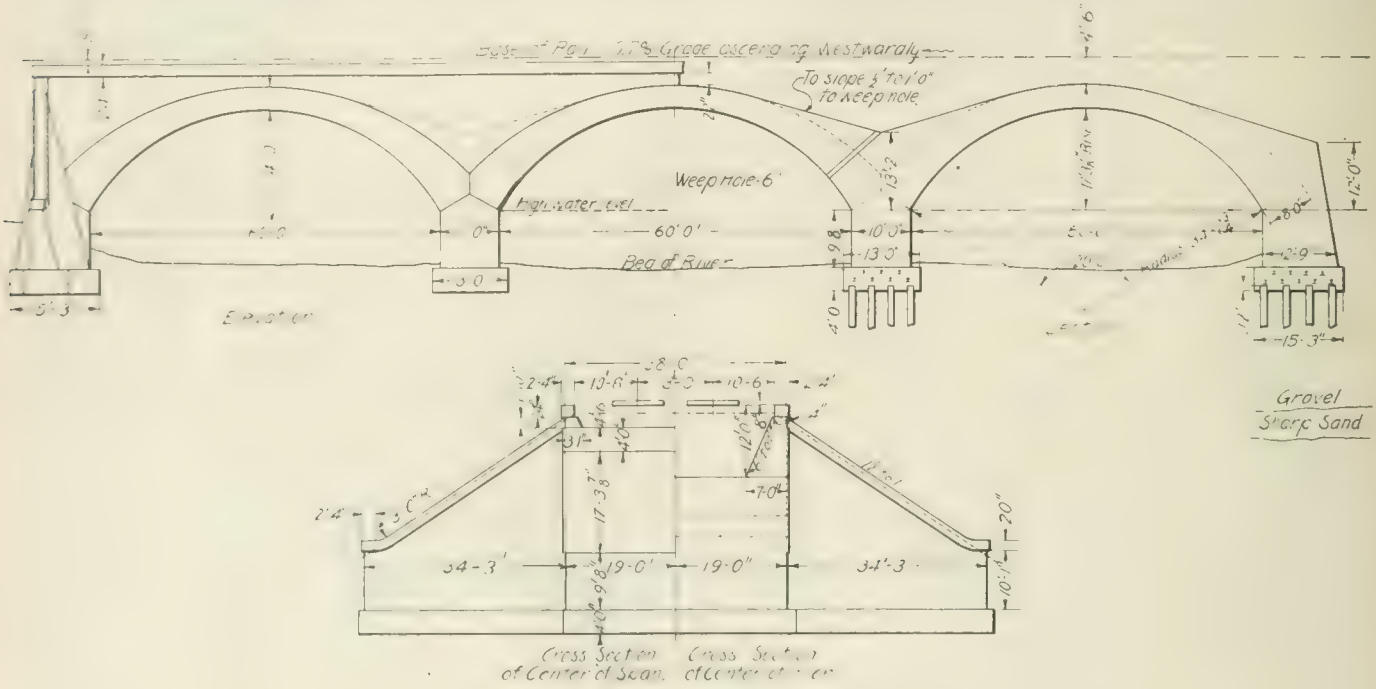


Fig. 7—Elevation and Cross Section of Triple 60-Ft. Arch.

The type of arches built is shown in the figures. In constructing arches of from 40 ft. to 70 ft. span, the arch ring was divided into seven voussoirs of equal length on the intrados with radial bearing planes; while for arches of less than 40 ft. span the ring was divided into but five voussoirs. Each voussoir was cast separately to the full width without any

Fig. 8—Triple 60-Ft. Arch at Centerville, Ind.

attempt to bond it to the adjoining masonry. In placing the spandrel walls, wing walls and coping, the same practice was followed, the spandrel walls and coping being built in sections about 30 ft. in length to allow for temperature variations. The relative order of construction followed in the building of these arches is shown in one of the illustrations. In this connection it should be noted that the keystone voussoir was placed be-

Fig. 9—Arch at East Haven.

fore those on either side. No attempt has been made to maintain open joints between the various sections by the use of paper or wood filler. The provisions made for expansion have resulted satisfactorily thus far, and no cracks have opened except at the joints. Wherever possible the wing walls have been built at right angles to the tracks, so that they can be utilized at any future time that additional tracks are necessary. On all overhead bridges the standard clearance of 21 ft. above the top of rail has been maintained.

Special attention has been given to the waterproofing of the bridge structures. A covering of 3-ply Barrett specification felt and tar is placed over the barrels of the arches and dapped up 1 ft. on the spandrel wells, which are then coated with pitch

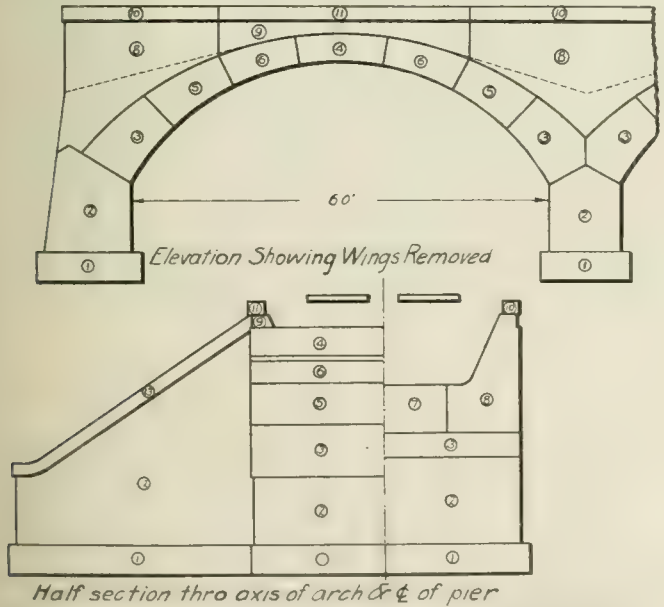


Fig. 10—Order of Construction of Arches.

to the top of the embankment. On the steel trough floors four thicknesses of Barrett specification felt are laid with one layer of Tartex placed in the middle. All layers are cemented together with pitch, while the bottom thickness of felt is placed on the concrete dry to avoid cracking with any movement of the concrete. A cushion of fine sand is then laid above the waterproofing and on top of this a protecting layer of common brick. Wherever the grade exceeds .5 per cent. new crown is provided at the middle of the span and the waterproofing is laid parallel with the grade.

A highly finished surface on the concrete is secured by rubbing the exterior with a concrete brick and water as soon as the forms are removed. A structure with this work partially done is shown in Fig. 8. The concrete used in the arch rings is a 1:2:4 mixture and all other concrete is 1:3:6. Crushed limestone is used in all cases.

Because of the elevation of the line through Cambridge City it was necessary to move the junction of the branch leading southwest toward Louisville to a point 3 miles west of Cambridge City, requiring the construction of five miles of single track branch line between Bentonville and the new junction and the abandonment of the old line between Bentonville and Cambridge City.

Pennsylvania standard 85-lb. rail is being laid on oak ties with 18 in. of gravel ballast under the ties, the ballast being secured from a pit at Germantown. All track work is done by company forces. The main lines are built 13 ft. centers, while passing tracks are 17 ft. from the main line. Both eastbound and westbound advance passing tracks are provided at intervals of about five miles of a length sufficient to hold 120 cars, or two maximum trains each, and with a trailing crossover between

Fig. 11—Walnut St. Subway; Cambridge City.

them at stations. All main line crossovers and switches entering passing sidings will be handled from interlocking plants, while the outgoing switches of passing sidings will be controlled from the interlocking plants by electric locking. Telephones will also be installed at these outlying switches for purposes of quick communication.

The cost of this work is estimated at $2,750,000, or a little more than $106,000 per mile. The contractors on the grading and masonry work are the Drake & Stratton Co., of Philadelphia, Pa., P. F. Brendlinger, also of Philadelphia, and Lorimer & Galligher, of Chicago, while A. J. Yawger & Company, of Indianapolis, Ind., are building the overhead bridges at Dublin.

This work is being done under the direction of W. C. Cushing, chief engineer of maintenance of way, by the division forces. S. B. Robertson, superintendent of the Erie & Ashtabula division, formerly division engineer of the Indianapolis division, prepared the plans. The bridges were designed by J. C. Bland, engineer of bridges. We are indebted to F. H. Watts, division engineer, and G. R. Barry, assistant engineer, for the above information.

PROPORTIONS OF CONCRETE MATERIALS.

Engineers frequently have occasion, in ordering material for concrete, to estimate the quantities of various materials needed. The following table is sufficiently accurate for all ordinary purposes and gives the amount of the various materials needed per yard of concrete:

Mixture	Cement (Barrels)	Sand (Cu. Yds.)	Stone (Cu. Yds.)
[illegible]	1.83	0.51	[illegible]
[illegible]	1.57	[illegible]	0.88
[illegible]	1.29	[illegible]	0.91
1-3-5	[illegible]	0.51	[illegible]
[illegible]	1.10	[illegible]	[illegible]

PROTECTION OF EMBANKMENTS FROM HIGH WATER.

BY C. F. GREEN.

Supervisor Bridges and Buildings, Southern Pacific, Sacramento, Cal.

For years past, in common with most roads, the Southern Pacific has used rock by the carload in times of high water, to protect embankments from washing. This method is unsatisfactory unless the rock is used in large quantities and is also slow and expensive. To overcome these objections other methods have been adopted for both temporary and permanent protection.

For temporary protection a brush mat is used which can be placed in a current swift enough to wash away rock weighing half a ton. In making this mat, if possible, the brush is cut as long as the slope or bank of the fill in question. It is made up into bundles by tying the brush together with baling wire or small rope at intervals of about 3 ft., the bundles being made of

Constructing Concrete Revetment.

such size that they can be carried by three or four men. These bundles are placed close together along the track, the small ends projecting toward the water, and are fastened together with baling wire. When enough bundles have been laid out to protect the entire length of the wash, a heavy line, the weight depending on the swiftness of the current, is fastened around the middle of the down stream bundle, and then around all the other bundles until the last one up stream is reached. The end of this line is then tied to a tree or dead man up stream, where it will hold the mat against the washed bank when afloat. A number of small lines about the length of the bundles are fastened to the ends of the bundles next to the water at intervals of about 20 ft. Starting at the up stream end, the mat is then shoved over into the stream, while men hold on to the short line so that the mat will not swing away from the bank. About two or three feet of the mat is left on top of the bank after it is shoved into the water. Starting at the down stream end, scrap rail, long enough to reach from one short line to the next, is thrown out on to the mat as far as possible under these [illegible] the [illegible] of the mat as needed [illegible] down. [illegible] [illegible] the [illegible] [illegible] the small rope are [illegible] on the [illegible] the lower edge of the mat can be [illegible] to the [illegible] of the mat by hauling [illegible] letting out the lines, and the wash effectually stopped. Using a mat made [illegible] emergencies and can be made in a very short time. When [illegible] [illegible] [illegible]

DEPTH OF STONE BALLAST.*

A piece of single track was constructed at South Altoona foundries, under which were placed three strong boxes open at the top and having removable ends, each box being sufficiently large to contain two standard ties spaced the standard distance apart. The boxes were filled with various kinds of ballast and roadbed material. A heavily loaded truck was designed to run back and forth on the track so that the effect of its load acting through the ties upon the ballast and roadbed could be studied by the removal of the ends of the boxes, when measurements and photographs could be taken. The general arrangement of the plan is shown herewith. The track was 109 ft. in length, built of new P. R. R. standard 85-lb. rail, spiked to standard white oak ties 7 in. by 9 in. by 8½ ft. long, no tieplates being used. The rail fastenings were standard spikes, and the rail joints were so arranged as not to fall within the limits of the boxes. Eighty-five-pound rail was selected in preference to 100-lb. rail in order that the track might be sufficiently flexible to subject the ties to as much weight as possible. The ends of the track were elevated to facilitate the stopping and starting of the car, but the part over the boxes was level. The boxes were built of yellow pine planking 4½ in. thick by 8 in. wide and had floors of the same material resting on sand several inches deep, which, in turn, rested on an undisturbed shale formation. The site was selected to provide a solid bottom to prevent any appreciable settlement taking place in the boxes. The joints between the planks were not tongued and grooved nor sufficiently tight to prevent the passage of water. The boxes were strengthened by an arrangement of heavy posts and tie rods, and were spaced 12 ft. apart, center to center. Their inside dimensions were: 4 ft. 8½ in. wide, 9 ft. long and 3 ft. 4 in. high, being set so that their tops were 2 in. below the base of the rail.

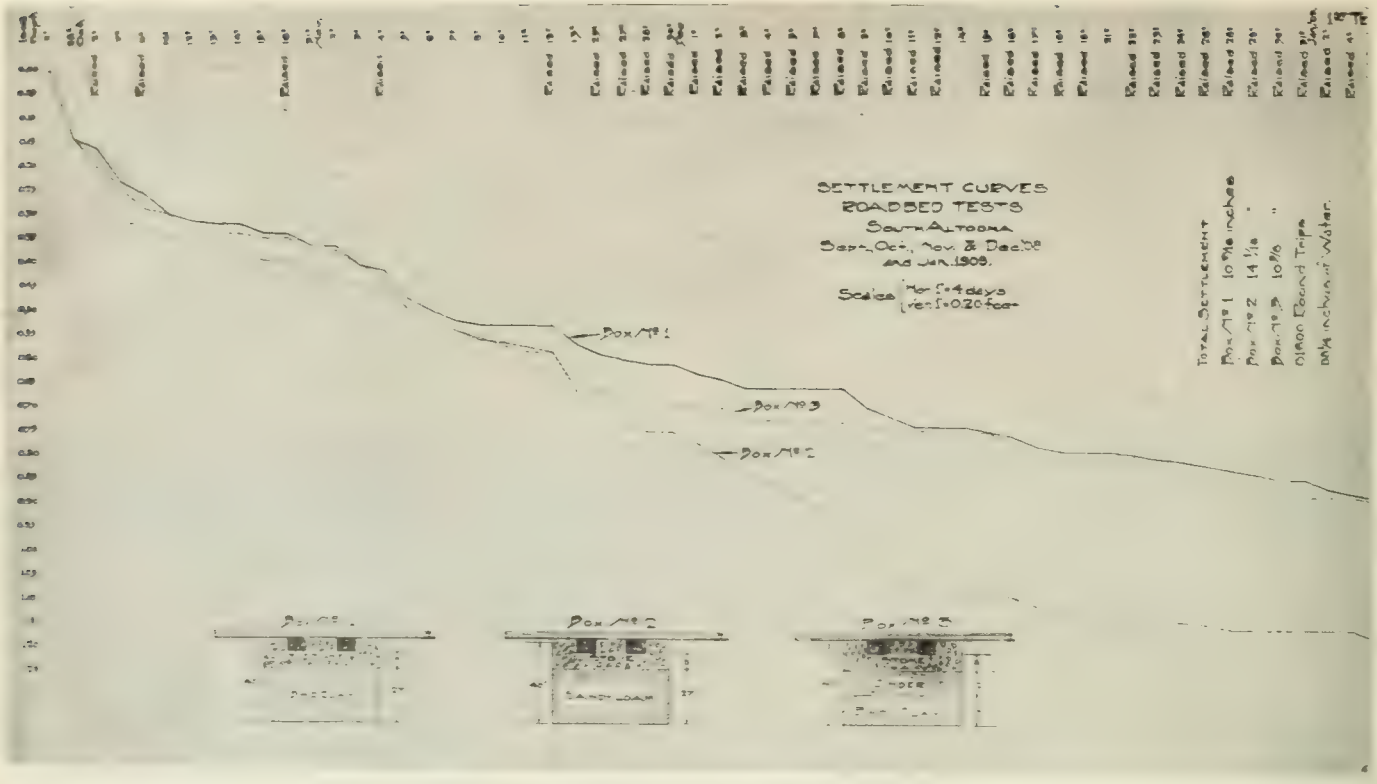
The testing plant was roofed over to prevent rain from falling on the boxes so that the amount of water applied to the boxes could be accurately determined. The car or truck having two axles was designed to run back and forth upon the track at a speed of about five miles per hour. The car had a wheel base of 9 ft. and was loaded with pig iron, so that the gross weight amounted to 150,000 lbs., or 75,000 lbs. per axle. There was no spring intervention between the weight and the axle, the journal boxes being fastened directly to the body of the car. It was kept moving by an electric motor geared to one axle, the current being supplied through an overhead shoe bearing against a conductor. At the elevated ends of the track a device automatically shut off the current and reversed the motor so that the car needed very little power or attention to keep it in motion. A counter on the car registered the number of trips made.

General View of Test Track Arrangement.

It being impracticable to run the car faster than about five miles per hour, at which speed any effect upon the track, due to impact alone, would be negligible, a weight of 75,000 lbs. per axle was chosen for the experimental truck, so as to obtain about the same effect on the track as an "H8b" locomotive running at the usual speed. The weight per axle for this class of locomotive is 58,100 lbs. In order to conduct the experiments as rapidly as possible the car was kept running night and day during the tests.

The running back and forth of the loaded truck over the track resulted in a settlement of the ballast and roadbed materials contained in the boxes. After a settlement was noticed, aggregating about an inch, the car was stopped and the track raised to its original elevation and surfaced by tamping the stone ballast with tamping picks according to the usual service methods, the proper elevation and levels of the track being determined by the use of a "Y" level. The truck was then started and the above operation repeated from time to time, additional

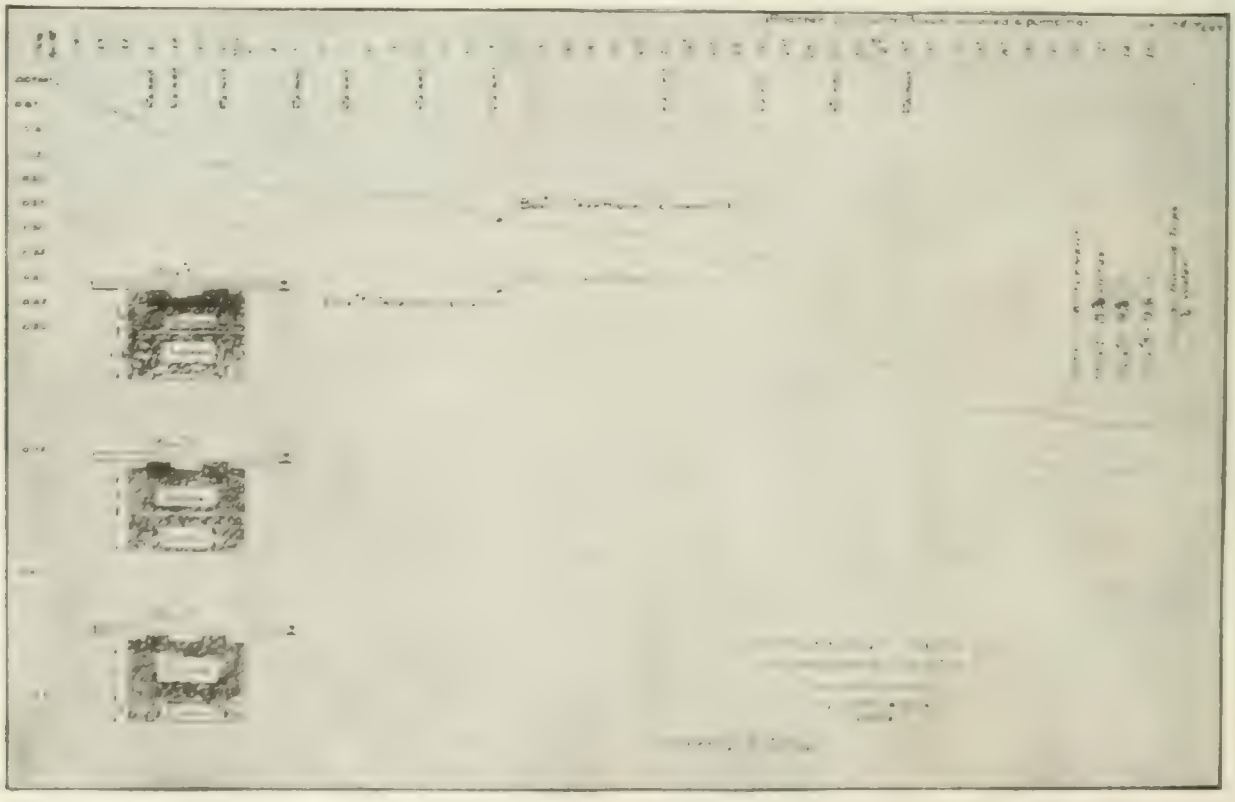
*From Bulletin 136 of the American Railway Engineering Association. Report of the General Manager's Committee of the Pennsylvania Railroad appointed to determine, by experiment, the necessary depth of stone ballast. - Committee: L. R. Zollinger, Chairman, E. D. Nelson, Allen B. Cuthbert, G. W. Snyder.



Settlement Curves of First Test.

tamping and settlement. In filling the boxes in each test, the loam, clay, engine cinder or other material, except the stone ballast, was compacted by a rammer, care being taken to ram each box and each kind of material as nearly alike as possible.

The truck was kept running and the accumulated results of settlement were noted until the decrease in the daily settlement was so marked that it was considered time to close the test, when the boxes were opened and at each end three vertical sections parallel with the rail were cut in the ballast and roadbed materials; the first was taken at the end of the tie; the second half-way between the tie and the end of the rail; and the third beneath the rail. Each section was photographed, also carefully measured by the use of the "Y" level, to show the

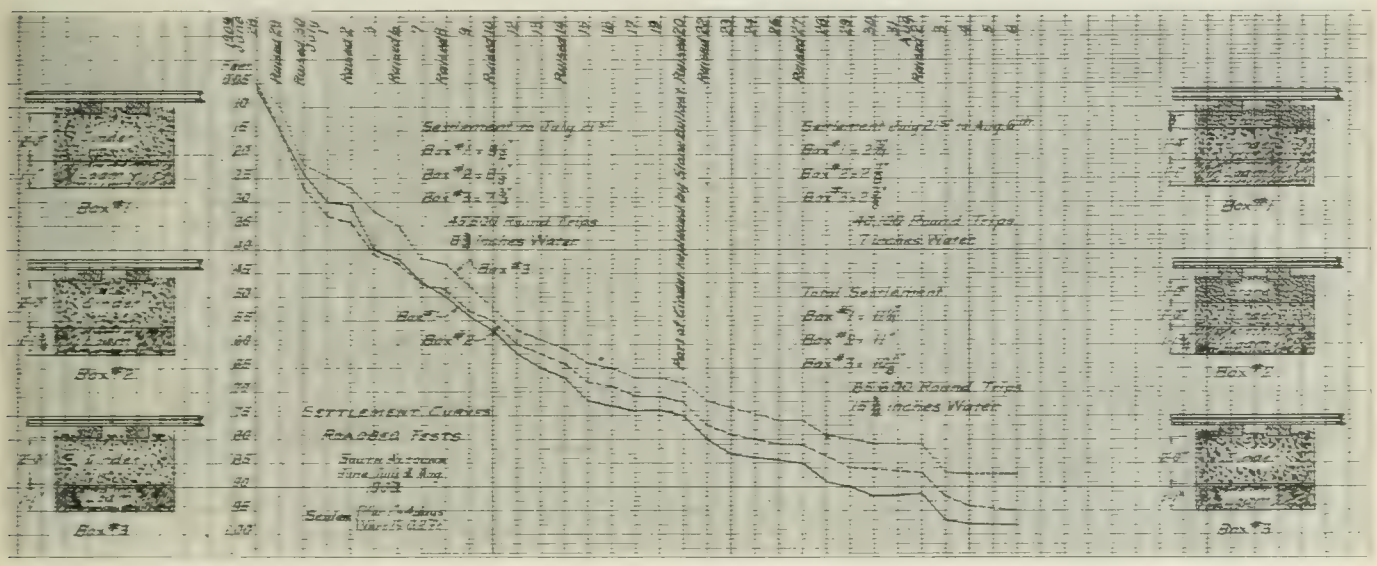


Settlement Curves of Second Test.

curve or line between the ballast and the various materials with which each box was filled. In addition, measurements were made in the same manner of vertical cross-sections at right angles to the track under the middle of the north tie, under the middle of the south tie and midway between the two ties. In addition to this, other data was collected showing the amount of daily settlement of the rail over each box, also the the amount the track was raised each time it was tamped. The total number of trips of the car was recorded, as well as all other data that would influence the results obtained.

In order to simulate natural conditions as to rainfall, water in known quantities was sprinkled over each box for the purpose of wetting the ballast and roadbed materials, to induce settlement and possibly to produce pumping track, but the latter never developed. A careful record was kept showing when the water was applied and of the amount in its equivalent in inches of rainfall.

While the various tests were being conducted the ties adjacent to and between the boxes were kept slightly loose, as far as tamping was concerned, in order that the full weight of the car, in passing, would come upon the two ties in each of the three boxes.



Settlement Curves of Third Test.

A series of five tests has been completed; the first one beginning on September 2, 1908, and the last one ending on August 2, 1910.

TEST NO. 1.

In filling the boxes for the first test it was determined to use 8 in. of standard trap rock ballast beneath each tie, 8 in. of ballast being standard for single track. Beneath the ballast in one box was 27 in. of yellow clay from Nerl's Cut on the middle division, which had proved itself a very bad and unstable material for roadbed purposes. In the second box, beneath the 8 in. of trap rock ballast, was placed 27 in. of good sandy loam, and in the third box, beneath the 8 in. of trap rock ballast, was placed 12 in. of engine cinder, and below that 15 in. of yellow clay, the same as in the first box. The track was then surfaced by the use of tamping picks, brought up to grade and the boxes filled with standard trap rock ballast to the top of the tie. The car was started and elevations taken from time to time to note the settlement and the track was raised, by tamping, when required, as before described.

After the car had made about 4,000 round trips, water was applied by sprinkling it equally over each box, first applying each day an amount equivalent to one-half inch rainfall. After a few days this amount was increased to 2 in. each day and continued daily for quite a period, when the amount was increased to 4 in. per day for about a week, then 8 in. per day applied for two days, in the hope of producing pumping track. This was not accomplished, as the water found its way out between the cracks of the planking about as fast as it was put in.

The car having made 81,600 round trips and the track over the boxes being nearly stationary, or settling very slowly, it was decided to close the test.

The track over box No. 1 had settled a total of 10 9-16 in.; over box No. 2, a total of 14 1-16 in., and over box No. 3, a total of 10⅝ in. Water equivalent to a rainfall of 98¼ in. had been sprinkled over each box during the test. After the ends of the boxes were removed, sections and photographs were taken. An inspection of the boxes showed that in every case the depth of the ballast beneath the bottom of the tie had been materially increased, due to the compression of the roadbed material and the sinking of the ballast into the material beneath it. Further, the line of demarcation between the bottom of the ballast and the roadbed material was not straight, the ballast having formed a saucerlike depression in the roadbed material beneath each tie under each rail.

In box No. 3 the original 12 in. of engine cinder, between the bottom of the ballast and the top of the clay, are very considerably compressed, the bottom of the ballast immediately under the rail being forced about half-way through the cinder. On the other hand, the clay beneath the cinder showed very little compression, and the line of demarcation between the bottom of the cinder and the clay was quite straight, while the line between the bottom of the ballast and the top of the cinder was very much depressed under each tie.

The test showed conclusively that a depth of 8 in. of standard trap rock ballast, when laid on the usual roadbed material, was not sufficient to distribute the weight carried by the ties uniformly over the roadbed. The results in the third box showed, however, that if 12 in. of permeable material, such as soft coal engine cinder, were used beneath the 8 in. ballast, the distribution of the weight over the roadbed material was much better.

The results of the first test led to the conclusion that a second test should be conducted to determine how a depth of 12 in., 18 in. and 24 in. of trap rock ballast under the ties would behave. The experience gained from the first test suggested that better results would be obtained by using sandy loam beneath the ballast rather than yellow clay, because the first test showed that the sandy loam was more compressible than the yellow clay and that the line dividing the ballast and the loam was easier to study than the line dividing the ballast and the clay.

TEST NO. 2

The boxes were again filled, No. 1 box having 12 in. of trap rock ballast beneath the tie, with 26 in. of loam underneath it;

box No. 2 having 18 in. of ballast under the tie, with 19 in. of loam beneath it; and box No. 3 having 24 in. of ballast under the tie, with 14 in. of loam beneath it.

The car was started running on April 18, 1909, and practically the same method was pursued as in test No. 1. During the test, water equivalent to 11¾ in. of rainfall was applied. After the car had made 49,932 round trips, it was stopped on June 15, 1909, because the track over the boxes settled very slowly. The boxes were opened and photographs and measurements made.

An inspection of the boxes clearly showed that in box No. 1, having 12 in. of ballast beneath the tie, the lower surface of the ballast had been compressed a considerable distance into the loam, and that the line dividing the two was far from straight, there being a considerable depression in the line beneath each tie, especially under the rail. In box No. 2, where there was 18 in. of ballast originally under the tie, the ballast had not been driven so far down into the loam and the dividing line was much straighter. In box No. 3, having 24 in. of standard trap rock ballast beneath the tie, the amount of ballast settlement was still less and in this case, the line between it and the loam quite straight.

In test No. 2, measurements were taken to show cross-sections at right angles to the rail, one through the middle of each tie and one through the center between the two ties. An inspection of these sections will confirm the conclusion already reached, as it will be noticed the deeper the ballast, the straighter the line between it and the loam.

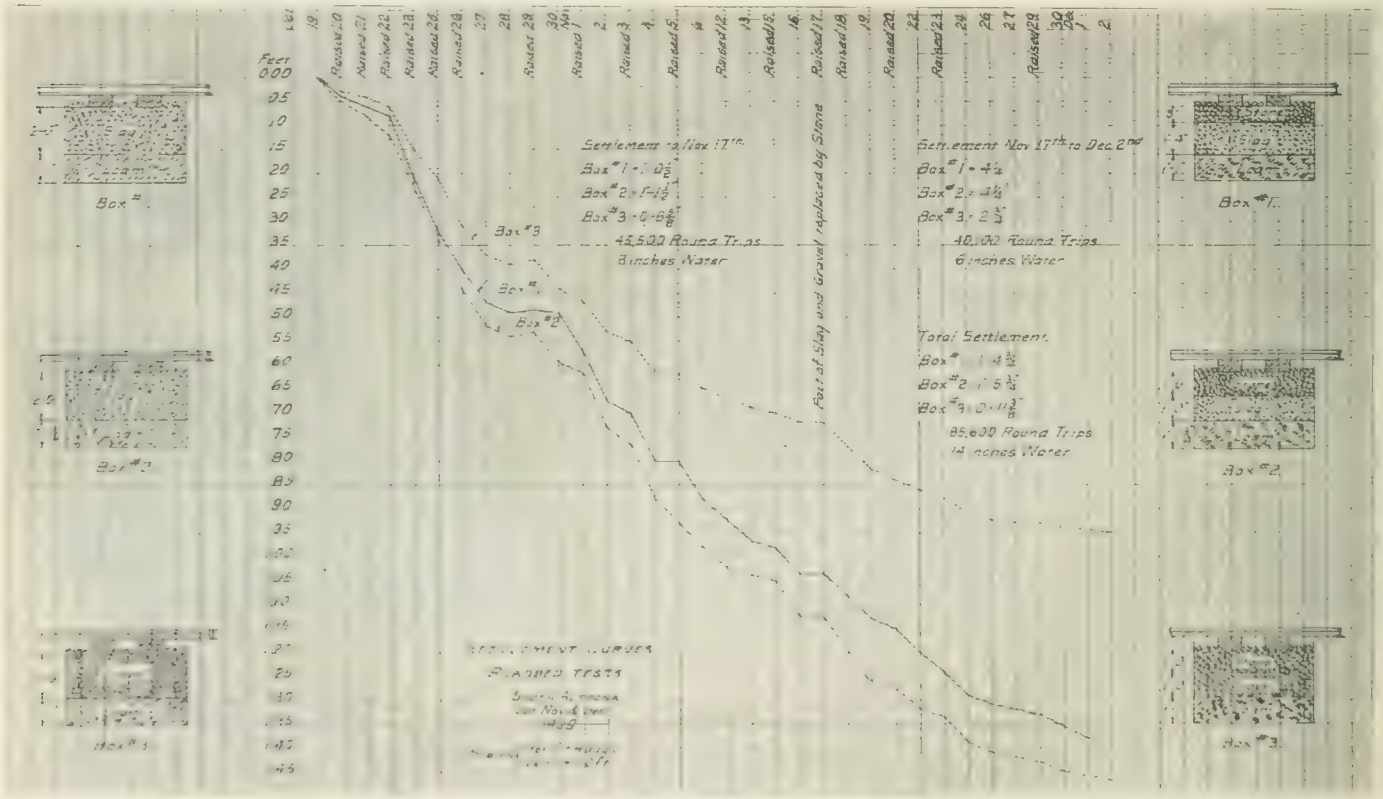
After a careful consideration of the data presented by the second test, the conclusion seems inevitable that with standard stone ballast nothing less than 24 in. beneath the tie will distribute the weight of the load sufficiently over the sub-grade or roadbed. On the other hand, test No. 1 had shown that a depth of 8 in. of stone and 12 in. of cinder gave apparently fair results in distributing the weight upon the sub-grade.

TEST NO. 3.

It was therefore decided to fill No. 1 box with 24 in. of cinder between the tie and 12 in. of loam below that, No. 2 box and No. 3 box the same; to run a number of trips over each box and then remove from No. 1 box 8 in. of cinder beneath the tie and substitute for it 8 in. of standard trap rock ballast; in No. 2 box to remove 12 in. of cinder and substitute for it 12 in. of ballast and allow No. 3 box to remain without any change in the materials and then run a number of trips over each box. The object in running on the engine cinder before putting in the stone ballast was to compact it in a similar manner to actual service conditions when the track is first ballasted with engine cinder and later raised out of the cinder upon standard stone ballast.

No. 3 test was started on June 28, 1909, and when the car had made 45,500 round trips it was stopped and the cinder removed and stone ballast put in boxes Nos. 1 and 2. The car was then started and 40,000 round trips were made, water being applied at a rate equivalent to about one-half inch of rainfall per day until a total of 15¾ in. had been sprinkled over each box.

In the previous tests it had been noted that the water found its way through the stone ballast to the top of the clay or loam beneath it, and there collected and ran through the cracks between the planks. In making the third test a new feature was introduced in one of the boxes by placing therein, on top of the loam and beneath the 24 in. of cinder, two pieces of iron pipe perforated with many holes. Each piece of pipe sloped from the center of the box outward to the ends and a slot was made in each end of the box opposite the end of the pipe, so that it could be watched. When the test was started, on June 28, 1909, water equivalent to one-half inch of rainfall was applied daily. This was in progress for nine days, until water equivalent to a total rainfall of 4¾ in. had been sprinkled on box No. 3 before any moisture appeared at the ends of the iron pipe, and then only a very small quantity of slime began to ooze out at the ends. At no time during the test did water run freely from the ends of these pipes. This was considered a very significant fact, inasmuch as it showed the ability of engine cinders to absorb and dissipate a large amount of water falling upon it before the water was able to reach the sub-grade in sufficient quantities to do much damage by saturating it. During the experiments the



Settlement Curves of Fourth Test.

pipes were carefully watched and kept clean from the inside, so that any water reaching them could be observed.

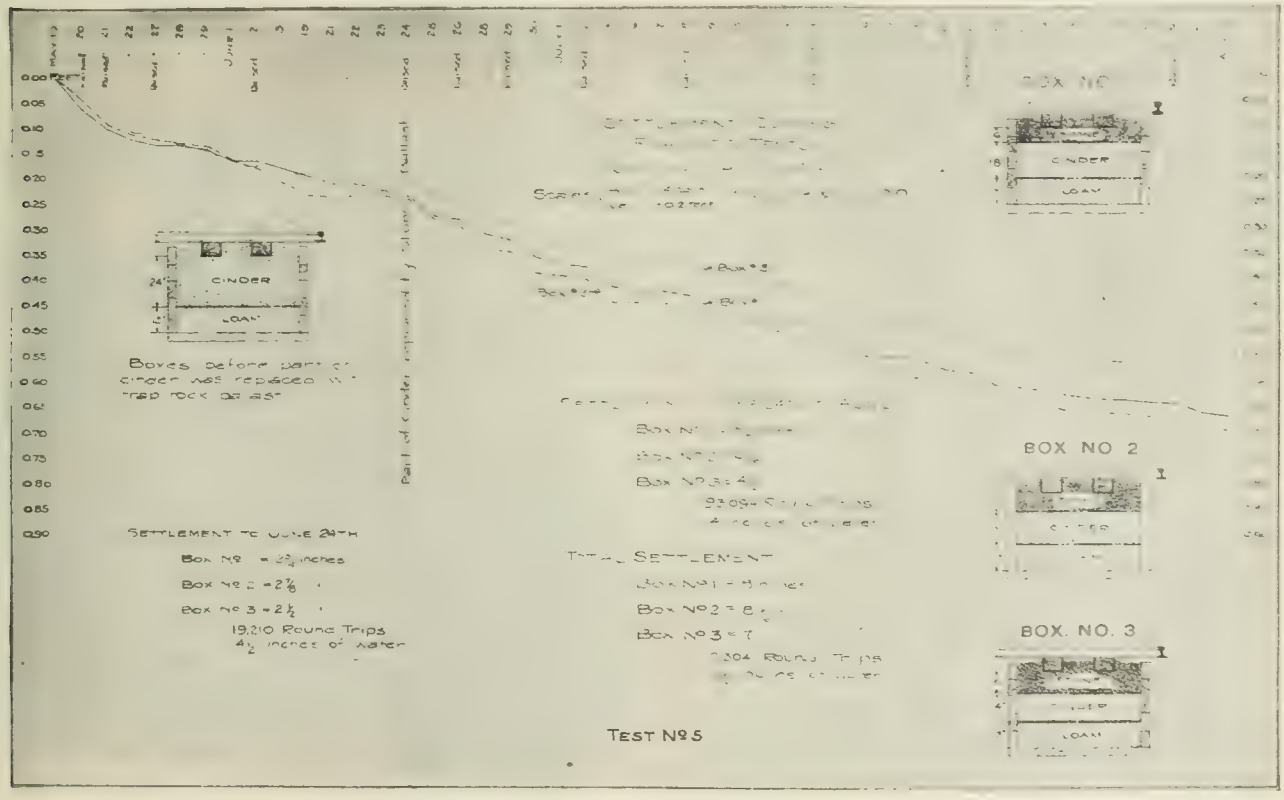
On August 6, 1909, after 85,600 round trips had been made and water equivalent to 15¾ in. of rainfall had been sprinkled on each of the boxes, they were opened, sections measured and photographs taken.

A study of the sections and photographs showed that in box No. 3, where cinder was continued the entire test and no stone ballast substituted. the line between the cinder and the loam was the straightest or best, showing the least amount of cupping, and that the line between the cinder and the loam in boxes Nos. 1 and 2 left very little to choose between them, with a difference slightly in favor of box No. 2. At the same time it should be clearly noted that the sections taken at right angles to the track show the ties bent more in box No. 3 than they did in either boxes No. 1 or No. 2, due to the fact that engine cinder is more compressible than broken trap rock.

A study of the lines of demarcation, between the trap rock ballast and engine cinder in boxes No. 1 and 2, develops that there was less deformation or cupping of the cinder beneath the ties where the depth of stone ballast had originally been 12 in. in box No. 2 than where 8 in. in box No. 1.

put in beneath the ties and on top of the granulated slag, while box No. 3 had 12 in. of standard trap rock ballast put in on top of the gravel. The car was again started and run for 40,060 round trips. After a total of 85,621 round trips had been made and water equivalent to 14 in. of rainfall had been sprinkled over each box, the car was stopped, the boxes opened, sections measured and photographs taken.

This test developed the superiority of gravel when used for sub-ballast, as compared with granulated slag, the granulated slag being much more compressible and unstable than the gravel. There was little difference, however, in the line dividing the slag and the loam, and the gravel and the loam. This would seem to indicate that neither material had much advantage over the other in distributing the pressure upon the loam. A further study of this line showed that in box No. 2, where, during the latter half of the test. there were 12 in. of trap rock ballast beneath the tie, the line between the slag and the loam was a trifle better than where there were only 8 in. beneath the tie in box No. 1. An inspection of the line, dividing the trap ballast and slag in boxes Nos. 1 and 2, and the ballast and the gravel in box No. 3, showed that there was more cupping or deformation where the ballast was only 8 in. deep beneath the tie on top of the slag than where it was 12 in. deep beneath the tie on top of the slag or gravel. Further, the line in box No. 3, between the trap rock ballast and the gravel, was still better than between the stone ballast and the slag in box No. 2. This is also confirmed by an inspection of the sections taken at right angles to the track.



Settlement Curves of Fifth Test.

TEST NO. 4.

It was determined upon the conclusion of test No. 3 that it would be well to test two other materials available for use as sub-ballast, namely, granulated slag and gravel, to see how they would compare with engine cinder under similar conditions. Therefore test No. 4 was started, boxes Nos. 1 and 2 having 24 in. of granulated slag under the ties and 12 in. of loam beneath that; box No. 3 having 24 in. of a sandy New Jersey gravel procured along the Bonhampton branch of the New York division. After the boxes were filled practically the same method was pursued as in test No. 3. It was noted that the compressibility of gravel was about equal to that of engine cinder, while that of granulated slag was much greater.

After 45,561 round trips had been made by the car, boxes Nos. 1 and 2, respectively, had 8 in. and 12 in. of trap rock ballast

TEST NO. 5.

The data obtained from all of the tests up to this point indicate that the greater the depth of trap rock ballast, beneath the tie, at least to a depth of 24 in., the less deformation there is in the line dividing the trap rock ballast and the material directly beneath it, the best results in this respect having been shown with a depth of 24 in. of trap rock ballast beneath the tie in box No. 3 of the second test. This brought forward the proposition whether it would be possible, by a combination of trap rock ballast and engine cinder, having a total depth of 24 in., to get

as good a distribution of weight or pressure on the loam as was obtained by a depth of 24 in. of standard trap rock ballast alone. And, further, would such a combination of standard trap rock ballast and engine cinder show too much deformation of the line separating the stone and the engine cinder?

To determine this, if possible, test No. 5 was started with 24 in. of engine cinder beneath the ties on top of 13 in. of loam in each box. The car was started running on May 19, 1910, and 19,210 round trips made to compact the engine cinder until the daily settlement of the cinder amounted to very little. On June 24, 1910, the car was stopped and 6 in. of standard trap rock ballast were placed beneath the ties in box No. 1; 8 in. beneath the ties in box No. 2, and 10 in. beneath the ties in box No. 3. The ballast was tamped with tamping picks as in all the previous tests. The car was run until a total of 112,304 round trips had been made and water equivalent to a rainfall of 18½ in. had been sprinkled over each box. On August 2, 1910, the car was stopped, the track having, for several days prior, shown very little settlement. The boxes were opened, and the usual measurements made and photographs taken.

The fifth test showed that there was less total settlement in box No. 3, where the depth of the stone ballast was the greatest, namely, 10 in. beneath the tie. Also that there was less deformation or cupping between the line of engine cinder, but the line between the engine cinder and the loam in box No. 3 was not as good as the line between the ballast and the loam in box No. 3 of test No. 2, where there were 24 in. of trap rock ballast beneath the tie and on top of the loam. This indicates that 24 in. of trap rock ballast beneath the tie will distribute the pressure upon the sub-grade more uniformly than a like depth of trap rock ballast and compressed engine cinder combined, up to the point where the layer of engine cinder has a thickness of not less than 14 in. It is our opinion that any layer of engine cinder, having a less depth than 14 in., would be sufficient to produce the results desired by the use of engine cinder, viz., a layer of material beneath the stone ballast which will absorb, lead off and dissipate water falling upon the track before it can reach the roadbed proper in sufficient quantities to be injurious.

A depth of 24 in. of standard trap rock ballast, beneath which is an additional layer of mat, 24 in. thick, of good permeable material, will place our sub-grade at a depth below the average frost line obtaining in the latitude in which the greater part of our system is located, thereby eliminating the trouble due to the action of the frost upon the roadbed and track.

Since the amount of wear and tear imposed on the experimental track and sub-soil during the various tests was very small compared with that to which our main line tracks are subjected under service conditions, the committee recommends the use of 24 in. of stone ballast underneath the ties to meet satisfactorily the conditions that exist today and which will probably become more severe as time goes on, and that in addition to the 24 in. of trap rock ballast beneath the ties, there [illegible] a layer of engine cinder, gravel or an equivalent to act as an absorbent mat to promptly and properly dispose of the water falling on the track in such a manner as to prevent its softening the roadbed material. Where the material forming the roadbed is of poor quality, the mat of engine cinder or gravel will also prove advantageous to prevent its working up into the ballast, thus shutting off drainage.

[illegible] on the bridges of the Antung-Mukden Railway, Manchuria, is progressing rapidly. The total length of the bridges will be upward of 30,000 ft., the largest being 1,830 ft. Most of the steel bridges are of American make, while the rails are Japanese. Although the rail-laying work was interrupted by the [illegible] 20 miles have been completed since September last, and 40 miles of track remain to be finished. The Yalu river bridge will also be finished and uninterrupted railway communication from Mukden to Seoul by November 3.

DERRICK CARS IN MAINTENANCE WORK.

Several divisions of the Pennsylvania Lines West of Pittsburgh have in service derrick cars built by the local maintenance of way forces, of which the one used on the Louisville division is typical. This car has been found almost indispensable on account of the saving in time and labor on a great many classes of maintenance work. The car shown in the accompanying photograph was made in the Louisville division shops by mounting a single drum hoisting engine on a flat car and fitting up a frame mast and boom. The boom is 26½ ft. long, allowing it to reach to the center of a flat car, coupled to the derrick car, and is removable, so that in transit it can be carried in brackets alongside the house. In the rear end of the car are coal bunkers and water tanks, carrying supplies for 48 hours' service. As the engine has but one drum the boom is raised and lowered by hand, and the swinging is accomplished by a hand lever, clamped to the mast and revolving with the mast and boom. For moving the car for short distances, as is necessary in backing on to sidings to allow regular trains to pass, a 250-ft. anchor line is used. One of the regular tongs, carried with the car, is attached to angle bars or ties in the track as

Derrick Car Used on Pennsylvania Lines West.

far ahead as the line will reach, and by winding up the line on the drum the car is pulled ahead.

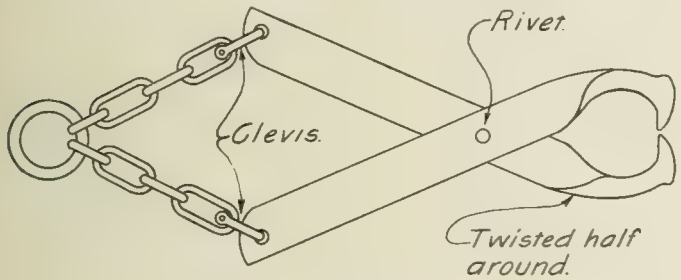
Practically all the rail used on the division is handled with this car. In unloading or picking up from the main track a force of seven men can do the work, which requires 18 when the rail is handled by hand. For picking up rail the tongs shown on the following page are used. These tongs have practically displaced more complicated types. They can be made from two old switch rods riveted together and the ends twisted to form points.

In laying side tracks a storage yard is established at one end of the work, where all material is held until needed. It is loaded on a flat car by the derrick, the rails and ties being piled in alternate tiers and a second car loaded with joint material, spikes and surplus tools. The work train engine then pushes the derrick car and these material cars ahead on the new track, and the material is unloaded at the front end ready for laying. It has been found that one carload lays about 300 ft. of track.

When renewing ties the trackmen assemble the old ties in piles of nine and these are loaded into gondolas by the derrick car and hauled into the division terminal to use for engine wood.

This use of the derrick saves several men as compared with the practice of loading the ties by hand. A pair of tongs similar to the ones shown in one of the illustrations is used for handling ties.

In building trestles on new tracks the derrick car is kept at hand to raise bents and handle stringers, relieving the bridge gang of practically all the heavy lifting usually required in this work. In renewing trestles under traffic wherever a side track is convenient, or the size of the job justifies the construction of a temporary side track, the car is also used. In erecting plate girders, spans of 30 ft. or under are readily unloaded and placed with this car. Heavier ones require the services of the steam wrecking derrick, or if that is not available they must be unloaded by hand, but in any event the derrick car is usually called into service to unload the floor beams and stringers. In erecting truss bridges a temporary side track is built adjacent to the work and the derrick car unloads all members from this side track, handles them to the bridge location under its own power and takes care of all handling required during erection. This does away with the heavy expense of a traveler and of keeping the work train in service, as would be necessary without the derrick car. The accompanying photograph shows a deck struss 231 ft. long erected by the car. This bridge replaced a Howe of 150 ft. span, the widths of the two trusses being such that the new one was erected outside of the existing Howe span. The car has been found very convenient in erecting overhead bridges, as all members can be placed direct from the car without false work.



Tie Tongs.

In setting signal posts for an automatic signal installation, a work train was fitted up, with the derrick car, a car of concrete materials and a car containing the signal posts. The holes to contain the foundations for these posts had been excavated previously, and at each location it was only necessary to pick up the post with the derrick car, swing it into place, and hold it in a vertical position while concrete was placed around its base. This work required two signal men, five men in the concrete gang, three carpenters to set the forms, the signal supervisor and the division engineer, in addition to the train crew. With this force 14 automatic signals were placed in one day. Signal bridges and overhead cranes have also been erected with the derrick car.

When masonry work is to be done the derrick car is first used to unload the hoisting engine and other equipment used on the ground, and to raise and hold the derricks while they are being guyed. In cases where the masonry is located under both a main and side track the derrick car is left on the side track during working hours and serves as a hoisting engine and derrick, saving the expense of erecting and dismantling a hoisting engine. When only a few defective coping stones are to be replaced at one location the work can be very readily done with the derrick car. In one case the end of a truss bridge was carried on packs while the old stone was removed and new stone placed between trains.

By using the derrick car for unloading and placing sections of cast iron pipe culverts the time consumed can often be made so short that the work can be done from local freight trains. In one case on this division, when the main track was being lifted, a dry wall about 300 ft. long was required to prevent the encroachment on a public road. In this case the derrick car was set off on a side track built for the purpose and the wall was built by working from one end, unloading the material direct from cars on the main track alongside. The derrick car also handled all the stone for extending two bridges within the limits of this wall, eliminating the necessity for stationary derricks. When not in use on the road the derrick car is kept at the storehouse available for use in handling heavy material of all classes.

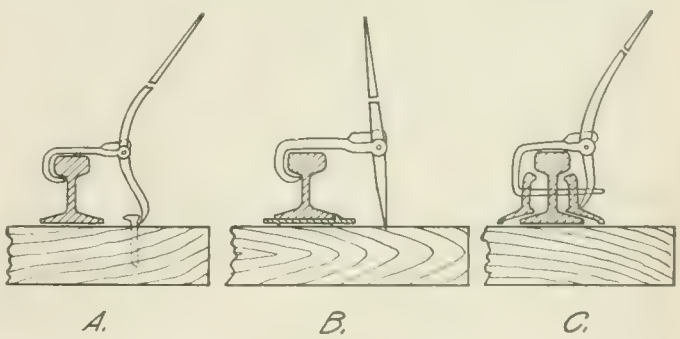
HANDLING CEMENT SACKS.

The handling of empty cement sacks has been the subject of a great deal of discussion by the railways for several years. Recently uniform rules regarding the handling of such sacks have been put in force throughout the entire country. These rules require, among other things, that each bundle of sacks shall be securely tied with not less than three separate wire ties or three separate ties of rope, the latter to be at least 3/16 in. thick. Also each bundle shall be marked with a linen tag showing name and address of shipper and consignee, the tag to be securely fastened to the bundles by wire. Freight must also be completely prepaid. In western territory the tariffs have contained the provision to the effect that if bundles were not tied and tagged in accordance with these rules, double freight should be charged. This provision has been found unsatisfactory, for the double freight charges do not compensate the roads for the loss and expense they sustain by reason of defective shipments being broken up and losing their identity in transit. A movement is now under way to refuse to accept shipments unless they are properly bundled and tagged.

THE HANDY BAR.

BY W. E. DAVIN.
Supervisor Roadway and Track, Pittsburgh & Lake Erie, McKees Rocks, Pa.

This bar is somewhat similar to the monkey bar described in our issue of June 16, and is now in use on the Pittsburgh & Lake Erie, where it has been found to work very satisfactory and to result in a saving in labor. It is made in three types, as shown in the sketch. Type A is used to force the rail into place against the spikes when renewing rail. Style B is used to hold the rail to gage where tie plates are being applied, or where there are no spikes in the ties, while type C is used to draw the angle bars into place in order that the bolts may be easily applied.



The Handy Bar.

About 9,000 ft. of concrete drainage ditches are being constructed along the base of small ravines and gulleys at Empire, Canal Zone, to carry off storm water during the rainy season. These drains are built to established lines and grades, and are expected to do away with the necessity of removing obstructions and cave-ins which are now constantly filling the ditches.

General News Section.

The commission to investigate second-class postage rates, Justice Hughes, chairman, has postponed its first public hearing (at New York) until August 1.

The government has begun suit in the United States District Court at Grand Rapids, Mich., against the Grand & Indiana to recover penalties for a violation of the hours-of-service law.

The government has entered suit at St. Louis, Mo., against the St. Louis, Iron Mountain & Southern for violation of the hours-of-service law, in working a fireman twenty-three hours.

The shopmen of the Louisville & Nashville, at Decatur, Ala., to the number of 1,850, have had their pay increased 5 per cent., beginning with July 1.

The executive offices of the New York Central fast freight lines were moved on July 15 from Buffalo to Chicago. The clearing house and the offices of the car accountant will remain in Buffalo.

In the Criminal Court at Jersey City, N. J., fines amounting to $4,950 have been imposed on the Pennsylvania for maintaining a soft coal smoke nuisance, and of $3,650 on the Erie for a similar offense. The roads will appeal.

At Brussels, Belgium, July 17, Mr. Olieslager, in a monoplane, flying around the aerodrome, traversed a distance of 388 miles without a stop. This distance is said to be twenty-six miles farther than has ever before been thus made in a flying machine.

The 41,000 employees of the Missouri Pacific system have been strongly urged in an address issued to them by President B. F. Bush to co-operate with the management to prevent waste of material and labor, and establish better relations between the road and the public.

Employees on all parts of the Atchison, Topeka & Santa Fe have subscribed to a fund to pay for the erection at the Topeka Kas., cemetery of a granite obelisk monument 40 ft. high in memory of James E. Hurley, formerly general manager of the Eastern lines, with headquarters at Topeka.

A robber who attempted to hold up the passengers in a sleeping car on an eastbound train of the Chicago & North Western Railway Company, near Tama, Iowa, on the night of July 17, was himself held up by the brakeman, who had a revolver and ordered the bandit to surrender. The brakeman had to shoot him, however, and he had to be taken to the hospital.

Representative Talcott of New York has introduced in Congress a bill prohibiting the running of wooden cars between steel cars in passenger trains after January 1, 1912. The intent of the measure is to apply to the whole of a passenger train, the legal restriction against the use of wooden cars between steel cars which now applies to mail cars only.

The Oregon State Railroad Commission proposes to proceed in the courts against the Oregon Electric Railway Company for keeping a station agent on duty more than nine hours at a time, in violation of the state labor law. The railway company denies the power of the state to act in this matter, contending that the regulation of the commission is an attempt to interfere with the Federal law on the same subject.

The Pennsylvania Railroad has begun suit at Harrisburgh, Pa., to contest the constitutionality of the full crew law of Pennsylvania, passed at the last session of the legislature. The company has filed a bill in equity declaring the law to be unconstitutional and void, because it is not a valid exercise of the police power possessed by the legislature of Pennsylvania, is in violation of the terms of the constitution prohibiting special laws requiring labor; is repugnant to the constitution of the United States because it would interfere with interstate traffic.

The Railway Commission of Canada has issued an order requiring railways, within 60 days, to file statements describing their locomotive headlights, with reference to candle-power, and whether it is necessary for a man to go under the engine to clean out the pot. Another order has been issued requiring that when an engine moves at a highway crossing, a watchman must be immediately assigned to that crossing and kept there until the commission has made an investigation; and this applies to every crossing at which a person has been killed or injured since January 1, 1905.

So small a thing as a fire in a wooden overhead highway bridge blocked the main line of the Pennsylvania last Sunday night for several hours. The bridge spanned the four main tracks at Gap, east of Lancaster, and some of the timbers had fallen to the track before the section men arrived on the scene. There was no water near and the men had to extinguish the fire by shoveling earth upon it, but before this was accomplished some of the rails had been warped by the heat so that the restoration of the track took some time. Through passenger trains were sent from Parkesburg to Harrisburg, and vice versa over the freight line, by way of Columbia.

The special committee appointed by the National Association of Railway Commissioners to study the express rate situation throughout the country is composed of the following members of the different state commissions: C. F. Staples, Minnesota, chairman; Martin S. Decker, New York; O. P. Gothlin, Ohio; H. S. Erickson, Wisconsin; L. B. Finn, Kentucky; E. S. De Pass, Arizona, and O. F. Berry, Illinois. On July 27 a session of the committee, which it is expected will last several days, will begin at Chicago, during which officers of railways and express companies as well as shippers and citizens generally are invited to furnish information and offer suggestions to the committee.

The electrification commission of the Chicago Association of Commerce will consider at its meeting on July 28 the advisability of sending a number of representatives of Chicago firemen's brotherhoods to London to study English methods of stoking, which, according to President S. M. Felton of the Chicago Great Western, who returned a short time ago from a visit to London, are far superior to the methods of American firemen. Mr. Felton tells his neighbors in Chicago that the smoke nuisance could be practically eliminated if the best methods of firing were employed, and it is thought that English ideas would be taken up by American firemen more readily if they learned of them through members of their own brotherhoods than through higher officers of the roads.

In an appraisal being made by the state tax commission of Ohio of railway property in the state, the following increases in valuations have been made for purposes of taxation: Hocking Valley from $7,400,000 to $40,659,900; Norfolk & Western, $7,017,000 to $28,002,400; Wabash, $2,361,081 to $8,794,000; Toledo, St. Louis & Western, $1,360,158 to $3,732,100; Ann Arbor, $121,027 to $292,500; Louisville & Nashville, $205,625 to $462,700; Chesapeake & Ohio of Indiana, $147,684 to $419,900; Bessemer & Lake Erie, $328,355 to $789,600; and Ashland & Western, $38,687 to $186,300. A valuation of $873,700 was fixed on the Cincinnati, New Orleans & Texas Pacific, the only Ohio property of which is a terminal a little more than half a mile in length. Several of the roads have protested against the increases in their valuations.

The legislature of Wisconsin has passed a radical employers' liability law. An employers' liability law is before the legislature of Massachusetts. It is known as the Saunders-Parks bill. In principle it is similar to laws which have been adopted in other states. It forbids an employer to offer as defense in a suit for damages for personal injuries in industrial occupations a claim that the employee was negligent or that he had assumed the risk, etc.; but if an employer join the insurance association provided for by the law then these changes shall not apply. Detailed provision is made for the incorporation of the "Massachusetts Employees' Insurance Association" in which employers may insure. It is expected that employers, to avoid the increase in risk which will be imposed upon them if they do not join the association, will elect to join. Having joined, they are subject to a schedule laid down in the law, providing for weekly payments to disabled employees.

The New York, Westchester & Boston, which expects to run trains the coming autumn from New York City northeast to Mount Vernon, and which has its southern terminus at 177th

street, in the borough of the Bronx, has contracted with the Harlem River & Port Chester for the use of its tracks from 177th street southward to the terminus of the H. R. & P. C., at Willis avenue. At the same time arrangements are being made for the construction of a large passenger station at 180th street for transferring passengers to and from the elevated and subway lines of the Interborough Rapid Transit Company. Thus it appears that the Westchester road may run its trains through to Willis avenue (the Harlem river terminus of the New Haven road) and that passengers to or from the Interborough lines will have to change cars at 180th street. The Harlem River & Port Chester is the Harlem River branch of the New Haven road. The Westchester road also is controlled by the New Haven.

At the request of a representative of the Brotherhood of Railroad Trainmen, E. W. Major, attorney-general of Missouri, has written a letter giving his interpretation of the law requiring railways in Missouri to make semi-monthly payments of wages, which was passed at the last session of the legislature at the instance of railway employees. The Missouri, Kansas & Texas made payments for the first 15 days of June on July 1, by which practice it will hold back at all times from 15 days' to a month's pay, and the employees have complained against this. According to Mr. Major's interpretation, the law means that payments shall be made in full twice a month and that at no time should the railway be indebted for more than 15 days' service to its employees. An officer of the road stated that it would be a physical impossibility to comply with the attorney-general's interpretation, as it is out of the question in one day to make out payrolls, compute time, deduct for board, make out checks sign checks, mail checks, etc., for men scattered all over the country. He indicated that while it might be done in a day or two less than half a month, it takes practically all of that time.

Variations: By the Press Agent.

The Southern Pacific Company is endeavoring to keep track of its patrons. To aid in the expeditious handling of excursion travel and holiday traffic, men go through the trains leaving large cities, and give cards to passengers, requesting them to write the station from which they expect to return and the time of the intended departure. . . . One passenger returned a card with a postscript to the passenger traffic manager, informing him that he was a "wise old guy." One woman wrote that she would return from any station which suited her best and at the time she chose. But most of the cards contained brief answers and to the point, giving the information desired.—*Sacramento Bee.*

Abandonment of 130 Miles of Railway.

The National Railways of Mexico has abandoned 130 miles of main line track, extending from Matamoros, state of Coahuila, to Sauceda. This division was formerly a part of the Mexican International main line from Piedras Negras to Durango. When the National Railways of Mexico absorbed that property and also took over what were formerly known as the Monterey & Mexican Gulf and the Coahuila & Pacific roads it found itself in possession of three parallel lines running between Monterey and Torreon. The three lines have all been operated at heavy and unnecessary expense and the abandonment of one of them was decided upon to remedy the situation. The track is now being taken up and the rails will be used for the construction of extensions in some other part of the country. It is reported that other paralleling and useless lines belonging to the system will soon be abandoned and the tracks removed. One of these stretches of track is that of the old Mexican Central line running between Celaya and Mexico City, 181 miles. For this distance the road closely parallels the former main line of the Mexican National. By abandoning that part of the division the cost of maintaining two stations in many of the towns, as well as the heavy expenses of keeping up the useless tracks will be done away with.

Some Results, Possibly, of Industrial Trains.

Eleven southern states will this year for the first time grow 100,000,000 bushels of corn, in addition to having a cotton crop worth in prospect more than $1,000,000,000. The corn crop will come nearer making that section self-sustaining than in any preceding year. Since 1906 these eleven states have increased their area in corn from 33,015,000 to 41,328,000 acres, or 25.5 per cent. Of this rapid gain, amounting to 8,313,000 acres, fully one-fourth of it has been made by the two states of Mississippi and Louisiana. As these are the states in which, apart from Texas, the boll weevil has been most destructive, it is evident that the loss in cotton acreage has to no small extent been made good by the expansion in corn. In fact Louisiana for the first time last year actually exported corn into other states.

The extent to which this tendency to enlarge corn acreage has advanced in these states is shown by the following comparison of acreage in 1906 and in 1911:

	Acres in Corn, 1911.	Acres in Corn, 1906.	Inc. 5 Yrs. Acres.
Texas	9,240,000	6,925,000	2,315,000
Georgia	4,577,000	4,339,000	238,000
Kentucky	3,703,000	3,195,000	508,000
Tennessee	3,683,000	3,075,000	608,000
Alabama	3,665,000	2,990,000	675,000
Mississippi	3,329,000	2,204,000	1,125,000
North Carolina	3,072,000	2,732,000	340,000
Arkansas	2,884,000	2,237,000	647,000
Louisiana	2,518.000	1,524,000	994,000
South Carolina	2,515,000	1,935,000	580,000
Virginia	2,142,000	1,859,000	283,000
Total	41,328,000	33,015,000	8,313,000

Several important results are sure to flow from this development. Not only will there be less need for the southern states importing so much corn from the West as usual, but the outlay formerly made for this purpose will be available for other uses. A second advantage of the change to greater independence in this respect will be the introduction of a rotation system into the methods of farming, whereby both the soil and the system of farming will be benefited. In addition to these must be mentioned the more careful cultivation which corn growing requires —a benefit which must in due time be imparted to other crops as well.—*Wall Street Journal.*

Railway Valuation in Japan.

Railways in Japan are owned by the government. Soon after the Russo-Japanese War a bill termed the railway naturalization law was introduced in the Diet, providing for the state purchase of all railways within ten years. As a matter of fact, the purchase was effected within 18 months, the capital invested exceeding $210,000,000. Several smaller companies, totaling some 450 miles, were not included. The price to be paid was determined as follows: Twenty times the average of the net profits for the years 1902, 1903 and 1904, divided by the original cost of construction and multiplied by the cost of construction at the date of purchase. It will be evident that roads paying a good dividend got a good price from the government, and roads not paying a dividend were sold at a sacrifice. Dividends are a more or less elastic thing. For instance, when the Tokyo street railway last year wanted to sell to the government they were paying 6 per cent. dividends according to the sheets produced. The governmnt could not consider the proposition for the purchase at that time. Later the street railway management appeared before the government with a bill asking that they be allowed to increase the fare. At that time their balance showed little or no dividend. High finance has reached Japan.—*James F. Paige,* before New England Railroad Club.

The P. R. R. Porter.

William H. Ridgway, of Coatesville, Pa., a teacher of Bible lessons, writing in the *Sunday School Times* and discussing the doings of King Josiah, 621 B. C., preaches a little sermon on the word "All"—as follows:

All that was committed to thy servants, they are doing (v. 16). All. Not just some things. Bosses want that kind of help. Clients that kind of lawyers. Railways that kind of trainmen. There got on the train the other day with me a stolid foreign laborer with a 98-cent dress suit case. He put it up in the rack. When we approached Philadelphia the colored porter, which the Pennsylvania Railroad employs to look after *"All"* passengers, came and politely took down the poor suitcase and placed it by the side of the Hunkey. The foreigner would not have been more surprised had the porter struck him a blow in the face. And then you ought to have seen him smile as he appreciated the unexpected and perhaps rare attention. It made him happy.

When the porter came back I congratulated him on his courtesy to the Hunkey. This made the porter smile. He was happy. The foreigner was happy. I was happy. We three. I joined a dinner party of nine in Philadelphia and told them about it. They also smiled with pleasure. Twelve were happy. I am now telling 100,000 about it. Do you smile? And all because a humble porter did "*All*" that was committed to him. "He that is faithful in a very little is faithful also in much: and he that is unrighteous in a very little is unrighteous also in much."

Twelve Passengers Killed at Muehlheim, Germany.

Press despatches of July 17 report the derailment at Muelheim Baden, Germany, in which twelve persons were killed and a large number injured. The train was an express passenger from Basel, Switzerland, to Berlin, Germany. The engine ran off the track as the train was entering the station; cause not given. A part of the train fell against another train that was standing on an adjacent track.

Railway Travel in Japan.

After a day at Kobe, I engaged accommodation on the night express for the Kure naval station, some 200 miles distant.

This night we had our first experience in a Japanese sleeping-car. The track is narrow gage, and the standard sleeping-cars have six seats running lengthwise, each seating two passengers, with a center aisle. The upper berth is the regular Pullman style, and a section will accommodate two passengers. The night was during the extreme heat of mid-summer, the car was crowded, and in addition to the regular curtains each berth was provided with a "mosquito bar," which added to the general discomfort. Passengers were taken on and let down at all stops, so there was a constant procession through the aisle all night. Part of the car was reserved for local accommodation, and those who sat up smoked incessantly, so that long before morning the atmosphere became intolerable. There are no exclusively smoking-cars in Japan.

At the stations the click-clack of the wooden shoes of the people, walking along the concrete platforms, together with the noisy calls of the vendors of tea and lunch, combined to disturb even a sound sleeper.

When the Japanese travels he intends to have some of the comforts of home. He carries a sleeping outfit, one or more blankets, and a pillow that he can fill with air; and at every stop he gets a lunch of some kind. Tea is served in little teapots. For a couple of cents you can get a teapot with tea and enough hot water to make several cups full, and also a small cup, hardly as large as an after-dinner coffee cup. When the traveler drinks his tea he throws the crockery ware out of the window.

Following the custom that obtains in all Japanese houses, many passengers remove their shoes upon entering the train, and about the first thing the porter does after you are seated is to produce a pair of slippers.

The Japanese porters are exceptionally attentive, always on hand, will secure lunches, fruit and papers at any station on request send telegrams, and are ever ready to assist, even to buttoning a lady passenger's shirtwaist up the back. The extremely low charge of one cent per package carried, which is the limit the law allows, places their services within the reach of all travelers, and needless to say, they are well patronized. I may say that Japanese travelers are proverbial for the number and variety of packages and hand baggage they carry when traveling, and in fact, man's position and standing is not infrequently judged from the extent of his baggage. I have seen one man with [illegible] separate pieces of baggage and some of them were almost as large as a small steamer trunk. When you get to the station the porter will take charge of your baggage, travel same on [illegible] platform. He will watch it till the train comes, and then put it on board. The train boy will place it [illegible] seat or alongside in car. These train boys have a wonderful perception in knowing just what each passenger wants to eat. I have always got what I called for after a ride of 24 hours or more on one train with passengers coming on and going off all the time and I had no special tags on it either.

Leaving the [illegible] at 7.00 a. m. after a night of more or less discomfort, we took the train for the remaining eight miles, passing through twelve tunnels, and at 8.30 a. m. arrived at the Kure station—200 miles in ten hours. The cars on the branch line—as on all branch lines—are generally of the box compartment type, cross seats and side doors, very similar to the English style.—*James F. Paige,* before New England Railroad Club.

Just Plain Railroading.

For the first time in 25 years there are no private wires running from Missouri Pacific's New York offices to St. Louis. President Bush has concluded that in the future he can dispense with these inasmuch as he intends to run the property from St. Louis. Hence the private wires went out of existence on July 1. Hereafter when officialdom, at 165 Broadway, wants to communicate with Mr. Bush, it will use Western Union lettergrams or the slower service provided by the United States mails.

Mr. Bush expects to save about $23,000 per annum in private wire charges. A few such economies and Mr. Bush will be able to save the amount of the added charge upon the company represented by his yearly salary. The recently retired president drew no salary.

In railway circles a belief is expressed that Mr. Bush's latest innovation should have a tremendous moral effect. There are several indications that Mr. Bush and Mr. Gould have some tacit understanding which provides for "hands off." If Mr. Bush is permitted to keep up his present pace for the next five years, Missouri Pacific stockholders will wake up some morning and find they own a real railway.—*Wall Street Journal.*

Laws Regulating Drinking on Trains.

A law has been passed by the Illinois legislature, going into effect on July 1, providing that any person who shall drink any intoxicating liquor, or who shall be intoxicated in or upon any railway smoking car, parlor car, day coach, interurban car or caboose car, in use for the transportation of passengers or in or about any station or platform, upon conviction thereof, shall be fined not less than $25 nor more than $100, or imprisoned for not less than 30 days nor more than 100 days, or both fined and imprisoned. Dining, sleeping and buffet cars are not mentioned in the act. Every conductor while on duty is authorized for the purpose of enforcing these provisions to exercise all the powers conferred on sheriffs and required to arrest any person violating them, the conductor in so doing acting for the state and not as an employee of the company, and being subject to a fine of from $10 to $25 if he refuses to act in such cases. The railway companies are required to keep copies of the act posted in conspicuous places at all stations, and failing to do so are subject to a fine of $50.

An Illinois law prohibiting the use of common drinking cups in trains and at railway stations went into effect on July 1. Some roads have met the situation by installing slot machines from which oiled paper cups may be obtained for a cent, and the Chicago, Burlington & Quincy, which has issued an order abolishing the use of the common cup on its lines in all states, is planning to have machines from which passengers may procure paper cups without paying anything. Bubbling cups will be put in at all large stations, as has already been done at many.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

Air Brake Association.—F. M. Nellis, 53 State St., Boston, Mass.

American Association of Demurrage Officers.—A. G. Thomason, Scranton, Pa.

American Association of General Passenger and Ticket Agents.—C. M. Burt, Boston, Mass., next meeting, St. Paul, Minn., Sept. 19, 1911.

American Association of Freight Agents.—R. O. Wells, East St. Louis, Ill.

American Association of Railroad Superintendents.—O. G. Fetter, Carew building, Cincinnati, Ohio; 3d Friday of March and September.

American Electric Railway Association.—H. C. Donecker, 29 W. 39th St., New York; October 9-13, Atlantic City, N. J.

American Railway Association.—W. F. Allen, 75 Church St., New York; November 15, Chicago.

American Railway Bridge and Building Association.—C. A. Lichty, C. & S. W., Chicago, Oct. 17-19, 1911, St. Louis, Mo.

American Railway Engineering Association.—E. H. Fritch, Monadnock Block, Chicago; annual convention, March 19-21, 1912, Chicago.

AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago.

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—O. T. Harroun, Bloomington, Ill.

AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

AMERICAN SOCIETY OF ENGINEERING CONTRACTORS.—D. J. Haner, 13 Park Row, New York; 3d Tuesday of each month, New York.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York.

ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.

ASSOCIATION OF RAILWAY CLAIM AGENTS.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 22, 1912, Los Angeles, Cal.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago; annual, November 6-10, Chicago.

ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, 135 Adams St., Chicago, annual June 24, 1912, New York.

ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 75 Church St., New York; December 12-13, Louisville, Ky.

CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk Ry., Montreal, Que.; 1st Tuesday in month, except June, July and August, Montreal.

CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLead, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

CIVIL ENGINEERS' SOCIETY OF ST. PAUL.—D. F. Jurgensen, 116 Winter St., St. Paul, Minn.; 2d Monday, except June, July and Aug., St. Paul.

ENGINEERS' SOCIETY OF PENNSYLVANIA.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Richmond, Va.; annual, Buffalo, N. Y.

GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

INTERNATIONAL RAILWAY CONGRESS.—Executive Committee, rue de Louvain, 11 Brussels; 1915, Berlin.

INTERNATIONAL RAILWAY FUEL ASSOCIATION.—D. B. Sebastian, La Salle St. Station, Chicago.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—L. H. Bryan, D. & I. R. Ry., Two Harbors, Minn.; July 25-27, Chicago.

INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, Lima, Ohio; annual, Aug. 15, Toledo, Ohio.

IOWA RAILWAY CLUB.—W. B. Harrison, Union Station, Des Moines, Ia.; 2d Friday in month, except July and August, Des Moines.

MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York.

MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago.

MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOCIATION, OF UNITED STATES AND CANADA.—A. P. Dane, B. & M., Reading, Mass.; Sept. 12-15, 1911, Atlantic City, N. J.

NEW ENGLAND RAILROAD CLUB.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

NEW YORK RAILROAD CLUB.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

NORTHERN RAILWAY CLUB.—C. L. Kennedy, C., M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.

OMAHA RAILWAY CLUB.—H. H. Maulick, Barker Block, Omaha, Neb.; second Wednesday.

RAILROAD CLUB OF KANSAS CITY.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

RAILWAY CLUB OF PITTSBURGH.—C. W. Alleman, P. & L. E., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

RAILWAY INDUSTRIAL ASSOCIATION.—G. L. Stewart, St. L. S. W. Ry., St. Louis, Mo.; annual, May 12, 1912, Kansas City, Mo.

RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Bethlehem, Pa.; annual, Oct. 10, Colorado Springs, Colo.

RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, Box C, Collinwood, Ohio.

RICHMOND RAILROAD CLUB.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—Walter E. Emery, P. & P. U. Ry., Peoria, Ill.; September 12-15, St. Louis, Mo.

ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

SOCIETY OF RAILWAY FINANCIAL OFFICERS.—C. Nyquist, La Salle St. Station, Chicago; Sept. 12-14, St. Paul, Minn.

SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.; annual, October 20, Atlanta, Ga.

SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

TOLEDO TRANSPORTATION CLUB.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

TRAFFIC CLUB OF CHICAGO.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.

TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

TRAFFIC CLUB OF PITTSBURGH.—T. J. Walters, Oliver building, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

TRAIN DESPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.

TRANSPORTATION CLUB OF BUFFALO.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.

TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.; annual, August 29-September 1, Chicago.

WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

WESTERN RAILWAY CLUB.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Wednesday in month except July and August, Chicago.

WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, First National Bank bldg., Chicago, annual January 16-18, Chicago.

Traffic News.

Beginning July 17 freight service was inaugurated by the Chicago & North Western between Clinton, Iowa, and Davenport, using the line of the Iowa & Illinois Electric Railway from Comanche, Iowa, to Bettendorf, and the Davenport, Rock Island & Northwestern from Bettendorf to Davenport.

The attorney-general of Missouri, acting on request from other states, has called a convention, to be held in St. Louis, August 4, to discuss questions concerning suits now pending in the courts relating to railway rates. The states especially interested are Arkansas, Oklahoma, Minnesota, Kansas, Nebraska and Iowa.

Permanent reductions amounting to from ½ cent to 2 cents per 100 lbs. have been announced by the Great Northern in its rates on grain from points in central and eastern Washington to Puget Sound points, effective August 15. A reduction in wheat tariffs throughout eastern Washington and northern Idaho to Seattle and Spokane was announced by the Harriman lines on July 5.

The Pennsylvania Railroad, in pursuance of its plan to cultivate the friendship of the farmers, will make an elaborate exhibit at the American Land & Irrigation Exposition to be held in Madison Square Garden, New York City, next November. There will be a split-log drag, a model of the company's live stock car, models of ancient wagons and modern electric trains, illustrating the history of transportation; graphic charts; statistics of what the company has done to conserve the forests, and complete information about the success which the company has had in raising good crops on poor land on Long Island and elsewhere.

Germany's sea canal, the Kaiser Wilhelm, which connects the North Sea and the Baltic, with Kiel at its eastern terminus, reports that in 1910-11, 45,569 ships, with a net holding capacity of 7,580,000 tons, used the canal, and the revenue amounted to $875,000. Five years ago, the tonnage reached 5,800,000, and the receipts were $700,00, while 10 years ago the tonnage was 4,300,000 and receipts $525,000. Since 1899, reckoning by the ships' tonnage, canal traffic has doubled and returns have correspondingly increased. Last year there was an increase in the net registered tonnage of over 1,000,000 and in receipts of over $100,000, as compared with the previous year, at hitherto unprecedented record.

Protests have been filed with the corporation commission of Oklahoma by the railways in that state against an order it has proposed requiring the roads to furnish for theatrical parties of not less than 18 members a special coach and one baggage car at a minimum charge of $25, for parties of not less than 30 passengers a special coach and two baggage cars at a minimum charge of $40, and proportionate accommodations for larger parties. The roads have objected to the order on the ground that it reduces the minimum number of paid fares to be required to secure the additional accommodation, 25 fares being the minimum fixed by most roads to secure the special service. Interstate roads oppose the rule because it would cause confusion to have tariffs covering rates and service for theatrical parties in Oklahoma different from that class of tariffs in the other states.

At a hearing before the Interstate Commerce Commission board of suspension on August 17, regarding the new reciprocal switching rule and rates for the Chicago district, an agreement was reached by which the Chicago & Alton, the Atchison, Topeka & Santa Fe, the Wabash, the Illinois Central, the Chicago, Indianapolis & Louisville and the Chicago & Eastern Illinois have become parties to the new arrangement, which, up to this time, they have refused to do because the new switching rules provided that they should absorb the inbound switching rate on grain which has heretofore been absorbed by the eastern lines. When the roads named refused to subscribe to the rules the eastern roads raised the switching rates on coal received from them, which was to result, effective August 1, in an increase in the rates on coal to consignees. The new plan, including the provision that coal switching rates will be absorbed as in the past, will now go into effect August 1, and the switching rates

on grain will be advanced and will be absorbed by the lines parties to the agreement, but not on shipments coming over the six lines mentioned. Further negotiations to adjust their differences on the grain switching rates will be carried on by the roads.

In a notice sent to receivers of freight throughout the United States by the freight traffic committee of the Chicago Association of Commerce, with the view of educating shippers to save themselves the annoyance of receiving overcharge bills from the carriers, the following advice is given: "A large number of complaints come from receivers of freight respecting overcharges

Car Surpluses and Shortages.

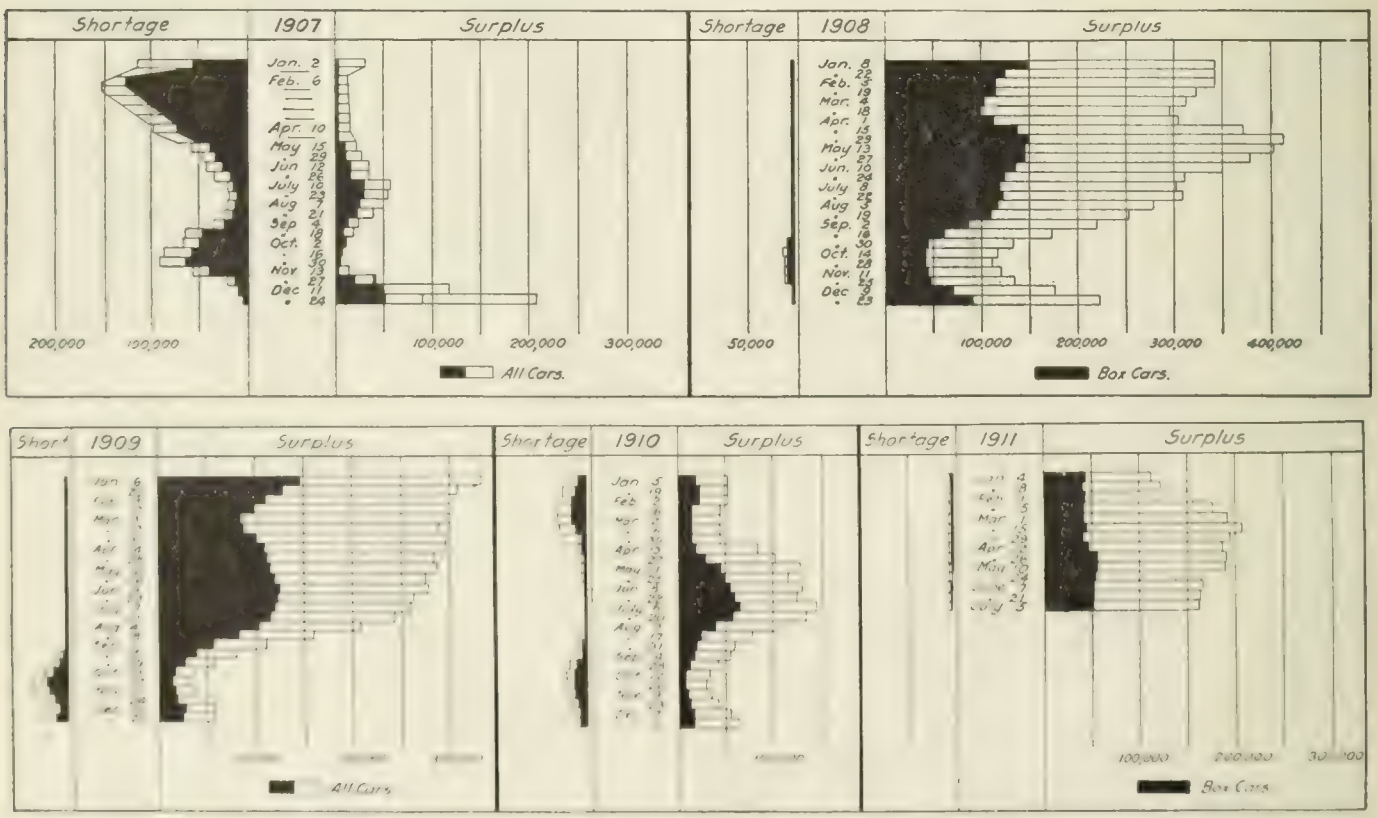
Arthur Hale, chairman of the committee on relations between railways of The American Railway Association, in presenting statistical bulletin No. 99, giving a summary of car shortages and surpluses by groups from March 2, 1910, to July 5, 1911, says:

"The surplus of all classes is 165,508, being 426 cars less than the total reported for June 21. There was little change in box cars and flats, while coal and gondolas show a decrease of 2,522, partially offset by an increase in miscellaneous of 2,095 cars. The shortages reported in groups 4 (middle Atlantic), and 11

Car Surpluses and Shortages.

Date.	No. of roads.	Surpluses					Shortages				
		Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.	Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.
Group *1.—July 5, 1911.	8	506	675	1,164	202	2,547	150	142	25	18	335
" " 5, 1911.	26	3,159	122	18,265	7,025	28,571	3	0	2	7	12
" " 5, 1911.	26	12,314	865	36,531	4,268	53,978	10	0	0	10	10
" " 5, 1911.	10	1,612	119	2,850	1,227	5,808	23	0	0	0	23
" " 5, 1911.	19	3,510	344	3,518	2,019	9,391	0	0	0	0	0
" 6.— 5, 1911.	28	10,729	1,253	3,230	6,955	22,167	10	20	9	0	39
" 7.— " 5, 1911.	4	2,069	111	349	834	3,363	75	0	0	0	75
" " 5, 1911.	17	7,705	222	2,260	3,338	13,525	0	0	0	0	0
" 9.— 5, 1911.	11	1,599	581	470	733	3,383	55	1	0	0	56
" 10.— " 5, 1911.	22	9,017	1,635	1,706	8,981	21,339	18	0	1	[illegible]	19
" 11.— " 5, 1911.	7	655	190	20	571	1,436	535	140	30	613	1,318
[illegible]	178	52,875	6,117	70,363	36,153	165,508	879	303	67	638	1,887

*[illegible] New England lines; Group 2—New York, New Jersey, Delaware, Maryland, and Eastern Pennsylvania lines; Group 3—Ohio, Indiana, Michigan and Western Pennsylvania lines; Group 4—West Virginia, Virginia, North and South Carolina lines; Group 5—Kentucky, Tennessee, Mississippi, Alabama, Georgia and Florida lines; Group 6—Iowa, Illinois, Wisconsin, Minnesota and the Dakotas lines; Group 7—Montana, Wyoming and Nebraska lines; Group 8—Kansas, Colorado, Missouri, Arkansas and Oklahoma lines; Group 9—Texas, Louisiana and New Mexico lines; Group 10—Oregon, Idaho, California and Arizona lines; Group 11—Canadian lines.



Car Surpluses and Shortages in 1907 to 1911, Inclusive.

collected by the railways upon excessive weights and incorrect [illegible] prompt payment of freight bills please carefully check the weights of the items inserted against the weights on export bills. Bare rates should also you have reason to believe they are incorrect, insist upon such correcting the charges to last [illegible] weight and tariff rates. In case of refusal on the part of the agent to make correction notify the shipper, that action may be taken to have agent instructed to make proper adjustments in the future. It is our belief that co-operation between the consignor, the consignee and the carriers will prevent overcharges, thus removing a fruitful cause of annoyance to shippers and carriers."

(Canadian), have materially decreased. It will be noticed that last year there was an increase of about 18,000 in the surplus between the second period of June and the first period of July, while this year the surplus is practically stationary."

Foreign Crop Progress.

The United States Agricultural Department, commenting on foreign crops, says that conditions surrounding crops in Canada are, over most of the territory, pronounced flattering. Of the 15,500,000 acres under wheat this season, over 9,500,000 are in the spring wheat provinces, Saskatchewan, Manitoba, and Alberta, the increment in area, though perhaps not so great as

expected, amounted to 1,200,000 acres, as compared with an increase of 1,500,000 acres in 1910. Ever since the seed went into the ground the spring wheat lands have been saturated by opportune rains, and, with few exceptions, favored by forcing temperature. Present prospects, therefore, afford a refreshing contract to those at the same period a year ago, when much of the country was suffering the withering effects of drought.

In Argentina the newly sown wheat, oats, and flaxseed are said, under the influence of plentiful moisture, to have germinated well. Areas are believed to be heavily increased; popular opinion puts the surface under wheat 5 per cent. to 10 per cent. over the 15,500,000 acres sown last year. High prices are thought to have stimulated additional sowing of flaxseed. The 1910 wheat crop of Chile is reported insufficient for home needs, and imports are being made from Australia. The monsoon, the indispensable precursor of a favorable seed time on unirrigated soil in British India, broke in full force in mid-June, and heavy rains have already fallen over wide areas. Late reports, however indicate partial cessation of rainfall. Cotton planting is progressing in some localities of the empire.

The harvest in progress on the north coast of Africa is said to promise well in Algeria, where the yield of wheat is usually upward of 35,000,000 bushels, and of barley over 45,000,000 bushels. In the much less important producers, Tunis and Morocco, only a moderate outcome is expected. According to the June official report, the yield on the 1,250,000 acres of wheat in Egypt was likely to be "good" in upper Egypt, but in lower Egypt not quite up to the standard.

In Europe the wheat harvest is on in the southern latitude, beginning in Sicily in late May. Its progress northward through Italy, where better yields than last year are anticipated, has been preceded or attended by heavy rains, which may later show their effects on quality. In Spain, an official puts the wheat crop 20,000,000 bushels above the excellent yield of last season. The territory comprising France, the United Kingdom, Belgium, Holland, Germany, and parts of northern and central Russia suffered over extensive localities from lack of sufficient moisture during the first half of June.

Winter wheat and rye seem generally to have had effective power of resistance, but spring-sown crops, especially oats and barley, were in places severely tried, and the extent of their recuperating after the copious rains in the latter half of the month has not yet been determined. The hay crop over much of this area was seriously diminished, but the quality is generally excellent. In Austria-Hungary, Roumania, the Balkan states and southern Russia, precipitation in June seems generally to have been ample, and the progress of vegetation, on the whole, more satisfactory than in northern Europe.

As harvest moves northward in Europe, winter wheat and rye may, on the whole, be said to have fully maintained their former promise. The wheat crop of the United Kingdom, on an increased area, is regarded likely to furnish an average yield. France with diminished areas under both wheat and rye, promise a medium outturn of the former and a less satisfactory one of the latter.

Governmental Approval of a "Back Haul."

The New York State Public Service Commission, Second district, has ordered the New York Central to either stop its train No. 44 at Altmar, to take on passengers for Utica, or to make an arrangement whereby train No. 49 shall take passengers to Richland to connect with train No. 44 without expense by reason of the necessity of doubling to Richland in order to secure passage on train No. 44.

INTERSTATE COMMERCE COMMISSION.

The commission has authorized the Gulf & Ship Island temporarily to disregard the long and short haul clause of the law in making rates on tropical fruits imported at Gulfport.

The commission has suspended until November 14 a tariff filed by the Southern Pacific showing terminal charges and absorptions at Galveston, Texas, which was to have gone into effect July 18.

The attorney-general of Arkansas has filed with the commission a complaint against rates made by the express companies from points in Arkansas to cities in numerous other states on fruits, vegetables, butter and eggs.

Rates on Fir Lumber Reduced.

Oregon & Washington Lumber Manufacturers' Association v. Southern Pacific et al. Opinion by Commissioner Prouty.

Rate of $5 per ton on rough green fir lumber and lath from points in the Willamette Valley, except from the Wendling branch, to San Francisco and bay points, found unreasonable, and rate of $3.50 per ton prescribed for the future. Rate from the Wendling branch and from stations upon the west bank of the Willamette river should not exceed $3.75 per ton. Foregoing rates are not applied to mills located within the city of Portland, which take a uniform rate of $5 per ton upon all kinds of lumber. S. P. v. I. C. C., 219 U. S., 433, cited and distinguished. (21 I. C. C. 389.)

Conference Rulings.

A state statute permits the exchange of intrastate mileage books for advertising. Such books may not be used on any part of an interstate journey. 315.

Routes involving the transshipment of freight from a rail line to a water line or from a water line to a rail line are "rail-and-water routes," and routes composed of rail lines connected by car ferries over which the freight is ferried in the car constitute "car-ferry routes" and are understood to be included in the general term "all-rail." Where a shipper does not specify a particular route, or a rail-and-water route, the carrier's agent must consider car-ferry routes as available in performing the duty of routing a shipment over the cheapest route. 316.

The commission has no jurisdiction over claims for damages due to alleged errors in the transmission of telegraphic messages. 317.

In view of the amendment to section 15 of the act, paragraph *b* of Conference Ruling No. 214 is now amended so as to read as follows: (*b*) In order to secure desired delivery to industries, plants, or warehouses and avoid unnecessary terminal or switching charges, the shipper may direct as to terminal routing or delivery of shipments which are to go beyond the lines of the initial carriers; and his instructions as to such terminal delivery must be observed in routing and billing such shipments. When shipments are accepted without specific routing instructions from shipper, where all-rail rates and rail-and-water rates are available the carrier's agent must have the shipper designate which of the two he wishes to use. Carriers will be held responsible for routing shown in bill of lading. 321.

The authority conferred on the commission by the amendatory act of June 18, 1910, to suspend schedules stating new individual or joint rates, was not intended to withdraw from carriers the right to initiate their rates, and does not mean that in every case of advanced rates or charges the schedules should be suspended. The statute vests a discretion in the commission in that regard and contemplates that it will be exercised in a judicial spirit. Except in cases where it acts on its own initiative the commission will not ordinarily suspend the operation of a schedule unless the changes complained of are called to its attention at least 10 days before the effective date of the schedule, thus giving the commission time in which to act intelligently and to avoid discriminations that might result from the improper suspension of a schedule. Requests for such action by the commission should be made in the form of a complaint indicating the schedule by its I. C. C. number and specifically referring to the parts thereof as to which suspension is asked, together with reasonably detailed explanations as to the probable effect of the proposed new rates, fares, etc. 322.

It appearing that some confusion has been caused by the commission's conference rulings Nos. 48, 133, and its ruling of February 14, 1911, the following is issued in lieu of the three rulings above mentioned. The commission has no authority to control the disposition of an overcharge. The carrier must charge no other than its lawful rate and the failure to collect the full rate as to any shipment is a violation of the law, as is the collection of more than the full rate. The commission declines to declare that an overcharge may be offset as against

an uncollected undercharge; such offset is not within the power of the commission to authorize or condemn. 323.

It is unlawful for carriers to make special and discriminatory divisions of joint rates on locomotive fuel as between an originating or participating carrier and a purchasing carrier. In the division of joint rates a railway must be treated precisely as any other shipper is treated, and the commission will regard any special division as a device to defeat the published rate. All divisions on fuel coal must be made in good faith without respect to the fact that one of the carriers is the purchaser of such coal. 324.

An Order Permitting Bulked Shipments.

California Commercial Association v. Wells Fargo & Co. [illegible] Express Lines.

In this case the question was first raised before the commission as to the right of a carrier to make its rates to base upon the ownership of the property transported. Where shipments belonging to, and intended ultimately for, various consignees had been united in a bulked shipment from one consignor to one consignee, the defendant had refused to apply the rate applicable on the shipment as a whole but had insisted upon making a separate charge on the package or packages intended for each ultimate consignee. The commission in its original report (14 I. C. C., 422), held that the practice of the defendant was unlawful. No order, however, has gone into effect owing to the fact that the legal question involved was taken into court in what is known as the Export Shipping case (14 I. C. C., 437). It was the contention of both the railway and the express companies in these cases that they might make rates with relation to the ownership of the property transported. The commission held to the contrary, and the Supreme Court of the United States has upheld the commission in its conclusion. I. C. C. v. D., L. & W. R. R. Co. (220 U. S., 235.) The commission, therefore, now makes an order forbidding express companies from discriminating against bulked shipments. (21 I. C. C., 300.)

Another Advance Rate Refused.

In the investigation and suspension of supplements No. 2 to transcontinental freight bureau westbound tariffs No. 1-L and No. 4-H, issued by C. W. Bullen, agent; J. F. Tucker, agent; and R. H. Countiss, agent; effective November 15, 1910. Opinion by Commissioner Prouty:

The commission held in *Burgess* v. *Transcontinental Freight Bureau*, 13 I. C. C. R., 668, that an advance upon hardwood lumber from 75 to 85 cents per 100 lbs. from Chicago territory and points west to the Pacific coast was unreasonable, and ordered the establishment for two years of the 75-cent rate. On the expiration of that order the defendants filed tariffs advancing the rate to 85 cents, which led to numerous protests from lumber shippers affected. Thereupon the commission began this proceeding and suspended the rates pending the same.

The original order referred only to lumber, and did not include staves and headings, which had formerly taken the lumber rate. [illegible] the making of our order in the *Burgess case, supra*, carriers did not apply the 75-cent rate established by the commission to staves and headings, but subsequently did, [illegible] to both these commodities. The advance is also made applicable to both commodities, and our proceeding and the complaint of the Arkansas Southern Manufacturers' Association put in issue the reasonableness of the [illegible] as to lumber.

The carriers admitted on the hearing that the same rate had [illegible] applied to lumber and [illegible] to the Pacific coast, and stated that they knew of no reason why a distinction should be made in [illegible] were not prepared to admit that the [illegible]

[illegible] the extent of the movement of staves from this territory to the Pacific coast, their value, the car loading, etc. From the whole record we are clearly of the opinion that, whatever may be true when staves are compared [illegible] and [illegible] may be accorded a rate of 85 applied to [illegible] involved in this proceeding.

[illegible] the present hearing showed that two [illegible] a change of [illegible] had occurred since the [illegible]

It appeared that the competition of foreign hardwoods was somewhat more forceful at the present time than formerly, and that while the consumption of such lumber was continually increasing upon the coast the amount shipped from the east was rather upon the decrease. Lumber manufacturers insisted that the effect of any substantial advance in the present rate would be to finally exclude eastern hardwoods from the market of the Pacific coast.

The carriers showed a substantial increase in operating expenses as compared with two years ago, due mainly to an advance in wages. These wage increases for the most part have not been long enough in force to determine their exact effect upon the cost of operation, but the net returns to these transcontinental lines under old conditions were exceedingly liberal, and we believe that they will be ample under present conditions without any increase in rates. This, however, as was said in the recent advance cases, can only be satisfactorily determined by actual results.

After having fully heard the parties we are of the opinion that the proposed rate of 85 cents as applied to hardwood lumber and staves and headings from Chicago territory and west, being that territory from which the present 75-cent rate is in effect, would be unjust and unreasonable; that a rate of 75 cents per 100 lbs., on the present minimum, ought not to be exceeded for the future, and it will be so ordered. (21 I. C. C., 397.)

The Commission Left to Itself to Find the Facts.

Oshkosh Traffic Association et. al. v. Chicago & North Western et al. Opinion by Commissioner Harlan.

For some years sash, doors, blinds, and other house-trimming products have moved from Oshkosh, Fond du Lac, Wausau, Merrill, and Grand Rapids, all in the state of Wisconsin, to points in the states of Indiana, Michigan, Ohio and Kentucky, on the intermediate rates to and from Milwaukee, Manitowoc, or Chicago. These charges the complainants contend are unreasonable in and of themselves as well as discriminatory when compared with the joint through rates to the same destinations that are available to competing mills at Dubuque, Clinton, and other Mississippi river points. The petition prays for an order fixing reasonable joint through rates to the destinations in question.

The record is singularly bare of helpful suggestions by either party to the controversy. That the complainants have a substantial grievance is insisted upon by them and seems to be conceded by the defendants. Nevertheless the record leaves the commission practically to its own resources in arriving at a correct solution of the problem. While the defendants produced one witness at the hearing, his testimony did not touch the merits of the case, and they have not given the commission the benefit even of a printed brief to facilitate our examination of the matter. Nevertheless we have made some investigations of our own and have arrived at the conclusion that the present rates are excessive and should be reduced. The minimum carload weight on lumber, in a 36-ft. car, is 34,000 lbs. Sash, doors, and blinds of course cannot be loaded so heavily, and in a car of that length take a minimum weight of 24,000 lbs., both into Chicago and beyond. The carload earnings on the manufactured product at a rate of 1 cent in excess of the lumber rate would therefore be materially less than the carload earnings on lumber, although its value would probably be somewhat in excess of the value of the carload of lumber. On the other hand, it is clear that these products are not moving freely from the mill points in question into central freight association territory on the present adjustment of rates. While the defendants, as stated, would probably be satisfied with rates 3 cents higher than the lumber rates, no showing of record has been made to convince us that these commodities would move freely under such a rate adjustment.

From such light, as the record and our own investigations give us, we have reached the conclusion that the rates on sash, doors, blinds and house trimmings from the mill points in question to the destinations mentioned ought not to exceed 2 cents in excess of the lumber rates, and that any rates in excess of rates so constructed would be unreasonable. To destinations that lie, in a general way, east of a line drawn through Richmond, Ind., the rates by the car-ferry route of the Pere Marquette on traffic originating in the Oshkosh-Fond du Lac group are understood to be uniformly 2 cents less by the all-rail routes through Milwaukee, and on traffic from the Wausau-Merrill group 1½ cents less than by the all-rail routes through Chicago. (21 I. C. C. 385.)

STATE COMMISSIONS.

The Railroad Commission of Ohio has ordered the rates on coal on the Hocking Valley from Nelsonville to Toledo and intermediate points, reduced. The reductions are proportionate to the reduction from $1 per ton to Toledo to 85 cents per ton.

The Railroad Commission of Ohio has ordered the railway companies having team tracks in Akron to receive from the Baltimore & Ohio cars loaded on the B. & O.'s private side track, to be placed on the team tracks of the other roads. A joint rate on such cars is ordered, and the commission holds that this is a transportation service and not a switching service.

The Railroad Commission of Louisiana has ordered the New Orleans Great Northern to replace the spur or side tracks at Pool's Bluff. The side track was removed with the consent of the commission. On investigation it was found that the commission had given its consent on the strength of a statement made by the railway company which is at variance with the facts and evidence as now presented.

The new Board of Public Utilities Commissioners of New Jersey, on a petition for an order directing the Pennsylvania Railroad and the Pennsylvania Tunnel & Terminal to build a station at the tunnel shaft at West Hoboken, finds that the general purpose of the new line was to give the Pennsylvania Railroad an all-rail entrance into New York City, and to separate the through from the local traffic so that it could better serve both. After a personal inspection, and on recommendation of engineers who have made a careful study of the situation, the board refused to grant the petition.

The Board of Public Utilities Commissioners of New Jersey, in a memorandum, says that its attention has been called to certain published statements made in connection with the offering for sale of public utility securities issued under the law which provides that the consent of the Board of Commissioners must be obtained before the issue of new securities. These statements are so worded, the commission says, as to be capable of misleading the public and particularly possible investors by inducing the belief that this commission confirms the financial and business standing of issuing corporations *as a whole* by approving the issue of certain securities of such corporations. Such approval does not imply any confirmation of the business or financial standing of the issuing corporation as a whole.

As heretofore reported in these columns, the Railroad Commission of Louisiana has been making an exhaustive study of complaints brought against the facilities in Louisiana of the Louisville & Nashville. There were three general complaints. The first was a complaint as to the inadequacy of the passenger station facilities in New Orleans. The commission finds that this complaint is justified only in so far as the train sheds are concerned, these not being long enough, and orders that they be extended to cover the longest trains operated by the company. The second complaint is in regard to freight sheds. Here the commission finds that by building brick walls at each end of the principal freight sheds, with proper division walls on the interior of the building, the fire risk would be greatly reduced, with a consequent reduction in the insurance rate both for shippers and for the railway, and an order is issued accordingly. The third proposition before the commission relates to the track and bridges of the defendant company in the state of Louisiana. A great deal was said in the testimony and statements of numerous parties before the commission about the condition of the track and bridges of the Louisville & Nashville previous to the inspection made by the commission. Letters filed with the commission also refer to the defendant company's roadway in such language as to make the commission feel that if the charges were true the company had been grossly neglectful of its highest duty to the public, viz.: to maintain an absolutely safe track. After hearing the evidence of the chief engineer of the defendant company, the commission made a personal inspection by going over the railway in a special coach and engine, together with the officers of the company. The Louisville & Nashville, in Louisiana, is constructed of good material, well ballasted, and is smooth, firm and safe. As compared with other railways in the state of Louisiana, it is far superior to many, and inferior to none. The special complaint was made about Rigolet's bridge. In this case the commission finds that the work, which is now being done by the Louisville & Nashville, to replace a bridge destroyed by the great storm of 1909, is satisfactory and safe in all respects.

The Washington Public Service Commission.

By an act of the state legislature, the Washington Public Service Commission has been created to take the place of the State Railroad Commission. The new commission is to consist of three members, appointed by the governor, with the approval of the senate, for a term of six years, with annual salary of $5,000 each.

The commission is empowered to fix all rates, and it is authorized to establish joint and through rates. It may order repairs to railway property and may suspend traffic until such repairs are made. It may investigate accidents, and every public service company is ordered to report all such to the commission which result in injury or death of a person. All complaints served on companies are to be given a hearing not later than ten days thereafter. Orders of the commission become effective twenty days after service. The penalty for violation of an order is $1,000 per day for each offense, an officer or employee responsible for such violation is held guilty of a misdemeanor.

The commission may inspect books and papers of any public service company, and examine any employee under oath. Every company is required to answer all questions asked; it must file annually a full statement with the commission, listing amount of capital stock issued, equipment, franchises, number of employees, salaries, and the like, as well as accidents occurring, cost of same, amounts expended for improvements. A report monthly of receipts and expenses may be required at the discretion of the commission.

In the valuation of property the commission is given the full power to investigate every detail. Appeal for a review of the findings of the commission in any instance, may be made to the superior court of the county, within thirty days of the date of the commission's order, and the court may issue notice of restraint of enactment of such order, pending the outcome. Appeal may be carried from the superior to supreme court, the proceedings before the lower court constituting the record.

If the commission finds a charge excessive, it may order the company to refund to the complainant the overcharge with interest. If such overcharge is not paid within the time fixed by the order, and suit is commenced for recovery, the commission's findings and order will constitute the record of evidence. Complaints for overcharges must be made within two years to the commission, dating from the time the cause of action accrues; any petition for enforcement of order shall be filed in the court within one year from the date of the commission's order.

To assist the commission a secretary shall be appointed at a salary of $2,000 per year, a rate clerk and satistician at a salary not to exceed $3,000, an inspector of safety appliances at a salary not to exceed $3,000, an expect accountant at a salary not to exceed $1,800, a stenographer at a salary not to exceed $1,800, and any other assistants the commission may deem needed.

The law creating this commission went into effect June 9, 1911.

COURT NEWS.

Judge Bean, of the United States District Court at Portland, Ore., on July 14 sustained the demurrer of the Oregon railway commission to a bill filed by the Southern Pacific Company for injunction to restrain the commission from enforcing its order reducing from 2 to 30 per cent. the class rates between Portland and points on the Oregon & California, a road operated by the Southern Pacific as lessee. Permission to file an amended bill of complaint was granted to the railway.

The government has begun suit in the United States Circuit Court at Philadelphia, against the Philadelphia & Reading, to test the legality of its ownership in and control of the Philadelphia & Reading Coal & Iron Co. and other coal companies. The charges are similar to those in the suit against the Lehigh Valley noticed in the *Railway Age Gazette* of July 14, p. 101; namely, that the maintenance of a separate company is a means for evading the commodities clause of the Interstate Commerce law. It is charged that the railway company has advanced more than $70,000,000 to the P. & R. coal company without charging adequate interest.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

S. L. Schoonmaker has been appointed co-receiver with H. M. Atkinson, of the Atlanta, Birmingham & Atlantic.

J. P. Pelham, chief clerk of the Gulf & Ship Island, has been appointed acting auditor, with office at Gulfport, Miss., succeeding to the duties of E. L. Hall, auditor, resigned.

F. A. Clark, auditor of traffic of the Erie Railroad at New York City, has been appointed auditor, succeeding J. G. Livengood, resigned. C. D. Ward, assistant auditor of traffic, has been appointed auditor of freight accounts. A. J. Moran has been appointed assistant auditor of freight accounts, and P. J. Reilly has been appointed auditor of passenger accounts, all with offices at New York City.

Operating Officers.

J. B. Elliott has been appointed district superintendent of the Pullman Company, with office at Omaha, Neb., succeeding William Lucas.

W. H. Gunzelman, formerly trainmaster of the Chicago & Alton at Roodhouse, Ill., has been appointed chief despatcher of the First and Second districts of the Chicago, Indianapolis & Louisville, with office at La Fayette, Ind.

W. W. Rupert, assistant trainmaster of the Allegheny division of the Pennsylvania Railroad, at Oil City, Pa., has been appointed assistant trainmaster of the Buffalo division, with office at Mayville, N. Y. C. H. Sourwine succeeds Mr. Rupert, with office at Oil City, Pa.

W. M. Ansley, trainmaster of District 1, British Columbia division of the Canadian Pacific, at Revelstoke, B. C., has been appointed trainmaster of District 3, with office at Nelson, succeeding H. W. McLeod, who succeeds Mr. Ansley as trainmaster of District 1, with office at Revelstoke.

C. W. Hotchkiss, general manager of the Chicago, Indiana & Southern and the Indiana Harbor Belt at Chicago, has resigned his office with the latter road. George Hannauer, superintendent of the Chicago, Indiana & Southern and general superintendent of the Indiana Harbor Belt at Gibson, Ind., has resigned as superintendent of the C. I. & S., and will devote his time exclusively to the Indiana Harbor Belt. H. A. Ziesel, superintendent of the latter road at Kankakee, Ill., succeeds Mr. Hannauer.

Perry S. Sampson, whose appointment as superintendent of the Illinois division of the Chicago & Eastern Illinois, with office at Salem, Ill., has been announced in these columns, was born June 12, 1865, at Brazil, Ind., and received a common school education at Brazil and at Sedalia, Mo. He learned telegraphy in 1882 while a messenger boy for the Mutual Union Telegraph Company at Richmond, Ind., and in the same year began railway work as an operator and assistant clerk in the office of the engineer maintenance of way of the Pittsburgh, Cincinnati, Chicago & St. Louis, and the next year was transferred to the freight department. In 1884 he went with the Grand Rapids & Indiana as an operator and bill clerk, and was with the Baltimore & Ohio from 1885 to 1886. He was then out of railway service until 1889, when he went with the Chicago & Eastern Illinois as a brakeman, and he has been with that road continuously since that time, having been promoted successively to conductor, train despatcher, chief despatcher, trainmaster of construction, trainmaster, assistant superintendent and supervisor, and to superintendent as above.

Traffic Officers.

[illegible] has been appointed general freight agent of the Denver, Northwestern & Pacific at Denver, Colo.

[illegible] has been appointed traveling freight agent of the Missouri, Kansas & Texas at Houston, Tex.

[illegible] has been appointed soliciting freight agent of the Mobile & Ohio, with office at Birmingham, Ala., succeeding J. G. Putnam, Jr., resigned.

Frank H. Dearing has been appointed a traveling freight agent of the Georgia Railroad, with office at St. Louis, Mo., succeeding J. N. Garland, deceased.

H. C. Franks, commercial agent of the St. Louis & San Francisco at San Antonio, Tex., has resigned to go with the San Antonio & Aransas Pass.

S. J. Ellison, general passenger agent of the Great Northern, with office at St. Paul, Minn., has resigned, effective August 1, to engage in other business.

George B. Haynes, immigration agent of the Chicago, Milwaukee & St. Paul at Chicago, has been appointed assistant general passenger agent, with office at Chicago.

H. C. Moran, contracting agent of the Missouri, Kansas & Texas at Houston, Tex., has been appointed soliciting freight agent of the Kansas City Southern, with office at Houston.

The office of traveling freight agent of the Lake Erie & Western, the Ft. Wayne, Cincinnati & Louisville, and the Northern Ohio at Sandusky, Ohio, has been transferred to Indianapolis, Ind.

J. C. Leacy, contracting freight agent of the Great Northern at Duluth, Minn., has been appointed traveling freight agent, with office at Winnipeg, Man., and W. J. Doherty succeeds Mr. Leacy.

W. C. Wherritt, soliciting agent of the Louisville & Nashville at New Orleans, La., has been appointed assistant contracting agent, with office at New Orleans, and W. L. Dulaney succeeds Mr. Wherritt.

E. Z. Giblon, city passenger agent of the St. Louis & San Francisco at Cincinnati, Ohio, has been appointed traveling passenger agent of the Union Pacific and Southern Pacific, with headquarters at Cincinnati.

W. T. Webster, commercial agent of the Chicago, Indianapolis & Louisville at Grand Rapids, Mich., has been appointed general agent at Chicago, succeeding S. J. Cooke, and Mr. Cooke succeeds Mr. Webster at Grand Rapids.

T. V. Murray, soliciting freight agent of the Gulf, Colorado & Santa Fe at Dallas, Tex., has been appointed a traveling freight agent, with office at Dallas, succeeding T. E. Brazelton, promoted. J. C. Stephens succeeds Mr. Murray.

W. H. Wynne has been appointed traveling freight and passenger agent of Morgan's Louisiana & Texas Railroad & Steamship Company, with office at Alexandria, La., succeeding H. A. White, transferred to Lake Charles, La., as local agent.

F. B. Wurzbacher, general agent of the White Pass & Yukon Route at Skaguay, Alaska, has been appointed general agent at Seattle, Wash., with jurisdiction over traffic matters in the Vancouver office, succeeding I. W. Dudley, resigned.

W. B. Ryan, traveling freight agent of the Illinois Central at Jacksonville, Fla., has been appointed commercial agent, with office at Little Rock, Ark., succeeding W. H. Hays. W. J. Middlekauff, contracting freight agent at Jacksonville, succeeds Mr. Ryan.

R. N. Beason, freight soliciting agent of the Southern Railway at Huntsville, Ala., has been appointed freight soliciting agent at Memphis, Tenn., succeeding H. P. Wade, resigned to go into other business. T. C. Sanford succeeds Mr. Beason, with office at Huntsville.

Felix M. Williams has been appointed division freight agent of the Texas & Pacific, with office at Shreveport, La., and the office of commercial agent at Shreveport, heretofore held by H. S. Hinton, has been abolished. D. L. Ray has been appointed traveling freight agent, with headquarters at Fort Worth, Tex.

W. B. Wetherell, agent of the Union Steamboat Line at Milwaukee, Wis., has been appointed commercial agent of the Erie, with office at Grand Rapids, Mich. W. J. Fitzgerald has been appointed assistant general agent of the Erie, with office at Milwaukee, and will look after the interests of the Union Steamboat Line, succeeding Mr. Wetherell.

C. W. Ford, whose appointment as general superintendent of the Grand Junction & Grand River Valley, with office at Grand Junction, Colo., succeeding J. H. Brinkerhoff, has been announced

in these columns, has been appointed also general traffic manager, succeeding Mr. Brinkerhoff, who has left the service of the company to engage in other business.

G. K. Stark, formerly traveling freight agent of the Missouri Pacific at Pittsburgh, Pa., has been appointed traveling freight and passenger agent of the El Paso & Southwestern, with office at Pittsburgh, succeeding J. L. Fox, transferred. W. K. Hardesty has also been appointed traveling freight and passenger agent of the El Paso & Southwestern at Pittsburgh.

Thomas W. Jacobs has been appointed European traffic agent of the Erie Railroad, with office at London, E. C., England, succeeding Wells, Fargo & Co. Express, and all communications heretofore adressed to D. G. Mellor, general European agent, Wells, Fargo & Co. Express, relative to the European traffic of the Erie Railroad, should be sent to Mr. Jacobs, effective August 1.

E. L. Throgmorton, traveling freight agent of the Illinois Central at Memphis, Tenn., has been appointed contracting freight agent of that road and the Yazoo & Mississippi Valley, with office at Memphis. H. S. Gooch has been appointed a traveling freight agent of the Illinois Central at Louisville, Ky. M. L. Costley, traveling freight agent of the Illinois Central and the Yazoo & Mississippi Valley at New Orleans, La., has been transferred to Brookhaven, Miss., and C. F. Verlander, traveling freight agent at Vicksburg, Miss., has been transferred to New Orleans, succeeding Mr. Costley. H. F. Stanley, Jr., has been appointed a traveling freight agent of the Yazoo & Mississippi Valley, with headquarters at Natchez, Miss.

Engineering and Rolling Stock Officers.

Charles Morlock has been appointed assistant division engineer of the Baltimore & Ohio, with office at Philadelphia, Pa.

F. W. Bailey, superintendent of bridges and buildings of the Missouri, Kansas & Texas, with office at Denison, Tex., has resigned to engage in other business.

T. H. Williams has been appointed master mechanic of the International & Great Northern, with office at Mart, Tex., succeeding W. J. McGee, resigned to go with the Texas & Pacific.

N. Rowe has been appointed roadmaster of the Atchison, Topeka & Santa Fe, with office at Newton, Kan., succeeding W. S. Boyce. A. W. Ross has been appointed roadmaster, at Abilene, Kan., succeeding T. J. Moriarty.

The titles of W. C. Stears, superintendent of shops of the Cincinnati, Hamilton & Dayton, at Lima, Ohio; F. C. Pickard, assistant master mechanic, at Moorefield, Ind., and W. G. Rose, assistant master mechanic, at Ivorydale, Ohio, have been changed to that of master mechanic.

William B. Ott, whose appointment as master mechanic at the Trenton (N. J.) shops of the Pennsylvania Railroad, has been announced in these columns, entered the service of the Pennsylvania Railroad on October 8, 1897, as a draftsman in the office of the principal assistant engineer of the Philadelphia & Erie division. In October of the following year he was appointed master carpenter of the Western division, and in January, 1901, was made inspector at the Altoona shops. In June, 1903, he was appointed assistant master mechanic at the Harrisburg shops, and in December of the same year was made assistant engineer of motive power of the Buffalo & Allegheny Valley division. He was appointed assistant engineer of motive power at the Altoona shops on February 1, 1906, which position he held at the time of his recent appointment as master mechanic as above noted.

William Elmer, Jr., who has been appointed superintendent of motive power of the Buffalo & Allegheny Valley division of the Pennsylvania Railroad, with office at Buffalo, N. Y., as has been announced in these columns, entered the service of the Pennsylvania Railroad as an apprentice at the Meadows (N. J.) shops on October 1, 1896, and in April, 1898, he was transferred to the Altoona (Pa.) shops in the same capacity. On October 10, 1898, he was appointed to special duties in the office of the superintendent of motive power, and in January, 1900, he was assigned to duty on the Interchange Street Railway, at Atlantic City, N. J. He was appointed assistant master mechanic in October, 1900, at the Altoona shops, and in January, 1903, was made assistant engineer of motive power of the Pennsylvania Railroad division. In February, 1906, he was appointed master mechanic of the Pittsburgh (Pa.) shops, which position he held at the time of his recent appointment as superintendent of motive power.

Robert K. Reading, whose appointment as superintendent of motive power of the Eastern Pennsylvania division of the Pennsylvania Railroad, with office at Altoona, Pa., has been announced in these columns, entered the service of the Pennsylvania Railroad on May 13, 1880 as a special apprentice at the Renova shops. From July, 1882, to November, 1884, he was on leave of absence, taking a mechanical engineering course, and then re-entered the service of the company as a special apprentice. In February, 1887, he was transferred to the office of the superintendent of motive power, and in January, 1892, he was promoted to assistant foreman of engines of the Baltimore division. He was appointed master mechanic of the Erie shops in April, 1892, and was made master mechanic of the Baltimore (Md.) shops in February, 1900. The following August he went to the West Philadelphia (Pa.) shops in the same capacity, and on August 1, 1903, he was promoted to superintendent of motive power of the Philadelphia & Erie division and the Northern Central Railway. In April, 1906, he was appointed superintendent of motive power of the Buffalo & Allegheny Valley division, which position he held until his recent appointment as above noted.

A. W. Gibbs, who has been appointed chief mechanical engineer of the Pennsylvania Railroad, with office at Philadelphia, Pa., as has been announced in these columns, was born October 27, 1856, at Fort Fillmore, N. Mex. He entered the service of the Pennsylvania Railroad in March, 1879, as a special apprentice at the Altoona (Pa.) shops, remaining in that position until June, 1881, and was then for four months draftsman. He went to the Richmond & Danville, now a part of the Southern Railway, in October, 1881, in the same capacity, and in August, 1886, was appointed master mechanic of the Atlantic & Charlotte division, and in October, 1888, was made master mechanic of the Virginia Midland division. He was appointed superintendent of motive power of the Central of Georgia in September, 1890, and when that position was abolished in July, 1892, he was again appointed master mechanic of the Richmond & Danville. Mr. Gibbs re-entered the service of the Pennsylvania Railroad in July, 1893, as assistant mechanical engineer. In September, 1902, he was appointed superintendent of motive power of the Philadelphia, Baltimore & Washington, and since January 1, 1903, he was general superintendent of motive power of the Pennsylvania Railroad for the lines east of Pittsburgh.

Purchasing Officers.

Edward Morris, general foreman at the general stores of the Rock Island Lines at Silvis, Ill., has been appointed district storekeeper of the Third district, with office at Shawnee, Okla., succeeding C. H. Rost, promoted.

Special Officers.

S. C. Wilson has been elected secretary-treasurer of the Kansas City division of the American Association of Railroad Superintendents and manager of the Missouri Valley Demurrage and Storage Bureau, with office at Kansas City, Mo., succeeding in both offices J. H. Ashley, resigned.

OBITUARY.

Benjamin T. White, general attorney of the Chicago & North Western, with office at Omaha, Neb., died at Omaha on July 15.

Nicholas Densmore, a native of Minnesota, and for many years prominent in railway construction work in West Virginia, Kentucky and Tennessee, died in the village of Umala, near the Chacarilla copper mines, La Paz, Bolivia, S. A., on June 10. Mr. Densmore, who was about 60 years of age, was associated for a number of years with the firm of Bolan & Dillon in railway construction work on the Guayaquil-Quito Railroad, the Cerro de Pasco Railroad and the Bolivia Railway, and had also constructed roads for the Bolivian government. During the past three years he devoted all of his time to mining interests in the Quimza Cruz mountains and the Chacarilla copper region.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Intercolonial is said to have ordered 5 locomotives from the Canadian Locomotive Company. This item is not confirmed.

The Canadian Northern is said to have ordered 20 consolidation locomotives from the Canada Foundry Company. This item is not confirmed.

The Baltimore & Ohio has ordered 10 Mallet (0-8-8-0) locomotives from American Locomotive Company. These locomotives are similar to those described in the daily edition of *Railway Age Gazette* of June 14. The dimensions of the cylinders will be 26 in. and 41 in. x 32 in. The diameter of the driving wheels will be 56 in., and the total weight in working order will be 468,500 lbs.

CAR BUILDING.

Swift & Company is in the market for a few additional tank cars.

The Cold Blast Transportation Company, Chicago, is in the market for 100 tank cars.

The Montreal Street Railway has ordered 25 pay-as-you-enter cars from the Ottawa Car Company.

The Philadelphia Rapid Transit Company has ordered 30 subway cars from the J. G. Brill Company.

The Chicago, Memphis & Gulf is in the market for 100 freight cars, including box and flat cars.

The Boston Elevated has ordered 25 steel car bodies from the Standard Steel Car Company, and 25 from the St. Louis Car Company.

The St. Louis & San Francisco is in the market for 19 coaches, 12 chair cars, 3 passenger and baggage cars and 3 mail and baggage cars, and not for the equipment mentioned in the *Railway Age Gazette* of July 7.

The Intercolonial is said to have ordered 230 box cars, 20 flat cars, 25 dump cars, 2 baggage cars and 1 refrigerator car from the Canadian Car & Foundry Company, and 100 freight cars, 2 postal cars and 2 stock cars from the Nova Scotia Car Company. This item is not confirmed.

IRON AND STEEL.

The Chinese Government is in the market for 9,000 tons of rails.

The Chilian Government is in the market for 10,000 tons of rails.

The Chesapeake & Ohio is in the market for 1,000 tons of bridge material.

The New York, Ontario & Western is in the market for 1,100 tons bridge material.

The Boston & Albany has ordered 1,000 tons of bridge material from Pennsylvania Steel Company.

The Delaware & Hudson has ordered 1,200 tons of bridge material from the Pennsylvania Steel Company.

The Atchison, Topeka & Santa Fe has ordered 9,940 tons of bridge material from the American Bridge Company for its bridge over the Missouri river at Sibley, Mo.

The Chicago, Milwaukee & St. Paul, mentioned in the Railway Age Gazette of May 12 as having ordered 40,000 tons of rails has specified that 1.50 or 1 per cent vanadic titanium shall be used in the rails.

General Conditions in Steel. During the past week the Steel Corporation has increased its mill operations to 70 per cent of capacity and its shipments still more are now larger than at any time since the first of the year. Business continues to exhibit the same characteristics noted in the Iron Age of last week. Specifications for bridge material are coming in freely and a good business is looked for in the near future. Reports of the crops are generally of a satisfactory character and the steel industry is looked for

Supply Trade News.

The Strauss Bascule Bridge Company, Chicago, has received an order from the city of New Orleans to put up a 60-ft. clear-span bridge over the Old Basin canal at Hagan avenue, New Orleans, La.

The Roberts & Schaefer Company, Chicago, has been awarded a contract by the Chicago, St. Paul, Minneapolis & Omaha, for designing and building, complete in operation, a 200-ton single counterbalanced bucket locomotive coaling station of frame construction to be installed at Merrillan, Wis.

The Standard Tool Company, Cleveland, Ohio, has opened a western branch at 552 West Washington boulevard, Chicago, where a complete stock of all styles of twist drills, reamers, milling cutters, taps, drill chucks, taper pins, etc., made by the company will be carried for immediate delivery of order.

The Hayes Track Appliance Company, Richmond, Ind., recently received an order for 100 model AP derails from the Havana Central, for shipment to the United Railways of Havana, at Havana, Cuba. The company was able to make this shipment on the same day the order was received. Shipments of derails have also been made recently to Karachi, India.

Lewis B. Rhodes, formerly superintendent of motive power of the Virginian Railway, has been made southern manager, a newly created position, of the Ward Equipment Company, New York. Mr. Rhodes was born in 1864 at Macon, Ga. He received his education in the high schools at Macon and began railway work in the latter part of 1880 on the Central of Georgia. He was later a machinist and was then made a foreman on the same road. In 1889 he left that company to go to the Georgia, Southern & Florida, since which time he has been consecutively, until 1900, locomotive engineer, shop foreman, general foreman and foreman of locomotive repairs. He was appointed master mechanic of this road in 1900, and in April, 1910, he was made superintendent of motive power of the Virginian Railway. He resigned this position in December, 1910, and has only just recovered from a six month's illness.

Lewis B. Rhodes.

The General Electric Company, Schenectady, has received an order from the Philadelphia Rapid Transit for 30 two-motor car equipments for use on its elevated division, and 50 two-motor equipments for use on its surface division. The equipments for the elevated division consist of two 125 h. p. motors with Sprague-General Electric type M control, while those for the surface lines consist of two 60 h. p. motors with K-30 control.

Negotiations have been about completed for the sale of $9,7 ,3,000 Illinois Steel Company debenture bonds of 1940, held in the treasury of the United States Steel Corporation. The financing will be done by J. P. Morgan & Co., New York. The proceeds of the issue will be used for capitalizing new construction completed and the redemption of $6,900,000 Illinois Steel Company 4 per cent non-convertible debentures which fall due on April 1 1913.

J. V. & W. Baird & Company, Boston, Mass., have transferred their interests in the manufacture and sale of Rex Flintkote roofing and other waterproofing and insulating specialties, to the Flintkote Manufacturing Company, Boston, Mass. This will also permit them to give their undivided attention to the other branches of their business. The Flintkote Manufacturing Com-

pany, a corporation whose directors and stockholders have been identified for years with J. A. & W. Baird & Company, will on July 15, 1911, take over the roofing, waterproofing and insulating business in its entirety and continue it on the same general lines as heretofore.

F. A. Casey, vice-president of the Ashton Valve Company, Boston, Mass., died at Billerica, Mass., on July 15, from cancer of the liver. Mr. Casey was born in Bedford, Mass., August 17, 1846. He had 15 years' experience as a locomotive engineman on the Fitchburg, now part of the Boston & Maine; on the Lake Shore & Michigan Southern, and on the Old Colony, now part of the New York, New Haven & Hartford. He entered the service of the Ashton Valve Company over 30 years ago, and later went to the New York Air Brake Company for a few years, returning to the Ashton Valve Company to become vice-president and manager of the railway department. He held this position 16 years. His illness began from an injury received in a railway accident on the Boston & Albany two years ago, but he remained actively engaged in business up to the last few months. Mr. Casey attended the American Railway Master Mechanics' Association conventions for 33 consecutive years, and was chairman of the Railway Supplymens' Association, 1901-1902.

F. A. Casey.

TRADE PUBLICATIONS.

SOOT REMOVER.—G. L. Simonds & Co., Chicago, have published a 32-page catalog describing the Vulcan soot cleaner. The application of this device to different types of boilers is illustrated and explained, also the principle on which it works. It is claimed that with this device stationary boilers may be cleaned more quickly and thoroughly than is possible by hand cleaning. The fireman simply turns on the steam and operates the steam jets from the outside of the boiler away from the flying soot and dirt.

LOCOMOTIVES.—The American Locomotive Company, New York, has issued bulletin 1009 describing the 230-ton articulated compound locomotives recently built for pusher service on the Baltimore & Ohio. These engines are 40 per cent. heavier and more powerful than the pioneer articulated compound which was built for the same road seven years ago. With a consolidation, this engine will handle a train of 2,200 tons at 18 m. p. h. on a 1 per cent. grade. This locomotive does the work of two consolidations and, it is claimed, saves 38 per cent. in the cost of maintenance. The general dimensions of the locomotive and the erection drawings are also included in the bulletin.

MECHANICAL COAL PASSER.—The Ryan-Johnson Co., Chicago, has published a comprehensive booklet on its mechanical coal passer for locomotive tenders. The bearing this device has on economy in fuel and saving of labor is discussed in an interesting manner, and it is clearly shown what the coal passer does for both the engine and the fireman. The construction and operation of the device is explained by diagrams in which the different parts are lettered so that a clearer description may be given. This coal passer is in operation on the Atchison, Topeka & Santa Fe, the Great Northern, the Chicago, Burlington & Quincy, the Chicago & North Western and the Baltimore & Ohio. It may be applied to old as well as new tenders, and to the U-shaped tank as well as the water-bottom tank. The catalog contains 24 pages, of which 11 pages are devoted to clear-cut illustrations.

Railway Construction.

New Incorporations, Surveys, Etc.

ALBERTA CENTRAL.—An officer is quoted as saying that this company is carrying out the grading work on a section with its own men. About 40 miles of line has been built, and contracts let for work on between 60 and 70 miles. It is expected that about 100 miles will be under construction this coming fall. The company was organized to build from Red Deer, Alb., westerly to the Grand Trunk Pacific in the Yellow Head Pass. Application was made to the parliament of Canada to build from Saskatoon, Sask., northeast to Hudson Bay, with terminals at both Fort Churchill and Port Nelson. J. C. Moore is vice-president, Red Deer.

ATCHISON, TOPEKA & SANTA FE.—The Pecos & Northern Texas has been opened for business from Slaton, Tex., southeast via Sweetwater to Coleman, 190 miles.

BALTIMORE & OHIO.—The Consolidation Coal Company in the development of its 100,000 acre tract of big vein coal in Pike and Letcher counties, Kentucky, has undertaken the construction of about 30 miles of railway from Shelby Junction, on the Chesapeake & Ohio. For this purpose the Big Sandy & Elkhorn Railway was incorporated. This latter company is to be acquired by the Baltimore & Ohio, on the basis of cost of construction with interest. The Consolidation Coal Company is developing mines with a minimum output capacity of 3,000,000 tons per annum. It is expected that the coal from this section will pass over the Chesapeake & Ohio branch to the Cincinnati gateway until such time as a new crossing of the Ohio river may be effected, as has been under consideration, at some point between Huntington and Ironton. It is understood that the object of the Baltimore & Ohio in acquiring an interest in the new railway was with a view of assuring the routing of the large tonnage via the Cincinnati, Hamilton & Dayton.

BIG SANDY & ELKHORN.—See Baltimore & Ohio.

CALIFORNIA ROADS (Electric).—The city council of Los Angeles, Cal., is securing right-of-way for a municipal railway, to be built from Los Angeles south to the harbor of San Pedro, 23 miles.

CANADIAN NORTHERN.—Vice-president Sir Donald D. Mann announces that contracts for the Canadian Northern Ontario extension from Sellwood Junction, Ont., west to Port Arthur, 550 miles, have been let. Press reports say that the contracts have been let to Foley Brothers, St. Paul, Minn., and to the Northern Construction Company, Winnipeg, Man. (June 9, p. 1333.)

The section of the Toronto-Ottawa line from Toronto to Trenton, about 100 miles, will be open for inspection by the government by August. It is expected that this line will be open for train service east as far as Kingston this coming fall, and will be completed to Ottawa in about one year.

Plans are being made to secure an entrance into Montreal, Que., by a tunnel through the mountains in the north, but no action will be taken until a report of the experts now working on this scheme has been made.

CANADIAN PACIFIC.—The Windsor Mills, Eastman & Mansonville branch of the eastern division has been extended from Mansonville, Que., to North Troy, five miles.

According to press reports, a contract has been given to Palmer Brothers & Hemmins, Vancouver, B. C., to build the branch from Duncan, on the Esquimalt & Nanaimo, to Cowichan lake, 25 miles. Work is to be started in a few weeks. (July 7, p. 64.)

CATSKILL TRACTION CO.—An officer writes that application has been made to the New York Public Service Commission, Second district, for a franchise and to issue bonds. The company plans to build from Leeds, N. Y., northwest to Cairo, 6.75 miles, and has surveys made. Herman C. Cowen, president, Catskill.

CENTRAL CANADIAN RAILWAY & POWER COMPANY.—Plans have been filed by this company to build from Winnipeg, Man., to the beaches and harbors of the east and southeast shore of Lake Winnipeg. The plans include a line from East Selkirk, northeasterly to Thalburg, thence to Fort George on Winnipeg river, a few miles south of Fort Alexander. From Thalburg another

line is to be run north to Balsam Bay, thence following the lake shore to Victoria beach. It is understood that the Canadian Pacific is back of the project.

Chicago, Indianapolis & Louisville.—An officer is quoted as saying that this company will extend the line from Switz City, Ind., to Linton, six miles. The work is to be started in a short time. The trackage arrangements with the Illinois Central between these places expired June 1.

Chicago, Memphis & Gulf.—This road has been extended from Phillipy, Tenn., north to Hickman, Ky., 11 miles.

Cleveland, Cincinnati, Chicago & St. Louis.—The Evansville, Mt. Carmel & Northern has been opened for business from Evansville, Ind., north to Mt. Carmel, Ill., 34.8 miles, and is being operated as a part of the Cairo division.

Copper River & Northwestern.—An officer writes that the main line from Cordova, Alaska, northeast to Kennecott, 196 miles, was put in operation on March 29. Surveys were recently made up McCarthy creek, extending 12 miles from the proposed junction at Mile 191, and preliminary surveys are now being made from this junction point up the White river country, covering about 60 miles of line. Both these proposed extensions will pass through mineral lands, but it is undecided when actual construction work will be started. (June 2, p. 1296.)

De Queen & Eastern.—An officer is quoted as saying that the company is planning to build an extension from the present eastern terminus at Dierks, Ark., northeast to Hot Springs, about 70 miles.

El Paso & Southwestern.—Bids are wanted up to July 25 by J. L. Campbell, engineer maintenance of way, El Paso, Tex., for grading and masonry work on 66 miles of railway to be built in Arizona. The grading work calls for the handling of 2,600,000 cu. yds.; foundation excavation, 30,000 cu. yds., and the masonry work constructing 36,000 cu. yds. of concrete. (July 14, p. 104.)

Esquimalt & Nanaimo.—See Canadian Pacific.

Evansville, Mt. Carmel & Northern.—See Cleveland, Cincinnati, Chicago & St. Louis.

Fort Worth Southern Traction Company.—Organized in Texas with $1,500,000 capital, to build an electric line from Fort Worth, Tex., south to Cleburne, 32 miles. Surveys have been made and the right-of-way has been secured. The incorporators include: C. H. Clifford, W. A. Hanger and W. C. Forbes, Fort Worth.

Georgia, Florida & Alabama.—This company, operating a line from Carrabelle, Fla., north via Tallahassee to Richland, Ga., 182 miles, is planning to complete a direct line from Pensacola through timber and agricultural districts to the coal and mineral territory of northern Alabama, by securing existing lines and building extensions.

Georgia & Florida.—This company has opened for business a new branch from Sparks, Ga., south to Adel, 2.4 miles.

Gilmore & Pittsburgh.—This road is now open for passenger service between Armstead, Mont., Leadore and Salmon, Idaho, 100.3 miles, with a branch from Gilmore, Idaho, to Leadore, 18.5 miles.

Grand Trunk Pacific.—The Lake Superior division has been extended from Gedeon, Ont., to 252.4 miles west to Winnipeg, Man., where connection is made with the main line west. New [illegible] has been opened for business from Melville, Sask., north to Canora, 34.7 miles, and from Lacadena, Alb., south to Mirror, 70.9 miles.

Great Northern.—An officer writes that the contract recently let to Guthrie & Co., St. Paul, Minn., is for laying track and [illegible] on the 12-mile section between Princeton, B. C., and Coalmont, along the Tulameen river. (July 14, p. 105.)

Hocking Valley.—An officer writes that land has been bought [illegible] through Grigsby and Scott, Columbus, Ohio. The land for the new yard is on the south side of the present [illegible] between Pigeon creek and Lockbourne road, and outside [illegible] right-of-way contains about 130 acres. This has been [illegible] and is being used for yard purposes and is approximately 7,800 ft. long with a maximum width of about 920 ft. The contract for the grading has already been let. The necessary filling material, about 250,000 cu. yds., will be taken from a mound about 30 ft. in height, located about one-quarter mile from the proposed yard on the opposite side of the main track. For northbound trains there will be ten arriving tracks, each of 65 cars capacity and 3,500 ft. long, on the north end of the yard, and a similar arrangement of tracks for southbound trains is proposed to be located at the south end of the yard.

Iberia, St. Mary & Eastern.—According to press reports, work is to be started soon on the line from New Iberia, La., southeast to Berwick City, opposite Morgan City, about 50 miles. F. M. Welch, president, New Iberia.

International & Great Northern.—This company is planning to spend $1,000,000 for improvements, it is said, as soon as the reorganization has been adjusted. The line from San Antonio, Tex., south to Laredo, 150 miles, is to be relayed with 75-lb. rail, and new rails are also to be put in at other places, aggregating about 100 miles. Improvements are to be made at station points, and betterments of the roadbed over the entire system, including new ballasting, are planned.

Mexico North Western.—An officer writes that construction work is now under way from Terrazas station, about six miles south of Neuva Casas Grandes, Chihuahua, Mex., south to Madeira, 116 miles. About 100 miles is graded and 95 miles of track has been laid. The remaining 16 miles is expected to be finished during 1911. This work will complete a connecting link between the section extending south from El Paso, Tex., to Terrazas and the section northwest from Tabalopa, near Chihuahua, to Madeira. Work is under way on a branch from a point on the main line, a short distance north of where the continental divide is crossed, southwest to Chuicpupa, 45 miles. Grading has been finished on five miles and 20 miles additional is under contract. A branch about 15 miles long is being built from San Antonio, which is on the line between Chicuahua and Madeira, south to Cusihuiriachic. The grading and bridging is completed on this branch and the track will be ready soon. Some of these extensions in Northern Mexico traverse a rough section of the Sierra Madre, the work is expensive, and includes the excavation of 11 tunnels, the two longest being 2,219 ft. and 3,838 ft. respectively. (June 9, p. 1334.)

Mexican Roads.—The Chamber of Commerce of Mazatlan, Mex., has petitioned the national government to build a line between that port and Durango. It is the intention to have the new line form part of the National Railways of Mexico. Surveys for such a line were made some time ago.

Missouri, Arkansas & Gulf.—A contract has been given to P. A. Herrington, Houston, Mo., it is said, for completing the grading on a 35-mile section between Rolla, Mo., and Licking. The line is eventually to be extended south to Bakersfield, in all 125 miles. Gilbert Lay, president, St. Clair. (May 5, p. 1085.)

Nacogdoches & Southeastern.—This road has been extended from Dockville, Tex., south to Dunham, seven miles. (April 28, p. 1016.)

National Railways of Mexico.—This company has finished converting the branch line that runs from Acambaro, Mex., to Eruapan, 152 miles, from narrow to standard gage.

Plans are said to be under consideration for a large amount of construction work to be carried out during the next two years. The first improvement on which work will be started is a line between Tampico, Mex., north to Matamoras, about 300 miles; also on a link in the Mexico City-Matamoras short line.

It is understood that the line now being built by Richard Honey and associates, of Mexico City, between Pahuca and Zimapan is to be extended to Tampico and then taken over by the National Railways of Mexico and operated as part of the government system.

Tentative plans are under consideration for extending the Mexican Southern from the present terminus, a short distance south of Oaxaca, to some port on the Pacific coast; also to carry out important improvements on the Interoceanic.

New Orleans, Mobile & Chicago.—An officer writes regarding the propsed extension to be built from the present northern terminus at Middleton, Tenn., north to Jackson, about 40 miles, that the company has not yet completed the surveys for this line. (April 14, p. 925.)

Northwestern Pacific.—An officer writes that work is now under way closing the gap between Willits, Cal., and Shively, 105 miles. It is expected to have the work finished in about two years. The company has taken over the operation of the Hammond road, which extends from Eureka, north about 20 miles, but nothing has been done regarding building an extension along the coast further north.

Nova Scotia Roads (Electric).—Surveys are being made, it is said, for an electric line from Lunenburg, N. S., to Riverport, 12 miles, with a spur to Park Creek. T. G. Nichol, Mahone Bay, is the promoter.

Oakland & Antioch (Electric).—An officer writes that contracts are being let to build an extension of 20 miles, to complete a line from Antioch, Cal., southwest via Black Diamond, Baypoint, Concord, Lafayette and Walnut Creek to Antioch, about 35 miles. The line is now in operation for 23 miles. S. L. Napthaly, president; W. Arnstein, vice-president. (March 10, p. 479.)

Ohio & Kentucky.—This road has been extended from Cannal City, Ky., to Malone, seven miles.

Oregon-Washington Railroad & Navigation Co.—The Madras line of the Oregon division has been opened for business from Deschutes Junction, Ore., south to Madras, 101 miles.

Pecos & Northern Texas.—See Atchison, Topeka & Santa Fe.

Pioche-Pacific.—Incorporated in Nevada with $250,000 capital, and office at Pioche, Nev. The plans call for building from Pioche to Royal City, in Lincoln county, 12 miles. Frank M. Foote, president; E. A. Culbertson, vice-president; F. R. Wooley, secretary and treasurer, all of Salt Lake City, Utah.

Rapid Transit Interurban.—An officer writes that this company was chartered in November, 1907, to build from Muskogee, Okla., southwest via Tecumseh to Chickasha, about 160 miles, with a branch from Tecumseh northwest to Guthrie, about 60 miles, and another branch from Tecumseh south to Sulphur, 58 miles. Surveys have been made for the branch from Tecumseh south via St. Louis, Asher, Stratford, Hart, Dolberg and Palmer to Sulphur. J. W. Saxon, president, Tecumseh, and W. T. Forsythe, engineer, Philadelphia, Pa.

Rowlesburg & Southern.—An officer writes that work is now under way on a line from Rowlesburg, W. Va., south to Parsons, about 20 miles. The work on the first seven miles is quite heavy. G. G. Satzinger, president, New Castle, Pa., and Monroe & Downs are the engineers.

St. Louis Southwestern.—This company expects to finish work on the extension from Hamilton, Tex., to Comanche by July 15. While no definite plans have been made, it is understood that the question of building a further extension beyond Comanche is under consideration, on which work may be started this fall. (April 14, p. 912.)

Santa Maria Valley.—Incorporated in California with $300,000 capital to build from Betteravia, Cal., to the Santa Maria oil district, 15 miles. Hugh McKinney and P. H. McPherrin are incorporators.

Southern Traction Co.—Announcement has been made that the line will be built from Dallas, Tex., to Waco, with a branch from Ferris to Ennis and Corsicana. Right-of-way has been secured on about 15 miles. J. F. Strickland, president, Dallas. (April 7, p. 878.)

Southern Pacific.—A contract is said to have been let for building a section of 100 miles from Natron, Ore., southeast to Klamath Falls.

Sunset Railroad.—This road has been extended from Fellow, Cal., to Shale, two miles.

Washington, Idaho & Montana.—This road has been extended from the western terminus at Palouse, Wash., to Lairds, one mile, and from Bovil, Idaho, north to Purdue, two miles.

Yankton & Norfolk.—The line, for which surveys were made about 25 years ago, from Norfolk, Neb., to Yankton, S. D., may now be built, the rights and property having been bought, it is said, by C. S. Cleaver, Chicago.

Yazoo & Mississippi Valley.—An officer writes regarding the reports that a connecting line is to be built from Natchez, Miss., south to Woodville, about 40 miles, that no appropriation has been made for this work, but that the company is now making a preliminary survey over the route.

RAILWAY STRUCTURES.

Altoona, Pa.—The Pennsylvania Railroad is constructing a semi-circular subway for the use of pedestrians under the Hollidaysburg branch tracks at Union avenue, Altoona, between Twenty-second and Twenty-third streets. The subway will be 55 ft. long, 8 ft. wide and 9 ft. high at the crown of the arch, and is being built of concrete.

Bozeman, Mont.—The Gallatin Valley will build a new station, it is said, at Bozeman.

Calwa, Cal.—The Atchison, Topeka & Santa Fe has let contracts for grading a new yard to relieve the congestion in the Fresno terminals. A 15-stall roundhouse and the necessary water and oil facilities will be provided.

Duluth, Minn.—The Canadian Northern will build a steel and concrete 10-stall roundhouse with a 70-ft. turntable, a blacksmith and machine shop 100 ft. x 60 ft. and a storage and office building 110 ft. x 30 ft.

El Paso, Tex.—The Atchison, Topeka & Santa Fe has begun work on a viaduct over its tracks on Smelter Road. The estimated cost is $76,000.

Everett, Wash.—The Northern Pacific has given a contract to the H. Chase Co., Everett, for the erection of shop buildings at Everett.

Orchard Park, N. J.—The New York Public Service Commission, Second district, has authorized the Buffalo, Rochester & Pittsburgh to abandon its present station in the village of Orchard Park, town of East Hamburg, Erie county, on condition that a new station be built near the crossing of its line over Buffalo street, in Orchard Park.

Paris, Tex.—The St. Louis & San Francisco, it is reported, will build a freight depot which will also provide for the local offices. The building will be of brick construction, one or two stories high.

Puyallup, Wash.—The Puget Sound Electric will build a new station, it is said, at Puyallup.

Savannah, Ga.—An officer writes that the company is carrying out improvements, to include considerable track work, at Hutchinson Island. There is to be an extension to the warehouse on the east side of slip No. 3, 490 ft. long, to cost about $50,000; extension to covered shed on west side of slip, 400 ft. long, to cost about $25,000, and the dredging work in the slip to secure a minimum depth of 24 ft. will cost about $50,000. The bulkhead work being carried out on some 1,400 lin. ft., will cost about $7,000. Press reports say that contracts have been let to the Atlantic Gulf & Pacific Co. for the dredging work, and for the extensions to buildings and wharves, to Budwell and Hillyer, Jacksonville, Fla.

South Chicago, Ill.—The Pennsylvania has completed plans for building two vertical lift bridges over the Calumet river at South Chicago, to have a double track, 210 ft. skew truss spans with a clear waterway of 140 ft. and a vertical lift of 120 ft. above water level. The substructures will be concrete caissons to bed rock.

The Lake Shore & Michigan Southern is having plans prepared by Waddell & Harrington of Kansas City, Mo., for a vertical lift bridge over the Calumet river at South Chicago. The bridge will be a four track skew truss span, 210 ft. long and will have a clear waterway of 140 ft. and a vertical lift of 120 ft. above water level. The substructure will be cement caissons resting on rock.

Seattle, Wash.—The Oregon-Washington Railroad & Navigation Company is having plans made for a new coaling station to be built at Seattle. The estimated cost of the improvements is $16,500.

Winnipeg, Man.—Announcement is made that the Canadian Pacific will build a large addition to the Royal Alexandra Hotel at Winnipeg.

Railway Financial News.

Boston & Maine.—At auction 2,273 shares of Boston & Maine common stock, the balance remaining unsubscribed for of authorized issue last December of 106,637 shares, were sold in one lot at 105¼ to Kidder, Peabody & Co., Boston, Mass.

Brockville, Westport & Northwestern.—It is said that this property is to be placed in the hands of a receiver, no interest having been paid on the bonds for four years. The Knickerbocker Trust Co., New York, trustee for the bonds, had made an application for immediate sale of the road. This road runs from Brockville, Ont., to Westport, 45 miles.

Canadian Northern Alberta.—The London Stock Exchange has listed £647,200 ($3,236,300) 3½ per cent. first mortgage debenture stock, guaranteed by the Dominion of Canada.

Central Arkansas & Eastern.—The Guaranty Trust Co. and Rhodes & Co., both of New York, are offering a block of first mortgage 5 per cent. bonds of July 1, 1910-1940, of the Central Arkansas & Eastern, guaranteed principal and interest by the St. Louis Southwestern. The total authorized issue is $3,000,000, of which $730,000 are outstanding. The bonds are secured by a first mortgage on the road from Stuttgart, Ark., to England, and on the road from Rice Junction, Ark., north to Hazen, a total of 45 miles.

Chicago & Eastern Illinois.—In order to perfect the consolidation of the Evansville & Terre Haute and the Chicago & Eastern Illinois, the Evansville & Terre Haute has filed a mortgage for $1,284,000 on all its property. The money is to be used to redeem the 25,666 shares of the capital stock of the company.

Dawson, Grand Forks & Stewart River.—At a meeting of the holders of the prior lien debentures and the consolidated 6 per cent. debenture stock, it was decided to postpone the repayment of the principal of the prior lien debentures from July 1, 1911, to July 1, 1914, and that interest on both the stocks be suspended to 1914.

Denver, Northwestern & Pacific.—A letter from Colonel D. C. Dodge, chairman of the committee of the board of directors of the Denver Railway Securities Co., says in part:

"The company [Denver Railway Securities Co.] has been organized in Colorado with an authorized capital stock of $10,000,000 for the purpose of purchasing all of the stock, bonds, notes and other obligations of the Colorado-Utah Construction Co. and of the Denver, Northwestern & Pacific owned by the estate of D. H. Moffat, and issue its entire capital stock of $10,000,000 in payment of said purchase. Among the principal and most valuable assets to be purchased is $8,232,000 (half common and half preferred) stock of the Denver, Northwestern & Pacific, and $8,000,000 4 per cent. first mortgage bonds of the railway company subject to a lien of $4,000,000 6 per cent. collateral trust notes. There is offered for sale at $750,000, $5,000,000 of stock of the Securities company. Out of this sum it is proposed to pay $500,000 of the principal of the $4,000,000 collateral trust notes under an agreement that the balance, $3,500,000, shall be extended."

Great Northern.—A press despatch from Winnipeg says that the Great Northern has made arrangements to have trackage rights over the "Regina Boundary Line" of the Grand Trunk Pacific, which is now under construction.

Gulf, Florida & Alabama.—This company, which has been formed with an authorized capital stock of $7,500,000 and a funded debt of $10,000,000, has been organized to take over certain existing roads and to build certain extensions. See this company under Railway Construction.

Megargel & Co., New York, are offering $1,000,000 first mortgage 5 per cent. bonds, at 1911 1961, at 85, with a bonus of 40 per cent. in common stock and 20 per cent. in preferred.

Indiana Harbor Belt.—The Lake Shore & Michigan Southern and the Michigan Central, which together own all of the $2,450,000 stock of the Indiana Harbor Belt, have sold 40 per cent. to the Chicago, Milwaukee & St. Paul and the Chicago & North Western.

Kansas City, Mexico & Orient.—Edwin Hawley and Theodore P. Shonts have been elected additional directors.

Kansas City Southern.—The Oklahoma City *Oklahomian* says that reports coming from authentic sources state that negotiations are being carried on for the taking over by the Kansas City Southern of the Fort Smith & Western.

Maxton, Alma & Southbound.—This company, which was previously announced as having taken over the Alma Railroad, is now in operation and has filed a freight tariff between Alma, N. C., and Midway, seven miles.

Norfolk & Western.—Up to June 30 there had been $8,284,000 convertible 4 per cent. bonds of the Norfolk & Western exchanged for stock. The total issue of these bonds is $25,569,000.

St. Louis Southwestern.—Rhoades & Co. and the Guaranty Trust Co., both of New York, are offering at 98 $730,000 Central Arkansas & Eastern first mortgage 5 per cent. bonds, of July 1, 1910. The bonds are guaranteed, principal and interest, by the St. Louis Southwestern. See March 10, 1911, page 481.

Sierra & Mohawk.—This company has taken over the Sierra Valleys Railway, which was sold under foreclosure on June 30, 1909, by the Nevada-California-Oregon Railway. The Sierra Valleys Railway runs from Plumas Junction, Cal., to Clio, 71 miles.

Sierra Valleys Railway.—See Sierra & Mohawk.

Valdosta, Moultrie & Western.—The Georgia Railroad Commission has authorized the company to issue $630,000 first mortgage bonds, the proceeds to be used in part to retire $300,000 first mortgage 5 per cent. bonds due 1939 but subject to earlier retirement. The road runs from Valdosta, Ga., to Moultrie, 42 miles.

Wichita Falls & Northwestern.—This company has filed with the secretary of state of Oklahoma a certificate of increase of stock from $1,000,000 to $2,000,000.

FOREIGN RAILWAY NOTES.

According to dispatches received from San Jose, an American capitalist has applied to the government of Costa Rica for authority to construct an electric railway which, starting from Puerto del Coco, on the bay of the same name, shall continue as far as Liberia, and thence south to La Barranca.

Paul Gonzenbach, of Manta, Ecuador, has the contract for building a short railway from that port to Santa Ana, work on which has already been commenced. Proposals are also being received for constructing the railway from Ambato, Ecuador, to the Arajuano river, but it is not probable that anything will be done now, owing to lack of funds.

While it was thought that the recent plague and the consequent scarcity of coolies would seriously hinder the progress of the reconstruction work on the Antung-Mukden Railway, Manchuria, the authorities have stated that such has not been the case, as the plague abated in time to allow the spring work to commence in the usual manner. Everything, in fact, has gone with remarkable smoothness, and it is expected that the entire work will be finished by November 3, the anniversary of the Japanese Emperor's birthday. It will be remembered that on that date last year the Antung-Chikuanshan section of the road was completed and that a large celebration was held in honor of the occasion. The Chikuanshan tunnel, the last to be finished, was completed a short time ago. It is 3,828 ft. long, and the miners who began at opposite ends met exactly at the center. It is stated that the calculations were not more than an inch or two out and that the same was true of the other long tunnels on the line. There are 24 tunnels in all, the combined length of which is 26,542 ft. The tunnels are to be brick-lined throughout. This work, however, will not, it is thought, be finished until August. The drills used were of American make and as a rule worked by compressed air. The miners for the most part were Koreans; they possess a remarkable aptitude for this class of work.

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GENERAL NEWS SECTION 185

As a measure of stability in railway values, in spite of adverse political and other influences, the market prices of 20 active railway common stocks are suggestive. Taking the middle of the present month and the approximate closing average price, 123, as the measure and standard, one finds a rise of 10 points as compared with a year ago. The highest price of the last 4½ years—December, 1906—shows an average price only 15 points higher; and the lowest price—81—of the post-panic period that began in October of 1907, is 42 points lower. The standard price of 123 compares with 126, the highest price of 1910, with 134, the highest price of 1909, with 121, the highest price of 1908, and with 91, the highest price in 1907, after the October panic of that year. Allowances must, of course, be made in any inferences based on average prices. A sudden rise, like that of Canadian Pacific during the present year tends to disturb the average just as at an earlier period there were such rises as took place in Union Pacific and Reading. But there have been partly offsetting depressions, such as those in New Haven, Pennsylvania and New York Central, and during the period under consideration two forces—rise of wages and railway baiting—have been almost continuously acute as "bear" influences. Were the quoted prices merely speculative they would not be worth citing. But through the speculative ups and downs there persists the investment demand and price as a kind of ballast outstaying the chills and fever of stock gambling. In the stability of railway prices it shows that confidence in the ultimate value of the railway which has survived remarkably through a long period of cloudy railway weather.

After compelling an extra session of Congress, the Canadian reciprocity agreement has finally passed the Senate as it might and should have done five months or more ago. Interest in it now shifts to Ottawa and to the question whether the Conservative opposition will be able to force a general election and referendum. While railway interests in this country have generally been quiet on the subject of reciprocity during the protracted hearings, they have, so far as heard from, been in favor of the agreement. The railways have rested on that major premise which has been accepted by the country as a whole—namely, that the positive benefits of the many overcast the very hypothetical injuries to the few, and that transportation thrives with general commerce and diminishes with commercial obstruction. The specific changes of tariff duties when re-studied in the agreement do not modify appreciably the theory that it is in the railway interest. Farm stuffs, vegetables, rough lumber and fish become free; while our mechanical products going to Canada are lowered in tariff rates. Access to Canadian forests reduces the swift consumption of our own; and the 10 per cent. reduction to the free list of railway ties and the free listing of creosoted timber suggests an important direction of railway economy. In the railways' position as consumers, the prospective readjustment of lumber prices is probably the most vital feature of the agreement.

How both absolutely and relatively railway taxes are running up is shown strikingly by the figures of Poor's Manual of Railroads for 1911, covering the comparative returns for 1909 and 1910. Assets of the railways of the United States increased for 1910 by a little more than 7 per cent.; gross earnings 11.59 per cent.; and net earnings 7.85 per cent. In vivid contrast, taxes increased from $90,790,949 to $107,862,419, or nearly 19 per cent. Taxes increased nearly 3 times as fast as assets and somewhat less than 2½ times as fast as net earnings. But in reckoning such taxes only those paid by the railway corporations directly are counted in. Not computed and not to be computed in any approximate figures are those paid by the bond holder and stock owner as an individual or trustee. The double taxation thus levied is notorious, the bond holder, for example, in one state often being taxed on securities on which the corporation has paid the full tax in another commonwealth; and to this breach of the taxation equities has been added, of late years, the large transfer inheritance taxes still increasing in many states, though just modified in New York. These inheritance taxes, as Governor Dix of New York recently said, may in some cases mean triple taxation and, in the case of some collateral legacies, run up to almost confiscation ratios. What is the real railway securities tax, corporate and private, and what the rate of increase, would be startling could they be joined and computed. That the individual can and often does dodge the legacy tax by *ante mortem* distribution is hardly consolatory to the railway corporation which lives on and must

THE high character of Governor Baldwin, of Connecticut, who has been chief justice of the supreme court of that state, and who has a national reputation as a legal authority, has given a special interest to his three appointments to the new Connecticut public utilities commission with its greatly enlarged powers, inclusive of steam roads and street railways. He has appointed the three members of the railway commission whose names he had sent to the state senate earlier in the legislative session and it must be confessed that as appointments they are not profoundly satisfactory. One is a municipal civil engineer not very well known; the second, a successful peach grower, active in the past in the state grange; and the third, a county coroner, a lawyer, quite respectable, but not ranking among the best lawyers of his locality. All three may be described as without technical training for their places, and there is a mild savor of politics in their appointment. On the other hand, it is to be said that the governor had offered one of the original appointments to a leading civil engineer of the state who had refused the place; that the new commission shines by contrast with the partisan politicians who brought the old commission into disrepute; that there were, apparently, no candidates of high technical training for the places; and that the responsibilities of the commission under the new statute are such as to demonstrate very soon incapacity or the reverse, and in the former case the law itself with its unique "recall" feature supplies a remedy. The appointments show the difficulties under which the best appointing power may labor in lifting the personnel of a state commission.

THE PACIFIC COAST CASE DECISION.

THE decisions of the Interstate Commerce Commission in the Pacific coast rate cases, which were made public this week, and which we abstract elsewhere, are based on entirely different principles from its previous decisions in these cases. In its first decision in the Spokane case under the Hepburn Act the commission held that the earnings of the railways serving that city were excessive, and their rates unreasonable, and prescribed class rates to Spokane, which it believed would be reasonable in themselves. These rates, from the middle West at least, were those then in effect to the coast; but the commission said that it did not prescribe them to Spokane because it meant to hold that the rates to Spokane should not be higher than those to the coast, but because it believed that the existing rates to the coast would be reasonable rates per se to Spokane. Its subsequent decisions in the Spokane case and in the other Pacific coast cases, were likewise based upon the ground, that in view of the earnings of the roads their rates from the east to western intermountain points were unreasonable.

The decisions rendered this week turn, not on the excessiveness of the rates involved, but on the question of unfair discrimination. As Commissioner Prouty says in the opinion in the Spokane case, "it should be ever borne in mind that the acute complaint in this case is the discrimination and not the unreasonable rate." The commission decides that the present adjustment of rates in the West is unjustly discriminatory against the interior points as compared with points on the Pacific coast, and therefore in violation of the Interstate Commerce act as amended by the Mann-Elkins act.

The Mann-Elkins act made two changes in the fourth, or long and short haul section. The original Interstate Commerce act made it "unlawful for any common carrier to charge or receive any greater compensation in the aggregate for the transportation of passengers or of like kind of property *under substantially similar circumstances and conditions* for a shorter than for a longer distance over the same line." The Mann-Elkins act struck out the words "under substantially similar circumstances and conditions." It also provided that when the commission authorized a railway to charge a lower rate for longer than for shorter haul the commission must from time to time prescribe the extent to which such designated common carrier may be relieved from the operation of this section." A number of theories have been advanced as to the meaning of Section 4, as amended. The counsel for the city of Spokane argued that by striking out the words "substantially similar circumstances and conditions," Congress had failed to lay down any rule for the guidance of the commission in permitting or forbidding disregard of the long and short haul principle; that this had rendered the provisions giving the commission discretionary authority to suspend the clause unconstitutional, because Congress cannot delegate legislative authority without laying down the rule according to which it shall be exercised; and that, these provisions of the section being thus stricken out, left it a hard and fast long and short haul clause. The theory advanced by some railway counsel has been that the only real change made in the law is, that whereas, formerly, the roads, when they believed a departure from the long and short haul principle justifiable, could, put into effect rates which were higher for longer than for shorter hauls, under the law as amended they must first get the permission of the commission. On this theory the commission must permit any departure from the long and short haul principle which would have been legal under the original act.

The commission's interpretation of the law is substantially that contended for in an article in the *Railway Age Gazette*, November 25, 1910. Commissioner Prouty says in his opinion in the Spokane opinion that if the fourth section were read by itself and taken at its literal face meaning the commission would possess unrestricted power to grant or deny any application for permission to charge more for the short than for the long haul. "So construed," he adds, "the proviso would probably be void as a delegation of legislative authority." Therefore, the commission concludes that it must seek for the rule to guide it in administering the section in other parts of the act. It finds the rule in those provisions which require rates to be reasonable and not unfairly discriminatory. As Commissioner Prouty says: "It must investigate each case, and if, after such investigation, it is of the opinion that a departure from the rule of the fourth section would not result in unreasonable rates or undue discrimination, it must permit that departure. If, upon the other hand, it is of the contrary opinion, it must refuse the permission."

But it may do something more than either refuse or grant the permission. The act as amended also authorizes it to prescribe the extent to which a common carrier may be relieved from the operation of the fourth section; in other words, to fix the *relation* which must exist between the rates for the longer and the shorter hauls. Some railway lawyers have contended that the provision conferring on the commission this authority is unconstitutional. They say that a railway has a right to charge a reasonable rate for each service that it renders; that this includes the right to fix rates which will enable it to meet water competition so long as these rates are not less than cost of the service; that it also includes the right to fix rates that are reasonable in themselves, to points where water competition is not met, and that Congress has no authority, and much less it gives the commission power, to require that the rate made where water competition is not encountered shall be fixed with reference to the rate where water competition is encountered. Naturally, the commission assumes that the provision giving it the authority to determine the extent to which the long and short haul principle shall be departed from is constitutional. It is not a court. It is an administrative body exercising certain powers delegated to it by Congress, and as the agent of Congress it is its business to carry out the will of Congress, not to say that what Congress has done is unwise or unconstitutional.

Applying the theories of law, justice, and economics, the commission in its decision rendered this week does not prescribe any schedules of rates, but prescribes the *relations* which it believes should be established between the rates from the territory

east of St. Paul and the Missouri river to the Pacific coast and to intermediate points. It recognizes the controlling force of water competition between the Atlantic and Pacific seaboards, and therefore, holds that the railways may make rates from the Atlantic seaboard to intermediate points as much as 25 per cent. higher than those to Pacific coast terminal points. It holds, however, that the force of water competition rapidly grows less as traffic originates farther west from the Atlantic coast, and it therefore reduces step by step the differential which may be maintained between rates to the Pacific coast and to intermountain territory until it reaches St. Paul and the Missouri river, from which points it prohibits rates from being made any higher to intermediate points than to the coast. It apparently refuses to recognize any competition as justifying disregard of the fourth section except strictly transportation competition.

The effect of the commission's order obviously is to make all of the rates from all parts of the country to the western interior dependent upon the rates to the Pacific coast. If the commodity rates to the coast be left by the railways as they are now, as the commission evidently expects, then sweeping reductions in practically all of the commodity rates to the western interior must be made. This would involve the loss of millions of dollars of net revenue to the carriers. It probably would, considering them as a whole, disable them from earning the 7 per cent. on the value of their property which Judge Sanborn held is the least to which a railway can be legally restricted. And yet, even if this be the case, it is questionable if the roads can attack the decisions on the ground that they are confiscatory. For, as has already been said, the commission has not in these orders fixed rates; it has merely prescribed the *relations* that must be established between them. So far as the commodity rates are concerned, which alone are affected by these decisions, it would seem that the railways are left free to establish between them the relations the commisison prescribes either by advancing the rates to the coast or by reducing them to the interior; that if, while complying with the decision, they can in any way put their rates as a whole on a basis which will give them adequate revenues they probably cannot raise the issue of confiscation.

By directing that the rates to intermediate points from St. Paul and the Missouri river shall be made no higher than they shall be made to the coast, and that the rates from more eastern points to the intermediate western points shall not be made more than certain percentages higher than the rates to the cost, the commisison has with doubtful constitutionality sought to force on the transcontinental railways the necessity of choosing whether they will desist from meeting water competition on the coast, and thereby put themselves in a position to maintain their rates to the interior, or will continue to meet water competition on the coast, and thereby subject all of their rates to its influence. The commission refers to the fact that water competition is more potent than it has been in many years, and that with the completion of the Panama canal it will become much stronger than it is now. If the water rates do decline and the railways continue to meet them, they will, if they comply with the commission's order, have to reduce their rates to the interior proportionately; every decline in water rates would reduce not only the revenue on their business to the coast, but the revenue from all of their business.

It is quite possible that the roads might, for the present, leave their rates to the coast as they are and establish between them and the other rates the relations prescribed by the commission without being disabled from continuing to pay their present dividends. If, however, water competition increases in strength, as is now anticipated, it would seem that in the course of a few years they might have to either contest the commission's order in the courts or to adopt the policy of making a large part,, or even all, of their rates to the coast in substantial disregard of water competition. The traffic that now moves to the coast may be roughly divided into three classes. The first consists of those commodities which would move by rail in any event; the railways can, of course, make the rates on them practically what they please so long as they do not make them excessive, and therefore unlawful. The second class of commodities is composed of those which are so adapted to water transportation that they will move by water almost regardless of what rates the railways make on them; the railways might to advantage raise the rates on these commodities also, for by so doing they would not lose much revenue to the coast and would protect their revenue to the interior. The third class of commodities is composed of those that can move almost equally well by rail or by water; the railways can neither reduce the rates on them to meet water competition nor raise them in disregard to it without losing a large amount of revenue from their coast business; if, however, they fix them regardless of water competition they can protect their revenue to the intermediate points, while, if they make them so as to meet water competition they will, under the commission's order, have to adjust their rates to intermediate points correspondingly.

The whole situation is so complex that it will be no easy matter for the railway managers to decide what to do about it. A reduction of the rates to intermediate points, such as the commission desires, while it would in the immediate future greatly reduce the revenues of the roads, would tend to build up the intermountain country, where they get all the business, at the expense of the Pacific coast territory, where they have to divide the business with the boats. Some of the carriers have more promising intermountain territory than others, however, so that there are apt to be differences of opinion among them as to just what the ultimate effects of such a policy would be.

One thing, however, seems plain. The commission has made it plain that it believes the rates to the intermountain territory are excessive and unfairly discriminatory; its orders in reference to them have steadily grown more sweeping; and the roads will not gain anything from it by further postponing their decision as to whether they shall appeal to the courts or fix the rates as the commission orders. On the other hand, the protraction of the struggle postpones the day when the railways can establish satisfactory relations with the public in the intermountain territory. It would seem, therefore, that whether they are going to adopt the commission's rate theories, or appeal to the courts, the sooner they do it the better it will be.

NEW BOOKS.

Popular Law Making. A study of the origin, history and present tendency of law making by statute. By Frederic Jesup Stimson, Professor of Comparative Legislation in Harvard University. New York: Charles Scribner's Sons. Cloth, 390 pages, 6 in. x 8¾ in. Price, $2.65.

This is a very interesting book. The chapters most directly relating to railway business are those dealing with labor laws (the 11th) and with corporations and monopolies (9th and 10th); but there is much useful information all through the book. It is made up of lectures given at Harvard, and so, in many places, is more full and detailed than the busy railway officer would like to have it, but it is written in a pleasing style, often colloquial, and will be found entertaining when one is not busy. The book is primarily a compendium of facts, telling just what has been done, in a great multitude of cases, by legislatures and parliaments, but it is not without comment and philosophy; indeed the author's keenness in comment and his reasonableness and simplicity in philosophy are what make the book entertaining.

Some of the principle chapter headings are: Early English Legislation; Re-establishment of Anglo-Saxon Law; Laws Against Restraint of Trade; Other Legislation in Medieval England; American Legislation; Regulation of Rates and Prices; Labor Laws; Political Rights; Marriage and Divorce; Criminal Law and Police. The chapters on ancient English history fill up more than one-third of the book and present in readable shape a mass of facts otherwise not easily accessible.

Letters to the Editor.

THE PROCEDURE OF TECHNICAL ASSOCIATIONS.

North Egremont, Mass., July 11, 1911.

To the Editor of the Railway Age Gazette:

I have just returned to the United States from Europe. I find in your issue of July 7 an editorial on the Society for Testing Materials, and I agree entirely with the criticism therein given.*

If your influential journal would undertake to bring about a more rational method of holding congresses, conventions and meetings of various organizations in this country, you would accomplish much for the general good. I might select many examples of congresses conducted satisfactorily, but I will, as illustrating my views of correct proceedings, refer in detail to only one recent congress, and that is the International Road Congress, held in August last year in Brussels, and to be held in 1913 in London; and let me remark here that while I believe the Railway Congress has too long an interval between its congresses (five years), the custom of holding a meeting every year, as is done by the American Society for Testing Materials, is objectionable, making it impracticable to properly prepare for it.

The papers for the Road Congress were prepared many months in advance, on agreed-upon, assigned questions, translated and printed in the three languages of the congress, French, German and English, and distributed among the members of the congress in over 30 different countries of the world long in advance of the assembling of the congress. These papers were also reviewed by selected general reviewers, or reporters, each one of whom made a digest of all the papers on the subjects assigned to him, with his own observations and his own views of what the congress should adopt on each "question" as "conclusions." These general reports were also translated and printed and sent out to the entire membership, the proposition for adoption by the congress made by the general reporter being printed in italics for easy reference. The reports of the eight reporters and with conclusions on eleven questions were bound up together in a small volume, forming, as it were, the hand book of the congress for the members, all of whom had previously, at their homes, read not only the about 75 papers, but the general reports, so that it was unnecessary at the congress to read any of the papers or even the reports, only the conclusions, which were the basis of discussion. These conclusions went through the ordeal of oral discussion in each section (the congress was divided into sections) and came out of it modified, sometimes radically changed, and in some cases reformed almost entirely. They were then voted upon by the section and finally adopted by it, and later by the combined sections in a general meeting. During the discussion of each question the general reporter of it sat beside the presiding officer of the section to explain his conclusions, to uphold his own views and to assent to or dissent from the changes of ideas or form. By this method the final conclusions were crystallized and edited into final form.

Like the Railway Congress, the proceedings of each day were printed and published the following morning in a Journal, a full report of the discussion and the action of the sections being given so that the members knew what was going on in sections [illegible] the previous day. This, by the way, is the method of procedure adopted by the International Navigation Congress to be held at Philadelphia next June, and [illegible] Every country in the world [illegible] The subjects to be discussed [illegible] by the Permanent International Commission, [illegible]

*The reference is to an editorial in the issue of the International Railway Congress, Mr. Corthell's paper on "The Improvement of Railway [illegible]

July 31, 1910. The limit of time for receiving the papers is June this year, and I happen to know, as I have myself written and sent in a paper for this congress. Many of the papers are now in the hands of the general reporters in this country, able experts whom the United States government board having charge of the congress has carefully selected.

I write this communication hoping through you to bring about in this country a more rational method of congresses, conventions and annual meetings.

E. L. Corthell

THE COST OF RAIL AND WATER TRANSPORTATION.

University of Chicago, July 18, 1911.

To the Editor of the Railway Age Gazette:

In your issue of June 30 appeared a reply by S. A. Thompson to my article on the "Cost of Rail and Water Transportation" in your issue of June 2 and an editorial by yourself in answer to Mr. Thompson. If in your judgment the importance of the question under consideration merits a prolongation of the discussion I should be glad of an opportunity to say a few more words on the subject.

The purpose of my article was two-fold: To point out that the usual method employed by advocates of waterway development in proving water transportation many times cheaper than that by rail is fundamentally fallacious; and to direct attention to the fact that under the proposed method of subsidizing the waterways the burden of transportation is not in the main borne by those who enjoy the benefits of the transportation service. Your editorial calls attention to many of the fallacies in Mr. Thompson's argument, and I shall consequently confine my reply to other aspects of the case.

To my argument that unless on the waterway side of the cost equation there be included for the allowance for the expenditures made upon the highway itself by the state, and borne by the taxpayers, it cannot be contended that water transportation is cheaper than that by rail, Mr. Thompson replies that the gifts which have been made to the railways of the country should likewise be included. To this proposition I would give my unqualified assent. All the items of cost on both sides of the equation should be included. But to Mr. Thompson's further statement that it is impossible to make a comparison of the cost of rail and water transportation for the reason that it is impossible to get at the value of the gifts that have been made to the railways I cannot give assent. Granting, for the sake of the argument, that what he says be true—that we cannot ascertain the value of the gifts made to the railways, or to the waterways either, for that matter—we may still compute the relative cost of constructing a waterway and a railway over any given route at the present time, and we may ascertain thereby whether transportation by rail is, indeed, more costly than by water. Mr. Thompson cannot thus easily escape the issue, and continue to quote statistics of average rates which are based on wholly dissimilar conditions or to prove his case by referring to the prosperity of waterways before the era of modern railways.

Mr. Thompson suggests that I have given no consideration to the economic benefits in the way of general stimulus to industry which are to come from the building of canals. My reply is that such benefits can be shown to exist only in case it can be proved that water transportation, all factors considered, is cheaper than transportation by rail. In the absence of such proof these supposed benefits vanish into thin air. Mr. Thompson would prove his case by merely stating it. He assumes that water transportation is the cheaper, and thereby proves that there are general benefits accruing to the community from the lessened cost of transportation. Before the age of railways, when canals were constructed to take the place of the old stage roads, unquestioned benefits sprang from their construction. The great reductions in freight rates, amounting often to several hundred per cent., gave a remarkable stimulus to industrial development, and the

favored regions enjoyed periods of unusual prosperity. But today conditions are wholly changed. It is no longer a question of the canal against the turnpike, but it is the canal against the modern railway. Wholly ignoring these changed conditions, however, enthusiasts like Mr. Thompson dream of the departed glory of our waterways, and then fondly imagine that if we only spend enough money upon them (which expenditures are not to be counted as part of the cost of transportation) canals can become as superior to the railways as to the old-time stage roads.

The second main purpose of my article was to call attention to the point that if the government constructs a transportation agent and donates its use to the public, the cost of transportation is only partly borne by those who reap the benefit of the transportation service. The cost of construction and maintenance is borne by the taxpayers. If a state builds a highway the cost is mainly borne by the owners of property within the state, regardless of the use they make of the transportation agent. If the national government constructs the route, the cost is mainly borne by the consumers of tariff-protected commodities, regardless of their interest in transportation. But, on the other hand, if the means of transportation be privately constructed, the entire cost is paid by the shippers who make use of the transportation agent. Mr. Thompson says: "With the latter part of the above statement I must emphatically disagree." The cost of transportation, says Mr. Thompson, is only advanced by the shippers; it is ultimately paid by the consumers of the commodities transported. It would seem to follow from Mr. Thompson's disagreement that my second main point had gone by the board. I am not disposed to quibble over the question whether the shipper pays the cost ultimately; Mr. Thompson is doubtless perfectly right. But what bearing does it have on the point at issue? The point which I made remains untouched. In the one case transportation is paid for entirely by those who reap the benefit, shippers, or consumers, as you please. In the other case the larger part of the cost is borne not by the shippers or the consumers of the goods transported, but by the general taxpaying public regardless of its direct interest in transportation.

Again, Mr. Thompson takes exception to my statement that there are waterway schemes before this country involving an initial expenditure of approximately $2,500,000,000, and he wishes to understand in what way they are before the country. If Mr. Thompson will read the reports of the score or more of waterway associations which are insistently demanding funds for waterway development he will find that my figures are substantially correct. I should say that a project was before the country for consideration even though it had not been favorably passed upon by a board of army engineers. For instance, at the last session of the Lakes-to-Gulf Waterway Association a firm stand was taken for an ultimate depth of 24 ft. from Chicago to the Gulf. Nine ft. and 14 ft. are but steps on the way to the greater depth, and the 24-ft. project is, in my opinion, before the country for consideration. Mr. Thompson forgets, furthermore, that the usual preliminary estimates invariably prove but a fraction of the amount required to complete the projects. It was estimated that the Chicago drainage canal would cost $16,000,000, but it eventually required nearly $55,000,000. The Manchester ship canal cost more than twice the original very careful engineering estimates. The first estimate of the cost of the Panama canal, made by the government engineers, was $140,000,000; the latest is $375,000,000. Such is the history of all canal construction. If this be true after the engineers have made their careful reports, how much more is it likely to be the case with projects which have not been surveyed? In this connection it should be reflected that those who ask for government appropriations usually realize that their demands should appear modest in amount; and there is accordingly little reason for a belief that the probable cost has been underestimated.

Again, Mr. Thompson, like all other waterway advocates, chooses to ignore the cost of building the necessary harbor and terminal facilities along the water routes. He includes terminals in the cost of railways, and to be consistent he must also include them in the cost of waterways. The State of New York voted its $101,000,000 for enlarging the Erie canal without having given a thought to the question of terminals. Several years later it was discovered that terminal facilities were as essential to the success of the scheme as the canal itself, and a commission was appointed to look into the terminal situation. After spending many thousand dollars in investigation it was found that the terminal sites at both New York and Buffalo were largely under the control of private corporations, and that to secure possession of them would require the expenditure of over $18,000,000. To equip the necessary harbors, wharves, docks, etc., and to construct the necessary boats will doubtless cost as many millions more. If a 24-ft. waterway should ever be constructed from Chicago to the Gulf, has Mr. Thompson ever considered what it would probably cost to build a great ocean harbor at Chicago, and to reorganize the great railway terminal system of the city in such a way as to put it into harmonious relationship with the waterway? The cost of water transportation cannot be fully counted until such enormous outlays as these are included.

But Mr. Thompson errs most in his bald assumption that the waterways of other nations have met with the most unqualified success. It so happens that I have made an exhaustive first-hand study of the conditions of transportation in Europe, and I am consequently in a position to present some statistics of the total cost of transportation on the waterways of the continent.

The city of Frankfort, in Germany, is located on the Main river, twenty-three miles from the Rhine. Prussia and the city of Frankfort have together expended upon the canalization of the Main and the development of harbor facilities at Frankfort approximately $23,000,000, or about one million dollars a mile for the twenty-three miles of river between its junction with the Rhine and the city. At the average rate of railway construction in Prussia this would build nine or ten fully equipped railways between the same points. As a matter of fact, all of the present traffic could easily be handled on existing railways, and a single new double track railway could carry any amount of traffic that can be expected to develop in that region. Were the existing railways given this $23,000,000 subsidy they could move all the freight that now goes by water for nothing and still earn handsome dividends.

The well-known Dortmund-Ems canal cannot compete with the railways without the aid of enormous subsidies. In the year 1905 the deficit which was paid out of the public treasury for the support of this canal amounted to about 58 cents a ton for all the traffic that passed over the canal. To this is to be added the actual charges made by the barge companies, and the small tolls and harbor dues as well. When thus computed the total cost of transportation on this famous canal is found to be nearly twice that on German railways for similar kinds of freight. It should be stated in this connection, also, that the rates on German railways are much higher than on American roads, even on similar freight traveling under comparable conditions.

On all the waterways of eastern Germany traffic has increased but slightly in the last thirty years, and in every case, if we include the deficit met by the state, the cost is much greater than that by rail. The Rhine river, alone, may be regarded as unqualifiedly successful, and this is due to the tremendous quantities of coal lying near its banks, and the exceptionally favoring navigation conditions on the river.

Two German writers, Rathenau and Cauer, of Berlin, have computed that a barge canal between the Rhine river and Berlin, adequate for barges of 600 tons capacity, would cost approximately twice as much as an all-freight railway, and that at the same time its capacity would be only about half as great. The results of their study are published in a little volume entitled: "Massengüterbahnen." It should be added that the Germans have found from experience that the increased cost of constructing canals for boats of greater than 600 tons capacity

much more than counterbalances the gain coming from the enlarged carrying capacity of the canal.

Mr. Thompson says that the most efficient transportation system will be one in which waterways shall co-operate with railways. Much has been made of this point by waterway advocates, and it is therefore important that we inquire how this supposed co-operation is brought about in Europe.

In Germany the government fixes the rates of the railways on competitive traffic very high, and by relieving the waterways of nearly all the fixed charges enables the boat companies to charge much lower rates than those by rail. In addition, where it is necessary to transship goods from railways to waterways or vice versa, the government fixes but a nominal charge for the service, making up the deficit out of general taxation. In this way they force co-operation, if we may use the expression. If the railways were permitted to compete for the traffic it would be an easy matter for them speedily to divert the greater part of it to themselves.

In France, in order to force traffic to travel by water it is necessary to give the water routes enormous subsidies, amounting in 1905 to about 60 oenas a ton for all the freight handled by water, and at the same time to prevent the railways from lowering their rates for competitive purposes. Although the railways are entirely self-supporting, and although they contribute a large amount each year to the government in the way of taxes and special services, and although they earn handsome dividends, it is still necessary to compel them to quote rates on competitive traffic at least 20 per cent. higher than the water rates; this in order to prevent them from diverting traffic from waterways entirely supported at public expense. The co-operation between the railways and waterways of France is then, also, a forced co-operation. And it is far from advantageous to the railways. Wherever for special reasons the French railways have been permitted to lower their rates on competitive traffic they have been able to divert the freight to themselves while still earning reasonable returns on the business. The railways of France are in great need of the traffic that now travels by water. On page 31 of the Preliminary Report of the National Waterways Commission is a table which shows the density of traffic on the railways of France to be much less than on those of Germany and Belgium; and it is but a fraction of that on some of our leading American railways. The railways of France could easily handle all the traffic of the country; and if they were permitted to handle the total tonnage they could substantially reduce the cost per unit, not only on that which now travels by water, but on their own present traffic as well. The transportation business is subject to the law of increasing returns to an unusual degree. The larger the traffic the less is the cost per unit. Dividing the traffic of a country between two agents, therefore, when one alone is sufficient, is to increase the cost of the service on both agents.

M. Colson, Director of Roads and Bridges, and Counselor of State in France, and the foremost authority on French transportation, stated to the writer that, in his opinion, the expenditure of money on inland waterways except in the case of great rivers like the Rhine and Volga, of gentle slope and constant water supply, is nothing short of stupid. Yves Guyot, the noted French economist, writes that if burdens were placed on the [illegible] those placed on the railways of France, [illegible] all be on the boats on the canals.

Mr. Thompson contends that the railway service of the United States has permanently broken down and that water-[illegible] is impossible. The same argument [illegible] to prove to the railways of other countries [illegible] Mr. Thompson will refer to the statistics of car [illegible] and equipment which are published monthly by the Amer[illegible] Railway Clearing House he will find that since the fall of 1[illegible] there has been almost constant surplus of cars in this country, often amounting to several hundred thousand for months at a time. There was a serious congestion of traffic in 1906 and 1907, during the height of the great prosperity period, just as there was a serious general business congestion at that time, but with the normal conditions that have since prevailed the railways have been able to care for the traffic needs of the country with reasonable satisfaction.

The question of the ability of the railways to meet the growing needs of commerce was thoroughly discussed at the International Railway Congress, which was held at Berne, Switzerland, in July, 1910. In reply to advance questions asking if it were possible for the railway net to be expanded sufficiently to meet all future traffic requirements, the representatives of every country, except Prussia, replied in the affirmative. The Prussian delegates stated that they regretted to say that they must refuse to answer that particular question. Now, it had been officially stated in Germany that the density of traffic in the Westphalian industrial region was so great that additional canals there were indispensable. M. Colson raised the question with the Prussian delegates, and they replied guardedly that the opinion of the railway men of Prussia had never been asked upon that point. When the present writer raised the question with an engineer in the waterways division of the department of public works in Germany, as to how it was that if canals required more ground space in proportion to carrying capacity than the railways, they could be regarded as a means of relieving traffic congestion, there was no reply. The fact of the case is that the argument in Germany emanated from the Kaiser, who has his heart set on the continued development of the waterways. And the story has been more than once told in print that in order to secure the passage of the canal bills of 1899 the Kaiser dismissed twenty members of the Landtag and appointed twenty men in their places who would do his bidding. If Mr. Thompson would make even a cursory study of the waterways of Europe he would perhaps not be quite so certain that their experience teaches that large expenditures upon the development of American waterways "would be one of the wisest and most profitable investments that the people of the United States could possibly make."

Finally, I should like to call attention to the fact that Mr. Thompson, like other waterway advocates, entirely overlooks the cost of transshipment in counting the cost of transportation by water. Comparatively a small amount of traffic both originates and finds its destination directly on the banks of water routes. One or two transshipments are usually necessary. It is well known that the cost of loading and unloading goods, of transshipping them, is often much greater than the cost of moving them the entire distance from place of origin to point of destination. Indeed, the cost of transshipment is so heavy that it has been impossible to develop any considerable transshipping business in France. Millions of dollars have been expended in the development of transshipping facilities, and belt lines of railway have been constructed at the important waterway terminals, and yet nearly 99 per cent. of the waterway traffic of France is strictly riparian. In Germany transshipments are secured only by means of subsidy, by charging, as we have seen, much less than the cost of the service and making up the deficit out of general taxation. The waterway advocates of this country have absolutely no assurance that any considerable amount of transshipping business would develop.

Even if it should come to pass that goods would be extensively transshipped from rail to water and vice versa, I should like to raise the further consideration that the congestion of traffic would thereby be increased rather than diminished. The recent railway congestion was felt primarily at the terminals and transshipping centers, and was due in no small degree to a dearth of yard facilities. But be the railway situation ever so bad in this respect, it is much easier to transfer a loaded car from one track to another than it is to transfer the cargo from a car to a canal boat or the reverse. Congestion of traffic has been much increased in the Westphalian industrial region of Germany through the necessity of transferring the cargo from rail to water within the congested area. The same result would inevitably result from the adoption of a similar policy in the United States.

H. G. MOULTON.

APPLICATION OF THE NEW LONG AND SHORT HAUL CLAUSE TO INTERMOUNTAIN RATES.*

Railroad Commission of Nevada v. Southern Pacific et al. Maricopa County Commercial Club v. Santa Fe, Prescott & Phoenix et al. Opinion by Commissioner Lane:

It is now nearly a year since the commission issued its order establishing class rates from eastern points to stations in Nevada and Arizona. At that time it was announced that the question of commodity rates was reserved for later consideration. Before the commission came to deal with the matter of commodity rates, Congress amended the fourth section of the Act to Regulate Commerce with this very intermountain situation distinctly in mind, as the congressional debates disclosed. We have decided to allow our previous order as to class rates to stand, and instead of fixing commodity rates, proceed in accordance with the appeal of the original complaint, but more particularly in compliance with our understanding of the meaning of the new fourth section to seek an adjustment of the relations between the rates to the coast cities and the rates to interior points. Many theories as to the interpretation of the new long and short haul clause have been offered to the commission.

The simple truth is that Congress determined upon strengthening the long-and-short-haul section. Members of Congress representing those portions of our country against which there was the greatest discrimination presented amendments to the fourth section that would make it rigid, inflexible, absolute. Against these amendments the carriers themselves made protest that was supported with reason. The commission itself, although the opportunity had frequently been presented to it, has never indorsed a rigid long and short haul section. Indeed, the present provision is drawn along lines which received the tentative approval of the commission. In short, Congress intended that the law should say that, as a general rule, there should be no lesser charge to the more distant point, but it was not willing to say that there should not be some exceptions to this rule. The railways, however, were not to make these exceptions themselves. Such exceptions were to be made only upon petition to the commission and public justification being shown.

Clearly section four is at least a continuance of the stringent prohibitions against discrimination which are found in the preceding sections. In section two the carriers are told that they must not prefer one individual over another in the matter of rates. This is an "equality clause," as the English courts style it; and it was taken from their law. So with reference to the long and short haul section. It is in its nature a discrimination for a community that is nearer New York to be charged a higher rate upon freight from New York than a community that is at a greater distance from New York, the same line being used for the traffic. On its face nothing could appear more unjust than the relationship that exists between the intermountain cities, such as Reno and the coast cities, such as San Francisco.

In every decision of this commission, under any section whatsoever, there enters the element of personal judgment, just as in every verdict of a jury the result is colored necessarily by the mental attitude and experience of the juror.

The commission has not been left without a proper test to apply: The test of justness, of reasonableness, of discrimination, of preference and advantage; the test of fair play as between communities. Congress has undertaken to specify distinctly one practice which it wishes especially to destroy and charges this commission not to permit it to obtain unless such discrimination may be shown not to be a discrimination. All the burdens of establishing these justifying conditions are cast upon the carriers; the doubts are to be resolved against them; the wish of Congress is expressed and clear. The carrier may no longer float along as under the old section, needing no other justification for its policy than its own conscience, but must set forth clearly what it is doing and convince those constituted to judge that this exceptional policy in a special case is in harmony with the intent of Congress. The proviso, however, is primarily for the carrier's benefit; it recognizes that the railway may engage in competition for traffic to more distant points at lower rates than may be charged to intermediate points without doing injury or injustice to such intermediate points. But to this policy a limit may be, indeed must be put.

There is in our minds no doubt but that the Congress can put into effect a long-and-short-haul clause, such as is here considered. Similar provisions obtain in the laws of Arkansas, Indiana, Kentucky, Iowa, Massachusetts, Michigan, Minnesota, Nevada, New Hampshire, New Jersey, North Dakota, Ohio, South Carolina, South Dakota, Texas, Vermont, Virginia and West Virginia.

Until a carrier could demonstrate that its property was being confiscated by the enactment of a hard and fast long-and-short-haul clause it could not be heard to complain against the enactment of such a law. But this is no such provision. This section as it stands now reveals the mind of the Congress that in fairness to the carriers they may be allowed in exceptional cases to meet exceptional conditions at distant points, but these exceptions shall be controlled, not by the whim of the carrier or by its own desire to give preference or to increase earnings established that the carrier will suffer if such discrimination is not permitted, and, too, that the public will not suffer by such procedure. The proviso of the act is an extension of governmental leniency. It is made in the carriers' interest, and if it were removed from the act there is doubt if the carriers themselves could be heard to complain.

In dealing with this case we shall regard as established: That the intendment of the law is to make its prohibition of the higher rate for the shorter haul a rule of well-nigh universal application from which this commission may deviate only in special cases and then to meet transportation circumstances which are beyond the carriers' control; that is to say, a carrier shall not prefer the more distant point by giving it the lower rate because of any policy of its own initiation, but if at the more distant point it finds a condition to which it must conform under the imperious law of competition if it would participate in traffic to that point it may discriminate against the intermediate point without violating the law, provided it establishes such necessity before the commission.

We turn now from consideration of the law to a survey of the facts involved in the transcontinental rate situation. It is more than twenty years since this commission was first petitioned to extend to intermediate points the westbound rates that were given to the Pacific coast terminals. The agitation for a rigid application of the rule that a more distant point should not enjoy a lower rate has persisted throughout the years, manifesting itself before the commission, the courts, and each succeeding session of Congress at which consideration was given to the amendment of the act to regulate commerce. The intermountain country, in which Reno is a typical point, has led in this agitation. A shipper finds it difficult to reconcile himself to paying $500 a car for the transportation of a carload of merchandise to his own city when that same carload will be carried from the same point of origin through his city to a point 500 miles beyond for $300. Such a condition appeals to all as prima facie unjust. The railway, however, answers that it grants the $300 rate, not because it desires to, but under compulsion of water competition, and that the $500 rate is reasonable for the service that is given to the intermediate point.

We come thus to inquire: What is the transcontinental scheme of making rates, and what are the causes which have produced it? Has there been real competition between rail and water carriers, and what has been its effect? To what extent, if at all, does this present rate scheme rest upon the active rivalry of ocean and rail lines?

*In this abstract insofar as possible the language of the commission is preserved.

If one reverts to the original report in this case and studies the map therein printed, it will be seen that what is known as transcontinental territory extends from Colorado on the west to Maine on the east, and from this blanket the same rates are given practically upon all classes and commodities to what are known as Pacific coast terminal points. Of these latter the principal ones are Seattle, Tacoma, Portland, San Francisco, Los Angeles, and San Diego. In Oregon but two places enjoy these rates—Astoria, at the mouth of the Columbia River, and Portland, at the junction of the Willamette and the Columbia rivers—to both of which points steamships and sailing vessels carrying Atlantic seaboard traffic have easy and constant access. In southern California, San Diego is upon a harbor and is a port of call for steamships engaged in interoceanic traffic. Los Angeles, however, is not upon the sea; at least has not been until recently. The city limits of Los Angeles have now been extended so as to include a strip of land extending from that city to the port of San Pedro, which has become the port of Los Angeles, and the citizens have raised a fund for the improvement of the harbor and its water front and the building of a municipal line of steam railroad for the 16 miles between the heart of the city and the water's edge. This anomalous condition of things, however, exists—that until a recent order of the Commission the little city of San Pedro, through which traffic by water moved to and from Los Angeles, was denied terminal rates, although the city of Los Angeles, which was inland, enjoyed such rates. Many cities and towns an equal distance from the seacoast but equally accessible thereto do not enjoy terminal rates, and some immediately upon the coast, such as Ventura and Santa Barbara pay higher rates than does Los Angeles. How, then, is this preference of Los Angeles justified? The answer of the railways is that the benefits of sea competition were extended to Los Angeles by an arrangement between the Santa Fe Railway and the American-Hawaiian Steamship line, the Santa Fe publishing an extraordinarily low schedule of rates upon traffic transshipped at San Diego and destined to Los Angeles. In 1900 the American-Hawaiian Company put on a line of steamships by way of the Straits of Magellan, and for the last five years has had a considerable fleet engaged in this through business by way of the Tehuantepec National, which is controlled by the Mexican Government. This steamship line stops at San Diego, but does not stop at the port of San Pedro. The Santa Fe Railway extends to it and other water carriers a schedule of class rates from San Diego to Los Angeles approximately the same as that obtaining over the San Pedro line from San Pedro to Los Angeles, this schedule being based on a 16-cent rate per 100 pounds for first class traffic. Thus Los Angeles, by a combination of circumstances becomes a "terminal point."

Proceeding northward to central California, the first terminal that we find is San Jose, which is some ten or twelve miles removed from the Bay of San Francisco and can not be reached by water.

From even a rough sketch of the Pacific coast terminal situation it is at once perceived that it is not the result of the rigid application of any principle based entirely upon sea competition, for terminal rates are given to cities which are not upon the ocean, and the railways themselves in some cases have forced the sea carriers to absorb inland rates in order to meet railway competition at these interior terminal points. In passing it may [illegible] terminal points.

Turning our eyes eastward and regarding the territory in which originates this traffic it is at once appreciated that the same rate applies whether the traffic comes from New York harbor or from Chicago or Kansas City. Now, it is not contended that there is any direct water competition from Chicago or Kansas City, or the territory intermediate between the Mis[illegible]

answer this question it may be well to look back over the very remarkable history of the long-fought struggle between the transcontinental railways and the ocean carriers.

The history of this protracted struggle between the ocean and the land carriers shows that one water route after another has been rendered innocuous. To meet the competition of the railways the tendency of the ocean carriers has been to shorten the time consumed in passing by water from coast to coast. The clipper ship has been forced to give way to the steamship and the steamship has been compelled to transship by rail a portion of the distance. The routes by way of Cape Horn and the Straits of Magellan have been virtually abandoned. For nearly 40 years the Panama route has been under railway control. When an attempt was made to re-establish this route as a vital competitor, the railways used their own ocean-and-rail-line to eliminate it from the field. So that for several years there has been but one ocean line which apparently has no railway connection, that of the American-Hawaiian Steamship Company; and this line lives on sufferance, its rates being made with the knowledge of the railway company and with a more or less definite relation to the transcontinental rail rates. Within the past few months another water competitor has entered the field, the California-Atlantic line, which has done an extensive business both east-bound and west-bound for the short time that it has been in existence, but the prophecy made by the railway witnesses is that it will not last long.

In the light of this history it is not to be gainsaid that the transcontinental lines must give consideration to sea competition. For 30 years and more their effort has been to "neutralize and control" such competition, in the phrase of Mr. Stubbs, vice president of the Southern Pacific system. While they have subsidized, bought, and controlled the water carriers, there has always been present to the mind of the traffic manager of the transcontinental railway the existence of the ocean and the possibility of its use. Without a ship on it the ocean has the power to restrain, in some degree, the upward tendency of rail rates. A railway may not safely indulge its desire to impose all the traffic will bear between two ocean ports, and it may truly be said that the least poetical of railway traffic managers never looks on the ocean without a sense of awe.

The railways, moreover, must soon meet with a competition by water more intense than any that they have heretofore suffered, for within three years another route, one more important, searching, and determinative in its effect upon railway rates than any other, will be opened—a route all water by way of the Panama Canal. The cutting of this canal will in effect bring the Straits of Magellan 3,500 miles to the northward, and with modern steamships it is estimated that San Francisco will by water be removed from New York but 14 days.

We have noticed how through the years the blanket of class and commodity rates has been drawn westward from the sea-competitive point until it extends two-thirds of the distance across the continent. How have the carriers justified this blanket to the coast but not to intermediate points? Long before the blanket had been stretched to its present western extent the communities intermediate between its eastern border and the Pacific made protest against the injustice that was being done. For nearly a quarter of a century this complaint has been heard and has ceased at times only to be revived with greater earnestness. A line of railway policy which leads to such result may be presumed to have in it something artificial and unnatural. That which appeals to us as unnatural in this situation is that rates which are said to be less than reasonable because compelled [illegible] ocean competition are made from points where we can find no such competition. We look in vain throughout the records of this commission for 20 years to find any but the most fragmentary evidence that sea competition extends to Chicago. On the contrary, it is the admission of the carriers themselves that the rates which they make from Chicago to the Pacific coast terminals are established in order that the manufacturers and the jobbers of the west may compete on a level with the jobbers

and manufacturers who have the advantage of a location at the Atlantic seaboard.

Whatever the reason, the fact stands forth throughout this record that the source of supply upon which the far western communities largely draw their manufactures has within half a century moved westward from the Atlantic seaboard, so that, as was found by the railway commission of Nevada from an analysis of the billing of actual shipments into Reno, 75 per cent of their traffic coming from the east originated no farther east than the longitude of Chicago. There are cotton mills as far west as Kansas City; mining, milling, and farming machinery is produced more largely in and about Chicago than in any other section of the country; boots and shoes, hats and clothes, cooking utensils, and the multitudinous articles of domestic use may be secured in large part without coming east of the Alleghenies; in fact, the center of those industries which supply the far west apparently is not far removed from the center of population of the country. This is a pregnant fact.

It is not provable, but there is much reason to support the statement that if all the producing territory—the fruit and vegetable growing, mining, and lumbering territory—which does not receive the benefit of terminal rates, and which is compelled to pay the rate to the coast plus the rate back upon its commodities of eastern production, were taken from the transcontinental carriers they would be on the verge of bankruptcy in but a short time. Surely a railway policy adapted to the conditions of one day may properly change with the conditions of another, and in the very nature of things it must be apparent that the transcontinental carriers can not continue forever charging higher rates to the intermountain country than to the coast from the middle west. The condition is too artificial to last. The carriers have taken from San Francisco in large part the advantage that she should enjoy from her situation on the ocean by throwing around her a circle of terminal points 100 miles or so inland. By doing this they have forced water carriers to meet rail competition at these interior places, and yet the railways urge that the rates are made to meet ocean-to-ocean competition. In the east they have stretched the blanket from Portland, Me., to Denver, Colo., a distance farther than from Antwerp to Moscow, but they refuse to admit that from any point along this long line it would be justifiable to make the rates given to the coast terminals applicable to Reno.

Furthermore, we find that this situation is artificial in that it has been brought about by a procession of agreements between carriers. Each carrier has been appeased by giving to it something which would cause it to be satisfied with the arrangement. The carriers have competed with each other across a table until their minds agreed upon a condition that would prevent rate wars. It is wholesome and beneficial that the body politic should not be disturbed by rapid fluctuations in rates of transportation which tend to destroy the stability of commerce and imperil the fortunes invested in such transportation facilities. If society does not undertake to regulate the methods by which a natural monopoly such as a railway may be profitably conducted it is not to be expected that such a monopoly will not seek to protect itself, even at the disadvantage of the public it serves. The results of such self-protective measures, however, must be such as neither to offend the law nor be opposed to the development of the country and the instinct of its people for fair play.

Ocean competition, say the carriers, brings about the low rates from coast to coast; market competition produces the lower rates from the interior to the coast. We have considered ocean competition and see how real was its effect and how the carriers dealt with it. "Market competition" is a phrase with which the railway traffic manager too often conjures. When no other force can be found which brings about a discrimination, market competition is advanced. It is both a sword and a shield; it is used to protect the carrier against attack because of undue discrimination as between communities, and it is a weapon of offense as well, by which one carrier invades the territory of another upon a different basis from that which it grants to its own immediately dependent communities and forces concessions from its rival carriers.

Market competition, as we have seen, is a euphemism for railway policy. The history of the fourth section makes clear that it was born out of a desire, and has been amended out of the purpose, to restrict the force and effect of market competition. Experience has demonstrated to the national legislature that it is not safe to leave to the carriers the determination of the question what markets should be brought into competition with one another. Clearly to allow for market competition as a sole and controlling factor under the fourth section is to render it nugatory, for this would be tantamount to saying that a railway could justify every discrimination as between communities by the assertion of nothing more than its own determination of policy.

In this case and under these applications the commission has given thought to many considerations not touched upon in this report, some of which are suggested by the tables to be found in the Appendix (C—D). Such, for instance, as the reasonableness of the transcontinental rates upon commodities in and of themselves when applied from different points of origin and the relation of the cost of service over the Central Pacific when delivery is made at Reno or at San Francisco. And when we have considered the return per ton-mile yielded by many of these rates it is not remarkable that other carriers from the east have pressed forward, even to their own temporary financial embarrassment, to reach these coast terminals. No other carriers in this country enjoy such long hauls on so great a volume of high-class traffic as do these transcontinental railways.

Their fine earnings are testimony to this effect, as well as to the competency of their management. If the principle that a railway should charge what the traffic will bear is the criterion of railway rates, no exception can be taken to the transcontinental situation, for it is masterfully designed to secure a maximum of revenue and yet develop such industries and benefit such communities as the railway in its wisdom may wish to thrive, for the growth of the Pacific coast certainly is in no small part to be accredited to the discretion lodged in and exercised by the transcontinental traffic manager.

We desire to be extremely conservative in this the first application of the new law, and to require an adjustment of rates that will be safely within the zone of our discretion. For this reason we have decided that the transcontinental carriers serving Reno and other points upon the main line of the Central Pacific shall make no higher charge upon any article carrying a commodity rate than is contemporaneously in effect from Missouri River points, such as Omaha and Kansas City, to coast terminal points. This principle we shall also expect to be applied on commodity rates to all main-line intermediate points in Nevada and California. Traffic originating at Chicago and in Chicago territory moving under commodity rates may have a rate 7 per cent. higher than that imposed on freight originating in Chicago and Chicago territory and destined to the coast terminals. From Buffalo-Pittsburg territory the rates to intermediate points may rise above those demanded and charged from the same points and territory to the coast terminals to the extent of 15 per cent., while from New York and trunk line territory the rates charged shall not exceed 25 per cent. over and above terminal rates. This means that Suisun, Auburn, Truckee, Reno, and Elko, for instance, points intermediate to San Francisco from the east, shall have at least the benefit of the commodity rates extended from the Missouri River to Sacramento and San Francisco, and shall pay no more than 7 per cent. above the Chicago-coast terminal rates, etc., from Pittsburg and New York territories.

Some of the petitions under the fourth section which have been considered are made by carriers reaching California terminals through the southern gateways, southern Nevada and Arizona. These applications are also denied in so far as they involve the imposition of higher rates upon intermediate points

than are applied on commodities from the Missouri River to Los Angeles, San Francisco, or other coast terminals. To all such intermediate points [Ashfork, Maricopa, San Bernardino, Bakersfield, Fresno, and Ventura, for instance] terminal rates shall not be exceeded as from Missouri River points, with the same proportionate advances east of the Missouri River as heretofore specified.

An order will be made to this effect, allowing to the carriers until October 15 in which to file tariffs in accordance with said order—the same to go into effect upon three days' notice.

No order need be entered in either the Reno or Phoenix cases, so-called, at this time. (21 I. C. C. 329.)

APPLICATION OF THE LONG AND SHORT HAUL CLAUSE IN THE SPOKANE CASE.*

City of Spokane et al. v. Northern Pacific. Commercial Club Traffic Bureau of Salt Lake City, Utah, v. Atchison, Topeka & Santa Fe et al. Opinion by Commissioner Prouty:

The real gravamen of the complaint was directed towards the alleged discrimination against the city of Spokane, which resulted from the fact that the defendants charged from eastern points of origin to Seattle, Portland, and other Pacific coast terminals lower rates than were applied at Spokane, although the traffic moved through Spokane in reaching those points. While it was alleged that the rates were in and of themselves unreasonable and while this allegation has been sustained by the commission, nevertheless the moving cause of the complaint was the violation of the fourth section, and to some extent this same question was involved in the Salt Lake Case.

The commission felt that, in view of the whole situation, rate to Spokane from eastern territory ought in justice to depend to an extent, at least, upon those which the carriers made to the coast cities, and it considered the advisability of attempting to dispose of the case upon that theory, but in view of the doubt as to its right to do so it adopted the plan of prescribing a schedule of rates to Spokane without reference to the coast.

On June 18, 1910, subsequent to the promulgation of the foregoing opinion, the fourth section was amended. The city of Spokane claims that the amended section now in express terms forbids the discrimination against which that locality has always protested. In this case we have to inquire:

1. What is the duty and authority of the commission under the present fourth section?

2. Can the commission under that section make an order in one or both of these cases which will obviate the necessity of prescribing a schedule of reasonable rates?

The most satisfactory way of determining the effect of this amendment is by inquiring what meaning had been put on the omitted phrase, "under substantially similar circumstances and conditions," and what the practical effect of that phrase had been on the operation of the section itself.

It was the claim of the carriers that if competition of any sort existed at the more distant point this created the necessary dissimilarity of circumstances and conditions and removed the case from the prohibition of the fourth section. The [illegible] carriers was [illegible] to an entire [illegible] of the section itself.

This subject finally reached the Supreme Court of the United States in what is known as the Alabama Midland case [illegible] Alabama Midland [illegible]

In this case the opinion of the court fully sustained the [illegible] of the carriers. It held that where there was a dissimilarity of circumstances and conditions the rule of the fourth section did not apply and that it was for the carriers themselves to determine in the first instance whether that dissimilarity did exist. It also held that all forms of competition [illegible] commission [illegible] petition must be considered in determining whether circumstances and conditions were similar at the two points.

The commission understood this decision to mean that if circumstances and conditions were different at the more distant point, that of itself removed the case from the inhibition of the fourth section and from the jurisdiction of the commission under that section.

Later in a proceeding before the commission out of which the E. T., V. & G. Ry. Co. v. I. C. C. suit grew, the city of Chattanooga complained that carriers leading through Chattanooga to Nashville made a lower rate from eastern points of origin to Nashville than to Chattanooga. The commission had found that there was no water competition which forced this lower rate, but that there was a competition of railways and of markets which forced the defendants to accept the Nashville rates, and that if compelled to observe the long-and-short-haul provision they must either reduce their rates at Chattanooga or retire from the Nashville business. The commission had ordered the carriers to cease and desist from charging more to Chattanooga than to Nashville, and this order had been affirmed first by the circuit court and afterwards by the circuit court of appeals.

The Supreme Court of the United States reversed all these findings and held that on the admitted case competition did exist at the more distant point which compelled the taking of the lower rate and, that this being so, circumstances and conditions were dissimilar and the fourth section not applicable.

This decision of the Supreme Court fully confirmed the interpretation which this commission had placed upon the Alabama Midland case. If circumstances and conditions at the more distant point were dissimilar, carriers might without restraint depart from the long-and-short-haul rule. This virtually repealed that section, for the reason that it is always possible to show in the interlacing network of railways in this country, and in view of the intricate commercial conditions, that circumstances are different at one point from another. To hold that carriers may, wherever the dissimilarity exists, meet that competition or decline to meet it, partially meet it here and fully meet it there, is to hold that they may without practical restraint discriminate between different localities.

The history of the judicial interpretation of this section has been given with tedious and apparently unnecessary detail, in order that the effect of the words "similar circumstances and conditions" on the actual application of the statute might be clearly apprehended. The fourth section was for practical purposes a nullity. For 20 years this commission has made no order of consequence under that section which could be enforced, and this because of the existence of these words.

In view of these facts what was probably the intention of congress in removing that phrase from the statute? It is earnestly contended by the carriers that the only effect was to take from the railway the power of initiative. The carrier can no longer judge in the first instance whether it may disregard the rule of that section, but is compelled to submit that question to the commission.

To this view we can not subscribe. Had the only purpose of congress been to shift the burden of proof it would have said so, as it did with respect to certain other rate conditions. It meant not merely to declare a wrong, but to provide a remedy.

This brings us to the further inquiry: What is the function and authority of the commission under the fourth section as amended?

That section provides that no carrier shall charge more for the short than for the long haul unless on application to the commission permission to do so is granted by it. If this section were read by itself and were taken at its literal face meaning the commission would possess unrestricted power to grant or deny such application. It could permit in one

case and refuse in another, according as its fancy might dictate.

So construed, the proviso would probably be void as a delegation of legislative authority.

The statute of Minnesota provided that any railway company desiring to increase its capital stock should apply to the railway commission of that state, and that no increase should be made without the consent of that commission. The supreme court of Minnesota held that this statute was unconstitutional as a delegation of legislative authority. State v. G. N. Ry., 100 Minn., 445.

There would seem to be little difference between delegating, without restraint, to a railway commission authority to determine whether the capital stock of a railway shall or shall not be increased and investing that commission with power to arbitrarily determine whether, in a particular case, the long and short haul rule may be departed from. Of the two, the latter power would rather more clearly involve the exercise of legislative functions.

Counsel for the city of Spokane insists that we should hold that the fourth section imposes an absolute long-and-short-haul rule and should enforce that rule against the carriers.

It is the rule that where a statute is susceptible of two interpretations, under one of which it is constitutional and under the other unconstitutional, that interpretation must be adopted which will save the validity of the act.

Bearing in mind the authority which the commission now administers in prescribing a reasonable rate and in declaring and correcting as undue preference, it seems evident that the purpose of congress was to commit to this body the duty of determining whether if the carrier was permitted to charge a higher rate at the intermediate point that would result in a violation of the provisions of the act. But in so doing the commission can not act arbitrarily. It must investigate each case, and if after such investigation it is of the opinion that a departure from the rule of the fourth section would not result in unreasonable rates or undue discrimination it must permit that departure. If, upon the other hand, it is of the contrary opinion, it must refuse the permission. Such is the only possible construction which can be put upon this section in connection with the entire act, and if any doubt as to the real purpose of congress could exist, it must be effectively put at rest by an examination of the history of the passage of this measure.

The question may arise as to what elements the commission should now take into account in determining whether permission should be granted to deviate from the rule of the fourth section. It was formerly held by the commission that in applying that section only competition by water and competition with railway lines not subject to the act to regulate commerce could be considered; that all other forms of competition should be disregarded. Is this rule to be still observed?

We think not. The former holding of the commission was under the section as it then existed and expressed an attempt to so construe the words "circumstances and conditions" as to give some real vitality to that part of the act. The section today in its practical application is entirely different and the questions presented for consideration are different. We are considering now not merely whether circumstances at the two points are dissimilar, but whether, on the whole, that dissimilarity justifies a departure from the rule of the section.

Competition of carriers subject to the act has always been a factor with us in determining whether a preference in favor of a given locality is due or undue, and that is substantially the question which must be answered in passing upon an application under the present fourth section.

Strictly speaking, there is no such thing as market competition which is distinct from competition between the lines of transportation serving the market. A market can only compete through the agency which transports for it. The carrier makes a rate from a given market, not out of favor to that locality, but because it desires to obtain traffic which will not otherwise come to it. There would seem, therefore, to be little distinction between the competition of markets and the competition of rival railways. The whole situation must be considered by us in passing upon these applications.

The amended section provides, as did the original section, that the commission may from time to time prescribe the "extent to which such designated common carrier may be relieved from the operation of this section." Congress has evidently had it in mind at all times that cases might arise where carriers should properly be permitted to charge a lower rate at the more distant point, and has intended to arm the commission with authority to do justice in such instances by permitting a deviation from the rule of the section and prescribing the amount of that deviation.

We hold that under the amended section it is the duty of the commission to investigate each application made by a common carrier for leave to depart from the rule of the section.

Spokane is located about 400 miles east of the Pacific Ocean, in the midst of a region rich in agricultural and mineral resources. Between it and the coast lies the Cascade Range of mountains. Spokane is the principal city in Washington east of these mountains and aims to distribute to the territory which surrounds it, in which attempt it meets severe competition from Seattle, Tacoma, and Portland.

Two of the trunk lines of railway serving Spokane both from the east and the west are the Northern Pacific and the Great Northern, the principal defendants in the Spokane case. Traffic handled by these carriers from eastern points of origin to the Pacific coast cities passes through Spokane and over the Cascade Range. Notwithstanding this, rates to Seattle, Tacoma, and Portland from points as far west as St. Paul and the Missouri River are, for the most part, materially higher to Spokane than to coast towns. Merchandise consumed in territory east of the mountains can be hauled through the city of Spokane, across the mountains, to Seattle, and from Seattle back over the mountains a second time, at a less transportation charge than it can be taken to Spokane and thence distributed to this territory. It is against this relation of rates that Spokane has always protested and now protests. Its complaint is, first of all, against this violation of the fourth section.

Carriers justify this scheme of rate making upon the plea that water competition between the Atlantic and the Pacific coasts fixes the rate from eastern points of origin to the coast cities, and that they, in naming heir rates to those points, simply meet the water rate.

The complainants insisted on the original hearing, and have renewed the claim at every stage of this proceeding, that there is no active water competition; that the whole claim of water competition is put forward by the defendants as a pretense by which to justify the rank discrimination against the interior points.

The circuit court of the United States has twice found, once in a proceeding concerning these very rates to Spokane, that active water competition does exist which controls the cost rate.

This commission has repeatedly found and recognized the same fact.

In the recent hearing upon the applications of transcontinental lines for leave to disregard the rule of the fourth section evidence has again been produced upon this subject which conclusively shows that the previous finding of the commission is right. We had before us in the Spokane case the manifests of two ships from New York to San Francisco, and in the last hearing we had the manifests of two other ships. They showed in detail the articles transported, the

point where they originated, the destination for which they were intended, and the rate under which they moved. These actual transportations prove more conclusively than any mere statement that almost every article which is the subject of ordinary commerce between the coasts can and does move from New York to San Francisco by water at rates materially lower than those maintained by the defendants by rail. We have used San Francisco as the destination port on the Pacific coast, and in some instances rates from New York to San Francisco are a trifle lower than to other coast cities, but, generally speaking, the San Francisco rate is maintained at Los Angeles, Portland, Seattle, Tacoma, and other points upon the coast.

It is said that the amount of the movement by water is so insignificant that it should be disregarded. The amount is not insignificant. If reference be had to the traffic which actually originates upon the Atlantic seaboard a considerable percentage moves by water, but the significant thing is not the amount of the movement, but the ever-present possibility of that movement.

The carriers have met this competitive situation by establishing from the Atlantic seaboard to Pacific coast ports a series of commodity rates. Rates to interior points are usually constructed by adding the local rate from the terminal to the interior. This is not so in all cases. It was said, for example, that rates from the east to Spokane were higher than the coast rate by about 75 per cent. of the local back. In all cases, however, the rate from all this blanketed territory to the interior point is very much higher than to the more distant coast point.

Now, assuming that there is actual water competition with these defendants may meet, is there anything in this scheme of transcontinental rate making of which Spokane can legitimately complain? The question is not whether rates from the Missouri river or from other eastern points of origin to Spokane are excessive. That question has been considered and passed on by the commission. We are now inquiring whether the system upon which these rates are constructed is unlawful, and whether any substantial relief should be or can be given by an order under the fourth section.

The complainants contend in the first place that the terminal rates are themselves sufficiently high and that intermediate rates for a less service ought not to be higher. If, therefore, the fourth section were to be applied, having reference to this contention of the complainants alone, we must hold that from the Missouri river and corresponding territory no higher rate should be charged to Spokane and Spokane territory than to the coast, but that from Chicago and territory east of the Missouri river generally a higher intermediate charge might be made.

The next contention of the complainants is that even though there be water competition between the Atlantic seaboard and the Pacific coast and even though the force of that competition does dictate the rate between those points, nevertheless there is no such competition from the interior, as, for example, from Chicago, and that therefore while the defendants may properly charge a higher rate from New York to Spokane than the corresponding rate to Seattle, they can not properly maintain this discrimination when the point of origin is Chicago.

Everything indicates that the effect of this water competition will increase rather than diminish from now until the completion of the Panama canal and when that waterway is ready for business both rate and facility will be very much better than today. It is true, however, that carriers maintain the same transcontinental rate from Chicago as from New York, not by reason of the direct effect, but rather as an indirect result of water competition.

There is in this same connection market competition proper. Chicago, with all its political and financial strength, demands that it shall be accorded the same right to sell in San Francisco which its rival New York has. Its argument is this: If this traffic moves by rail from New York, it passes through Chicago, and is hauled 1,000 miles farther than as though it originated at Chicago. If it originates at Chicago there is eliminated from the service the useless waste of energy involved in transporting the business for the first 1,000 miles. Therefore, if this traffic is to move by rail such a rate should be made as will move it from Chicago and not from New York.

And why is not this argument a sound one, at least if reference be had entirely to eastern territory? It is for the interest of Chicago that it be allowed to sell in San Francisco; it is in the interest of San Francisco that it be allowed to buy in both Chicago and New York. It is in the interest of the carriers, considered as a whole, that the business originate at the nearer point and that is the just interest of the public to the end that useless waste be avoided. New York and the lines leading from New York to Chicago alone suffer.

Considering this question broadly and in all its aspects we cannot say that the legitimate effect of water competition upon the Atlantic seaboard may not be to reduce the rail rate from interior points.

The third claim of the complainants is that while the defendants recognize upon the Atlantic seaboard the force of competition in its various forms, hereinbefore stated, they decline to do so upon the Pacific coast. While they extend the New York rate to Chicago and the Missouri river they decline to extend the Seattle rate to Spokane although every reason which justifies that in the former case requires it in the latter. Just as traffic can be and occasionally is carried by rail from Chicago to New York and thence by water to San Francisco, so is traffic at times and indeed much more frequently handled from New York to Seattle by water and from Seattle to Spokane by rail. If the application of the transcontinental rate from Chicago is necessary to prevent the movement by water from Chicago through New York, all the more is the application of that rate from New York to Spokane necessary to prevent the movement of traffic from New York to Seattle and from Seattle to Spokane.

Spokane is a great distributing center and aims to be a greater one. It demands the right to rates which will enable it to bring from the east and distribute into territory lying east of the Cascade range. Such traffic, when distributed from Spokane, is hauled a less distance by 400 miles than when distributed from Seattle, and the distribution haul itself is also much less expensive. It is a manifest economic waste to haul traffic over the Cascade mountains and back again.

Admitting, however, that it is for these defendants to say to what extent if at all they will meet these competitive conditions, they are not at liberty, in meeting them, to adopt such a policy, nor to execute the policy adopted in such a manner as to unjustly discriminate between different localities. For the purpose of disposing of this matter by an order under the fourth section, we have divided the United States into five territorial zones, as follows:

(The transcontinental groups hereinafter described are as specified in R. H. Countiss, agent's, transcontinental tariff I. C. C. No. 929.)

Zone No. 1 comprises all that portion of the United States lying west of a line called line No. 1, which extends in a general southerly direction from a point immediately east of Grand Portage, Minn.; thence southwesterly, along the northwestern shore of Lake Superior, to a point immediately east of Superior, Wis.; thence southerly, along the eastern boundary of transcontinental group F, to the intersection of the Arkansas and Oklahoma state line; thence along the west side of the Kansas City Southern to the gulf of Mexico.

Zone No. 2 embraces all territory in the United States lying east of line No. 1 and west of a line called line No. 2, which

begins at the international boundary between the United States and Canada, immediately west of Cockburn Island, in Lake Huron; passes westerly through the Straits of Mackinaw; southerly, through Lake Michigan to its southern boundary; follows the west boundary of transcontinental group C to Paducah, Ky.; thence follows the east side of the Illinois Central Railroad to the southern boundary of transcontinental group C; thence follows the east boundary of group C to the Gulf of Mexico.

Zone No. 3 embraces all territory in the United States lying east of line No. 2 and north of the south boundary of transcontinental group C and west of line No. 3, which is the Buffalo-Pittsburg line from Buffalo, N. Y., to Wheeling, W. Va.; thence follows the Ohio River to Huntington, W. Va.

Zone No. 4 embraces all territory in the United States east of line No. 3 and north of the south boundary of transcontinental group C.

Zone No. 5 embraces all territory south and east of transcontinental group C.

We are of the opinion that from zone 1 no higher charge can justly be made at any intermediate point than to a more distant point. The eastern limit of this territory is approximately 1,500 miles from the Atlantic seaboard, almost midway between the Pacific and Atlantic oceans. No traffic has ever been, and none probably ever will be transported from this section to the Atlantic coast and then by water to the Pacific coast.

With respect to territory embraced in zone 2 the case stands somewhat different. This zone comprises the Mississippi valley and a considerable portion of the great manufacturing area of the west. It lies 400 miles nearer the Atlantic seaboard, with which it is connected in part at least by lines of railroad affording the cheapest transportation service in any part of the country. Still there never has been and there probably never will be in the future any considerable movement of traffic from this territory to the Pacific coast by way of the Atlantic seaboard.

We are of the opinion that rates from this territory to intermediate points may properly exceed by not more than 7 per cent. rates from the same points of origin to Pacific coast terminals.

From zone 3 there is still greater possibility of actual transportation competition on business destined to Pacific coast points, although from this section hitherto the actual movement has been only occasional.

We are of the opinion that from points of origin in this territory rates to intermediate points may properly exceed those to terminal points by not more than 15 per cent.

In the past the actual movement from eastern points of origin to Pacific coast terminals has been mainly confined to zone 4, and even in this zone the greater part of the traffic has originated in or near the seaboard itself.

The force of water competition is greatest at New York and gradually diminishes as the distance from New York increases, but we are of the opinion that this entire territory may properly be treated as a single group, and that rates from points of origin within its limits to intermediate points may properly exceed those of terminal points by not more than 25 per cent.

No opinion is expressed at this time as to zone 5, since rates from that territory are not involved in these proceedings.

An order will be entered, effective November 15, denying the application of the carriers, except that the charging of higher intermediate rates will be permitted in accordance with the above findings.

There is no essential difference between this order and an order which the commission might make under the third section.

We do not think that any further order should be made for the present in this case. It may be asked why the schedule of rates suggested by the commission as reasonable should not be ordered in. The answer is that carriers should be permitted insofar as possible to adjust their own tariffs and that it seems probable that in compliance with this order carriers must establish rates in substantial accord with those suggested by us. It should be ever borne in mind that the acute complaint in this case is the discrimination and not the unreasonable rate.

EARNINGS OF RAILWAY EMPLOYEES FOR THE YEARS 1900 TO 1910.*

The total compensation of railway employees, exclusive of general officers, increased from a little over half a billion dollars in 1900 to $972,000,000 in 1909, or an increase of 72.3 per cent. In 1907 the total compensation was over a billion dollars. Aggregate labor compensation amounts to nearly three-fifths of the total operating expenses. If account were taken of wages represented in materials and supplies purchased by railways, probably not less than four-fifths of the money spent for railway operation would resolve itself into salaries and wages. It is significant that during the nine years, 1900 to 1909, when operating expenses increased about 77 per cent., labor compensation continued to claim the same share of total expenditure. Whether this relationship will continue is a question that cannot be answered without more exhaustive study than has been possible in this report. However, one conclusion seems warranted. In the absence of offsetting increases in rates of pay, a liberal maintenance policy tends to lower the proportion that labor secures directly of total outlay for railway operation, because it means a relatively larger expenditure for materials.

While the per cent. that aggregate labor compensation is of total operating expense may for the railways of the United States as a whole be relatively invariable, yet an investigation of the figures of individual roads shows that this figure for the United States is the average of a mass of widely varying percentages on individual railway systems, and that these variations are due to no one cause. Labor cost is a variable quantity in the midst of other variables, and its relation to the other factors depends on a number of causes (such, for example, as increased expenditure for materials used in maintenance), working with more or less effect on different railway systems.

Labor obtains about 40 per cent. of the gross receipts of railways from their transportation service. This percentage does not vary materially from year to year for the United States as a whole, but there is no such close correspondence if individual roads are considered. Differences of accounting method, differences in maintenance policy, differences in rates of pay, and differences in operating efficiency have their influence, varying in degree on different roads.

Revenues per traffic unit (ton miles plus passenger-miles) increased 3.8 per cent. during the years 1900 to 1909, the increase being entirely in revenue per ton mile. Labor compensation per traffic unit increased 9.5 per cent. during the period, and there were three years, 1904, 1907, and 1908, in which the figure exceeded that for 1909.

Of the fifteen roads whose accounts have been studied, ten show a very definite increase in compensation per traffic unit, and in two of the remaining five the compensation per traffic unit has had a tendency to remain stable during the decade rather than to decline. It must be concluded either that the railways are being maintained and operated with steadily decreasing efficiency, or, as is the fact, that the rates of pay for railway labor have increased.

This increase in compensation per traffic unit is most significant. It is an axiom of railway operation that if the plant is not working to its full capacity an increase of traffic will be

*Prepared by the Bureau of Railway Economics; published with Bulletin No. 16.

accompanied by no corresponding increase in expense. While labor is not one of the invariable elements of expense, yet it would probably be granted that, other conditions remaining the same (and this includes rates of pay), labor cost should not increase so rapidly as traffic. But during these ten years, not only is there an increase in labor compensation equal to the growth in traffic, but an even more rapid increase.

Because of the varying methods used on different railways for reporting wage statistics, comparisons can be made only in a general way between different railways, but comparisons from year to year on individual roads will be valid, provided the methods used by each road remain the same.

Taking the United States as a whole, the most numerous group of employees is found to be those engaged in conducting transportation, amounting to 40 per cent. of the total number. Of the individual classes of employees, "other trackmen" contain by far the largest number, the proportion reaching 21 per cent. in 1909. Omitting the class, "all other employees and laborers," "other shopmen" come second, with about 13 per cent. The variations in percentages are not large from year to year. General office clerks have steadily increased their proportion and "switch-tenders and watchmen" have shown a steady decline relative to the other classes. Statistics seem to indicate that in years of retrenchment the discharge of men effects most of the important classes of labor. Certain classes, such as station agents and telegraph operators, are hardly affected at all by years of depression.

For the United States as a whole, and for every one of the groups, the three highest paid classes of employees are, in order, the enginemen, conductors and machinists. "Other trackmen" are the lowest paid. "Switch-tenders and watchmen" and "other station men" are classes also showing low rates of pay. Among the other classes there are many variations among the groups, but differences in methods of computation prevent any close comparisons.

For the fifteen individual roads subjected to study, the conclusions generally correspond to those just stated. There are some unexpected variations, but these may well be due to differences in methods of computation employed by different roads.

For the United States as a whole there has been a steady increase in average daily earnings of employees since 1897. As there has been no marked change in the proportions of the numbers employed in the different classes, this increase in the average can only be attributed to the increase in the rate of pay. "Other trainmen" show an increase in average daily earnings of 33.5 per cent., machinists of 30.1 per cent., firemen of 27.1 per cent. General office clerks show an increase of only 5 per cent., and switch-tenders an actual decline. The interstate commerce groups show results in many cases quite different from the averages for the United States. Thus in group IV the class showing the largest increase in daily earnings is the carpenters, in group V, the station agents, and in group VII, the firemen. The variations are still greater when the fifteen separate roads are considered, yet to ascertain accurately the causes of these individual variations would require a special inquiry in each case into methods of wage compilation, the peculiar situation of the different classes of employees, the strength of the demand [illegible] and the policy of the railway management.

[illegible] the various classes of trainmen has in most cases increased as rapidly as revenue per train mile, and in some cases much more rapidly. Thus, while revenue per train mile was 32.6 per cent. higher in [illegible] conductors' compensation per train mile was 37.8 per cent. higher, other trainmen's 59.5 per cent., enginemen's 24.1 per cent., and firemen's 30.4 per cent. Of the fifteen [illegible] increase in compensation per train mile exceeded the increase in revenue per train mile for engineers [illegible] and the other [illegible].

There has been no uniform increase in locomotive tractive power on different railways that correspond with the demand for hauling facilities, and hence the relation of labor compensation to this increase in tractive power cannot be established without detailed investigation. During the years 1902 to 1909, total tractive power increased 99 per cent., average tractive power 30 per cent., average daily earnings of enginemen 16 per cent., and of firemen 21 per cent.

Making due allowance for unsatisfactory price statistics, it appears that in 1907, the last year for which retail food prices are available, all classes of employees, except enginemen, carpenters and section foremen, show an increase in wages for the period 1892 to 1907, either in excess of the increase in cost of food or practically equivalent to it. For the period 1892-1909, the increase in wholesale prices, amounting to 30.3 per cent., was exceeded by that of two classes, "other trainmen" and "machinists," and equalled by "firemen." All other classes fall below this increase. For the fifteen roads, taken together, the increase in average daily earnings of employees, 1901-1910, was in excess of the increase in wholesale prices.

Comparing earnings of employees with ton-mile revenue for the years 1900 to 1909, it will be observed that the employee's ability to purchase ton-miles has increased about 13 per cent. In other words, assuming the number of employees to remain stationary, the railways were obliged to handle 13 per cent. more ton-miles in 1909 than in 1900 in order to pay the wages of their employees.

The purpose of this section of the study is to make clear the unsatisfactory character of the available statistical information and the impracticability of an attempt at a comparison with railway wages.

The considerations upon which this conclusion rests may be briefly summarized as follows:

1. Tabulations of wage statistics by different governmental agencies are based upon different methods of compilation.

2. Comparisons are disturbed by the varying proportions in different industries of skilled and unskilled labor, as well as by the geographical location of the industry.

3. The character of work differs, in different industries, in the same classes of labor.

4. Comparisons are affected by the degree of unemployment in different industries.

5. Statistical compilations are frequently inadequate because they relate to but a single year.

6. Railways employ different methods of compilation in the tabulation of wage statistics.

Plans are in hand for the completion of the Matadi-Leopoldville Railway, Congo. This line is the sole connecting link between upper and lower Congo. River communication on the Congo is completely cut off by the falls extending north of Matadi for 225 miles, while the overland caravan route is very difficult. Before the advent of the railway the journey by the caravan route, barely 250 miles in length, between Matadi and Stanleypool occupied 20 days and entailed great loss of life, while the cost was some $10 per load of 65 to 75 lbs. By the railway the journey is made in two days, and the cost of transporting such a load is a little over 10 cents. The railway, 250 miles long and built at a cost of $15,767,500, is a narrow-gage single-track line, with 99 bridges, all but one being constructed of iron. The line leaves the south bank of the Congo river at Matadi, 100 miles from the mouth, and meets the river again at Dolo, on the Stanleypool, some 7 miles above Leopoldville, to which town it runs down the bank of the river through Kinchasa, where there is an excellent harbor. Leopoldville harbor is dangerous, owing to the vicinity of the rocky reef at Kallina Point and of cataracts. The direction of the operation of the railway is, of course, in charge of white men.

A PRACTICAL DEMONSTRATION IN FUEL ECONOMY.

The Lehigh Valley recently made a fuel test on its class F-6 Atlantic type locomotive No. 2475, between Buffalo, N. Y., and Jersey City, N. J., to give its enginemen and firemen an object lesson in fuel economy. The locomotive is one of five of the same type which was designed in the office of the mechanical engineer of this road and made in its shops at Sayre, Pa., being placed in service in November, 1910. The company has furnished a report of which the following statement is an abstract.

The test was made on June 21, with John Corey, engineman, and Frank Pettit, fireman, handling the engine, which left Buffalo on train No. 4, at 9:58 a. m., and consisted of 10 cars. The same locomotive made the entire run of 446.6 miles with the same crew; the regular crews east of Sayre acted as pilots over their divisions, as Corey and Pettit were not familiar with that part of the road. The following table gives the weight of the train and the distance each weight has hauled:

Stations.	Miles Run.	Cars Hauled.	Tons Behind Tender.	Car Miles.	Ton Miles.
Buffalo to Bethlehem....	359	10	560	3,590	201,040
Bethlehem to Easton....	11.6	8	433	92.8	5,022.8
Easton to Jersey City..	76	7	372.8	532	28,332.8
Total	446.6	..	.....	4,214.8	234,395.6

The engine took water eight times, but was supplied with sufficient coal at the start to make the whole run, the total amount used being 33,070 lbs. A helping locomotive assisted the train from Wilkes-Barre, Pa., to Fairview, 16.3 miles, with a 1.8 per cent. grade; this is the usual practice. The weather was clear, the average temperature was 80 deg., the wind was light and the rail good. Thirty-one stops were made in the whole trip of 12 hours and 3 minutes, which was only 6 minutes over the scheduled time. The actual running time, deducting stops, was 10 hours and 40 minutes, which made an average speed of 41.8 m. p. h. A remarkable feature in the test is that the fire was not cleaned nor even raked during the whole trip and the grates were only slightly shaken six times.

The average boiler pressure throughout the run was 195 lbs., the minimum being 190 lbs. The coal used was shown to be 0.128 lbs. per ton mile and 48.94 lbs. per square foot of grate surface per hour. The following table gives a comparison of some of the figures taken from this test run and corresponding figures for the year ending June, 1910:

	Coal per pass. train mile.	Coal per pass. car mile.	Shovels full per mile at 14 lbs.
Train 4, June 21, 1911....	67.33 lbs.	7.134 lbs.	4.8
Average, 1910	132.2 lbs.	24.4 lbs.	9.4

This table indicates what can be done by an engineman and a fireman. The total amount of coal used, as previously stated, was only 15 tons and 70 lbs., where as the usual amount of coal used on this same run varies from 25 to 30 tons. The money expended yearly for locomotive fuel on the Lehigh Valley is one of its largest single expense items; for the year ended June, 1910, it was about $3,000,000. The coal during that time was handled by 1,000 firemen, or each fireman handled $3,000 worth of coal. If each engineer and fireman would operate the locomotive so as to use about two less shovelsfull of coal per mile, it would mean a reduction of some $200,000 in the yearly cost of fuel. However, this saving cannot be done by one man alone; it requires the united effort of the whole number of firemen and engineers. The following table gives the principal dimensions and ratios of the locomotive used in the test:

General Data.

Type	4-4-2
Service	Passenger
Fuel	Bit. coal
Tractive effort	25,300 lbs.
Weight on drivers	99,700 lbs.
Weight of engine and tender in working order	303,100 lbs.
Wheel base, driving	6 ft. 11 in.
Wheel base, total	25 ft. 8 in.

Ratios.

Weight on drivers ÷ tractive effort	3.94
Tractive effort x diam. drivers ÷ heating surface	586.
Total heating surface ÷ grate area	64.9
Firebox heating surface ÷ total heating surface, per cent.	4.81
Weight on drivers ÷ total heating surface	30.
Volume both cylinders, cu. ft.	10.40
Total heating surface ÷ vol. cylinders	320
Grate area ÷ vol. cylinders	4.92

Cylinders.

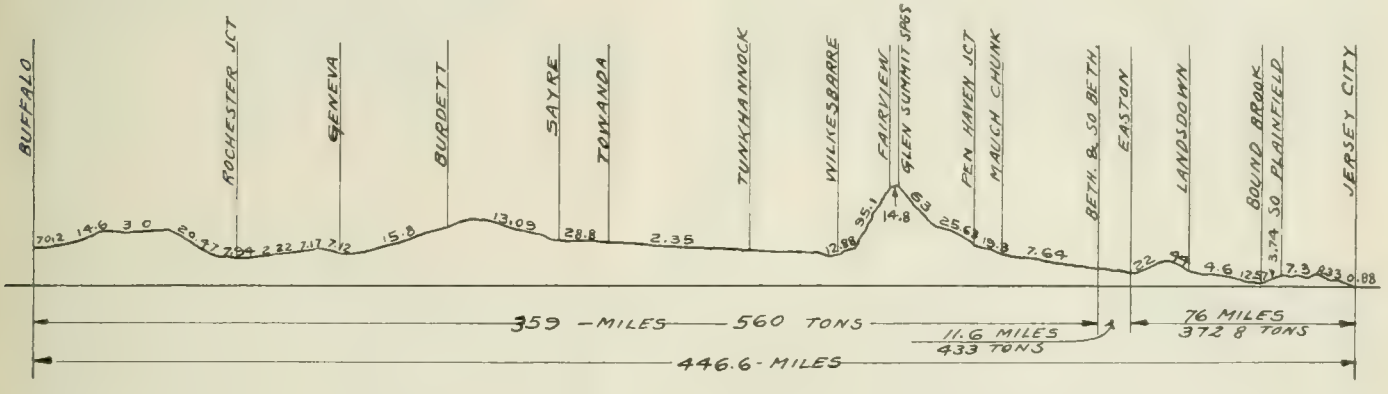
Kind	Simple
Diameter	21 in.
Stroke	26 in.

Wheels.

Driving, diameter over tire	77 in.
Engine truck, diameter	36 in.
Trailing truck, diameter	56 in.

Boiler.

Style	Straight
Working pressure	200 lbs.
Outside diameter of first ring	70¾ in.
Firebox	Semi-wide
Tubes, number	374
Tubes, length	16 ft. 2 in.
Heating surface, tubes	3,164 sq. ft.
Heating surface, firebox	160 sq. ft.
Heating surface, total	3,324 sq. ft.
Grate area	51.2 sq. ft.
Center boiler, above rail	9 ft. 11 in.
Top smokestack, above rail	15 ft. 4½ in.



Lehigh Valley Profile, Buffalo, N. Y., to Jersey City, N. J.

JAPAN'S NEW CENTRAL RAILWAY.

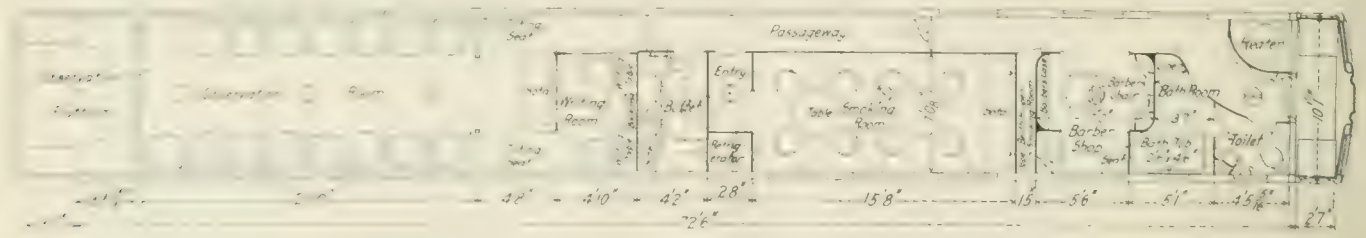
The completion of the last section (about 50 miles) of the western division of the Central Railway line, and the opening of the whole road to traffic on May 1, was celebrated at Nagoya. This division follows an old Daimyo road called the Nakasendo. The Central Railway runs from Tokyo to Nagoya, through the central provinces of Kai, Shinano and Mino, thus opening up entirely new territory, the communication between these cities having been heretofore carried on by the Tokaido Railway, which follows close along the eastern coast, being also an old Daimyo road of the same name. The distance between Tokyo and Nagoya is slightly less by the Central than by the Tokaido line, but as express trains will not be run for the present on the new

line, through passenger traffic will continue to follow the old route for some time to come. The new line, however, will undoubtedly become a favorite, especially with tourists, as it runs through some of the most beautiful and interesting scenery in Japan. The government's chief object in the construction of this line is undertsood to be military, but at the same time it will greatly facilitate intercourse between several important and heretofore inaccessible and outlying districts, and is especially expected to exert a very favorable influence in the business of Osaka. Formerly freight sent to and from that city and the central provinces and Echigo had to go all the way round by Tokyo, but now the new line makes a great reduction in distance and in rates. Articles sent to the indicated provinces from Osaka comprise fish, cotton cloths, cotton yarns, fertilizer, ironware, dyes and colors, ame, sugar and zinc sheets. The cost of construction of the 225 miles amounted to $17,500,000. The 95 tunnels total 113,378 ft., the average cost being $45.62 per foot. The Sasago tunnel, the longest in Japan, is over two miles, 71 chains.

The 351 bridges have a total length of 24,265 ft. It is estimated that these 351 bridges were built at an average cost of $85.09 per foot.

OBSERVATION-BUFFET CARS; CHICAGO, MILWAUKEE & ST. PAUL.

An order of steel cars, which includes observation-buffet cars, compartment and tourist sleepers, combination mail and express cars, and baggage cars, has recently been filled by the Barney & Smith Car Company, Dayton, Ohio, for the Chicago, Milwaukee & St. Paul. A large number of these cars are to be used on the Chicago, Milwaukee & Puget Sound, and are so lettered. The underframing, superstructure framing, exterior sheathing and roof of these cars consist entirely of steel, the interior finish is of wood, thereby incorporating the important features of safety and serviceability incidental to steel construction with the advantages that go with the wood interior finish, such as comfort and the opportunity afforded for decoration. As these cars are practically alike in their structural details, the following description of the observation-buffet cars will serve to give a general idea of the construction, and are well insulated throughout between the inside finish and the steel exterior.



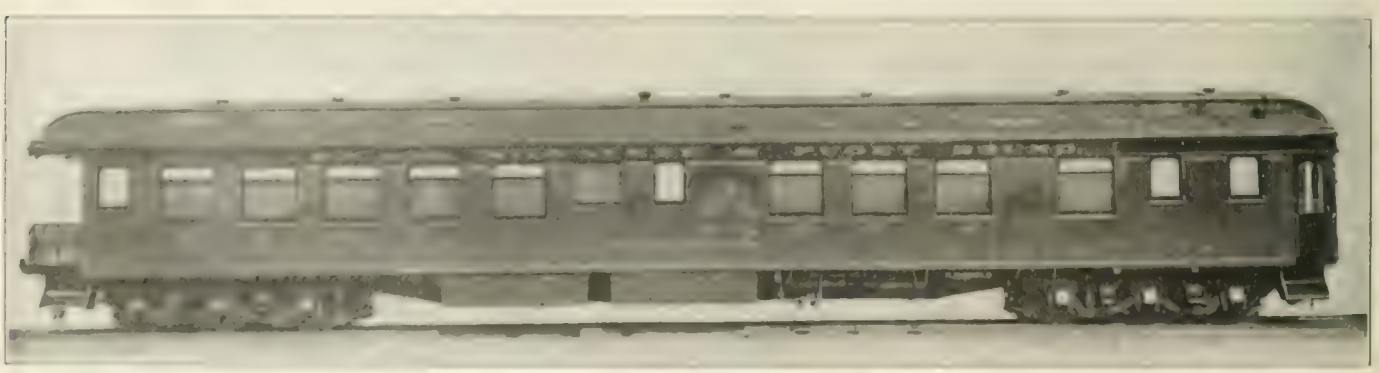
Plan of Observation-Buffet Car for the Chicago, Milwaukee & Puget Sound.

The cars are 72 ft. 6 in. over end sills and 10 ft. 1 in. wide outside of the sheathing. The underframe is built up of steel plates and shapes in conjunction with combined cast steel body bolsters and platforms. The center sills are two plate girders of the fish-belly type with 5/16-in. web plates, top and bottom angles, and a top cover plate. They are 30 in. deep between the needle beams, tapering toward the cast steel bolsters, to which they are riveted. There are 4 needle beams of a built-up construction having 5/16-in. web plates, top and bottom angles, and top and bottom cover plates. These needle beams are connected to the side and center sills by angles. The longitudinal floor supports are 3-in. channels, and the cross floor supports are 4-in. channels spaced at suitable intervals. The flooring consists of 5/64-in. sheet steel riveted to the floor supports and cross channels. Over this is laid 1 in. of hair felt insulation, No. 20 Keystone corrugated steel flooring, and then over that is laid a layer of a composition flooring—Karbolith.

The side framing is constructed of 3/16-in. pressed steel Z-bar shaped side posts with ⅛-in. steel sheathing, which forms the web of a plate girder, the side sill angles being the bottom member of a 4 in. x ¾-in. steel belt rail bar the top member. The body corner posts are 5/16-in. pressed steel shapes, and the vestibule corner posts are of ⅜-in. pressed steel. The side plate is a 6-in. channel; the end plate is of ⅜-in. steel; and the deck sides are of ⅛-in. steel plate pressed to shape and running the full length of the car, with openings for the deck sash. The deck posts, carlines, etc., are pressed steel shapes, and the roof and hood covering are sheet steel. The cars have the Barney & Smith anti-telescoping end framing of Z-bar

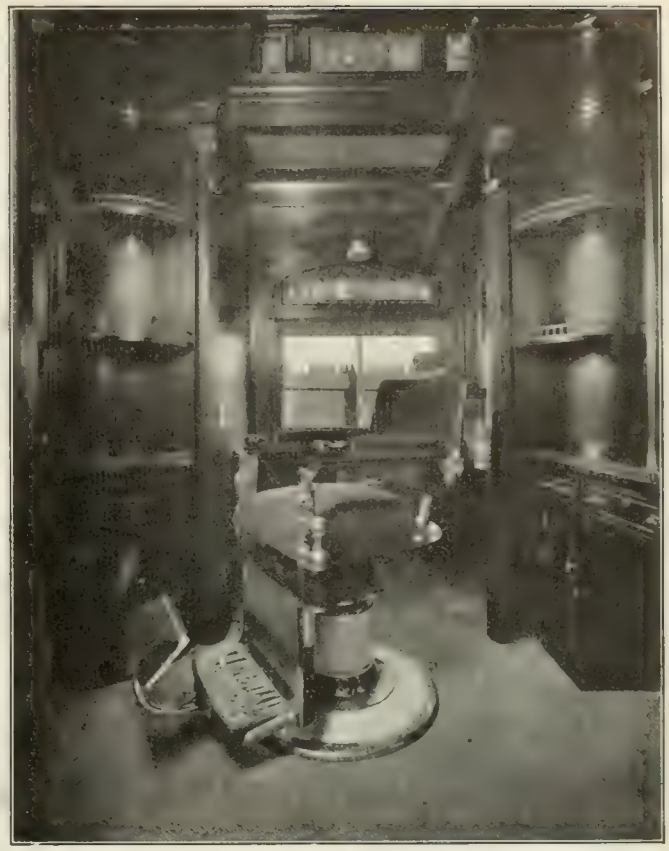
The accompanying illustrations show the interior appearance of the cars. The wood for the interior finish is Cuban mahogany inlaid with figures in marquetry, this being of different designs to harmonize with the character of the finish in the different compartments. All the marquetry has special treatment to preserve the natural colors of the wood, which gives a clear-cut contrast and naturalness to it.

The cars are equipped with Pintsch gas and the dynamo system of electric lighting, the lighting fixtures being of attractive designs. The ceilings are beautifully tinted. Art and leaded glass is used for the inside windows, the deck sash, the par-



Observation-Buffet Car; Chicago, Milwaukee & Puget Sound.

Steel Framing for Observation-Buffet Car.



Barber Shop; Observation-Buffet Car.

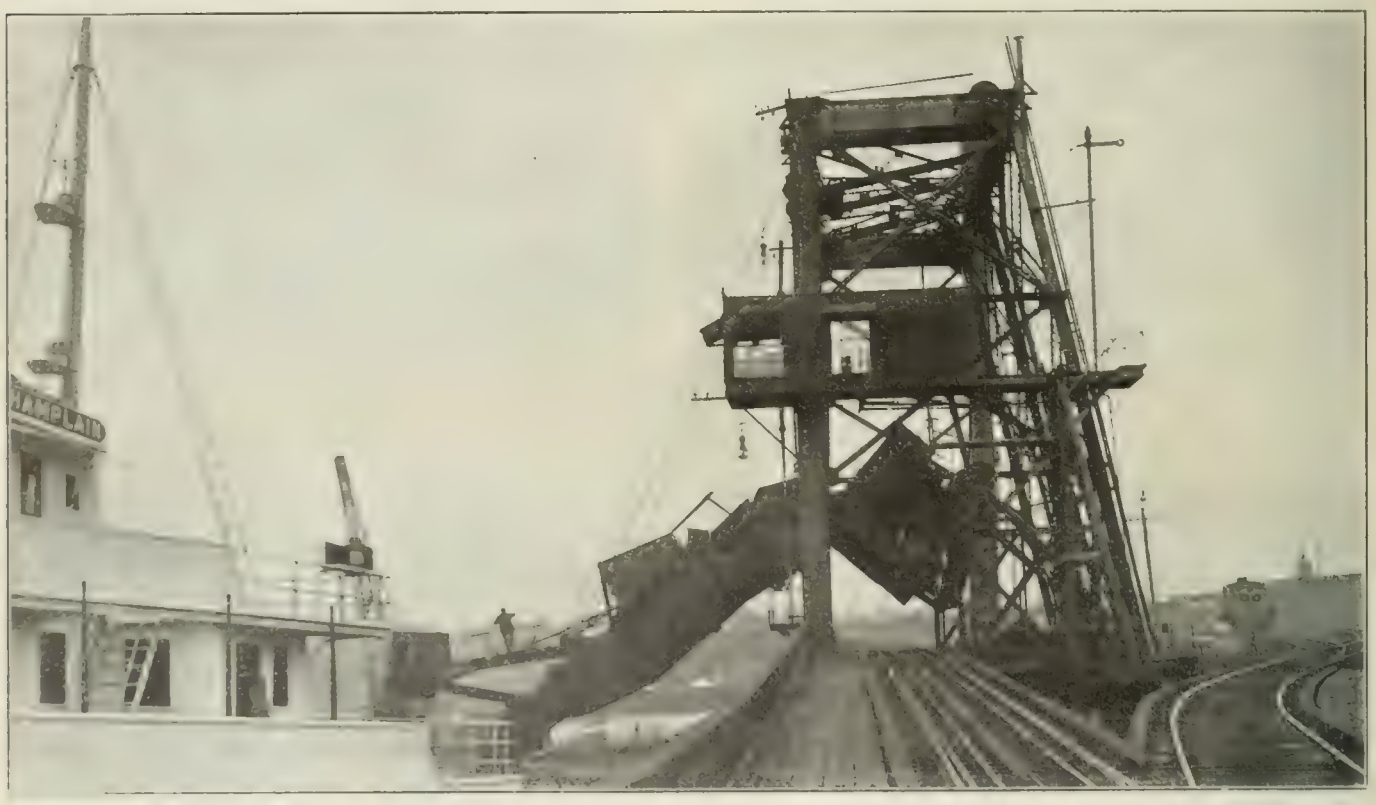
Smoking Room; Observation-Buffet Car.

Observation Room; Observation-Buffet Car.

tition dividing the smoking room and the passageway, and the partition enclosing the writing room. The exteriors of the cars have an unusually neat appearance for this type of equipment, because of the absence of rivet heads in connection with the letter boards and outside surface of the side posts above the window stooling. The interior arrangement, as will be seen from accompanying plan, includes an observation room with an observation platform, writing room, with writing tables and book case, smoking room, bath room, barber shop and buffet, all equipped with every possible convenience.

COAL AND ORE DOCKS OF THE BALTIMORE & OHIO AT LORAIN, OHIO.

The Baltimore & Ohio operates docks at Lorain, Fairport, Sandusky and Cleveland, on lake Erie; and with the addition of three improved ore-handling machines recently put into service at Lorain, the ore and coal docks there are among the



McMyler Unloading Machine, Unloading Car of Coal.

largest on the Great Lakes. Over the docks at Lorain the coal from the West Virginia and the southeastern Ohio fields is handled. Last year more than 2,750,000 tons of coal were loaded into the lake steamers at that port. At Fairport the coal from the Pennsylvania fields is handled exclusively, and, though the business in coal is not as extensive as at Lorain, the handling of ore exceeds the latter point in quantity.

[illegible] gravity to the machines for unloading the coal from cars into the vessels. There are two coal unloading machines in the terminal, each having four feed tracks of 50 cars capacity leading to [illegible] river empties into the lake, permitting the large steamers to tie [illegible] gravity and arrives at the unloading table just in time to start the empty car on its return trip.

Arriving at Lorain with their cargoes of ore, the steamers tie up at the docks to unload the ore for transshipment by rail. The new machinery for unloading the steamers is the latest design of Brown hoist unloader, driven by electricity and equipped [illegible] ore an hour.

[illegible] time they are lowered into the hold of the vessels, after which they are hoisted and carried in over the dock on a movable girder, or ram, carried in a heavily braced portal frame, which is itself movable lengthwise of the dock. The rams are a distinctive feature of the unloaders, replacing the hinged boom [illegible] machines hitherto constructed. The buckets may either be [illegible] discharged directly into cars on any one of the four tracks spanned by the unloader or dropped in the trough space, which

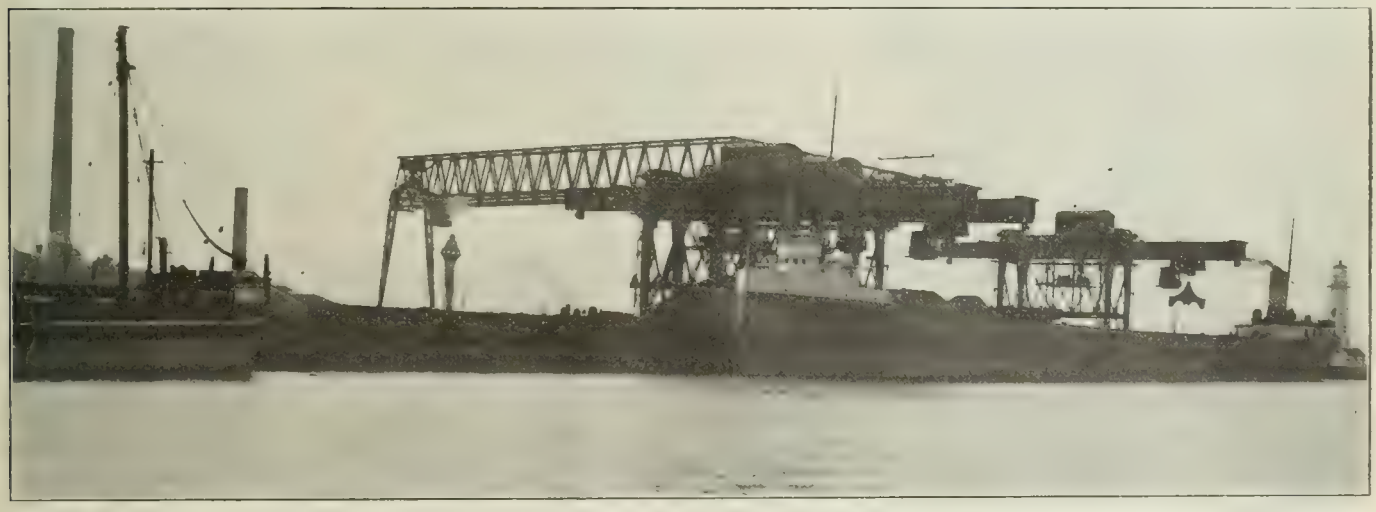
has a capacity of 100,000 tons, and is separated by a concrete wall from the tracks. Once deposited in the trough, the ore may either remain in temporary storage, or be conveyed to the larger storage space covered by the ore bridge.

This bridge is an immense gantry crane carrying a grab bucket of 10 tons capacity by an electric trolley traveling on a track 85 ft. above the ore floor. The main span of the bridge, 250 ft. in length, spans the principal storage floor, while a cantilever arm of 144 ft. extending toward the dock front commands the trough space back of the unloaders and also extends over the rear unloader wall and the track next to it on the dock side. All ore deposited in storage by the unloaders or the bridge may be picked up by the bridge bucket and reloaded on cars on either of two tracks through a weighing hopper similar to the weighing devices on the unloader. In fact, these arrangements for weighing ore direct into cars on all tracks commanded by the machines are believed to be the most complete so far installed at any dock. By their use, each car may be loaded to its exact capacity and leave the dock billed for the road without expensive delays for switching over yard scales, or the necessity of being returned to the dock to be lightened or loaded, accordingly as over or under loaded.

The combination of fast unloading plants on the dock front with buckets moving at high speed over a short travel, with a storage bridge of long space, carrying a larger bucket over the storage space is found on all modern lake docks. It has been found that the disadvantage of rehandling is more than counterbalanced by the increased efficiency of the dock machines. At the Lorain dock, the rehandling bridge has a capacity of 600 tons per hour, or 60 per cent. that of the unloaders taken together. This is estimated to be ample, as 40 per cent. of the ore received at the dock is, on the average, storage ore, while 60 per cent. goes direct in cars to the furnaces.

The construction of a permanent dock and track to carry the extreme wheel loads of the unloader trucks (96,000 lbs. per wheel on eight wheels each) presented special difficulties. Test drillings showed shale at depths from 18 to 24 ft. below mean lake level at the dock line. Two previous attempts to build a pile and timber dock on the site had failed, owing to insufficient penetration of the piles along a channel dredged to 21 ft. depth. It was decided to use timber cribs filled with stone and capped with monolithic concrete similar to the adjoining U. S. government pier. The contract was awarded James Stewart & Co., of New York, for the removal of old work and construction of 845 lin. ft. of this dock; also for four monolithic concrete walls on piling or reinforced concrete footings to carry the machine tracks back of the dock face and including 250,000 sq. ft. of oak plank flooring on the ore storage space. On account of anticipated settlement of the timber cribs, it was decided later to substitute a temporary timber superstructure to carry the dock front track, with the intention of substituting concrete later. Experience has justified this arrangement, as a settlement of 4 to 6 in., and a movement of 2 to 3 in. has occurred. This has been easily adjusted by shimming and shifting the temporary superstructure, but would have been disastrous to a concrete dock.

In all 17 cribs of 12 in. x 12 in. hemlock timber, about 20 ft. x 22 ft. x 48 ft., faced with 3 in. oak plank were sunk in the dock front. Each was secured against movement toward the river by 2 in. rods leading to a series of pile anchors, and by a line of 10 in. I-beams, 36 ft. in length, set 8 ft. center to center in front of the cribs in holes drilled in the shale bottom. In addition, 2,900 lin. ft. of track wall was built, requiring 7,500 cu. yds. concrete and 40,000 lin. ft. of piling. Sufficient dock and substructure walls were finished in November, 1910, to permit the Brown Hoisting Machinery Company to commence the erection of steel work, and May 1, 1911, the railway company's operators were placed on the machines which handled their first cargo of ore, May 22, 1911. Provision has been made for future development by so constructing the bridge that a rear cantilever of 150 ft. can be added when required, increasing the travel of the bucket by that distance; also by extension of the track walls out into the lake 500 ft. to the recently established U. S. harbor line; the bridge travel will be increased by that distance, doubling the storage area commanded by the bridge.



General View of Ore Unloader with Steamer at the Dock.

The ore received on the docks at Lorain and Fairport is distributed by the Baltimore & Ohio to the large steel mills and industrial plants in the Pittsburgh and Wheeling districts, and the Mahoning and Shenango valleys.

The power station which supplies electric power for the operation of the ore handling apparatus is located about 600 ft. from the ore machinery on the dock. The building is 73 ft. x 121 ft., with concrete foundations and side walls up to the level of the reinforced concrete engine room floor, the balance of the walls being of brick and the roof of reinforced concrete slabs carried on I-beam girders. Monolithic concrete foundations were provided for three Buckeye engine sets and for a 175 ft. stack constructed by the Alphons Custodis Chimney Construction Company. The power house and accessories, including concrete coal bunkers, 30 in. cast iron pipe inlet from the river and discharge line to the lake, electric ducts, etc., were constructed by P. Farrell, Cincinnati, Ohio. On account of the prominent location of the building near the Lorain water works, particular attention was given to securing a neat exterior finish. The plans were prepared by the architect for the B. & O.

The plant is equipped with two 250 h. p. B. & W. vertical

header, water tube boilers, operating under 150 lbs. pressure, arranged in batteries of two. Provision has been made for the future installation of three additional boilers, making a total of four batteries with a boiler capacity of 2,000 h. p., and an overload capacity of 50 per cent., providing, if necessary, 3,000 h. p. output.

The generating equipment of the plant consists of two 500-k. w., Westinghouse, 250 volt, direct current compound wound generators, with interpole windings, direct connected to two 1,040 h. p. cross compound 24 in. x 42 in. x 36 in. Buckeye engines, each being equipped with an extra heavy flywheel weighing 25 tons, capable of storing sufficient energy to maintain practically constant speed and voltage, even though subjected to sudden alternating motor and direct current generator, in parallel with one or both of the 500-k. w. Westinghouse generators previously mentioned, thereby providing 300-k. w. additional power for ore handling apparatus. Switching arrangements have been made to enable this motor generator set to be operated from either end as a motor, and in the event of repairs to the turbine, this set will be operated as a direct current and alternating current generator furnishing 440-volt, 60-cycle, 3-phase alternating current, which is stepped up to 2,300 volts for transmission to the shops. It will be seen from the foregoing that the motor generator set is a flexible tie between the alternating current and the direct current system in the station.

This motor generator set is made up of one alternating current unit and one direct current unit, the rotating elements being on one shaft and the whole machine on a common bed plate. The alternating current unit consists of one 3-phase, 300-k. w., 60-cycle, 440 volt separately excited alternating current machine. The direct current unit consists of one 250-volt, 300-k. w. compound, interpole machine operating at 600 r. p. m. normal rated speed. An Alberger surface condenser of sufficient capacity was provided together with a complete equipment of pumps for handling the exhaust steam from the 300-k. w. turbine previously mentioned.

A complete feed water system was installed, consisting of one Cochran feed water heater and two Epping Carpenter feed water pumps, 10 in. x 6 in. x 102 in. duplex, outside end packed, pot type, operated against a head of approximately 60 to 80 lbs. per water supply, the water supply to the heater being con-

Brown Hoist Unloader, Unloading Cargo of Ore; Grab Bucket Lowered into Boat.

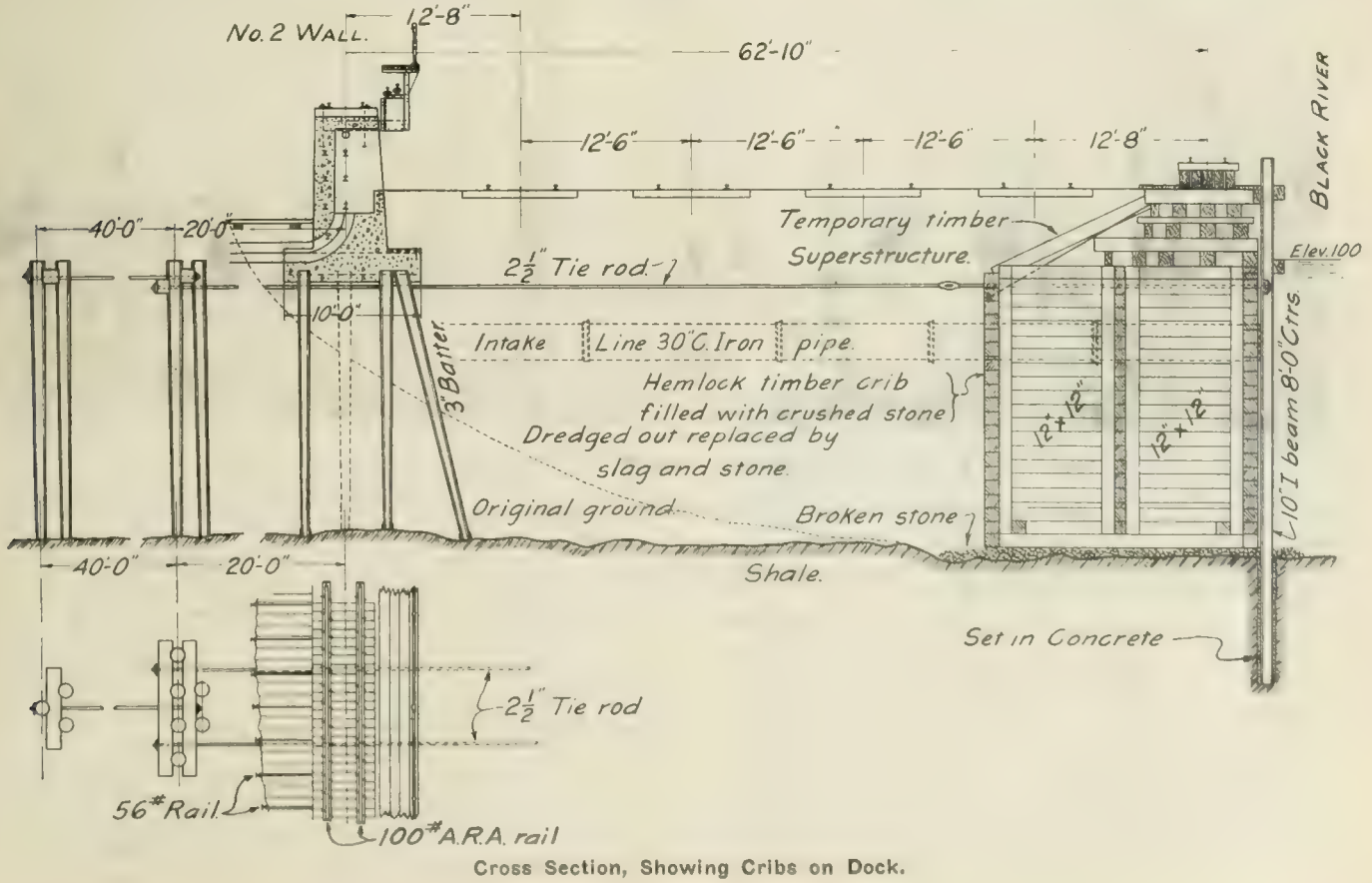
trolled by an automatic float valve. In the exhaust line a 24-in. preference or back pressure valve was installed directly under the head, this valve being designed to automatically control the amount of steam to the feed water heater. An outside control lever is provided in order that the valve may be controlled from the engine room floor. A Patterson damper regulator was installed to control the main damper in the flue.

Two 250-volt direct current feeder circuits were provided, one for the supply of power to the three Brown hoist ore unloaders, and one for the power supply for the ore bridge.

The feeder for the unloader supply consists of one 2,000,000 and one 1,500,000 c. m. cable per side, a total of 3,500,000 c. m. for a distance of approximately 800 ft. from the switchboard to the center of distribution. The bridge feeder consists of one 1,500,000 c. m. cable per side for practically the same distance as for the unloader feeder. These feeders are paper insulated, lead covered, and were drawn into a conduit system feeding the various manholes in the ore handling apparatus piers.

Power is transmitted to the ore handling apparatus through conductor rails located on the piers which support the unloaders and bridge. On the unloader pier there are two 90-lb. A. S. C. E. rails used as conductor rails. These rails are reinforced with

Unloading Machine and Arrangement for Loading Cars.



Cross Section, Showing Cribs on Dock.

two 700,000 c. m. bare copper cables the full length; each rail is also double bonded with an approved expanded bond. These rails are reinforced with two 1,250,000 c. m. w. p. cables, one positive and the other negative, with taps to the rail, also to the 700,000 c. m. cable along web of rail.

There are two piers for the bridge circuit. Each pair carries

Bridge Over Storage Piles.

one 90-lb. A. S. C. E. rail as a conductor, reinforced with one 700,000 c. m. bare cable on the web of the rail. These rails are also double bonded. These rails and feeders are so arranged that by means of suitable switches the entire output of the station may be concentrated on the unloader rails. The bridge feeders are then used as auxiliary unloader feeders. However, the bridge and unloader circuits may be separated and each oper-

Power House.

LETTERS FROM AN OLD RAILWAY OFFICIAL TO HIS SON, A GENERAL MANAGER.*

X.

Chicago, June 10, 1911.

My Dear Boy: You have asked me to tell you something about line and staff. The term line is used to indicate the direct sequence toward the active purpose of the organization. The line officer exercises a direct authority over men and things. He is the incarnation of administrative action. The staff is supplementary to the line as equity is supplementary to law. The staff officer is the playwright. The line officer is the actor. The actor is usually too much absorbed with th technique of his art to write new plays. The line officer, as such, seldom originates new methods, because he is too close to his everyday problems of administration to cultivate perspective. The ideal staff officer has had experience in the line.

The line with a railway—its fighting force, so to speak—is the operating department. Because they are staff departments the offices of the other three, namely, accounting, traffic, and executive, legal and financial, can close from Saturday noon until Monday morning. The operating department, being the line, keeps the road open and the trains moving. Because of the poverty of our language, we now encounter some difficulties of expression in explaining all the various ramifications of line and staff. A staff department, because of its size, may exercise line functions within its own interior administration. Thus, the auditor organizes his office forces under appropriate chief and subordinate officers who, within the accounting department itself, exercise the authority of line officers. When such accounting officers get outside their legitimate sphere and endeavor to act as line officers in the operating department, expensive friction begins. This feature I shall discuss with you later. Suffice it to say that at present the hardest of all problems is to keep line and staff in economical balance. Staff departments then may within themselves exercise line functions. This grows rather from necessities imposed by size than from inherent nature of function. The first staff officer was an adviser and exercised no authority, except that of polite inquiry, because there was no one whom he could properly command. So the line, the operating department, soon grows so big as to require staff officers within itself, people who have time to think out improvements because they are not burdened with administrative responsibilities.

Hold tightly to this thought, my boy. The plane of differentiation betwen line and staff usually follows a cleavage based upon size rather than upon relative importance of function. The first line officer needed no staff, because he had time to think as well as act for himself. The first superintendent looked after the repairmen himself. The first master mechanic came into being not because he was so different from everybody else, but because the superintendent had become too busy to do it all himself. By and by the master mechanic forgot this basic fact and unconsciously exaggerating his own specialty began to feel that the railway is incident to shops and equipment rather than shops and equipment being incident to the railway. The last five years have witnessed a decided improvement in this undesirable condition. Just at present the store department Indians are the tribe most in need of being rounded up on the operating department reservation for eye wash and vaccination against distorted perspective.

The operating department of a railway is or should be a real department, complete and self-contained. It consists of such important component elements or branches as maintenance of way and structures, maintenance of equipment, transportation, telegraph, signals, stores, purchases, dining cars, etc. Let us not waste any time discussing the relative importance of these com-

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us that while all are important each is useless without the others.

Individually the general superintendent, the chief engineers, the superintendent of motive power, the superintendent of transportation the superintendent of telegraph, the general storekeeper, and the superintendent of dining cars are line officers exercising direct authority in a defined sequence. Collectively they constitute, for consultation, the general manager's staff. When all have the rank and title of assistant general manager, this duality of function is the more pronounced and valuable. For the feudal notion of unbalanced components is substituted the cabinet idea of comprehensive deliberation, unified administration and devotion to a common purpose. (Anvil chorus: "It's that way on our road now.") Perhaps so, but if so, what assurance have your stockholders and the public that the same happy condition will obtain ten years hence? Each head of the nine executive departments in Washington is a line officer running his own department. At the President's cabinet table he becomes a staff officer deliberating upon the problems of all. The attorney-general should be called secretary of law, and the postmaster general secretary of posts. Then all nine would have the uniform title of secretary. The position of secretary to the president, an assistant *to* proposition, should be abolished—usually I prefer the gentler expression, "title discontinued." His duties should be performed by the secretary of state, who is always the ranking member of the cabinet. In the first cabinet, that of George Washington, the secretary of state, Thomas Jefferson, was in effect, though not in name, prime minister and chief of staff. Foreign affairs, then an incidental feature, are now so extensive for a world power that we should have another department under a secretary of foreign affairs, leaving the secretary of state as senior to be the able righthand man of the president. Here again the size of the proposition, the volume of business, is the proper determining factor.

On a small railway the chief engineer as a line officer may be able to do all the engineering himself. As the business grows he requires such special staff advisers as an office engineer, a locating engineer, a bridge engineer, a tunnel engineer, a signal engineer, etc. Some roads make such engineers line officers by giving them extensive authority over working forces. Usually I believe this is a mistake. It seems better for these engineers to be real staff officers, thinking, inspecting, warning, instructing (in the sense of lecturing), improving, designing and perhaps sometimes installing, but never directly operating or maintaining. The same general reasoning applies to the mechanical bureau when the business of the chief mechanical officer attains a volume necessitating the help of such valuable staff officers as a mechanical engineer, an electrical engineer, a testing engineer, etc.

When the telegraph came to supplement the railway, men stood in awe of its invisible effcts. Soon the telegraph man said in effect, "this is a wonderful and mysterious specialty which you fellows cannot understand. Let me, the expert, handle it for you." So he segregated unto himself a so-called department on the plea that it is so different. By and by the division superintendents woke up to find their telegraph hands tied. Appeals to the general superintendent or general manager proved fruitless. So the division linemen usually report directly to the superintendent of telegraph. They often stay around division headquarters until the chief despatcher is able to jar them loose and get them out on the road. Then they go to the scene of trouble, look wise and get the section foreman to dig the hole and do most of the work. Why not, therefore, hold the section foreman responsible for ordinary wire repairs in the first place? Let every section house have a pair of climbers, a wire cutter and pliers with whatever simple outfit may be necessary. If unusual troubles develop or a line is to be rebuilt send the most expert help available, but while on the division let such help be under the authority of the superintendent. We need an expert at the top as chief telegraph and telephone officer to tell us all how to do it. The volume of business will usually warrant making him a line officer with the rank and title of assistant general manager. He should not deal directly with operators and linemen any more than a general superintendent under normal conditions should instruct an individual conductor or a chief engineer communicate direct with a section foreman. The integrity of the division as an operating unit should be respected.

By and by the signals followed the telegraph. Once more the management allowed the specialist to put it over at the expense of the good old wheel horses in the regular line organization. The embryo signal engineer said, "This wonderful and mysterious development is really something different this time. It is absurd to suppose these stupid old section foremen can learn anything about electricity." So the signal engineer was allowed to build up a new department. He went out on the ranches or in the barber shops and hired signal maintainers. A new department is liberally treated because its activities are a fad for the time being. These signal maintainers in a few months absorb so much magnetism from the field of the signal engineer that they are qualified experts to whom the rest of us must not say anything. They have easier work, if not better pay, than the faithful section foremen of perhaps twenty years' service. The old section foreman has a "savey" of the railway business, an intuitive knowledge of the requirements of train movement that it will take the fresh young maintainer years to acquire. Then we wonder why it is so difficult to secure loyal section foremen. Sometimes a belated effort has been made to let in the section foremen on the signal game. It is difficult, however, to get the signal people to take an appreciative and sympathetic inerest in men who are not in "my department." Therefore, to prevent your track forces being thrown out of balance it will be better for a few years to keep the signal engineer on most railways as a staff officer without permitting him a line organization for operation and maintenance. Say to your roadmasters and section foremen that they will, at the company's expense, be given instruction in signals. When the signal engineer, the expert, pronounces them qualified by examination or otherwise, let them understand that there is a small automatic increase in pay. Transfer to branch lines the few who prove hopelessly deficient. The track laborer who can qualify to look after a particular signal is worth a few cents more a day to the company and should be so advised. If you start with the presumption that the man below is too dumb to learn you handicap him and probably doom him to failure. If you make him believe that he can learn what men of the same class around him are learning, that you, his elder brother, are in duty bound to help him, you will be astonished at the response of his latent intelligence. The great managers of the feudal period were forceful drivers. The great managers of today and tomorrow are great teachers, the greatest of all experts, because they show the man below how to do it. Lots of men know how. A good many know why. Comparatively few have that rare and valuable combination of knowing both how and why. It is not a happen so, but a response to the law of supply and demand that men of the Woodrow Wilson type are coming to the front in our political life.

Getting back to signals. On a road of more than one or two tracks, it may be advisable to segregate your signals from your track. Here again, the dividing line is volume of business rather than fancied importance of function. Signals are important, but so is the track. Each is an incidental component of railway operation, not the whole operation itself. On most railways the section foreman should be the responsible head of a complete sub-unit for everyday maintenance and inspection, including track, bridges, fences, poles, wires and signals. This may involve giving him more help or a shorter section.

One of the problems of line and staff is to determine what is intelligent rotation between the two. The line officer, dealing with men rather than ideas, may get into a rut of practice which prevents his seeing the beauty of the rainbow which the untrammeled staff officer may be tempted to chase too far. Some officers succeed brilliantly at originating or developing ideas in the staff and fail miserably at handling men in the line.

True individuality about which men prate the most is that which is understood the least. Our army and navy are insisting that before being staff officers, all officers, except surgeons and chaplains, must first learn to handle men by serving in the line; that crystallization in the staff must be prevented by periodic rotation to definite tours of duty in the line. The railway of the future will probably carry extra numbers of line officials in the various grades that some may be available for detail to the staff, that we may better co-ordinate our studying and our working activities.

People say that our good friend, Harrington Emerson, able and sincere, will unconsciously give the staff the best of it; while your old dad, on an even break, will be found on the side of the line. If they are correct, it leaves plenty of room for the other fellows in between. One of the delightful foibles that make human nature so interesting and so lovable is the inborn conviction of the average man that, "though H be a conservative and F. a radical, I am always the happy medium."

Affectionately, your own,

D. A. D.

HANDLING EXPRESS AND FAST MERCHANDISE FREIGHT.

BY A TRAINMASTER.

With the guarantee of safe transit of bullion across the continent by Adams & Co., and Wells, Fargo & Co., San Francisco bankers, the continental express companies were inaugurated. The great railway construction period following closely upon this, it was only natural that traffic arrangements should be made between the two. Transportation of other valuables and merchandise followed. The reason for handling merchandise by express companies was not the guarantee of safe transit, but the better service offered. The express companies transporting their merchandise by passenger trains and making door to door delivery, while the railways transported their merchandise by freight service and did not make door to door delivery.

With neither terminals nor rolling stock, with none of the operating, construction or equipment difficulties experienced by railways, the express companies are given passenger train service and the use of the most centrally located terminals for handling the same class of freight as the railways handle in freight service at less centrally located terminals. The result of this is that with practically no money invested, and therefore with comparatively little financial risk, the cream of the merchandise freight goes to the express companies, resulting in their paying enormous dividends. These dividends properly belong to the shippers, the railway stockholders and railway employees. Another ill is that passenger traffic is often demoralized by handling express (freight) at passenger terminals.

The railways should inaugurate a fast package freight service and make door-to-door delivery, making proper charge for the improved service. The present method of handling both express and high class freight is cumbersome and crude. All freight should be handled at freight stations, thereby removing [illegible] freight will necessitate some readjustment in handling, but since live stock, dressed beef, dairy products, fruit and produce are handled principally by freight service at the present time, there [illegible]

Currency and other valuable registered matter could be han[illegible]

The local or divisional merchandise locals should be made traveling transfers, and also be run on schedule, making divisional runs in six to ten hours. The present method of using freight equipment, the train crew handling freight across tracks [illegible] freight station platforms, is slow and a great [illegible] or more tracks an overhead carrier should be used. All cars in this service should be equipped with large end doors and overhead carriers running the length of the train. The freight trucks used on these carriers should be loaded at freight stations and on the train on arrival of the trains at stations, so that the only labor involved at freight stations would be that of running the freight trucks in and out of the train. Loading trucks at freight stations should be loaded by classification so that trucks could be run direct to the proper car. There should be a receiving car and a distributing car located near the center of the train. There would be a small percentage of bulky and unwieldy freight that would have to be handled by hand, as at present, but there would be only one car from which to load and unload, and more men to assist. With the overhead carriers and end doors, classification could be made en route.

The only shifting these trains should do should be to set off such cars as those containing freight from originating freight stations, and stations en route which make minimum loads. They should also pick up containing freight from the originating divisional station, and other stations en route to the terminal which would make minimum loads. This would amount to two or three pick ups and set-offs on a division. Several of these trains should be run daily and should make connections at terminals with through scheduled freights. The freight department should furnish the freight handlers and the operating department should furnish the train crews.

The benefits derived from this plan would be better service to the public, consisting in giving faster transportation, and door-to-door delivery freight, and in reducing interference with passenger traffic. It would be advantageous to the railways, because it would increase their revenue, increase the minimum carload, reduce labor at junction points, and make necessary fewer box cars, fewer movements and cars to and from junction transfers and fewer cars on the road.

TRANSPOSITIONS OF TELEPHONE WIRES.

The first telephone despatching circuit we installed was transposed every half mile. The selectors were in series, alternating on each wire. The circuit was found to be slightly noisy, and we then transposed it every quarter mile, which cut down the noise for a time, but we found it almost impossible to keep the circuit free from noise while working the selectors in series; and, as we found that most of the failures were due to the contact points of the relay, we changed from series to main line bridging selector without relay. Since then the circuit has been practically free from noise, and on all subsequent circuits installed the same method has been followed. We now transpose all our despatching circuits every quarter mile, except where two circuits parallel each for a portion of the way. Over this section one circuit is transposed every quarter mile, and the other every half mile. Looking forward to the time when the telephone will be used for other work, we arrange transpositions on our copper telegraph wires (and sometimes on the iron), every half mile for the first pair, and for the second pair, every mile, or transposed at the quarter, three-quarter, and mile, skipping the half mile. Our method of transposing when the two wires are on the same arm, is by the use of a curved iron bracket under the arm, and so placed that the wire it carries comes directly under the wooden pin carrying the other wire over the top of the arm.—*W. J. Camp* (C. P. R.) before Railway Telegraph Superintendents.

It is expected that the section of the railway between Kao Plyng, Siam, and Utaradit will take the place of the caravans which now bring down approximately 800 tons of goods yearly, consisting of hides, wax, horns, lacquer, betel nut, and medicinal plants to the value of about $111,000, taking back in return [illegible] cotton, dry goods and dried fish valued at about $259,000.

General News Section.

Firemen on the Southern Pacific have asked an increase of 20 per cent. in pay. The company offers 15 per cent.

A press despatch of July 18 reported a collision of work trains near Morelia, Mexico, in which more than 40 persons were killed. No later details are available.

The New York Central has followed the example of other roads in organizing a special bureau for the reduction of accidents through the education of employees and the public.

The Pennsylvania Railroad has been awarded a certificate of honorable mention for the exhibit made at the recent convention of the American Humane Association. The exhibit consisted of an actual size cross section, models and photographs of the Pennsylvania's steel underframe livestock car.

Lieutenant Conneau, who races under the name Beaumont, won the aeroplane race around England for the $50,000 prize offered by the London *Daily Mail*. The race began July 22, and Beaumont finished July 26, covering the 1,010 miles in 22 hours 28 minutes actual flying time. Vedrines was second.

The government has entered suit at Indianapolis, Ind., for violation of the hours-of-service law, against the Pittsburgh, Cincinnati, Chicago & St. Louis on 41 charges, penalties aggregating $25,000 being asked; and against the Cleveland, Cincinnati, Chicago & St. Louis, $5,000 in penalties being asked.

Suit has been brought against the Union Pacific by F. C. Boettger, of Kansas City, and his father for $10,000 each, as damages for wounds received by the son in the Laramie, Wyo., yards in August, 1909. Boettger was trespassing and was shot while running away from a railway policeman who was trying to arrest him.

Two attempts were made last week to wreck a train on the Long Island Railroad near Valley Stream. On Friday evening ties were laid across the track but were thrown aside without derailing the train. On Sunday night a cross tie was imbedded upright between the tracks. The engineman of a heavily loaded excursion train saw the obstruction in time to stop.

The Philadelphia & Reading is preparing to file suits contesting the Pennsylvania full-crew law. The Pennsylvania Railroad, as noted last week, has already begun suits. The latter company, while complying with the law, is trying to offset some of the additional expense by making up more heavy trains, double-heading where necessary, and thereby saving expenses of conductors and enginemen.

Operators on the Cincinnati, New Orleans & Texas Pacific have demanded more pay, shorter hours and improved working conditions. The increases in pay asked for are reported as being 30 per cent. A representative of the Order of Railway Telegraphers is quoted as saying that similar action would be taken on the Cincinnati, Hamilton & Dayton. Demands have already been made on the Cleveland, Cincinnati, Chicago & St. Louis.

The North Coast Limited on the Northern Pacific was held up by three train robbers near Buffalo, N. Dak., on the night of July 19. They boarded the train at a flag stop and went through the observation car and the sleeper next to it, taking about $500 from the passengers. After they had gone into the second sleeper the sleeping car conductor fired from the first sleeper and the robbers made for the head of the train. They shot the engineman twice, though without seriously injuring him, before he would stop the train, and then escaped.

The Lehigh Valley has ordered Western Electric selectors and telephones to equip the west end of its Buffalo division. When this new circuit, 135 miles long, and other sections for which material had previously been ordered, are equipped, traffic on the whole line from Jersey City to Buffalo will be handled by telephone. The Pennsylvania Railroad is about to install telephones on 129 miles of its Western Pennsylvania division. Only a few miles of road on this division are now equipped. The Grand Trunk is reported as having decided to adopt telephone train despatching over the whole system.

Columbia University has announced two evening courses in surveying for the coming year. A course in plane surveying, from September to June, will cover the use of surveying instruments, the principles of surveys and the office work connected therewith. The other course is in railway surveying, including the theory of curves, turnouts, etc., and the solution of many practical problems in connection with the theoretical work. A knowledge of plane trigonometry will be required for admission to the first course, and a knowledge of practical surveying as well will be essential for admission to the course in railway surveying.

Coroner Wilson at Bridgeport, Conn., who has been conducting a secret inquiry into the wreck of the Federal Express on the New York, New Haven & Hartford on July 11, has made a report finding that both the railway company and the engineman were criminally negligent. He charges the railway company with maintaining dangerously sharp crossovers on fast express tracks and with relying on a rule governing their use. So far as his report is made public, he does not take into consideration the fact that the railway company relied on signals and not a rule alone for restricting speed at the crossover.

The coroner's jury investigating the derailment on the Oregon Trunk Railroad July 10, in which seven lives were lost, finds the engineman, the conductor and the assistant roadmaster, who was on the train, responsible. The engineman was exceeding the speed limit over track which should have been protected by a slow board. The conductor and the assistant roadmaster are held negligent in not signaling the engineman to reduce speed. Two representatives of the Interstate Commerce Commission are making investigations, this being the second accident to be officially investigated by the commission since the new law went into effect, the first being the New Haven wreck two weeks ago.

The Steel Corporation's Second Quarter.

The financial statement of the United States Steel Corporation and subsidiary companies for the quarter ended June 30 shows that the total net earnings were $28,108,520, after deducting all expenses incident to operations, including those for ordinary repairs and maintenance of plants and interest on bonds and fixed charges of the subsidiary companies. This compares with $40,170,960 for the same period in 1910 and with $23,519,203 for the quarter ended March 31, 1911. The unfilled orders on hand June 30 were 3,361,058 tons, a decrease of 86,243 tons, compared with March 31, 1911, and a decrease of 896,736 tons, compared with June 30, 1910. The surplus for the quarter after the payment of regular dividends was $1,869,177, as compared with a surplus of only $31,155,000 in the preceding quarter.

Government Accident Bulletin.

Accident Bulletin No. 39, just issued by the Interstate Commerce Commission for January, February and March, 1911, shows that there were 146 persons killed and 3,228 injured in train accidents. Accidents of other kinds bring the total number of casualties, not including Industrial Accidents, up to 18,554 (2,124 killed and 16,430 injured). Of this number there was a total of 706 employees killed and 10,974 injured, being a decrease of 229 in the number killed and, also, a decrease of 2,908 in the number injured. Accidents resulting in slight injuries are not included in the figures given.

Comparing the figures with those in the bulletin of a year ago, there is a great falling off in the number of passengers killed in train accidents, being from 110 to 28; the explanation is that in 1910 there were 51 passengers killed by an avalanche and 45 killed as a result of a derailment.

There were 55 employees killed and 738 injured in coupling and uncoupling cars and engines, being a decrease of 5 in the number killed and 139 in the number injured, as compared with the figures in the preceding bulletin.

Accidents reported by electric lines, on which interstate traffic is carried, show that there were 61 persons killed and 696 injured on electric roads during January, February and March, 1911, being a decrease of 53 in the number killed and 335 in the number injured.

The total number of Industrial Accidents, those sustained by employees where no moving engine or car is involved, was 113 killed and 18,658 injured, being an increase of 6 in the number killed and a decrease of 1,736 in the number injured.

New York Subways.

Contracts were signed on July 21 for building the greater part of the Lexington avenue subway. This is to be built by the city, and actual work on the first section is to begin on July 31. Four years are allowed for the construction, but it is expected that it will be finished sooner. The Public Service Commission is working on forms of contracts for connecting subways, the general plans for which have been approved. The Board of Estimate has approved the terms offered by the Brooklyn Rapid Transit for the operation of the Lexington avenue subway and other lines, but this approval is not binding. The Interborough Rapid Transit or any one else may still negotiate for the operation of any subways the city may build. It is generally understood, however, that the Interborough Rapid Transit will have to make at least as favorable terms as those offered by the Brooklyn company in order to get the contract for operating the Lexington avenue subway and other lines which should logically be operated in harmony with it.

Annual Report of the Interstate Commerce Commission.*

The statements in this abstract are from the twenty-third annual statistical report of the Interstate Commerce Commission, covering the fiscal year ended June 30, 1910.

On June 30, 1910, there was a total single-track mileage of 240,439 miles in the United States, indicating an increase of 3,605 miles over the corresponding mileage at the close of the previous year. An increase in mileage exceeding 100 miles appears for the States of California, Florida, Georgia, Minnesota, Mississippi, Nevada, Oklahoma, Oregon, Texas, Washington, and West Virginia, and the Territory of Arizona.

During the year railway companies owning 8,614 miles of line were reorganized, merged, or consolidated.

There were 58,947 locomotives in the service of the carriers on June 30, 1910, indicating an increase of 1,735 over corresponding returns for the previous year. Of the total number of locomotives, 13,660 were classified as passenger, 34,992 as freight, and 9,115 as switching, and 1,180 were unclassified.

The total number of cars of all classes was 2,290,331, or 72,051 more than on June 30, 1909. This equipment was thus assigned: Passenger service, 47,095 cars; freight service, 2,135,121; and company's service, 108,115. The figures given do not include so-called private cars of commercial firms or corporations.

The average number of locomotives per 1,000 miles of line was 245, and the average number of cars per 1,000 miles of line was 9,510. The number of passenger-miles per passenger locomotive was 2,367,386, and the number of ton-miles per freight locomotive was 7,287,863. The returns indicate that the number of locomotives and cars in the service of the carriers aggregated 2,349,278, of which 2,301,260 were fitted [illegible] an increase of 36,333 over the previous year, and 2,332,837 were fitted with automatic couplers, an increase of 72,060. Nearly all of the locomotives and cars in passenger [illegible] equipped with both train brakes and automatic couplers. Substantially all the freight locomotives had train brakes and automatic couplers. Of the 2,135,121 cars in freight service on June 30, 1910, the number fitted with train brakes was 2,107,312, and the number fitted with automatic couplers was 2,120,750.

The total number of persons reported as on the pay rolls of the railroads of the United States on June 30, 1910, was [illegible], an increase of 196,597 in the total number of railway employees. There were [illegible] conductors, 136,938 other trainmen, and 44,682 switch tenders crossing tenders and watchmen.

The total number of railway employees (omitting 95,328 not distributed) was apportioned among the six general divisions of employment as follows: To maintenance of way and structures, 504,979; to maintenance of equipment, 329,373; to traffic expenses, 21,652; to transportation expenses, 661,355; to general expenses, 53,385; and to outside operations, 33,348.

The total amount of wages and salaries reported as paid to railways employees during the year ending June 30, 1910, was $1,143,725,306.

The total number of persons reported by switching and terminal companies as on their pay rolls on June 30, 1910, was 33,015. The total amount of wages and salaries reported by this class of companies for 1910 was $21,719,549.

The number of passengers carried during the year ending June 30, 1910, was 971,683,199. The corresponding number for the year ending June 30, 1909, was 891,472,425. The increase in the number of passengers carried during the year over 1909 was 80,210,774.

The number of passengers carried 1 mile, or the passenger mileage, as compiled for 1910, was 32,338,496,329. The corresponding return for 1909 was 3,229,173,740 less. The number of passengers carried 1 mile per mile of road was 138,250.

The number of tons of freight shown as carried (including freight received from connections) for the year ending June 30, 1910, was 1,849,900,101, while the corresponding figure for the previous year was 1,556,559,741, the increase being 293,340,360 tons.

The ton mileage, or the number of tons carried 1 mile, as shown for the year ending June 30, 1910, was 255,016,910,451. The total ton mileage as reported for the year ending June 30, 1909, was 218,802,986,929, from which it will be seen that the increase in the ton mileage for the year ending June 30, 1910, over the return for 1909 was 36,213,923,522. The increase in the number of tons carried 1 mile in 1909 over 1908 was 421,432,127. The number of tons carried 1 mile per mile of road for the year 1910 was 1,085,745.

The average receipts per passenger per mile, as computed for the year ending June 30, 1910, were 1.938 cents; the average receipts per ton per mile, 0.753 cent. The passenger service train revenue per train-mile was $1.30.396; the freight revenue per train-mile was $2.86.218. The average operating revenues per train-mile were $2.24.628. The average operating expenses per train-mile were $1.48.865. The ratio of operating expenses to operating revenues was 66.29 per cent.

International Railway General Foremen.

The International Railway General Foremen Convention opened Tuesday at the new Sherman Hotel, with C. H. Voges presiding. An address of welcome was made by E. F. Wade, assistant corporation counsel of Chicago. F. C. Pickard's report on "How Can Shop Foremen Best Promote Efficiency," was discussed during the greater part three days.

The shop kinks committee on Thursday morning presented the *Railway Age Gazette* shop kinks book as part of its report. This report was very favorably received. A paper was read Thursday afternoon by D. F. Barton on Methods of Shop Organization. There were addresses by J. F. Devoy Tuesday afternoon, by F. J. Bentley Wednesday afternoon and August Sinclair Thursday afternoon. The attendance was three times that of last year.

F. C. Pickard, master mechanic C. H. and D., at Indianapolis, was elected president; J. A. Boyden, of the Hornell shops of the Erie, was elected first vice-president; T. F. Griffin, of the C. C. C. & St. L. at Indianapolis, was elected second vice-president; W. Smith, of the Chicago & North Western at Fremont, Neb., was elected third vice-president; L. A. North, of the Illinois Central at Chicago, was elected fourth vice-president, and F. H. Bryan, Duluth & Iron Range at Two Harbors, Mich., was elected secretary and treasurer. The executive committee was as follows: W. W. Scott, C. H. and D., Indianapolis, and W. C. Reyer, N. Y. C. & St. L., at Nashville, Tenn.

The annual meeting of the Railway Supplymens' Association in connection with the convention of the International Railway General Foremen's Association, was held at the Hotel Sherman, Chicago, July 26. The following officers were elected: Chair-

man, J. C. Younglove, H. W. Johns-Manville Co., Chicago; secretary and treasurer, B. J. Nelley, Jenkins Bros., Chicago, and two directors to serve three years, George R. Carr, Dearborn Drug & Chemical Works, Chicago; and Henry S. Mann, Goldschmidt Thermit Company, New York.

Adreon Manufacturing Company, St. Louis, Mo.—Campbell graphite lubricating system, American graphite tank hose coupling, D. & L. throttle rod stuffing box, Security bell ringer, Security combination angle cock and pipe clamp, Security back up valves, Hanlon locomotive pneumatic sanders. Represented by Wm. Miller.

American Arch Company, New York.—Security sectional arch, showing its application to the Schmidt superheater. Represented by Le Grand Parrish, John P. Neff, Charles B. Moore.

American Steel Foundries, Chicago.—Illuminated photograph showing the pouring of the Davis steel wheels; models of Andrews side frames; Simplex bolsters, Simplex couplers; models of Vulcan, Hercules, Acme and Ajax brake beams. Represented by L. E. Jones, C. C. Hopkins, W. C. Walsh, W. G. Wallace.

Anchor Packing Company, Philadelphia, Pa.—Samples of air pump packing, and throttle sets and Taurail sheet packing. Represented by E. C. Adams and J. H. Robb.

Armstrong Bros. Tool Company, Chicago.—Full line of lathe and planer tool holders, ratchet drills, drop forged steel lathe dogs, clamps, etc. Represented by Paul Armstrong.

Ashcroft Manufacturing Company, The.—Prismatic water gages, water gage cocks, locomotive steam gages.

Ashton Valve Company, Boston, Mass.—Gages, pop valves, train whistles, wheel press, recording gage, gage testers, Ashton protected gages for rear end train brake service, Ashton sanitary drinking bubblers. Represented by J. W. Motherwell and C. A. Denniston.

Barrett Manufacturing Company, New York.—Samples of tar rock subfloors, Barrett specification roofs and literature describing same. Represented by E. J. Caldwell.

Bowser & Co., S. F., Fort Wayne, Ind.—Bowser oil storage and distributing system literature, blue prints, etc. Represented by J. E. Handy.

Carborundum Company, Niagara Falls, N. Y.—Grinding wheels, general railway shop grinding wheels, sharpening stones, polishing cloth, valve and steam pipe joint grinding grain. Represented by R. S. Marvin, C. C. Shoomaker, R. H. Hogg.

Carpenter Steel Company, Chicago.—Samples of tool steel and alloy steels. Represented by Russell Dale.

Celfor Tool Company, Chicago.—Celfor drills, taper shape drills, concave taper shank drills, taper shank reamers, three-lip taper shank drills, Celfor-Rich flat drills and chucks, flue sheet cutters, lathe tool holders, lathe tool bits, boring bars, counter sinks. Represented by J. J. Dale, F. G. Hoffman.

Chicago Pneumatic Tool Company, Chicago.—Line of pneumatic tools, drills, hammers, jam riveters, rivet busters, air tool supplies. Represented by C. E. Walker, Thos. Aldcorn, J. C. Campbell, T. G. Smallwood, J. W. McCabe, J. O'Connor and F. Walsh

Chicago Railway Equipment Company, Chicago.—P. C. Creco high speed passenger bearings, Creco roller freight and passenger side bearings, Creco street car bearings. Represented by C. H. Williams, Jr., Edwin F. Leigh, R. S. Deacon.

Consolidated Safety Valve Company, The.—Locomotive pop safety valves with and without mufflers.

Crane Company, Chicago.—Full line of valves. Represented by G. S. Turner.

Crucible Steel Company of America, Pittsburg, Pa.—Catalogues descriptive of Rex AA high-speed steel and other well-known brands, such as Parks' Crescent and Sanderson steels. Represented by F. Baskerfield, William Stevenson and F. A. Lawler.

Dearborn Drug and Chemical Works, Chicago.—Catalogues, etc. Represented by Robert F. Carr, George A. Carr, Paul T. Payne, J. D. Purcell, J. F. Roddy, I. H. Bowen, C. Murray.

Detroit Lubricator Company, Detroit, Mich.—Full line of one- to seven-feed lubricators with the oil control valve; also a five-feed No. 42 under working condition of feeding the oil; also the four sizes of the air pump and air cylinder lubricators, one to four feeds. Represented by A. D. Homard.

Dixon Crucible Company, Joseph, Jersey City, N. J., and Chicago, Ill.—Samples of graphite productions. Represented by F. R. Brandon.

Emery Pneumatic Lubricator Company, St. Louis, Mo.—Automatic lubricator for brake equipment and brake cylinder lubricant. Represented by N. J. McAloney.

Fairbanks, Morse & Company, Chicago.—Hydraulic roller bearing and extra heavy ratchet jacks, new ratchet car brassing jack with wheel-holding devices; also sectional model of the new Duff Bethlehem jack, showing construction made from solid forging. This type of construction making it absolutely leak-proof. Represented by A. A. Taylor, C. W. Kelly and E. M. Fisher.

Firth Stirling Steel Company, Pittsburgh; E. S. Jackman & Co., agents.—Finished blue chip tools consisting of end mills, lathe tools, milling cutters; also showing the barium-chloride process of tempering steel. Represented by Wm. Nelson, Jr.

Garlock Packing Co., The, Palmyra, N. Y.—Complete line of samples of piston packing and sheet packing for shop use, throttle and air pump packing for locomotives, special "950" packets for air pump and triple valves. Represented by J. P. Landreth and Phil Arnold.

Geometric Tool Company, The, New Haven, Conn.—Self-opening die heads, also taper threading heads and collapsing taps; special machine for grinding chasers and dies. Represented by George T. Case.

Goldschmidt Thermit Company, New York.—Welded samples, complete thermite equipment for welding locomotive frames, pipe welding samples, metal alloys and different thermits from which pure alloys are produced, thermit for foundry practice, electric sign in colors showing thermit welding process in operation, moving pictures showing views in various foundries and shops illustrating thermit welding of locomotive parts. Represented by H. S. Mann, H. D. Kelly and Dr. L. A. Beck.

Greene, Tweed & Co., New York.—Air pump and throttle valve packing, twist packing for small valves, and braided packing for piston rods; also packing for hydraulic work. Represented by F. E. Ransley and George A. Hawkins.

Hancock Inspirator Company, The.—One Type E. inspirator, one Type A inspirator, one Type H inspirator non-lifter and operating valve; hose valves, main steam valves, vertical check valves, binary blow-off valves, cylinder cocks, malleable iron oil cups, combined stop and check valves, Globe and angle valves, one pair swing check valve castings as taken from sand.

Hoskins Manufacturing Company, Chicago.—Electric furnaces, pyrometers for steel treating. Represented by W. V. Young and C. F. Busse.

Hunt-Spiller Manufacturing Corporation, Boston, Mass.—Cylinder packing bushing, valves packing, valve cages, cross-head shoes, air-pump bushing, side-rod backs, knuckle joint bushing shoes and wedges and driving boxes. Represented by J. G. Platt and V. W. Ellet.

Independent Pneumatic Tool Company, Chicago.—Thor corner drill, four-cylinder reciprocating type Corliss valve drill, one-piece riveting hammer, duplex valve chipping hammer. Represented by John D. Hurley, R. T. Scott, J. J. Keefe, H. Finney, V. W. Robinson.

Jenkins Bros., New York.—Samples of globe angle and Y-valves and 96 packing. Represented by B. J. Neely.

Johns-Manville Company, New York.—Asbestos and magnesia supplies, high and low-pressure packings, expander rings. Represented by James Younglove.

Leslie Company, Lyndhurst, N. J.—Leslie pressure regulator for steam or air, full line of valves. Represented by J. J. Cizek.

Locomotive Improvement Company, Clinton, Iowa.—Model of Merkel's removable driving box brass, lateral motion plates, flangeless shoes and wedges, solid back end of main rod. Represented by L. W. Barker.

Locomotive Superheater Company, New York.—Model type A superheater for locomotives, adaptable for all modern locomotives, showing entire superheater in boiler, cut in sections showing detail construction of the parts and illustrating the path of the steam from the boiler through the superheater and steam pipes to the steam chest and cylinders. Represented by George L. Bourne, H. B. Oatley.

Lodge & Shipley Machine Tool Company, Cincinnati, Ohio.—Catalogue descriptive of engine lathes. Represented by H. M. Wood.

Manning, Maxwell & Moore, Inc., New York.—Representing The Ashcroft Manufacturing Company, The Consolidated Safety Valve Company, The Hayden & Derby Manufacturing Company, The Hancock Inspirator Company, Hancock Type E Inspirator. Represented by L. Brown, L. R. Peterson and E. J. Holland.

Marshall Ventilated Mattress Company, Chicago, Ill.—Ventilated engineer cushions. Represented by S. Goldschmidt.

Marshall & Huschart Machinery Company, Chicago.—Catalouges descriptive of various lines of machine tools. Represented by H. W. Jones.

Matthews-Davis Tool Company, St. Louis, Mo.—Two in One boring tool for cast-iron car wheels, Two in One boring tool for steel wheels, Davis expansion driving box and connecting rod, brass boring tools and other boring tools for machine shops. Represented by W. E. Moberly.

McCord & Co., Chicago.—Journal boxes, McCord locomotive lubricator, full size model of driving box with attachments for lubricator, full size model of pinless lid journal box, full size model of pin lid journal box, small models of journal box and equalizing wedge, five-feed lubricator, model showing driving mechanism of the McCord lubricator. Represented by W. J. Schlacles, R. L. McIntosh.

McCrosky Reamer Company, Inc., Meadville, Pa.—Adjustable reamers, quick change chucks and collets, Noneeda-tang sockets, expanding mandrels, Universal lamp brackets and friction drive chucks. Represented by F. P. Miller.

McMaster Car Supply Company, Chicago.—Steam specialties and railroad supplies; Homestead valves, New Century chain hoist, gravity vise, shop cranes. Represented by C. A. Denniston.

Nathan Manufacturing Company, New York.—Kellogg water alarm, cut-off lubricator with shut-off valve, reinforced clinger gages, Simplex injectors, coal pops. Represented by C. A. Nathan.

National Boiler Washing Company, Chicago.—Photographs and descriptions of the National Boiler Washing Company's hot water process of washing locomotive boilers, map showing locations of systems installed in the United States and Canada, National low-duty vacuum steam heating system. Represented by E. B. White, W. C. Bell.

National Machinery Company, Tiffin, Ohio.—National open die heads and sets of National interchangeable Case dies; also literature describing full line of bolt and nut machinery and forging machines. Represented by H. E. Lott and K. L. Ernst.

Oakgrove Handle Company, Cameron, Wis.—Boiler makers' malleable head flanging mauls and tinners, mallets made of ironwood blue and swamp-oak handle. Represented by J. C. Templeton.

O'Malley-Beare Valve Company, Chicago.—Full line of multiple valves. Represented by Edward O'Malley and H. A. Crews.

Otley Manufacturing Company, Chicago.—Eureka steam joint cement, Besto locomotive joint cement, Glos-Kote locomotive paint, lubricating graphite. Represented by B. F. Otley, W. A. Otley.

Pilliod Company, Swanton, Ohio.—Baker locomotive valve gear in a working model. Represented by Burton W. Mudge, Herbert Green, R. F. Darby.

Pratt & Letchworth Co., Buffalo, N. Y.—Buffalo journal boxes. Represented by H. C. Edson.

Pyle-National Electric Headlight Company, Chicago.—Descriptive literature. Represented by J. Will Johnson, J. W. Cleary.

[illegible] New York [illegible] shop editions Car Builders' Dictionary, Locomotive Dictionary, new work, "Railway Shop Kinks." Represented by L. B. Sherman, Roy V. Wright, John N. Reynolds, Kenneth G. Cheal, Stanley Dyer.

Ryerson & Son, Joseph T., Chicago. [illegible] high-speed drills, reamers, Gisholt grinders, Gisholt high-speed tools, high-speed [illegible] Represented by [illegible] Carroll, A. M. Mueller.

Safety Car Heating & Lighting Company, New York. [illegible] reducing valve, steam heat traps, steam hose couplers, train line valves, [illegible] Represented by J. H. Rodger, W. G. Hermsen.

[illegible] Represented by [illegible]

Storrs Mica Company, Owego, N. Y.—Lanterns with mica globes. Represented by Charles P. [illegible]

Templeton-Kenly Company, Chicago.—Simplex car jacks. Represented by J. H. Hummel.

United States Metal and Manufacturing Company, New York.—Diamond steel pole, feasible drop brake staff, Galco head-lining, Wolfe automatic rail joint lock, Columbia lock nuts, Dunham hopper door device for coal and ore cars. Represented by J. J. Ross.

United States Metallic Packing Company, Philadelphia, Pa.—Gollmar bell ringers; King type and multi-angular metallic packing for piston rods, valve stems and air pumps; Leach sanders; inde-tructible oil cups. Represented by Morris V. Brewster, Clarence L. Mellor.

M. M. and M. C. B. Committees.

The M. M. and M. C. B. committees for 1911-1912 are as follows:

M. M. STANDING COMMITTEES.

1. *Advisory Technical:* G. W. Wildin (Chairman), (N. Y. N. H. & H.); A. W. Gibbs (Penna.); W. A. Nettleton (C. R. I. & P.).

2. *Revision of Standards:* T. W. Demarest (Chairman), (Penna. Lines); J. D. Harris, Roland Park, Md.; W. E. Dunham (C. & N. W.).

3. *Mechanical Stokers:* T. Rumney (Chairman); E. D. Nelson (Penna.); C. E. Gossett (M. & St. L.); J. A. Carney (C. B. & O.); T. O. Sechrist (C. N. O. & T. P.); S. K. Dickerson (L. S. & M. S.); George Hodgins, New York City.

M. M. SPECIAL COMMITTEES.

4. *Specifications for Cast-steel Locomotive Frames:* E. D. Bronner (Chairman), (Mich. Cen.); E. W. Pratt (C. & N. W.); R. K. Reading (Penna. R. R.); O. C. Cromwell (B. & O.); C. B. Young (C. B. & Q.); C. E. Fuller; L. R. Pomeroy (J. G. White & Co.).

5. *Main and Side Rods:* W. F. Kiesel (Penna.); H. Bartlett (B. & M.); G. Lanza (Mass. Inst. of Tech.); H. B. Hunt (Am. Loco.); W. E. Dunham (C. & N. W.).

6. *Consolidation:* D. F. Crawford (Chairman), (Penna. Lines); H. H. Vaughan (Can. Pac.); G. W. Wildin (N. Y. N. H. & H.).

7. *Safety Valves:* F. M. Gilbert, (Chairman), N. Y. C. & H. R.); James Milliken (P. B. & W.); W. D. Robb (Grand Trunk); Prof. E. C. Schmidt (Univ. of Ill.); W. J. Tollerton (C. R. I. & P.).

8. *Safety Appliances:* H. T. Bentley (C. & N. W.); M. K. Barnum (Ill. Cent.); C. B. Young (C. B. & Q.).

9. *Design, Construction and Maintenance of Locomotive Boilers:* D. R. MacBain (L. S. & M. S.); C. E. Chambers (C. of N. J.); T. W. Demarest (Penna. Lines); F. H. Clark (B. & O.); R. E. Smith (A. C. L.); E. W. Pratt (C. & N. W.); J. Snowden Bell, New York City.

10. *Contour of Tires:* W. C. A. Henry, (Chairman), (Penn. Lines); J. A. Pilcher (N. & W.); O. C. Cromwell (B. & O.); H. C. Oviatt (N. Y. N. H. & H.); O. M. Foster (L. S. & M. S.); G. W. Seidel (C. R. I. & P.).

11. *Steel Tires:* L. R. Johnson (Chairman), (Can. Pac.); J. R. Onderdonk (B. & O.); C. H. Hogan (N. Y. C. & H. R.); R. L. Ettenger (Southern); L. H. Turner (P. & L. E.).

12. *Flange Lubrication:* M. H. Haig (Chairman), (A. T. & S. F.); T. W. Heintzleman (So. Pac.); D. J. Redding (P. & L. E.); A. Kearney (N. & W.); W. C. Hayes (Erie).

13. *Minimum Requirements for Headlights:* D. F. Crawford (Chairman), (Penna. Lines); A. P. Wood (L. S. & M. S.); C. H. Rae (L. & N.); F. H. Scheffer (N. C. & St. L.); J. W. [illegible] (M. [illegible] & Q.).

14. *Standardization of Tinware:* A. J. Poole (S. A. L.); [illegible] (C. B. & Q.); [illegible] (Penna.).

15. [illegible] (B. & A.); W. H. Bradley (C. & N. W.); H. H. Vaughan (Can. Pac.); [illegible] (C. R. I. & P.); [illegible] (C. B. & Q.).

[illegible] (C. & N. W.).

[illegible] P.); T. W. Demarest (Penna. Lines); J. S. Lentz (L. V.); W. [illegible] (C. & O.); [illegible] (Penna.); [illegible] (Ill. Cent.).

Kleine (Chairman), (Penna.); W. E. Dunham (C. & N. W.); T. H. Goodnow (L. S. & M. S.); W. H. V. Rosing (St. L. & S. F.); C. E. Fuller (U. Pac.); T. M. Ramsdell (Ches. & O.); O. C. Cromwell (B. & O.).

3. *Train Brake and Signal Equipment:* R. B. Kendig (Chairman), (N. Y. C. Lines); T. L. Burton (C. of N. J.); B. P. Flory (N. Y. O. & W.); E. W. Pratt (C. & N. W.); B. K. Reading (Penna.).

4. *Brake Shoe Equipment:* Prof. C. H. Benjamin (Chairman), (Purdue); C. D. Young (Penna. Lines); R. B. Kendig (N. Y. C. Lines).

5. *Coupler and Draft Equipment:* R. N. Durborow (Chairman), (Penna.); G. W. Wildin (N. Y. N. H. & H.); F. W. Brazier (N. Y. C. & H. R.); J. F. DeVoy (C. M. & St. P.); F. H. Stark (Pittsburgh Coal Co.); H. La Rue (C. R. I. & P.); H. L. Trimyer (S. A. L.).

6. *Rules for Loading Materials:* A. Kearney (Chairman), (N. & W.); R. E. Smith (A. C. L.); C. H. Osborn (C. & N. W.); L. H. Turner (P. & L. E.); W. F. Kiesel, Jr. (Penna.).

7. *Car Wheels:* William Garstang (Chairman), (C. C. C. & St. L.); W. C. A, Henry (Penna. Lines); A. E. Manchester (C. M. & St. P.); R. W. Burnett (Can. Pac.); R. L. Ettenger (Southern); J. A. Pilcher (N. & W.); O. C. Cromwell (B. & O.).

8. *Safety Appliances:* A. Stewart (Chairman), (Southern); A. La Mar (Penna. Lines); C. B. Young (C. B. & Q.); H. Bartlett (B. & M.); T. M. Ramsdell (C. & O.); M. K. Barnum (Ill. Cent.); W. O. Thompson (N. Y. C. & H. R.).

M. C. B. SPECIAL COMMITTEES.

9. *Car Trucks:* A. S. Vogt (Chairman), (Penna.); C. A. Seley (C. R. I. & P.); J. J. Tatum (B. & O.); F. P. Pfahler (W. & L. E.); R. W. Burnett (Can. Pac.); N. L. Friese (N. & W.); G. A. Hancock (St. L. & S. F.).

10. *Prices for Labor and Material:* F. H. Clark (Chairman), (B. & O.); G. E. Carson (N. Y. C. & H. R.); C. F. Thiele (P. C. C. & St. L.); Ira Everett (L. V.); B. Julien (U. Pac.); S. T. Park (C. & E. I.); H. E. Passmore (T. & O. C.).

11. *Springs for Freight Car Trucks:* F. M. Gilbert (Chairman), (N. Y. C. & H. R.); W. F. Kiesel, Jr. (Penna.); W. E. Sharp (Armour Car Lines); T. A. Lawes (S. Ind.); J. R. Onderdonk (B. & O.).

12. *Consolidation:* F. H. Clark (Chairman), (B. & O.); W. A. Nettleton (C. R. I. & P.); C. A. Schroyer (C. & N. W.).

13. *Train Lighting and Equipment:* T. R. Cook (Chairman), (Penna. Lines); C. A. Brandt (C. C. C. & H. L.); Ward Barnum (L. & N.); J. H. Davis (B. & O.); E. A. Benson (Pullman Co.); D. J. Cartwright (Leh. Val.); E. W. Jansen (Ill. Cent.).

14. *Train Pipe and Connections for Steam Heat:* I. S. Downing (Chairman), L. S. & M. S.); C. A. Schroyer (C. & N. W.); W. C. Arp (Vandalia); T. H. Russum (B. & O.); J. J. Ewing (C. & O.).

15. *Nominations:* J. F. Deems (Chairman), N. Y. C. Lines); A. W. Gibbs (Penna.); C. A. Seley (C. R. I. & P.); W. H. Lewis (N. & W.); J. F. Walsh (C. & O.).

16. *Arrangements:* A. Stewart (Southern).

17. *Tank Cars:* A. W. Gibbs (Chairman), (Penna.); C. M. Bloxham (Union Tank Line); J. W. Fogg (B. & O.); Wm. McIntosh (C. of N. J.); S. K. Dickerson (L. S. & M. S.).

18. *Specifications for Tests of Steel Truck Sides and Bolsters for Cars of 80,000, 100,000, 150,000 Pounds Capacity:* Prof. E. C. Schmidt (Univ. of Ill.); J. S. Sheafe (Ill. Cent.); C. D. Young (Penna. Lines).

19. *Capacity Marking of Cars:* C. E. Fuller (U. Pac.); J. F. Deems (N. Y. C. Line); M. K. Barnum (Ill. Cent.); A. W. Gibbs (Penna.); F. H. Clark (B. & O.).

20. *Revision of Constitution:* D. F. Crawford (Penna. Lines); C. A. Seley (C. R. I. & P.); A. Kearney (N. & W.).

21. *Lettering Cars:* D. F. Crawford (Penna. Lines); J. F. Deems (N. Y. C. Lines); F. H. Clark (B. & O.); W. A. Nettleton (C. R. I. & P.); [illegible] (C. B. & Q.).

Individual Paper. Car Shop Apprentices: I. S. Downing (L. S. & M. S.).

Master Car and Locomotive Painters' Association.

The forty-second annual convention of the Master Car and Locomotive Painters' Association of the United States and Canada will be held at Atlantic City, N. J., September 12-15. The headquarters will be at the Hotel Rudolph. The subjects which will be discussed are: What is the Best Method of Finishing the Interior of Steel Passenger Equipment Cars, Appearance and Durability Considered, by W. H. Dutton (L. V.) and John Gearhart (Penna.); From a Sanitary Standpoint What Is the Best Treatment for Concrete or Cement Floors of Passenger Cars? by J. T. McCracken (Interboro Ry. of N. Y.); The Value of Chemical and Practical Tests of Railway Paint Shop Materials, by Prof. James H. Gibboney (Chief Chemist, Norfolk & Western); The Painting of Locomotives, Economy and Durability Considered, What Progress or Retrogression Has Been Made in Methods and Materials in Recent Years, by D. A. Little (Penna.), J. H. Kahler (Erie) and W. H. Wood (N. Y. C. & H. R.); Paint Mixing Vehicles—Their Use in Connection With Railway Equipment Painting, by Charles E. Copp (B. & M.); Varnish Removing from Car Interiors—What Portion of the Work Should Be Assigned to the Cabinet Maker? by A. H. Phillips (N. Y. O. & W.); Headlinings in Passenger Cars, by J. H. Whittington (C. & A.); James Gratton, (B. R. & P.), T. R. Cowan (C. P.) and E. T. Congdon (N. P.); What Are the Best Methods and Materials for Cleansing the Painted Parts of Locomotives, Preparatory to Repainting? by John D. Wright (B. & O.); Your Experience and Suggestions as to How Other Departments May Hinder or Help the Maximum and Daily Output from the Passenger Equipment Paint Shop, by T. J. Hutchinson (G. T.), George W. Lord (B. & M.) and George Schumpp (L. & N.); Baking Enamels—Their Use in Finishing Detachable Articles in the Railway Paint Shop, by Henry A. Polhemus (Erie); Linseed Oil—To What Extent Can Substitutes Be Safely Used? by W. O. Quest (P. & L. E.). Albert P. Dane, Reading, Mass., is secretary.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass.

AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomason, Scranton, Pa.

AMERICAN ASSOCIATION OF GENERAL PASSENGER AND TICKET AGENTS.—C. M. Burt, Boston, Mass.; next meeting, St. Paul, Minn., Sept. 19, 1911.

AMERICAN ASSOCIATION OF FREIGHT AGENTS.—R. O. Wells, East St. Louis, Ill.

AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—O. G. Fetter, Carew building, Cincinnati, Ohio; 3d Friday of March and September.

AMERICAN ELECTRIC RAILWAY ASSOCIATION.—H. C. Donecker, 29 W. 39th St., New York; October 9-13, Atlantic City, N. J.

AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York; November 15, Chicago.

AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W., Chicago; Oct. 17-19, 1911, St. Louis, Mo.

AMERICAN RAILWAY ENGINEERING ASSOCIATION.—E. H. Fritch, Monadnock Block, Chicago; annual convention, March 19-21, 1912, Chicago.

AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago.

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—O. T. Harroun, Bloomington, Ill.

AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

AMERICAN SOCIETY OF ENGINEERING CONTRACTORS.—D. J. Haner, 13 Park Row, New York; 3d Tuesday of each month, New York.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York.

ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.

ASSOCIATION OF RAILWAY CLAIM AGENTS.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 22, 1912, Los Angeles, Cal.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago; annual, November 6-10, Chicago.

ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.

ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 75 Church St., New York; December 12-13, Louisville, Ky.

CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk Ry., Montreal, Que.; 1st Tuesday in month, except June, July and Aug., Montreal.

CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLead, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

CIVIL ENGINEERS' SOCIETY OF ST. PAUL.—D. F. Jurgensen, 116 Winter St., St. Paul, Minn.; 2d Monday, except June, July and Aug., St. Paul.

ENGINEERS' SOCIETY OF PENNSYLVANIA.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Richmond, Va.; annual, Buffalo, N. Y.

GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

INTERNATIONAL RAILWAY CONGRESS.—Executive Committee, rue de Louvain, 11 Brussels; 1915, Berlin.

INTERNATIONAL RAILWAY FUEL ASSOCIATION.—D. B. Sebastian, La Salle St. Station, Chicago.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—L. H. Bryan, D. & I. R. Ry., Two Harbors, Minn.

INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, Lima, Ohio; annual, Aug. 15, Toledo, Ohio.

IOWA RAILWAY CLUB.—W. B. Harrison, Union Station, Des Moines, Ia.; 2d Friday in month, except July and August, Des Moines.

MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York.

MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago.

MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOCIATION, OF UNITED STATES AND CANADA.—A. P. Dane, B. & M., Reading, Mass.; Sept. 12-15, 1911, Atlantic City, N. J.

NEW ENGLAND RAILROAD CLUB.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

NEW YORK RAILROAD CLUB.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

NORTHERN RAILWAY CLUB.—C. L. Kennedy, C., M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.

OMAHA RAILWAY CLUB.—H. H. Maulick, Barker Block, Omaha, Neb.; second Wednesday.

RAILROAD CLUB OF KANSAS CITY.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

RAILWAY CLUB OF PITTSBURGH.—C. W. Alleman, P. & L. E., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

RAILWAY INDUSTRIAL ASSOCIATION.—G. L. Stewart, St. L. S. W. Ry., St. Louis, Mo.; annual, May 12, 1912, Kansas City, Mo.

RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Bethlehem, Pa.; annual, Oct. 10, Colorado Springs, Colo.

RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, Box C, Collinwood, Ohio.

RICHMOND RAILROAD CLUB.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—Walter E. Emery, P. & P. U. Ry., Peoria, Ill.; September 12-15, St. Louis, Mo.

ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

SOCIETY OF RAILWAY FINANCIAL OFFICERS.—C. Nyquist, La Salle St. Station, Chicago; Sept. 12-14, St. Paul, Minn.

SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.; annual, October 20, Atlanta, Ga.

SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

TOLEDO TRANSPORTATION CLUB.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

TRAFFIC CLUB OF CHICAGO.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.

TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

TRAFFIC CLUB OF PITTSBURGH.—T. J. Walters, Oliver building, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

TRAIN DESPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.

TRANSPORTATION CLUB OF BUFFALO.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.

TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.; annual, August 29-September 1, Chicago.

WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

WESTERN RAILWAY CLUB.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Wednesday in month except July and August, Chicago.

WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, First National Bank bldg., Chicago; annual, January 16-18, Chicago.

The construction of the 24-mile section from Petchaburi, Siam, south to Cha Ahn, was provided for in the British-Siamese treaty of 1909. It will be from 600 to 700 miles long, and running through the Siamese portion of the Malay peninsula will extend the railway system of Siam to the northern boundary of the British Federated Malay States and connect with a British line on the south, forming thus a direct connection between Singapore, Malay States, and Bangkok, Siam. The Malay peninsula is especially noted for its rich tin mines, and it is expected that this railway will afford special facilities in transportation of such machinery as is needed to develop this industry in places where formerly the cost and difficulty of transportation made it impracticable.

Traffic News.

The first Western Pacific fruit train arrived in Salt Lake City from Sacramento in 35 hours, making the 782 miles at an average speed of 23 miles an hour.

The Oregon Short Line on July 16 began regular passenger service with motor cars between Ogden and Salt Lake. The cars make the trip in 45 minutes.

The Canadian Pacific has made a reduction in its freight rates on apples from points in Oregon and Washington to points on its main line, varying from 25 to 45 cents per 100 lbs.

Conductors on through trains of the Lehigh Valley now ask passengers whether they are planning a return journey and offer to make reservations in sleeping and parlor cars. The conductors provide passengers with a blank, which is filled out and returned.

B. F. Yoakum is quoted as saying that the gulf coast country will produce better crops than any other section that he has seen. A great deal of farming land is changing hands and a large number of tracts are being placed in cultivation through the sale of 40-, 80- and 160-acre-farms.

Heretofore apples have been charged the same rates for icing as fruit on the Atchison, Topeka & Santa Fe. On August 10 the Atchison is to charge the same rate for icing apples as has been applied to vegetables. It is estimated that this new regulation will make a saving of about $30 a car to shippers from California.

Representative Campbell, of Kansas, has introduced a bill in Congress to forbid all railways from letting contracts for the carriage of parcels or merchandise of any kind and requires the railways to perform all this service themselves after January 1, 1913. The object of the bill is to do away with express companies.

The Minneapolis, St. Paul & Sault Ste. Marie, which now brings its passengers into the Illinois Central terminals at Chicago, is to hereafter use the Grand Central station, which is owned by the Baltimore & Ohio Chicago Terminal Co., and which was used by the Wisconsin Central before it became the Chicago division of the Soo.

The California-Atlantic Steamship Company and the Mississippi Valley Transportation Company, by a traffic arrangement expect on the completion of the Panama canal to reduce rates from 30 to 40 per cent. on California products for Mississippi river points. It is said that the round trip via these lines from California points to New Orleans will be made in 35 days.

A geological survey report on the Big Horn coal fields in Alberta, Can., estimates that there are about 87 square miles of coal lands in this district containing 6,600,000,000 tons of workable coal. The fields are about 85 miles northwest of Baniff, about 140 miles southwest of Edmonton, and 70 miles south of the Grand Trunk Pacific and Canadian Northern routes.

It is said that another attempt will be made to raise capital to establish a line of steamers between Boston and some Gulf port. This follows the failure of the Boston & Texas Steamship Line to raise $1,000,000 capital before June 1. The Boston & Texas Steamship Line promoters were unable to interest the large shippers in Boston to any great extent in the project.

The Southern Railway is warning the farmers and timber owners in [illegible] counties against the damage to be expected from the Southern Pine Beetle, an insect which has appeared in several different sections and which may do great damage to [illegible]. The Bureau of Entomology, Washington, D. C., is co-operating to check the situation.

The Transportation Committee of the Louisville Board of Trade has issued a bulletin calling attention to the fact that the fare from New York to Louisville is higher by $1.40 than is the fare from Louisville to New York. The committee has made an informal complaint to the Interstate Commerce Commission and has requested it to make a formal complaint.

The Illinois Commission of Illinois has given notice to the [illegible] companies, and shippers in that state that on and after [illegible] ing reductions of about 20 per cent. in express rates will go into effect on August 1. After a preliminary hearing on July 19 of representatives of both express companies and shippers, at which no agreement was reached, the commission decided to make a tariff of its own covering the reductions.

According to the Western Passenger Association, there has been considerable loss to railways through the practice of commercial travelers in checking their baggage on a mileage book and then traveling on an interurban electric road. This method of doing business is to be stopped by requiring holders of mileage tickets to present them at the ticket office and obtain a passage ticket for the distance to be traveled. This passage ticket must be shown before baggage is checked.

The Southern Railway and the Alabama Great Southern, through the cotton culture department, are making experiments in the use of lime for the improvement of the soil. The soil in the Southeast is deficient in this respect, which results in an excess of acidity when vegetable matter decays. It is not intended that lime should be used as a substitute for fertilizer, but its use should result in a greater percentage of the plant food of the fertilizer being retained in the soil.

Exhibits will be made by the Southern Railway, the Mobile & Ohio, and the Alabama Great Southern at the Mississippi-Alabama fair, to be held at Meridian, Miss., October 16 to 21, and at the annual exposition of the Tri-State fair to be held in Memphis, Tenn., September 26 to October 4. These exhibits will include agricultural, horticultural, mining and forest products, and manufactured articles. Representatives of the railways will be on hand to give information about the territory represented and conditions, crops, land prices, and opportunities for agricultural and industrial projects in the southeast.

Chairman Adamson, of the House Committee on Interstate and Foreign Commerce, has introduced a bill in the lower house of Congress which provides that it shall be unlawful for any bank to accept a bill of lading as security for a loan without first ascertaining by actual inquiry and investigation that the shipment described in the bill of lading was really delivered to the carrier whose agent purported to have signed the bill of lading, and that any bank violating this provision may be punished by a fine of $5,000; and in addition that both the bank and the agent signing the bill of lading shall be liable to any subsequent holder for all losses sustained.

The Receivers and Shippers' Association of Cincinnati is sending out to its members and other shippers in Cincinnati "Cincinnati's Official Package Car Guide No. 1." This guide gives in concise form the points to which the railways running out of Cincinnati are forwarding package cars daily. The time of delivery is also shown. The guide especially calls attention to the unusually good package car service out of Cincinnati. For instance, nearly every point of importance in the New England states is reached through package cars loaded to Albany, New York and Boston. Shippers are asked to co-operate with the railways in this service, especially in sending their shipments as early as possible in the day to the freight sheds.

The postmaster general has opened bids for a contract to carry mail from Atlantic ports to Colon. The government is to require 16-knot steamers to furnish a weekly service between New York and Colon, calling at Charleston or Savannah, and also a service between New Orleans and Colon. The plan calls for a service also from Seattle and San Francisco to Panama, calling at San Pedro or San Diego. This service is to be put in operation in the fall of 1914. The opening of the Panama canal will enable steamers under this contract to carry freight from New York to San Francisco without breaking bulk. The government provides for a guarantee against the control of these steamship lines by competing railway companies. It is estimated that the cost of this service will be about $1,000,000 a year.

The Neptune, the largest collier in the United States navy, took on at Baltimore on July 21 a cargo of 13,000 tons of coal. The entire cargo of coal was taken on in one working day, and in addition 2,000 tons of fuel coal was placed in bunkers the following morning. The Neptune is equipped for burning oil as well as coal. The loading of July 21 was done at the Baltimore & Ohio's pier at Curtis bay, Baltimore. The receiving yard of this pier has a capacity of 2,500 cars, and it is now planned to

increase this to 3,500 cars. The pier is 800 ft. long, permitting four vessels to load at the same time, two on each side. The dumping capacity of the pier averages 1,000 tons an hour on each side. There are 25 coal pockets on each side of the pier. A force of 400 men is employed in loading vessels.

A committee consisting of W. B. Biddle, vice-president of the St. Louis & San Francisco; J. M. Johnson, vice-president of the Missouri Pacific; H. Haile, vice-president and traffic manager of the Missouri, Kansas & Texas, and C. G. Burnham, vice-president of the Chicago, Burlington & Quincy are to submit to a committee of traffic officers of the eastern railways entering St. Louis a protest against the assessment of transfer charges on through freight moved via the St. Louis gateway. The Wabash did not join in the complaint, because it is an eastern as well as a western line. The controversy concerns only through traffic and does not affect rates, except as to their division between eastern and western lines. The western lines now have to pay the transfer cost from East St. Louis to St. Louis of freight passing through St. Louis.

An agreement has been entered into between the Baltimore & Ohio and the Philadelphia Belt Line Railroad, which enables that company to reach several large storage warehouses of the Pennsylvania Warehousing and Safe Deposit Company, as well as to a number of other manufacturing and commercial institutions, and it affords direct track connection with the company's freight station at Pier 22, Delaware river. The agreement dated July 1, 1911, which includes an agreement with the Philadelphia & Reading gives the B. & O. the right to have its business handled over that portion of the Belt Line tracks on Delaware avenue, between Tasker and Callowhill streets, a distance of about 2 miles. The tracks are operated under an arrangement with the Pennsylvania Railroad and roads using them pay a switching charge which, with proportion of maintenance, averages from $2 to $2.50 per car.

Total Revenues and Expenses.

Logan G. McPherson, director of the Bureau of Railway Economics, in presenting a summary of revenues and expenses of steam roads in the United States for May, 1911:

"For the month of May, 1911, total operating revenues decreased from the same month of 1910 nearly $4,355,000, which was equivalent to $45 per mile, or 4.4 per cent. This decrease was nearly all in freight revenue. Operating expenses per mile also declined as compared with a year ago, the decrease amounting to 4.3 per cent. This decrease is the resultant of reductions amounting to 9.7 per cent. in maintenance of way, 2.9 per cent. in maintenance of equipment, and 3.4 per cent. in transportation expenses, on the one hand, and an increase of 6.4 per cent. in general expenses on the other hand. A decrease in transportation account is again shown this month, the rate of decrease in May being 3.4 per cent., as compared with 0.4 per cent. in April. The operating ratio was 69.5 per cent., as compared with 69.4 per cent. in May, 1910, 70.4 per cent. in April, 1911, and 69.4 per cent. in March, 1911.

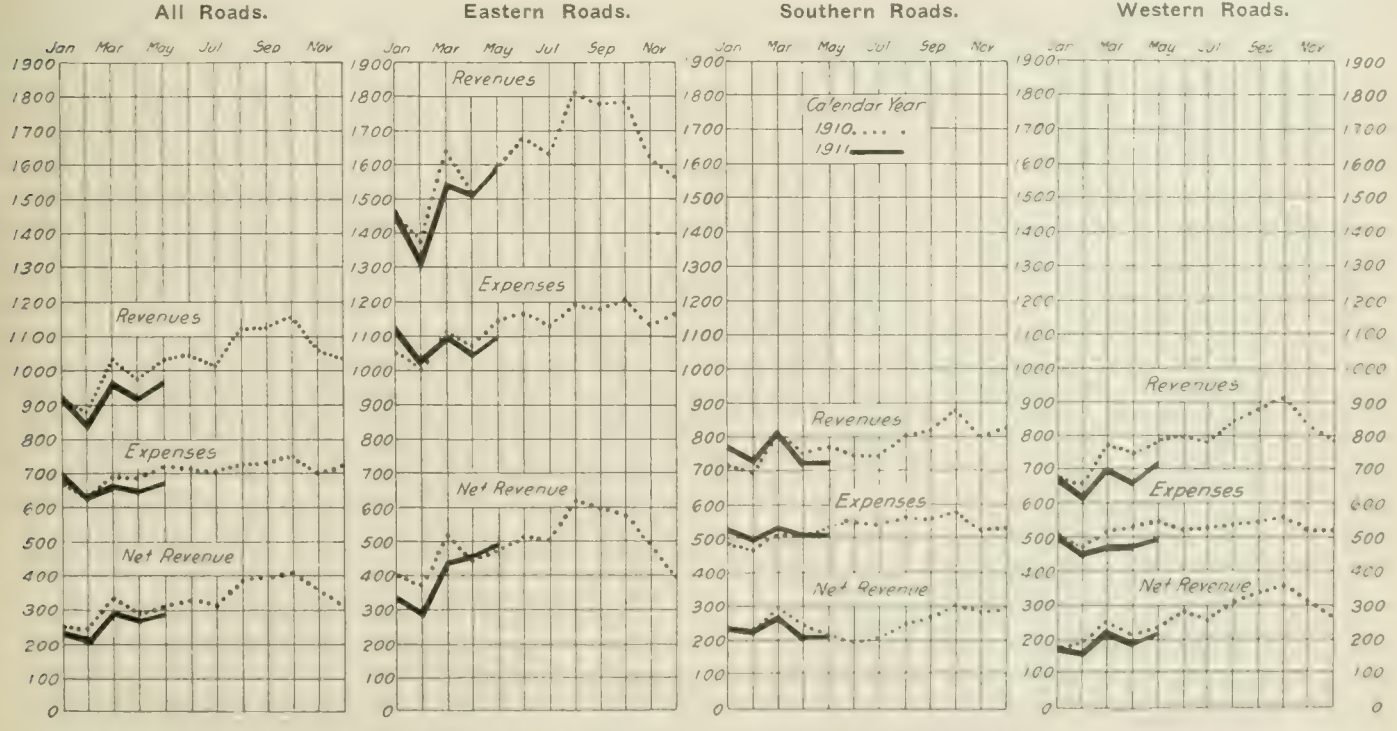
"Net operating revenue showed a decrease of $15 per mile, or 4.8 per cent. Net revenue per mile per day was $9.58, as compared with $9.16 in April. There was an increase in taxes of 0.2 per cent., and operating income, which is net revenue with outside operations included and taxes deducted, showed a decline of $15 per mile, or 5.5 per cent.

"Every group shows a decline in total operating revenues per mile. The heaviest decline was in the western group, amounting to 7.9 per cent. Passenger revenue decreased in every group, and freight revenue in every group except the East, where it remained practically stationary. In operating expenses there were also reductions for each of the three groups. The East shows a decline of 1.1 per cent., reductions in maintenance and traffic expenses being partly offset by an increase of 8.9 per cent. in general expenses. In the South there were decreases in all the accounts except transportation, where there was a slight increase. These resulted in a decrease in total operating expenses of 3.4 per cent. In the West there was a decrease in operating expenses of 6.9 per cent., the reduction amounting to nearly 14 per cent. in maintenance of way. The operating ratio shows but slight changes in the three groups. In the eastern group there is a small decrease, and in the western and southern groups slight increases.

"As in April the East again shows a gain in net revenue, amounting to 2.1 per cent. The South and West show declines of 8.1 per cent., and 10 per cent. respectively. Similar relative results are found in the case of operating income, the increase in the East being 2.6 per cent., and the decreases in the South and West being 10.8 per cent. and 11.4 per cent.

"For the eleven months of the fiscal year 1911 there is a slight decrease of operating revenues, for all roads, of one-tenth of 1 per cent. over the corresponding period of 1910. At the same time expenses increased 3.5 per cent., with the result that net revenue shows a decrease of 7.4 per cent. This decrease runs as high as 10.6 per cent. in the eastern group, 5.1 per cent. in the West, and 1.6 per cent. in the South. In operating income corresponding results are found.

"The calendar year continues to make an unfavorable showing



Total Earnings and Expenses of Railways in 1910 and 1911.

as compared with last year, because with a decrease in operating revenues there is not a correspondingly large decrease in operating expenses. Operating revenues for these five months for all roads declined 3.8 per cent., practically all the decrease being in freight revenue. Expenses decreased 1.7 per cent., with the result that net revenue shows a decrease of 8.5 per cent., and operating income of 10.2 per cent. As has been the case during the eleven months of the fiscal year, the heaviest decline in operating income is found in the eastern group, but the decreases in the other two groups are also considerable."

The following table shows how operating expenses were distributed in May, 1911, with comparisons.

Per cent of total operating revenues:	May, 1911.	May, 1910.	Fiscal year ended June 30, 1910.
Maintenance of way and structures.	14.5	15.2	13.4
Maintenance of equipment.....	15.6	15.4	15.0
Traffic expenses	2.1	2.1	2.0
Transportation expenses	34.6	34.3	33.4
[illegible]	.7	.4	.5
Total operating expenses	69.5	69.4	66.3

A Train Load of Two Million Melons.

The Southern Pacific has practically completed one of the most remarkable crop movements in its history, in the handling of the cantaloupe crop in the Imperial Valley. The total number of cars shipped to date amounts to 2,600, with about 100 cars additional to move. This is approximately 900 cars more than harvested in any season before.

There were 56,000,000 pounds of ice used in the field and Yuma, Ariz., to take care of these shipments. The biggest day's picking was June 11, when 133 carloads were harvested. These cars were hauled from Brawley, the shipping center, to Imperial Junction on the main line, in one train, the length of which was 6,175 feet, considerably more than a mile long.

There were 324 crates in each car and 45 melons to the crate, or a total number of 14,580 melons in each car, and in the train 1,939,140 melons. When one appreciates the fact that each of these melons was handled at least three times, in picking, wrapping and crating, they can readily imagine the army of men necessary in the field to do this work.—*Los Angeles Times.* [This is probably the greatest number of cars of the same class loaded with the same products ever hauled in one train.]

The New Organization of Wells Fargo & Co.

The Wells Fargo & Company express now operates over the Atchison, Topeka & Santa Fe; Chicago, Milwaukee & St. Paul; Chicago, Milwaukee & Puget Sound; Chicago Great Western; Erie; Kansas City Southern, and the Southern Pacific and connecting and subsidiary lines, and will on August 1 also operate over the Missouri Pacific, the St. Louis, Iron Mountain & Southern, the Wabash, the Wheeling & Lake Erie, the Texas & Pacific, the International & Great Northern, and the St. Louis & Southwestern.

The total mileage operated in this country on August 1 will be 66,000 miles.

Under the new organization the general superintendents of southern department and greater New York department will report to the president. In the absence of president, the general superintendent of Southern department will report to the vice-president at San Francisco, and the general superintendent of greater New York department will report to vice-president at Chicago; the general superintendents of Northern, Eastern, Central and Chicago departments will report to the vice-presidents at Chicago; the general superintendent of Southwestern department will report to the vice-presidents at San Francisco.

R. A. Wells, vice-president and general manager, at Kansas City, having resigned, that position will be discontinued on August 1, 1911.

A. W. Zimmermann, secretary and treasurer, having resigned, that joint position is discontinued.

The general officers of the company are: C. H. Gardiner, secretary, New York; B. H. River, treasurer, New York; Richard Burr, comptroller, New York; E. E. Honn, general auditor, New York; C. W. Stockton, commerce counsel and taxes, New York; J. D. Ludlow, general traffic manager, New York; C. R. Graham, traffic manager, San Francisco; G. F. Johnson, traffic [illegible]; [illegible], traffic manager, New York; D. J. Mervine, general superintendent of transportation, Chicago; [illegible], general superintendent of motive and street equipment, Chicago; W. [illegible], superintendent money order department, New York; W. W. Fulmer, general purchasing agent, Chicago; A. G. Brandenburg, general supply agent, Chicago.

The greater New York department officers are C. C. Fowler, superintendent, New York.

The Chicago department officers are: H. B. Calkins, general superintendent, Chicago; T. P. Earl, superintendent, Chicago.

The Eastern department officers are: T. M. DeWitt, general superintendent, Cleveland, to whom the following superintendents will report: E. J. Crowe, New Jersey and Eastern New York division, New York; E. A. Muncey, Western New York and Pennsylvania Division, Buffalo; W. F. Wallis, Ohio Division, Akron; F. Morrow, Indiana and Michigan Division, Toledo.

The Northern department officers are: G. B. Simpson, general superintendent, Chicago, to whom the following superintendents will report: H. E. Manchester, Central Illinois Division, Chicago; S. W. Gibson, Northern Illinois and Southern Wisconsin Divisions, Chicago; E. E. Westfall, Northern Wisconsin Division, Milwaukee; E. G. Wetzel, Minnesota Division, St. Paul; A. G. Eddy, Iowa Division, Des Moines; J. E. O'Neill, Dakota Division, Omaha.

The Central department officers are: O. J. Peterson, general superintendent, St. Louis, to whom the following superintendents will report: J. M. Crawford, Eastern Missouri Division, St. Louis; H. W. Campbell, Western Missouri Division, Kansas City; H. W. Walker, Eastern Kansas Division, Kansas City; E. E. Brayman, Western Kansas Division, Wichita; W. R. Buckmaster, Northern Kansas and Nebraska Divisions, St. Joseph; M. N. Kendall, general agent, St. Louis; I. Longaker, general agent, Kansas City.

The Southern department officers are: G. A. Taft, general superintendent, Houston, to whom the following superintendents will report: F. L. Selleck, Northern Texas Division, Dallas; C. L. Mackenzie, Southern Texas Division, Houston; C. N. Campbell, Western Texas Division, San Antonio; C. B. Kinne, Eastern Texas Division, Tyler; J. A. Hyde, Louisiana Division, New Orleans; L. O. Head, Arkansas Division, Little Rock; E. H. Stevens, Oklahoma Division, Oklahoma City; J. E. Crews, general agent, New Orleans.

The Southwestern department officers are: E. R. Jones, general superintendent, Los Angeles, to whom the following superintendents will report: J. M. Williams, Arizona and West Coast Mexico Division, El Paso; A. T. Payne, Colorado and New Mexico Division, Denver; J. F. Baker, Southern California Division, Los Angeles; E. E. McMichael, Nevada and Utah Division, Salt Lake City; F. O. Reed, general agent, Los Angeles.

The Northwestern department (including Alaska-Yukon)—the following superintendents will report to the vice-president and general manager, San Francisco: C. R. Teas, in charge of both Local and Bay Terminal Service, San Francisco; T. A. Woods, Central California Division, Oakland; N. K. Lockwood, Northern California Division, Sacramento; W. E. Carpenter, Oregon, Puget Sound and Alaska-Yukon Division, Seattle; J. W. Hill, assistant superintendent, Alaska-Yukon Division, Skagway and Seattle.

INTERSTATE COMMERCE COMMISSION.

The Spokane and Intermountain cases are abstracted elsewhere in this issue.

COURT NEWS.

The Illinois Central has bought the West Pullman Car Works for $190,000. This arrangement is the final settlement of the suits against the West Pullman Car Works in connection with the car repair frauds. These suits involved about $1,250,000.

The master in chancery appointed by the United States district court on July 19 has submitted his report in the case of the Chicago, Peoria & St. Louis, which company attacked the two cent passenger rate law of the state of Illinois as unconstitutional insofar as that company is concerned. The master finds that the law is confiscatory, and is therefore unconstitutional.

A report has been filed by Walter M. Allen, master in chancery of the federal court for the southern Illinois district, holding that the Illinois 2-cent fare law is unconstitutional as affecting the Chicago, Peoria & St. Louis, because confiscatory. He says that the road has been unable to earn a return of 6

per cent. on its investment from its state business, and recommends that the decree be changed to allow it to charge a maximum of 3 cents a mile to interstate passengers.

The Southern Pacific has appealed to the United States Supreme Court from the decision of the circuit court, which sustained the rate making power of the Oregon Railroad Commission in a case in which the railway company claimed that a rate between two points within the state directly affected interstate commerce. The railway company claimed that in such a case the Oregon Railroad Commission did not have the power to make a change in a state rate. The circuit court ruled against the railway company's contention.

U. S. Commerce Court.

INTERSTATE COMMERCE COMMISSION SUSTAINED.

James J. Hooker, President of the Receivers' and Shippers' Association of Cincinnati, v. the Interstate Commerce Commission, the C. N. O. & T. P., et al. Opinion by Judge Carland:

This is an appeal from the case in which the Interstate Commerce Commission found that although the rates complained of to Chattanooga, over the C. N. O. & T. P. could be reasonably reduced in the specific case of the C. N. O. & T. P., that such a reduction would so seriously affect rates on other roads that it would be unreasonable. The commission said "if it is our duty to take this railway by itself and to determine the reasonableness of these rates by reference to cost of construction, maintenance, and profit on investment, we think the complainants have established their case." It is claimed by the petitioners that the commission having found a so-called 60-cent schedule reasonable for the C. N. O. & T. P., considered by itself, it was bound to establish such a schedule. The commission said in its order that it must be remembered that any reduction from the North to Atlanta and corresponding territory would undoubtedly be followed by similar reductions from the East.

It is apparent, therefore, that to make any considerable change in this rate from Cincinnati to Chattanooga will work a lowering in rates throughout this entire southern territory. It should be noted that Chattanooga is not complaining of unfair treatment as compared with other southern points.

It appears from the findings of the commission that it has always refused, in the consideration of the reasonableness of a rate or rates, to consider only the particular carrier making the rate by itself, but on the contrary has always considered the rates in a particular territory affected by the change of the particular rates in question. The supreme court in *Texas & Pacific v. Interstate Commerce Commission* held that in passing on questions arising under the act, the commission or the court is empowered to fully consider all the circumstances and conditions that reasonably apply to the situation, and that in the exercise of its jurisdiction the tribunal may and should consider the legitimate interests as well of the carrying company as of the traders.

Under the second proposition we cannot disturb the order of the commission on a theory that it fixed rates so high as to be violative of the fifth amendment to the constitution unless the constitutional rights of the shippers were threatened.

While we are of the opinion that our power to review the order of the commission fixing a schedule of rates is co-extensive with the limits of the protecting shield of the constitution, still it must clearly appear that such protection in some degree has been taken away. The commission found that the rates complained of were not clearly excessive; much less are we able to find that the rates authorized by the commission in the order complained of, and which were a reduction of the former rates, are clearly excessive. While earnings may be considered in the fixing of a reasonable rate, rates necessarily cannot be based on earnings alone. A reasonable rate is a rate which yields to the carrier a fair return on the value of the property, and it is a rate which is fair to the shipper for the service rendered, and when this rate is established, if it results in large profits to the carrier the carrier is fortunate in its business, and if it results in a loss of the earning power so that the business of the carrier is unprofitable, the carrier is unfortunate; but the rate may not be lowered or raised merely on the ground that a carrier is either making or losing money, provided always that the rate is reasonable and just. Indeed, it has been held that the earning power of the rate is one of the least considerations in fixing a just and reasonable rate. The complaint is dismissed therefor.

Judge Archibald dissenting:

There is no right, as I look at it, to consider the effect of a rate or rates to be established on those of other roads between the same points or to maintain such rates at a figure which is necessary to meet the needs of those roads, and so far as the order of the commission was induced by any such idea it cannot be sustained. . . . It cannot be thought that the construction of a second or third road should be made the basis for higher rates. The standard should be that of the original and most favored line. The shipper is entitled to the benefit of any advance in transportation facilities that may be made. The commission in its order put on a parity the Cincinnati Southern, with its 336 miles of line, without branches, from Cincinnati to Chattanooga, and the Louisville & Nashville and the Nashville, Chattanooga & St. Louis, with their routes of 450 miles and their more or less unremunerative branch line mileage. This in my judgment they had no right to do.

Judge Mack concurs in the dissent.

I. C. C. REVERSED IN THE LOS ANGELES SWITCHING CASES.

Atchison, Topeka & Santa Fe et al. v. the Interstate Commerce Commission and the United States. Opinion by Judge Carland:

This is a petition for a temporary injunction by the complainants restraining the enforcement of the order of the Interstate Commerce Commission. The complainants make deliveries of carload freight from and to the public in general in Los Angeles on public team tracks, and this service is in all respects sufficient and adequate. The facilities for handling and delivery of L. C. L. freight are sufficient for double the amount of freight that can be tendered in any day. For the accommodation of certain shippers and for their benefit in loading and unloading, industrial tracks have been built. In the contracts covering building and maintenance of these tracks it was provided that the shipper shall pay the cost of construction and that the tracks shall be under the full control of the railway company, but the business of the shipper for whom they are built shall always have preference. A charge of generally $2.50 per car has been paid by the shippers using these tracks for the special service performed by the railway of receiving or delivering freight at the plant or industry in question. The general charge for drayage in Los Angeles is 50 cents a ton, which makes the cost to the consignee $10 on a carload of 20 tons, $15 on a carload of 30 tons, etc., as against the charge of $2.50 imposed by the petitioners for delivering the consignment to, or receiving the shipment at, the door of the consignee. Railways are exempt from the duty of personal delivery and bound only to carry goods to the depot and hold them for delivery when the owner calls for them. It is found in the order of the commission that the charge of $2.50 per car for delivering and receiving carload freight from industrial tracks within the switching limits of Los Angeles is in violation of the Act to Regulate Commerce. This is a conclusion of law and is open to inquiry in this court. We think that it is fair to say that the conclusion of the commission that the charge of $2.50 per car for the service named was illegal was based on two findings, first, that the industrial track on which the service was rendered is a terminal facility of the railway and not a plant facility of the industry; and second, that the service for which the charge is made is the same service as that which is performed by the carrier in delivering freight at its depot or team tracks. The real question presented is, is the carrier lawfully entitled to charge $2.50 per ton for the service performed on the industrial tracks? It is a service, regardless of the ownership of the track.

In cases where there is a substantial conflict in the evidence or testimony on which a finding of the commission is based we would feel bound by the findings unless clearly and palpably against the weight of the testimony, but we do not think that this court is concluded by the finding based on admitted facts which in no wise tend to sustain the conclusion reached.

To say that the transportation of cars and freight to and from industrial plants located from one-fifth of a mile to seven miles from the main track of the carrier is the same service which the carrier performs and for which it is paid by the general tariff charges when it delivers freight at its depot in Los Angeles or at the team tracks, is so contrary to the admitted physical facts as to be wholly untenable. We see no reason why the railways may not charge a reasonable price for this service, and the charge in question is conceded to be reasonable. An order will be granted suspending the order of the Interstate Commerce Commission until further order from this court.

Judge Mack dissents.

REVENUES AND EXPENSES OF RAILWAYS.

[Compiled from reports to the Interstate Commerce Commission. See also pages 7 and 143.]

Name of road	Mileage operated	Maintenance of way and structures	Maintenance of equipment	Operating expenses: Traffic.	Operating expenses: Transportation.	Operating expenses: General.	Operating expenses: Total.	Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or dec.) comp. with last year.
[illegible]	[illegible]	$[illegible]	$[illegible]	$4,[illegible]	$[illegible]	$5,366	$[illegible]	$[illegible]	$9	$[illegible]	$[illegible]	$[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	4,[illegible]	[illegible]	6,078	[illegible]	56,[illegible]	1,880	14,[illegible]	19,168	5,443
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	6,007	[illegible]	71,809	49	8,[illegible]	60,647	13,671
[illegible]	[illegible]	[illegible]	[illegible]	15,[illegible]	1,[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	16,134
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	5,795	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3,001	[illegible]	[illegible]	188	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	6,[illegible]	[illegible]	7,[illegible]	89,033	71,858	109	8,800	66,187	40,686
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	434	4,303	[illegible]	[illegible]	[illegible]	[illegible]	4,104
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

I. C. C. DEMURRAGE ORDER ON PRIVATE CARS UPHELD.

The Proctor & Gamble Co. v. United States, et al. Opinion by Judge Archibald:

The Proctor & Gamble Co. own private side tracks at Ivorydale, Ohio; Port Ivory, N. Y., and Kansas City, Kan., and also own a number of private cars, including tank cars. After the uniform demurrage code which was prepared by the National Association of Railway Commissioners and a member of the I. C. C., was put in force in February, 1910, the Proctor & Gamble Co. complained to the Interstate Commerce Commission against the rule which provided that private cars standing on the private switch track of the company owning the cars was subject to demurrage. The proceedings in this court are brought to set aside the order of the commission dismissing the complaint. The allegation being made that the rule, in so far as it provides that privately owned cars under lading on private tracks are in railway service and so subject to a demurrage charge until lading is removed, is unreasonable.

The Interstate Commerce Commission and the United States deny that this court has jurisdiction because the Interstate Commerce Commission merely dismissed the complaint which was made to it and granted no affirmative relief.

The real argument against the right of suit, where the complaint of a shipper has been dismissed, is that the denial of relief by the commission is not an order of which the court can lay hold. . . . It is clear that the shipper would have been entitled in one form or another to redress in court against an unjust and unlawful charge imposed by a carrier such as the one here is alleged to be, and the Proctor & Gamble Co. could have compelled the carriers to bring suit to collect the charge for demurrage, or could have gotten an injunction against this charge from a court of equity. Indeed, the only question would seem to be whether this is not the course which the company, even considering the provisions of the statute, was required to pursue, the legality of the demurrage charge being the only thing involved, and that being a matter for the courts and not for the commission to decide. It was decided, however, in *Texas & Pacific v. Abilene Cotton Oil Co.* that redress by a carrier against an unjust rate must be sought in the first instance by proceedings before the commission, and this was repeated in *Baltimore & Ohio v. Pitcairn Coal Co.*, where it was held that for the correction of an unequal distribution of cars, a shipper was similarly required to go to the commission and could not in advance of its option seek to remedy by mandamus the discrimination alleged. But if that be so, there can be no serious question as to the propriety of the present petitioner going first to the commission.

While the dismissal of a complaint by the commission in a case like the present one may not in strictness be an order, it virtually approves it and makes it operative.

But while the jurisdiction of this court in the premises is thus sustained, we are forced to conclude on a consideration of the merits that the demurrage charge in controversy was unlawfully imposed, and that the petitioner, therefore, has no just grounds for complaint.

The argument against the charge proceeds on a misconception. If this were an exaction for the use by the shipper of his own cars standing on his own track, the right to it might well be questioned; and it is difficult also to see how the imposition of demurrage on private cars for delay in unloading is necessary to prevent unjust discrimination.

It is not necessary to decide whether a railway can refuse or be required to haul private cars. Whatever may be its duty in this regard, it is conceded that such terms may be imposed as a condition to hauling them as have a reasonable relation to the transportation service in which they are employed. In using private cars, whether as supplementary to or in place of its own, a railway is entitled to require that there shall be a reasonably dependable supply. Exaction of demurrage from private cars the same as others is therefore neither arbitrary nor unjust, nor is it a violation of the owner's rights; it is simply a condition to the acceptance of his cars which the carriers have found it necessary to impose, and with which, therefore, he must expect to comply. The petition is dismissed.

Presiding Judge Knapp concurring:

The conclusion reached in this case is undoubtedly correct and I agree with the foregoing opinion only so far as it questions the right to enforce the demurrage rule for the purpose of preventing undue preference to owners of private cars.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

For officers of the Wells Fargo & Co. express, see an item in traffic news.

E. M. Curtis, assistant general auditor of the Missouri Pacific, has been appointed general assistant, with headquarters at St. Louis.

E. H. Lycett, auditor of disbursements of the Missouri Pacific and the St. Louis, Iron Mountain & Southern, at St. Louis, Mo., has been appointed general accountant. J. G. Livengood, auditor of the Erie Railroad, succeeds Mr. Lycett, with office at St. Louis.

Operating Officers.

For officers of the Wells Fargo & Co. express, see an item in traffic news.

Noah Suloff, general manager of the Tuscarora Valley, with office at Port Royal, Pa., has resigned.

W. H. de France has been appointed general superintendent of the Louisiana Southern at New Orleans, La., incident to the leasing of that road by the St. Louis & San Francisco.

W. A. Johnson, who has resigned as general freight and passenger agent of the Interstate Railroad, as noted under Traffic Officers, will continue to act as superintendent, with office at Stonega, Va.

F. R. Blunt, trainmaster of the Chicago Great Western at St. Joseph, Mo., has been appointed superintendent of the western division, with headquarters at Clarion, Ia., succeeding W. E. Carson, transferred.

F. M. Liston, having resigned as purchasing agent of the Ocean Shore Railroad, that office is abolished and the duties of same assumed by L. H. Landis, general manager, with headquarters at San Francisco, Cal.

C. E. Carson, superintendent of the Western division of the Chicago, Great Western, with headquarters at Clarion, Ia., has been appointed superintendent of the Northern division, with office at St. Paul, Minn., succeeding G. W. Vanderslice, resigned; effective August 1.

The headquarters of the superintendent of the Syracuse & Utica division of the Delaware, Lackawanna & Western has been transferred from Syracuse, N. Y. to Binghamton, effective August 1, and the jurisdiction of the superintendent will be extended over the Binghamton terminal.

F. W. Brown, superintendent of terminals of the Southern Railway, at Birmingham, Ala., has been appointed superintendent of the St. Louis-Louisville lines, succeeding C. C. Coffee, transferred, as noted under Engineering & Rolling Stock Officers. W. B. Cook suceeds Mr. Brown, with office at Birmingham.

E. E. Shackford, superintendent of Morgan's Louisiana & Texas Railroad & Steamship Company at Lafayette, Ind., has had his jurisdiction extended to include Mississippi terminals, the office of superintendent of Mississippi terminals having been abolished. J. McGuire, superintendent of terminals at New Orleans, La., has been appointed an assistant superintendent, with office at New Orleans.

Traffic Officers.

For officers of the Wells Fargo & Co. express, see an item in traffic news.

J. H. Corcoran has been appointed traveling passenger agent of the Grand Trunk, with office at Moncton, N. B.

C. E. Stailey has been appointed a traveling freight agent of the Illinois Central, with office at Little Rock, Ark.

R. B. Robertson has been appointed a general agent of the Denver & Rio Grande, with office at Milwaukee, Wis.

R. C. Smith has been appointed commercial agent of the Gulf, Colorado & Santa Fe, with office in New York City.

L. L. Maxey has been appointed assistant general freight and passenger agent of the Midland Valley, with office at Wichita, Kan.

E. M. Kehoe has been appointed a commercial agent of the Missouri Pacific and St. Louis Iron Mountain & Southern, with office at Rock Island, Ill.

L. A. Patterson has been appointed commercial agent of the Missouri & North Arkansas, and J. G. Smith has been appointed traveling freight agent, both with offices at Kansas City, Mo.

Frank Groesbeck, formerly connected with the passenger department of the Denver & Rio Grande at Salt Lake City, Utah, has been appointed traveling freight agent, covering the lines in Utah.

W. E. Fessenden, formerly traveling freight agent of the Rock Island Lines in southern California, has been appointed commercial agent of the St. Louis & San Francisco, with office at Los Angeles, Cal.

I. W. Dudley, general agent of the White Pass & Yukon route at Seattle, Wash., has been appointed commercial agent of the Chesapeake & Ohio and agent of the Blue Ridge Despatch, with headquarters at Seattle, Wash.

C. E. Emerson has been appointed a traveling freight agent of the San Pedro, Los Angeles & Salt Lake, with office at Los Angeles, Cal., succeeding George V. Thompson, granted an indefinite leave of absence on account of ill health.

R. B. Vandergrift, city passenger agent of the Atchison, Topeka & Santa Fe at Philadelphia, Pa., has been appointed traveling passenger agent, with office at Philadelphia, succeeding Otto Faas. Walter Jones succeeds Mr. Vandergrift.

W. V. Pittman, chief clerk to the assistant general freight agent of the Missouri, Kansas & Texas at Houston, Tex., has been appointed contracting freight agent, with office at Houston, succeeding H. C. Moran, resigned to go to another company.

The office of the traveling freight agent of the Lake Erie & Western, at Boston, Mass., has been abolished, and all correspondence should be addressed to E. P. Gardner, commercial agent, New York Central Fast Freight Lines, Boston, Mass.

F. L. Jones, assistant city ticket agent of the Chicago, Rock Island & Pacific at Ft. Worth, Tex., has been appointed traveling passenger agent at Ft. Worth, succeeding Joseph Gittings, transferred to the office of the general passenger agent at Ft. Worth.

John W. Wood has been appointed traveling freight agent of the Norfolk & Western, with office at Birmingham, Ala.; W. T. Cooper has been appointed traveling freight agent, at Atlanta, Ga., and the title of J. S. Hoffman, contracting freight agent, at Atlanta, has been changed to commercial agent.

Otis Mouser, traffic manager of the Interstate Railroad, has resigned, and his office has been abolished. C. L. Nash, auditor, has been appointed general freight and passenger agent, with office at Big Stone Gap, Va., succeeding W. A. Johnson, resigned. All claims will hereafter be handled by the auditor [illegible]

P. J. Brady, traveling passenger agent of the Union Pacific at Cincinnati, Ohio, has been appointed assistant manager of the North-Western-Union Pacific tours department, with office at Los Angeles, Cal. As has been announced in these columns, E. Z. Giblon has been appointed traveling passenger agent at Cincinnati, succeeding Mr. Brady.

J. A. Pride, assistant general freight agent of the Seaboard Air Line, at Atlanta, Ga., has been appointed general industrial agent, with office at Norfolk, Va., succeeding J. W. White, re[illegible] H. M. Boykin, division freight [illegible] E. P. Stringfellow, commercial agent at Richmond, succeeds Mr. Pride, and G. H. Parater, succeeds Mr. Stringfellow.

Engineering and Rolling Stock Officers.

William [illegible] general car inspector of Chicago, Burlington & Quincy.

[illegible] appointed assistant engineer of the Buffalo & Western division of the New York Central & Hudson River, with office at Buffalo, N. Y.

A. A. McGregor has been appointed assistant master mechanic of the Louisville & Nashville, with headquarters at Evansville, Ind., succeeding J. B. Huff, deceased.

John Walker has been appointed resident engineer on the Northern division of the Grand Trunk, with office at Allandale, Ont., succeeding H. W. McAll, resigned.

William E. Rockfellow, general car foreman of the New York Central & Hudson River, has been appointed superintendent of the car department of the St. Lawrence and Ontario divisions, with office at Oswego, N. Y.

H. R. Clark, formerly assistant engineer of the Chicago, Burlington & Quincy, on construction work in southern Illinois, has been appointed roadmaster on the Aurora division, with office at Sterling, Ill., succeeding P. E. Erickson.

F. A. Linderman, supervisor of boilers of the New York Central & Hudson River, at West Albany, N. Y., has been appointed district superintendent of motive power of the Ontario and St. Lawrence divisions, with office at Oswego, succeeding J. O. Bradeen, resigned. George Usherwood succeeds Mr. Linderman, with office at West Albany.

G. W. French, master mechanic of the Missouri Pacific, with office at Ferriday, La., has been transferred to Paragould, Ark., as master mechanic, succeeding R. H. Lanham, who has been appointed master mechanic, with headquarters at Poplar Bluff, Mo. W. A. Curley, foreman at Poplar Bluff, Mo., has been appointed master mechanic, with office at Ferriday, La., in place of G. W. French.

D. W. Lum, chief engineer maintenance of way and structures of the Southern Railway and the Northern Alabama Railroad, at his own request has retired from service, effective September 1. B. Herman, principal assistant engineer, has been appointed acting chief engineer maintenance of way and structures, with office at Washington, D. C. T. H. Gatlin, engineer maintenance of way, Middle district, with office at Knoxville, Tenn., has been appointed assistant chief engineer maintenance of way, with office at Washington, and C. C. Coffee, superintendent of the St. Louis-Louisville lines, with office at Louisville, Ky., has been appointed engineer maintenance of way, Middle district, succeeding Mr. Gatlin. R. D. Tobien, assistant engineer, at Washington, has been appointed engineer maintenance of way, with office at Birmingham, Ala.

OBITUARY.

Charles W. Sanford, manager of the Chicago Demurrage Bureau, died on July 21 at Kansas City, Co.

Franklin P. Stoy, who was mayor of Atlantic City, N. J., for a number of years, died on July 22 in a sanitarium at Wernersville, Pa., of paralysis, at the age of 52 years. Mayor Stoy was well known to railway men all over the country, having for many years welcomed to that city those in attendance at the annual conventions of the M. M. and M. C. B. associations.

Joseph Francis Tucker, chairman of the Central Freight Association, died at Chicago, July 25. Mr. Tucker was born in 1835 at Saco, Me. He began railway work in September, 1856, as ticket agent on the Illinois Central. Five years later he was appointed secretary to the president and after acting in this capacity for two years was made general freight agent, which position he held for 10 years. In 1873 he was made general superintendent and two years later master of transportation. In 1876 he was made traffic manager, and in October, 1884, he acted as arbitrator of the Transcontinental Association and of the California, Colorado & Utah Pool. In March, 1885, he became assistant general manager of the Chicago, Milwaukee & St. Paul, and in July, 1890, was made assistant to the president. For one year from 1892 to 1893 he was vice-president and general manager of the Chicago, Fort Madison & Des Moines, now the Chicago, Burlington & Quincy. In May, 1894, he became commissioner of the Chicago & Ohio River Traffic Association, and on April 1, 1896 was made chairman of the Central Traffic Association.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Chicago, Burlington & Quincy will build 6 switching locomotives at its shops at Aurora, Ill.

The Paulista Railway of Brazil has ordered 2 ten-wheel locomotives from the American Locomotive Company. The dimensions of the cylinders will be 21 in. x 26 in.; diameter of the driving wheels 66 in., and the total weight in working order will be 170,000 lbs.

The San Rafael & Atlixco Railway, Mexico, has ordered 1 ten-wheel locomotive from the American Locomotive Company. The dimensions of the cylinders will be 17 in. x 20 in.; diameter of driving wheels will be 42 in., and the total weight in working order will be 97,000 lbs.

CAR BUILDING.

The Illinois Central is in the market for 2,000 box cars.

The Boston & Maine is in the market for thirteen 60-ft. postal cars.

The Wabash Railroad is in the market for 1,000 box cars and 200 hopper cars.

The Atlantic Coast Line is in the market for 900 box cars, 100 flat cars and 8 postal cars.

The Texas Traction Company, Dallas, Tex., has ordered 2 trailer cars from the American Car Company.

The Missouri Pacific is in the market for 2,000 gondola cars, 500 flat cars, 18 baggage cars and 17 postal cars.

The Illinois Traction System, Champaign, Ill., has ordered 12 trailer cars from the St. Louis Car Company.

The International Railway Company, Buffalo, N. Y., has ordered 35 pay-as-you-enter cars from the J. G. Brill Company.

The Manufacturers' Railway, St. Louis, Mo., is preparing specifications on 100 all-steel 50-ton coal cars, and on 50 steel furniture cars.

The St. Louis & San Francisco, mentioned in the *Railway Age Gazette* of July 7 as being in the market for 19 coaches, 12 chair cars, 3 postal cars and 3 mail and baggage cars, has ordered this equipment from the American Car & Foundry Company.

The New York Central Lines have ordered 6 dining cars from the Barney & Smith Car Company, to be divided between the Lake Shore & Michigan Southern and the New York Central & Hudson River. This company has also ordered five 60-ton well cars from the Standard Steel Car Company.

IRON AND STEEL.

The Boston Elevated has ordered 200 tons of bridge material from the Pennsylvania Steel Company.

The Chicago, Milwaukee & St. Paul has ordered 2,500 tons of rails from the Illinois Steel Company.

The Detroit, Toledo & Ironton has ordered 1,700 tons of bridge material from the American Bridge Company.

The Canadian Pacific has specified that one-tenth of 1 per cent. of metallic titanium shall be used in the 10,000 tons of open hearth rails recently ordered.

The Fidelity Securities Corporation, Nashville, Tenn., is in the market for about 24 miles of 70-lb. relaying rails with plates, etc., which will stand rigid examination.

General Conditions in Steel.—Orders on the books of the Steel Corporation have increased steadily during the month of July, so even larger earnings are expected this month than for June. The industry is now operating at about 73 per cent. of its capacity. This is all the more remarkable when it is realized that the equipment orders of the railways, usually such a large item, are now far below normal. Some large equipment orders are pending, however, and they will probably be placed within a month. Steel men are confident that the improvement is permanent.

Supply Trade News.

The Isthmian Canal Commission will receive bids until August 4 on creosoted ties, and until August 7 on creosoted piles. Circulars Nos. 640 and 640-A respectively.

The Chicago Pneumatic Tool Company, Chicago, has changed the name of its air compressors, hitherto known as Franklin compressors, to Chicago Pneumatic compressors.

Jason Paige, lately resigned from the Inter Ocean Steel Company, Chicago, has been made contracting engineer for the Pittsburgh Steel Products Company, Pittsburgh, Pa., with office in Chicago.

The McKeen Motor Car Company, Omaha, Neb., has received an order from the Woodstock & Sycamore Traction Company, Sycamore, Ill., for a third 55-ft. motor car. There are now 114 of these cars in service in the United States.

Grip nuts, made by the Grip Nut Company, Chicago, have been specified on the equipment recently ordered by the Atlantic Coast Line, the Pittsburgh and Lake Erie, the Illinois Central, the Erie and the Merchants' Despatch Company, New York.

George E. Molleson, 50 Church street, has been made eastern representative of the Cowles-MacDowell Engineering Company, Chicago. Mr. Molleson will have charge of the sale of that company's steam heating and hot water washout systems in the eastern district.

Charles L. Cordes, for several years chief clerk in the traffic department of the American Steel & Wire Company, Chicago, has been promoted to division freight agent in charge of the Pittsburgh district, succeeding L. H. Korndorff, now in charge of the traffic on the Pacific coast with headquarters at San Francisco, Cal.

The Nova Scotia Car Works, Halifax, N. S., is increasing the capacity of its plant. The improvements to the forge department are nearly completed and the plant is now equipped with 17 oil furnaces. These furnaces are operated with crude oil instead of coal, resulting in increased output as well as decreased cost of operation. The new grey iron foundry is now in operation and the capacity is ample for all the requirements of the plant. The wheel capacity has been almost doubled by the erection of a new building. Most of the new machinery for the steel car plant has arrived and the work of installation is under way. The steel erecting shop will be a steel building, 300 ft. x 100 ft., equipped with electric overhead traveling cranes and electrically driven tools and air tools. The output of the company was recently six cars a day, but this is steadily being increased and it is expected that an output of 12 wooden cars will soon be reached. On October 1 the company will begin to build steel cars, and will have a plant capable of turning out 10 steel cars daily, making a total capacity of 22 cars a day.

The annual report of the American Car & Foundry Company, New York, for the year ended April 30, 1911, shows that the net earnings were $4,234,789, an increase of $145,311 over 1910. The company earned 7.01 per cent. on the common stock, a much better showing than was expected. The year was a very bad one, for the scarcity of orders and the consequent increased competition resulted in a lessening of the profit margin. The company has taken advantage of the comparatively light operations and has made a thorough overhauling of all the plants. The item of $500,000, which has previously been carried in reserve for the purchase of the Wilmington plant has been expended for that purpose, so that property is now owned, free of all incumbrances. The additional all-steel passenger car plant at St. Charles, Mo., has been nearly completed during the year. For this work and for other additions $434,225 of the sum reserved for the construction of and additions to steel car plants was spent. This depletion of this reserve was partly made up by an appropriation of $250,000 from net earnings, so that the reserve is now $1,277,795, as against $1,462,020 in 1910. The regular 7 per cent. dividend was paid on the preferred stock and 2 per cent. was paid on the common stock. The surplus for the year was $784,789, as compared with $1,389,478 in 1910. An appropriation of $750,000 for general overhauling, improvements and maintenance explains this reduction of surplus in 1911. The total surplus as of April 30, 1911, was $24,737,345.

TRADE PUBLICATIONS.

Chicago, Great Western.—This company has published a booklet entitled The Tale of Our Limited, telling of the comforts and up-to-date facilities that may be found on the Great Western Limited.

Car Doors.—The Bullard Car Door Equipment Company, Birmingham, Ala., has published catalog No. 3, illustrating, describing and giving the advantages of its various types of car doors and accessories.

Signals.—The General Railway Signal Company, Rochester, N. Y., in bulletin No. 114-A, describes its selective signaling system, model 3, form B. This bulletin is illustrated and contains a full account of the operation of the system.

Planers.—The Niles-Bement-Pond Company, New York, has published a well illustrated catalog of its large planing machines, including armor plate planers, connecting rod planers, crank planers, plate planers, rotary planers and vertical and horizontal planers.

Northern Pacific.—This company has devoted a small illustrated booklet to the efficiency of its train service in all departments. The various trains and the different classes of cars are briefly but clearly described, and several interesting bits of general information about the line are included.

Water Softeners.—The L. M. Booth Company, New York, has published a catalog of its water softeners, illustrating installations of the various types throughout the country, and telling of the success with which they have met. The chemical regulators are illustrated by diagrams and are fully described.

Grinding Wheels.—The Norton Company, Worcester, Mass., has published a small illustrated catalog of its grinding wheels under the title Safety, as Applied to Grinding Wheels. The descriptions are clear and concise, and the tables and diagrams combine to furnish a very good idea of the construction and advantages of these wheels.

Oxygen and Hydrogen.—The International Oxygen Company, New York, has published a small booklet on the I. O. C. system of generating oxygen and hydrogen for cutting, welding and other purposes. This system is clearly and concisely described, and the merits of the oxygen-hydrogen flame and the oxygen-acetylene flame for autogenous welding and cutting are compared.

Ventilating Fans.—The American Blower Company, Detroit, Mich., has published bulletin No. 315 on its Ventura disc ventilating fans. The bulletin is illustrated and includes tables and diagrams. This fan is reversible, so that it will either exhaust or blow in. The A B C cast iron exhaust fan is described in a separate little booklet, also published by this company. These fans are used principally to exhaust dust, smoke, shavings, etc.

Brake Beams.—The Chicago Railway Equipment Company, Chicago, has published a booklet entitled The Brake Beam, written by C. H. Williams, Jr., New York. It contains a full discussion on the importance of the brake beam, brake cylinder travel, brake beam deflection, and also a history of the development of the brake beam. Several illustrations are included which show some interesting results of tests of solid and trussed brake beams.

Staybolts.—The Flannery Bolt Company, Pittsburgh, Pa., has published a useful booklet on The Breakage of Staybolts. Various causes are pointed out and remedies are outlined. A paper on The Impossibility of Expansion in Locomotive Boilers and the Possibility of Eliminating the Bad Effects Therefrom, by Donald F. Mallett, and a Theoretical Discussion on the Breakage of Staybolts in Locomotive Boilers, by W. L. Turner and B. E. T. Stafford, are included.

[illegible] William Jessop & Sons [illegible] New York, has published an interesting little booklet on its different kinds of steel and the purposes to which each is best suited. Special attention is devoted to the Ark high speed treated tool holder bits. Their advantages are outlined and their prices given. Full directions for working are also included. There is also a useful table giving the various temper colors of carbon steel commonly accepted as standard. The booklet includes other interesting [illegible]

Railway Construction.

New Incorporations, Surveys, Etc.

Algoma Central & Hudson Bay.—According to press reports, a contract has been let to J. D. McArthur, Winnipeg, Man., and T. J. Kennedy, for the completion of the Algoma Central & Hudson Bay. The work will include grading and ballasting 208 miles, from Sault Ste. Marie, Ont., to the Grand Trunk Pacific. The work will cost about $3,000,000. The contract calls for completion of the work within two years. (June 30, p. 1713).

Atchison, Topeka & Santa Fe Coast Lines.—According to press reports, this company is receiving bids for the construction of a branch line from Blythe Junction, Cal., to a point near Blythe.

Atlantic, Waycross & Northern.—See this company in Railway Financial News.

Aroostook Valley.—See St. John & Quebec.

Canadian Northern Pacific.—An officer writes that this road will run from Vancouver, B. C., northeast via the valleys of the Thompson, North Thompson and Fraser rivers to the boundary line of British Columbia at Yellow Head Pass, about 500 miles. Construction work and track laying have already been started. The Northern Construction Company, Winnipeg, Man., has a contract for part of the work. The work will be very heavy. The maximum grade will be 0.4 per cent., compensated; and maximum curvature, 8 deg. Sir William Mackenzie, president, Toronto, Ont., and T. H. White, chief engineer.

Canadian Northern.—See Canadian Northern Pacific.

Central Idaho.—An officer writes that this road will run from Richfield, Idaho, northwesterly 34 miles, thence west 18 miles, and thence southwest six miles, to Taft, in all 58 miles. The road is now under construction, but no track is laid. The Utah Construction Company, Ogden, Utah, has the contract. Maximum grades will be 1 per cent., and maximum curvature 3 deg. The principal commodities the road will carry are agricultural products and livestock. W. H. Bancroft, vice-president and general manager of the Oregon Short Line is president, and Carl Stradley, chief enginer, both of Salt Lake City, Utah.

Chicago, Rock Island & Pacific.—All equipment necessary in the work of constructing the St. Paul & Kansas City Short Line from Allerton, north to Carlisle, Iowa, is on the ground. The work is well under way, and will be pushed to completion. The survey has been divided into eight sections of approximately eight miles each, and two gangs have been put to work on each section. The new line in connection with the St. Paul & Des Moines will complete an important through line for the Rock Island between St. Paul, Minn., Minneapolis, and the northwest, and Kansas City, Mo., and the company's line to California and the gulf. It will be the shortest line between Minneapolis, St Paul and Kansas City. (April 14, p. 924.)

Colusa & Hamilton.—Incorporated at San Francisco, Cal., with $2,000,000 capital, to build from Harrington, Cal., north to Hamilton, about 60 miles. The company was incorporated by officials of the Southern Pacific.

Corning, Keuka Lake & Ontario.—This company has applied to the New York Public Service Commission, Second district, for permission to build from Corning, Steuben county, N. Y., to Sodus bay, Wayne county, on lake Ontario, about 90 miles.

Idaho Roads.—The Idaho Continental Mining Company will build a line, it is said, from Porthill, Bonner county, Idaho, into its mining district, about 22 miles.

International Railway.—See St. John & Quebec.

Meridian & Deep Water.—An officer writes that construction work is now under way on the line from Meridian, Miss., to the beginning of deep water on the Tombigbee river in Alabama, 47 miles. Bids are now being asked for track laying, bridges, etc. The road will have a grade of 1 per cent. About 800,000 cu. yds. of earth will have to be moved. The principal commodities the road will carry are cotton, coal and vegetables. S. A. Neville, president, and W. C. Stowall, chief engineer.

Missouri, [illegible] & Texas.—Preliminary surveys [illegible] been

started, it is said, for a line from Parsons, Kan., to Wichita, about 110 miles.

MOUNTAIN QUARRIES CO. LINES.—An officer writes that contracts have been let and work is now under way building from Auburn, Placer county, Cal., to Cool, Eldorado county, eight miles. There will be a reinforced concrete bridge, to have three 140-ft. spans. Morris Kind, president, San Francisco. (May 26, p. 1223.)

NATIONAL RAILWAYS OF MEXICO.—Construction work will soon be begun on a branch line from Allende, Mex., to Las Vacas, about 75 miles.

NAVAJO SOUTHERN.—This company has been organized at Phoenix, Ariz., and has filed maps for the construction of a line from Holbrook to the south line of Navajo county, about 70 miles. F. H. Bowen, president, and W. H. Clark, secretary, Phoenix.

NEW YORK, ONTARIO & WESTERN.—An officer writes that the company is double-tracking the line between Cadosia, N. Y., and Poyntelle, Pa. The MacDonald Construction Company, New York, has a contract for part of this work, and the balance is being done by the company's men. This work includes a double-track steel bridge over the Erie Railroad tracks on the Delaware river at Hancock, N. Y., the estimated cost of which is $150,000. The Pennsylvania Steel Company has the contract for the steel work on this bridge, and the MacDonald Construction Company has the contract for the concrete work.

OREGON SHORT LINE.—See Central Idaho.

OWENS RIVER VALLEY (Electric).—An officer writes that grading is now under way on a line from Laws siding, Inyo county, Cal., on the Southern Pacific, south to Bishop, about five miles. The track laying, bridge work, etc., is to be done by the company's men. A grading contract has been let to McLean & Francisco, Bishop, and a contract has been let for the ties and timber. The line is being built to carry agricultural and dairy products, fruits and livestock. The company has not yet decided whether electricity will be used for the motive power or gasolene electric cars. Harry Shaw, president, and R. Spalding, chief engineer, Bishop.

PACIFIC ELECTRIC.—This company proposes to build, it is said, from Upland, Cal., west to San Bernardino, 20 miles, and from Riverside northeast to San Bernardino, 10 miles; in all, 30 miles.

SAN ANTONIO & MEXICAN.—See Texas Roads.

ST. JOHN & QUEBEC.—An officer of the Aroostook Valley writes that a line is to be built by the St. John & Quebec from St. John, N. B., northwest via Fredricton, Woodstock, Centerville and Andover to Grand Falls, where connection is to be made with the National Transcontinental (Grand Trunk Pacific), 210 miles. The new line is to be built under the charter of the St. John & Quebec, of which the Aroostook Valley is a subsidiary, forming part of a through line in the state of Maine. It is expected that work on the new line will be started this year. The average cost per mile is $35,000. When completed, the line will be operated by the Intercolonial Railway. A. R. Gould, Presque Isle, Me., is president of both the St. John & Quebec and the Aroostook Valley.

ST. PAUL & DES MOINES.—See Chicago, Rock Island & Pacific.

ST. PAUL, & KANSAS CITY SHORT LINE.—See Chicago, Rock Island & Pacific.

SOUTHERN PACIFIC.—According to press reports, contracts have been let and construction work commenced by the Utah Construction Company on a branch line from Tulasco, Nev., to the new town site of Metropolis, about nine miles.

See Colusa & Hamilton.

SOUTHERN PACIFIC OF MEXICO.—The section between the Santiago river, Mex., and the city of Tepic is expected to be finished in the latter part of October, and will probably be opened to traffic in November. Track is now laid to within 20 miles of Tepic, and the grade is nearly finished to that city. This company holds a concession to extend its line from Orendain to Mexico City via Guadalajara, and as soon as arrangements and surveys can be made construction work will begin.

TEXAS ROADS.—The San Antonio & Mexican Construction Company recently formed with $500,000 capital, to build from San Antonio, Tex., to some point on the Rio Grande, about 325 miles, has entered into a contract with C. S. Young, Brownsville, to make the preliminary surveys.

TWIN MOUNTAIN & POTOMAC.—An officer writes that this road will run from Keyser, W. Va., south via Arnolds Gap to Burlington, and thence to Twin Mountain, about 26 miles. No track has been laid, but the prospects of building the line are good. Contracts will be let about August 15. The work will be light. The maximum grade will be about 4 per cent., and the maximum curvature about 30 deg. There will be one 100-ft. steel bridge. The principal commodities the road will carry are fruit, lumber and coal. J. Clyde Lewis, chief engineer, Grafton, W. Va. (June 23, p. 1675.)

UTAH ROADS.—A company has been incorporated in Utah, with $150,000 capital, to build from a point on the Denver & Rio Grande, at Thompson, Grand county, Utah, into coal country, about eight miles. Construction work will be started shortly and the line will later be extended. The officers of the company are as follows: B. F. Bauer, president; H. T. Ballard, vice-president; C. L. Crockwell, second vice-president; William Darke, secretary, and W. S. McCarty, treasurer, all of Salt Lake City.

WENATCHEE VALLEY RAILWAY & POWER.—This company will build a line, it is said, from Wenatchee, Wash., northwest to Leavenworth, 20 miles. E. J. Felt, Tacoma, is interested.

WICHITA FALLS ROUTE.—An officer writes that the Wichita Falls & Northwestern will build an extension from Hammon, Okla., north via Leedy, Train, Vici and Woodward to Supply, 84 miles. Construction work is already under way, but no track has been laid as yet. The work will be heavy, about 50,000 cu. yds. of earth per mile. The maximum grade will be 0.75 per cent. and the maximum curvature 3 degrees. The road will carry grain, cotton, livestock, etc. J. A. Kemp, president, and R. A. Thompson, chief engineer, both of Wichita Falls, Tex. (June 9, p. 1135).

WICHITA FALLS & NORTHWESTERN.—See Wichita Falls Route.

RAILWAY STRUCTURES.

AMARILLO, TEX.—See Cleburne, Tex.

AUBURN, CAL.—See Mountain Quarries Company Lines, under Railway Construction.

CANADIAN, TEX.—See Cleburne, Tex.

CLEBURNE, TEX.—According to press reports, plans have been approved for improvements on the Texas lines of the Atchison, Topeka, & Santa Fe, as follows: Brick power house and power plant at Cleburne, to cost $27,000; water treating plant at Canadian, $7,000; 16-stall brick engine house at Galveston, $48,000 (July 14, p. 106); water treating plant at Amarillo, $8,200, and street improvements, $2,200; improving water facilities at Houston, $7,000; and yard improvements at Temple, $5,800.

FRESNO, CAL.—The Southern Pacific has commenced to rebuild its depot, which was recently damaged by fire.

GALVESTON, TEX.—See Cleburne, Tex.

GLENDIVE, MONT.—The Northern Pacific, according to press reports, has let contract to the Pittsburgh Construction Company for the completion of the railway bridge across the Yellowstone river above Glendive. The concrete work was finished last fall, and the contract calls for completion within 40 days after July 2. This bridge is on the Glendive-Sidney branch, now under construction. (See construction item under Northern Pacific in issue of October 28, 1910, p. 810.)

GRAFTON, W. VA.—The Baltimore & Ohio has awarded the contract for building a machine shop and supply building at this place.

HALIFAX, N. S.—The time for receiving bids for the construction of a reinforced concrete pier and sheds at the deepwater terminus of the Intercolonial Railway at Halifax has been extended from July 20 to July 31, and bids are wanted by August 1 for freight sheds on the quay wall at Halifax. Address L. K. Jones, secretary, Department of Railways & Canals, Ottawa, Ont. (June 30, p. 1715.)

Hancock, N. Y.—See New York, Ontario & Western under Railway Construction.

Houston, Tex.—See Cleburne, Tex.

Little Rock, Ark.—The Chicago, Rock Island & Pacific has awarded the contract for building a freight house to cost about $100,000.

Moline, Ill.—The Chicago, Burlington & Quincy has prepared plans for a one story, brick and concrete passenger station, 28 ft. x 185 ft. The building will contain a ticket office, waiting room, smoking room, women's rest room and baggage room and will have a canopy over the platform 15 ft. x 280 ft. The estimated cost will be $40,000.

Montclair, N. J.—Negotiations are almost completed for the construction of a new freight and passenger station for the Delaware, Lackawanna & Western at Montclair, and for the elimination of grade crossings at that place.

North Ontario, Cal.—See Upland Junction, Cal.

North Yakima, Wash.—The Oregon-Washington Railroad & Navigation has acquired a site at North Yakima on which to build repair shops.

Oelwein, Ia.—See Stockton, Ill.

Oklahoma City, Okla.—According to press reports, funds are being raised for the purchase of terminal facilities at Oklahoma City for an extension of the Missouri, Oklahoma & Gulf. It is believed that the $75,000 which is needed will be secured shortly.

Providence, Pa.—An officer of the New York, Ontario & Western, writes that the company is rebuilding two bridges over the Delaware & Hudson tracks between Dickson, Pa., and Providence, at an estimated cost of $80,000. The American Bridge Company has the contract for the steel work, and the MacDonald Construction Company, New York, has the contract for the masonry.

St. Joseph, Mo.—The Chicago, Burlington & Quincy is taking bids on a brick and steel freight house, 40 x 600 ft., with 11-ft. platform on the track side and flat gravel roof with 12-ft. overhanging eaves on both sides.

Sault Ste. Marie, Ont.—Bids for the construction of a $65,000 depot are called for, it is said, by the Algoma Central & Hudson Bay.

Savannah, Ga.—The improvements at Hutchinson Island, now under way, referred to in our issue of July 21, page 159, are being carried out by the Seaboard Air Line.

Sioux Falls, S. D.—The Chicago, Milwaukee & St. Paul will build a freight house at Sioux Falls.

Stockton, Ill.—The Chicago Great Western has awarded the contract for building a one-story, six-stall roundhouse of brick construction, to cost about $60,000. This company has also awarded the contract for improvements and additions to the shops at Oelwein, Ia. to cost about $100,000.

Taylor, Tex.—The Missouri, Kansas & Texas has prepared plans for a new passenger station, 184 ft. x 46 ft., mission style, brick and stone construction, inside finish of white enameled brick, roof to project over eaves to form cover for platform, to cost about $40,000. Construction will begin in a short time.

Temple, Tex.—The passenger station for the Missouri, Kan[illegible] will be erected, it is said, at a cost of $40,000.

[illegible]

[illegible] Corpus Christi, Oakville & San Antonio Heights (electric) has awarded contracts to Herbert Cleveland, Ontario, Cal., to build depots at Upland Junction, North Ontario and at Mountain avenue.

[illegible] depot will be erected at Vidalia by the Georgia & Florida. It will also be used by the Seaboard Air Line and the Macon, Dublin & Savannah. C. Lloyd Preacher is the architect. The building will cost about $12,000, and will be of [illegible] Work will be pushed as soon as the plans are completed.

Railway Financial News.

Atlantic, Waycross & Northern.—The stockholders have voted to authorize an issue of $4,800,000 bonds and $1,500,000 stock, to build the line projected from St. Mary's, Ga., to Atlanta, about 222 miles. There is now in operation about 10 miles.

Boonville, St. Louis & Southern.—This company has sold to Spitzer, Rorick & Co., Toledo, Ohio, $500,000 first mortgage 5 per cent. bonds of August 1, 1911-1951. The bonds are guaranteed principal and interest by the Missouri Pacific, which as heretofore announced has bought the Boonville, St. Louis & Southern. Of the proceeds of these bonds, $400,000 will be used to pay at maturity on August 1, 1911, $400,000 first mortgage 6 per cent. bonds.

Buffalo & Susquehanna.—The *Commercial & Financial Chronicle* quotes H. I. Miller, receiver, as saying that the $255,000 Buffalo & Susquehanna Railroad receiver's certificates will be paid off at maturity on August 1, and that it will not be necessary to reissue any part of them.

Chicago & Eastern Illinois.—In addition to the $1,284,000 bonds to be issued by the Evansville & Terre Haute, to be used to redeem the capital stock of that company, the Chicago & Eastern Illinois is to increase its capital stock from $25,000,000 to $30,000,000, the additional $5,000,000 stock being preferred, which is to be issued to pay for the property of the Evansville & Terre Haute and the Evansville Belt, and to pay for the stock of the Evansville & Indianapolis.

See also Evansville & Terre Haute.

O. S. Lyford, vice-president, has been elected a director, succeeding Frank Trumbull, resigned.

Cincinnati, Georgetown & Portsmouth.—It is said that control of this company has been bought by St. Louis bankers.

Columbus & Southern.—It is said that New York bankers have been given an option on the controlling stock of this company.

Connecting Railway (Philadelphia).—This company has made a mortgage securing $15,000,000 bonds. The company operates 36 miles of road in and around Philadelphia, and its $3,613,650 stock is owned by the Pennsylvania Railroad, which operates the road under lease.

Evansville & Terre Haute.—Stockholders of this company under the merger plan with the Chicago & Eastern Illinois are to receive 10/12 par value of C. & E. I. preferred stock in exchange for par, par value of E. & T. H. preferred, or may receive at their own option 4 per cent. refunding bonds of the E. & T. H. par for par with their preferred stock.

Grand Trunk.—This company has obtained an injunction against the New York, New Haven & Hartford preventing the New Haven from building a freight house across the proposed right-of-way of the Southern New England, which is the Grand Trunk subsidiary, which is to build into Providence, R. I.

Lake Superior & Ishpeming.—The Cleveland Cliffs Iron Company, Cleveland, Ohio, has offered to its stockholders $994,000 first mortgage 6 per cent. bonds dated February 1, 1911, payable $70,000 yearly from 1912 to 1931. The road runs from Presque Isle Harbor, Mich., to Jopling, and to iron mines in the Marquette district; in all 31 miles of main line and about 23 miles of branches and sidings.

New York, New Haven & Hartford.—See Grand Trunk.

New York, New Haven & Hartford.—This company has sold to bankers $7,200,000 bonds of its subsidiary, the New York, Westchester & Boston. The bonds will bear 4½ per cent. They are a part of a total authorized issue of $20,000,000 first mortgage bonds, the bulk of which has been in the New Haven treasury for several years. The whole issue is guaranteed by the New Haven, which owns $4,924,800 of the $5,000,000 capital stock of the subsidiary.

Offing Oil Co.—It is announced that a call of $10 per share is made on the 1,250 shares ($10 paid), due August 14, 1911.

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OF the 54,609 passenger coaches in service in this country, December 31, 1910, 2,927, or 5.3 per cent., were of all-steel construction, and 1,481, or 2.7 per cent., were equipped with steel underframes. Bulletin No. 21, issued by the special committee on the relations of railway operation to legislation, which is reproduced on another page of this issue, contains the first complete data which has been compiled on the number of all-steel and steel underframe passenger cars in service and also under construction. The rapid rate at which such cars are being introduced is shown clearly by the fact that 24 per cent. of the 2,000 passenger cars acquired in 1909 were of all-steel construction, while 21 per cent. were equipped with steel underframes. Of the 3,783 cars acquired in 1910, 53 per cent. were all-steel and 14 per cent. had steel underframes. Of the 4,074 cars which will be acquired during the present year, 62 per cent. will be all-steel and 14 per cent. will have steel underframes, leaving only 24 per cent. of new cars of wooden construction. At the close of 1908 only 0.8 per cent. of the passenger cars in service were of all-steel construction, while at the close of 1911 fully 9.3 per cent. will be so built. In the same time the number of cars with steel underframes will have increased from 1 to 3.5 per cent., or at a much lower ratio, while the percentage of wooden cars in service will have dropped from 98.2 to 87.2 per cent. The cost of replacing all the present wooden cars with steel, which would be required if some of our legislators had their way, is estimated at $630,489,400.

AFTER the decision in the commodities clause case the Delaware, Lackawanna & Western promptly formed the Delaware, Lackawanna & Western Coal Company and distributed as a dividend to its own stockholders pro rata the stock of the coal company. The Standard Oil Company of New Jersey has announced that it will do a somewhat similar thing on a much more complicated scale in regard to the stock of its subsidiary companies. There are 33 of these subsidiary companies, the stock of which is held either by the Standard Oil Company of New Jersey directly or through the National Transit Company, and each stockholder in the Standard Oil Company of New Jersey will receive, in addition to the certificate he now has, stock certificates representing shares, or fractional shares, in each one of the heretofore subsidiary companies. The Standard Oil Company of New Jersey continues in business as a purely manufacturing company. In the case of the Delaware, Lackawanna & Western the stock of the railway company was so closely held among a small group of wealthy men that almost without exception the railway stockholder took up and held, it is generally understood, the stock in the coal company. In the case of the Standard Oil it is believed that the Rockefellers, with their close associates, own a clear majority of the stock of the Standard Oil Company of New Jersey. It is conceivable that they will be able and willing to continue to hold the same proportion of stock in each of the subsidiary companies. If this is the case the management of the various properties can continue to be carried on in harmony with some general policy, and the wastes of competition will still be avoided. The Standard Oil Company, however, has a large number of stockholders who presumably are almost entirely ignorant of the comparative value and earning power of the subsidiary companies. It would seem that when the stocks of these subsidiary companies come on the market there would be afforded an opportunity for speculation by insiders that would amount to "heads I win, tails you lose," as far as the general public are concerned. And also, if the assumption that the Rockefeller interests can hold and will continue to hold a clear majority of the stock of each of the subsidiary companies is wrong, then the possibilities of competition, price fluctuations, higher cost of manufacture, etc., are quite apparent. If such competition should eventually come about, it would again be the small stockholder as well as the general public who would suffer. Of course, all of the dangers in such a reorganization as that of the Standard Oil to the small stock-

holder are much greater in the case of an industrial company than would be the case of a railway company. The Standard Oil Company is the largest example of an industrial company which has kept its corporate affairs strictly secret, but there are many other smaller industrial companies which have pursued very much the same general policy. The tendency toward regulation is commented on below. Railways are compelled to make their corporate affairs public, but if a course of publicity were forced on industrial corporations it is rather hard to see where the line could be drawn between a public and a private corporation.

A SUGGESTIVE fact in connection with the control by the New York, New Haven & Hartford of some 1,300 single track miles of street railways is that, in Connecticut at least, no attempt has been made to suppress competition with the steam lines. The general policy is illustrated by the fact that quick trolley service has been established between New Haven and Waterbury over the trolley routes, both in effect paralleling the steam road, though the Nangatuck valley and both the trolley roads being absolutely under the steam corporation's control. Given control of some hundreds of miles of parallel trolleys by a steam corporation owning practically all the outstanding trolley stock, its most profitable policy is not separative but co-operative. The steam and trolley parallels must be treated in close combination and with full knowledge of the fact that the dollar earned on the one is full substitute for the dollar earned on the other, so long as each dollar goes to the same treasury. On the New Haven's trolley system, whether in Connecticut, Rhode Island or Massachusetts, there has been an increase of traffic so steady and so large as to leave, relatively, any normal increase of steam business far behind. With the earned dollar still going into the parent corporation's strong box, it is, clearly, wise to develope the trolleys in the direction of greatest earning power, even though some trains on the steam parallels run thin. Another point worth attention is the New Haven's plan of keeping the Connecticut trolleys intrastate instead of letting them reach out into adjacent states. Their holding company is a Connecticut corporation holding practically only trolley lines within the state. The barrier to federal interferences is obvious, and an asset of the future not to be underrated.

GOVERNMENT REGULATION OF PRICES AND WAGES.

S[illegible] E. H. Gary said that the United States Steel Corporation would welcome federal regulation of its prices. Now comes Attorney General Wickersham, and in a speech before the Minnesota Bar Association at Duluth, Minn., by broad implication advocates the creation of a federal trade commission to regulate the prices of large industrial corporations in general.

It has sometimes been suggested by railway men that the great and rapid extensions of federal regulation of transportation would foster a public sentiment in favor of the socialization of [illegible]. The large shippers who have been active in the agitation against the railways have refused to take this suggestion seriously. They have said that the railway is a quasi-public corporation and, therefore, may be [illegible] which could not legally be applied to [illegible].

In reasoning thus they have overlooked one very important fact to which Mr. Wickersham referred. This is that the railway is held to be a quasi-public corporation, and, therefore, [illegible] "clothed with a public interest"; and it is "clothed with a public interest" [illegible] which the public is vitally [illegible] when a railway concern or combination, [illegible] of the products of its commerce in some commodity the sale of which at reasonable prices is of great importance to the public and concern or combination becomes in fact as much "clothed with a public interest" as a railway; and when it can be shown that such concerns have in fact become thus affected with a public interest, the courts are not at all unlikely, as Mr. Wickersham intimated, to apply to them the same principles of law that they apply not merely to railways, street railway companies and other public utilities, bust also to several other classes of concerns. In the famous case of Munn v. Illinois (94 U. S. 113) it was held by the Supreme Court of the United States that the state of Illinois had the power to regulate charges for the storage of grain in warehouses in Chicago, the court saying:

> "When one devotes his property to a use in which the public has an interest, he in effect grants to the public an interest in that use, and must submit to be controlled by the public for the common good to the extent of the interest he has thus created."

And in the case of Cotting v. Godard (183 U. S. 79) it was held that—

> "Tested by the rule laid down in Munn v. Illinois, it may be conceded that the state has the power to make reasonable regulation of the charges for services rendered by the stock-yards company. Its stock yards are situated in one of the gateways of commerce, and so located that they furnish important facilities to all seeking transportation of cattle. While not a common carrier, nor engaged in any distinctively public employment, it is doing a work in which the public has an interest, and therefore must be considered as subject to governmental regulation."

Can anybody seriously question that the United States Steel Corporation, the Standard Oil Company, and the packers' trust, for example, have now even more complete monopolies of their respective lines of business than is possessed by any railway or combination of railways in the United States? And do not some of them, at least, deal in commodities which are of as great consequence to the public as is the service of transportation or of storing grain? Following out this line of reasoning, we are led to the conclusion that it is highly probable that under the present federal constitution Congress could regulate the prices of many large trusts.

That there is apt to be a movement for such regulation seems now to be very highly probable. If it does develop, railway managers will be able to regard it with some equanimity. At present the large industrial concerns can, and do, complain to the Interstate Commerce Commission if they think that the rates which the railways charge, or propose to charge are unreasonable. On the other hand, when the railways go into the market to buy lumber, steel, rails, etc., they have to pay whatever prices the large combinations choose to exact, and those prices are never fixed according to the same principles which those who make them contend should govern the making of railway rates. It might be comforting to railway men to know that, while there was a tribunal which regulated the amount that the railways should receive for their services, there was also a tribunal to which the railways could appeal to regulate the prices that they might be compelled to pay for their lumber and rails.

There is one point, however, that Mr. Wickersham overlooked. This is that there are not only industrial trusts, but also labor trusts, and that many of these labor trusts exercise even more complete control over the wages that shall be paid to their members than the railways exercise over their rates or the industrial trusts exercise over their prices. Should we not go farther and create another commission to regulate wages? As already said, when railways in the past have suggested that one of these days there would be a movement for regulation of the prices of industrial corporations, the managers of these concerns have refused to take the suggestion seriously; and if the suggestion be now made that after the government shall have adopted the policy of fixing the prices of industrial concerns it will turn its attention to the regulation of the wages of labor, the labor leaders will probably scout the idea. But is it not obvious that if the government is to regulate railway rates and prices, sooner or later it will have to regulate wages, because wages enter so largely into rates and prices that they cannot be controlled unless wages also are controlled? The labor unions are a pretty strong element in American politics, but they are vastly outnumbered by those who do not belong to labor unions, and when this great majority found, as it certainly

would find, that the prices that they had to pay depended largely on the wages that organized labor received, they would not long leave organized labor to work its will, as it does now in the transportation and many other industries.

The prospect of having not only a commission to regulate the rates he may charge, but also another commission to regulate the prices he must pay, and still another to regulate the wages he must pay, must be very refreshing to the railway manager, who sometimes grows weary of trying to make government-made rates and trust-made wages and prices culminate in profits. But, looking at the matter not as a railway man, but as a citizen, he, in common with other thoughtful citizens, is apt to have his doubts as to the magnitude of the benefits that the public will derive from an extension to other branches of industry of the policy now applied to railways. Our policy of regulation of railways has not yet proved so clear and complete as success as to justify taking it as an example to be followed in dealing with other industries. It seems that if the state and federal governments, instead of extending their regulation of industry, would repeal some laws already in effect, better results might be obtained. For example, a reduction of the tariff on commodities made by trusts would involve a much less dangerous extension of governmental power and would be quite as apt to reduce prices as the creation of a commission for that purpose. If the government would undo some of the things it has done which have tended to create trusts and monopolies and to raise prices, it might develop that there is much less need than many now imagine for the insertion of its finger into every commercial and industrial pie, big and little, in the country.

NEW BOOKS.

Railway Rate Theories of the Interstate Commerce Commission. By M. B. Hammond, Professor of Economics and Sociology, Ohio State University. Published by Harvard University. Cloth, 5¾ x 8⅜. Price $1.00 net.

Professor Hammond has made a study of a large number of the decisions of the Interstate Commerce Commission, and through this inductive study has arrived at his conclusions as to the theories according to which the commission regulates rates. The author takes the characteristic academic view of the proper ways to make and to regulate rates. His leaning toward the cost of service theory, and his lack of knowledge of the practical conditions which make its genereal and uniform application impossible, are evident throughout. But this does not seriously impair the value of the book. It is clearly, concisely, and interestingly written and logicaly arranged and throws more light on the principles according to which the commission has acted, and the changes which have gradually taken place in those principles, than any other book that has up to the present been published.

The commission in early decisions pointed out that railway rates in the United States had usually been based mainly on the value of the service, saying in their first annual report, "Such method of apportionment would be best for the country because it would enlarge commerce and extend communication; it would be best for the railways, because it would build up a large business, and it would not be unjust to property owners, who would thus be made to pay in some proportion to benefits received."

Professor Hammond's analysis shows that the commission has been steadily drifting away from this theory and tending more and more toward the adoption of the cost of service theory. These changes in the commission's attitude, as is indicated by the author, have been due largely to changes in its personnel. While a strong advocate of the cost of service theory, Professor Hammond is judicial in his tone throughout, and while most railway men will refuse to accept his conclusions, they will nevertheless read his book with much interest and profit.

Letters to the Editor.

THE COSTLINESS OF FREIGHT TARIFFS.

Louisville, Ky., July 13, 1911.

To the Editor of the Railway Age Gazette:

There is probably no other single item of railway operation today that needs closer checking up than that of the compilation and printing of freight tariffs. That the railways are spending several millions of dollars yearly for the compilation, printing and distribution of their freight tariffs showing the cost of transportation is almost unbelievable, yet it is a demonstrable fact. Instances can be cited where the cost of compilation, printing and distribution of one tariff containing a few hundred destinations, the majority of which are unimportant towns and to which the movement of traffic is light from the points of origin shown therein, for a period of three years, was more than one hundred thousand dollars. The tariff referred to is compiled by one of the joint traffic associations, which association has expended in the last three years near to three hundred thousand dollars for compiling, printing and distributing twenty-eight tariffs, of which expense more than two hundred and twenty-five thousand dollars is chargeable to the cost of printing, over twenty thousand dollars to distribution, over five thousand dollars to miscellaneous, and the remainder to clerical salaries.

When it is considered that three hundred thousand dollars represents a yearly return of 5 per cent. for three years on an investment of two million dollars, the magnitude of the expenditure can be appreciated, and as there are several other traffic associations compiling many more tariffs and expending even larger sums than the one referred to, and as the individual lines are compiling thousands of their individual tariffs, it can be seen that a prolific field is open for study. An investigation of this important department would probably reveal that there are four underlying causes for the unnecessary cost incurred:

First: The too frequent changes in minor rates, making necessary the publication of expensive supplements to the original tariff or the reissue of the tariff proper.

Second: The employment of clerks to compile tariffs, who are not properly trained and experienced in the preparation of "printer's copy." When consideration is given to the fact that tariff typesetting costs from sixty cents to one dollar per hour (depending upon the locality) the importance of preparing copy in the most legible manner possible cannot be overestimated. Investigation will develop the fact that the cost of alterations caused by the carelessness of clerks preparing copy forms one of the chief items of expense, a cost which could be eliminated if this feature were given the proper study and attention.

Third: The reissuance of tariffs in compliance with some technical requirement. Instances can be cited where as much as seventeen thousand dollars has been paid out to cover the reissuance of tariffs simply to comply with an immaterial technical rule without the changing of a solitary rate.

Fourth: Exorbitant prices charged by printers. During the past three or four years the cost of printing has increased enormously. This can probably be attributed to the fact that the work is not let out on the proper competitive basis, and to a large extent in some cities to those big printers who, being in position to render satisfactory service, can form a "gentlemen's agreement" to charge uniform prices.

While it is obvious that it will always be necessary for the carriers to expend large yearly sums for the compilation, printing and distribution of their freight tariffs, an impartial investigation would develop the equally obvious fact that the expenditures in the past have been far beyond what should have been necessary.

H. G. McFAN,
Chief Rate Clerk, Southern Railway.

COLLEGE MEN IN RAILWAY WORK.

New York, July 18, 1911.

To the Editor of the Railway Age Gazette:

The letter from "1903," in regard to College Men and Railway Work, printed in your issue of July 14, really needs a reply.

"1903" is evidently impatient for immediate promotion and is not a good mixer with his fellow men. When the somewhat exaggerated tone of his letter is brushed over so as to take off the sharp corners, it leaves a pretty good outline of what a young graduate may expect to meet in his first few years of work, and I offer the following suggestions with the hope that they may be helpful to him and to many others.

Don't expect to be made the pet of the office, but take the work as it comes and show your superior worth by getting good results. That is what the officer in charge over you will be looking for.

Don't allow odious comparisons to be made between your education and the education of those who have been less fortunate than yourself. It is the character back of the education that makes the man, and some of the grammar school graduates may have acquired a knowledge of details and be of such character that their services are temporarily, at least, of more value to your employer than your own.

The knowledge of pure, as well as applied, mathematics and all other studies that are not used frequently will soon become hazy, but that need be a source of no misgivings; the mind has had the benefit of college training; the habit of logical reasoning has been formed; the ability to read over a scientific treatise and cull out the portions bearing upon the problem in hand has been acquired—the young engineer should now bend every effort toward mastering the practical details of the work in which he may be engaged.

The railway field is broad, and although the engineering for ordinary improvements and construction is generally simple, the vast problem of transportation in all its branches requires men of keen perception, large experience, and almost unlimited energy, resourcefulness and executive ability.

There are plenty of openings for young men with the right qualifications in almost any business, and railroading is no exception. He who shows promise of being able to accomplish good results will surely have the door to advancement opened for him without getting mixed up with political graft.

YALE 1894.

The various railways which have already been built, together with those under construction in Syria, and those projected in Syria and in the neighboring states, are already beginning to have an appreciable effect upon Beirut, which is noticed principally, at the present time, by the rise in values of all real estate. In the past Beirut has always been a leading center of learning, business, and finance, and it now bids fair to become of still greater commercial importance by reason of its connections with many important railway lines. The following additional information gives an idea of how these various railway extensions are regarded in Beirut. The construction of the Damascus-Haifa and the Homs-Tripoli railways has caused many people of Beirut to fear that the commerce of Beirut might be adversely affected by these railways, while many others have thought that the Homs-Tripoli line would become and remain the sea outlet of Aleppo. It has now been proved that the Haifa line has not caused a sensible decrease in the traffic on the Beirut-Damascus line, and that Beriut remains the natural outlet, not only of Lebanon, but also of Damascus and a good part of the interior beyond. As for the Homs line, it will, no doubt, divert to Tripoli all that traffic which Aleppo and the regions of Homs and Hama formerly sent out to Beirut; but Aleppo will evidently abandon this new line as soon as that city is connected with the sea by a shorter line. But this is for some future time, however.

GOVERNMENT OWNERSHIP OF RAILWAYS.*

BY FAIRFAX HARRISON.
President, Chicago, Indianapolis & Louisville.

There is an Oriental fable of a discontented shepherd who was ruined by the accomplishment of his own wishes: he prayed for more water than he needed, the Ganges was turned into his grounds and his flock and cottage were swept away by the inundation. Can we find a moral in this for our present enquiry? The American is essentially a practical person. If we can demonstrate to him that he already has all he needs, it is not necessary to argue further, but it may not be out of place to point out that not only is government ownership of the railways unnecessary for his protection but that there are positive dangers lurking in the proposition.

It will be recalled that on his return from a tour of the world several years ago a certain Peerless Leader publicly proposed a political programme of government ownership of the railways —and that the suggestion fell still-born, even in his own party of radical tendencies. But in the interval we have seen other as novel and perhaps not less radical political principles propounded and seriously discussed, so while the progressive elements in contemporary American public life have not yet sought seriously to revive the suggestion that the government should take over our railways, it must be recognized that the doctrinaire opinion emanating from some of our colleges, which has been the spring of many current political dogmas, has not entirely abandoned this supposed solution of the railroad question, and that it is quite possible that it may yet be made a live political issue.

In any event the fact that certain European countries today own and operate some or all of their railways, that Australasia has built up her railway system on that basis, suffices to make the question one worthy of serious economic discussion, and, of course, it must be a favorite topic with that large and growing school of opinion whose thesis is that all public utilities should be in the hands of government. Our generation has seen a remarkable growth of municipal activity in the operation of municipal facilities; water works, gas and electric lighting plants have been taken over by cities, and, in certain instances, successfully maintained. The experiment has even been tried of municipally operated street railways, though today the pendulum of opinion has rather swung away from that experiment and the practical social democrat seems for the moment to content himself with public ownership of street franchises leased and operated by individual *entrepreneurs*. Because certain public utilities can be proven to be safe in the responsible charge of a municipality, it does not follow that all public utilities should be operated by political public authority. The logic of such an argument may seem complete, yet it is perhaps subject to the fallacy of the undistributed middle. But, even if the argument was logically sound, a moment's reflection upon the history of our successful political institutions will demonstrate that the difference between Anglo-Saxon and Latin processes of government lies largely in the daring disregard by the Anglo-Saxon of all logic in shaping his political destiny. Our principle has been that logic is magnificent but it is not politics.

Before we proceed with our argument it must be admitted that the advocates of government ownership of our railways are not all doctrinaires or radicals. Not a few of them are to be found among the owners of railway securities, for such have been the uncertainties of the railway industry in recent years by reason of a variety of economic causes (among which may be cited as not the least the realized expectation of labor in constantly increased wages, and the accomplished requirement of governmental authority in matters adding arbitrarily to the expenses of operation), that many railway security holders, trembling over the uncertainty of the return on their invested savings, would welcome the opportunity to exchange what they have for the assured and stable income of a government bond. Indeed a

*An address before the Conference on Southern Problems at the University of the South, Sewanee, Tenn., August 1, 1911.

railway security holder upon whom the government should today make demand to surrender his property would be much in the position of a slaveholder in Virginia in the middle of the nineteenth century when agriculture with slave labor had reached its lowest economic ebb and abolition sentiment was rife. It will be recalled that John Randolph of Roanoke vehemently exclaimed in the House of Representatives that the time was soon coming when the masters would run away from the slaves and be advertised by them in the public papers.

At the threshold of our enquiry as to government ownership of the railways, it is meet to ascertain why that step has been taken by those nations which have taken it, and it is curious that no two of them have taken it for the same reason, which seems to indicate that there is no deep underlying principle which demands it.

Bismarck planned to acquire the German railways for the German Empire as part of his scheme of political unification; after being committed to the policy, he acquired them for Prussia, and accomplished his political object indirectly. The Swiss and the Belgians took over their railways because they feared the domination of foreign capital. Italy and France were both compelled to the step as a consequence of original subsidies and to solve otherwise inextricable complications about government control of rates. The Australasian commonwealths built their own railways because the capital could not be secured except on the credit of the state, and, having built the lines, they assumed in the first instance to operate them. Perhaps the history of this last experiment will be like that of the state of Georgia with the Western & Atlantic: after some years of operation by the state a private corporation was welcomed as lessee and has ever since continued to manage the property. The other states in the South which have surviving proprietary interests in their railways have always been content with private operation, *e. g.*, North Carolina with the North Carolina Railroad, and Virginia with the Richmond, Fredericksburg & Potomac; as is also the case with the Cincinnati Southern, which belongs to the city of Cincinnati.

We can find no guiding precedent among these instances. None of them fits the present situation of the United States as a whole.

If, then, there is no other argument for government ownership than the interest of the public, it may be answered that the interest of the public can be, and will be, and indeed is, protected by regulation. The interest of the public in the railways lies in three things: honest management, efficient service, and reasonable rates, without undue discrimination. None of these things would be promoted by government ownership, but are now secured through regulation.

Under existing conditions it is confidently claimed that railway management is honest, whatever may be said of the past history of the railways in the control of those eponymous financial heroes of the tribe of Capt. Kidd and Blackbeard, whose sins, committed during the period of construction or merger of the railway systems which bear their names, were as scarlet as they were picturesque. But the management of the railways of today is not in the hands of pirates. That tribe is as extinct as the great auk, and while their example, like that of Clovis to the later Merovingian Kings, has been responsible for some lamentable instances of vulgar crime among a few unworthy railway officers, it can fairly be said that no department of the government can boast a body of men higher minded, better equipped or more scrupulous in the public service than the men in responsible charge of the railways today. They have mostly risen from the ranks and are the product of years of sound discipline in subordinate positions, so that they know the responsibility of command and at the same time can respect those subject to their orders. They represent indeed that high ideal of intelligent workmanship so eloquently described in Ruskin's fine exordium:

"To obey another man, to labor for him, yield reverence to him or to his place, is not slavery. It is often the best kind of liberty—liberty from care. The man who says to one Go, and he goeth, and to another Come, and he cometh, has in most cases more sense of restraint and difficulty than the man who obeys him. The movements of the one are hindered by the burden on his shoulder, of the other by the bridle on his lips: there is no way by which the burden may be lightened, but we need not suffer from the bridle if we do not champ at it. To yield reverence to another, to hold ourselves and our dislikes at his disposal, is not slavery: often it is the noblest state in which a man can live in this world."

Never was character at such a premium in the railway service at it is today.[1]

Power in the hands of the individual is always a possibility of tyranny, and the power of the American railway manager is indeed great; not so great as it used to be in the days before regulation, but it is still sufficient great to compensate for some of the difficulties which hamper his work. Disraeli observed that a leader among the boys at an English public school, a captain of Eton or a praefect of Winchester need never envy the prime minister of England, and that is the feeling of the modern railway manager in the United States. Yet his power is now tempered by regulation, for he must account to public authority quite as much as to his board of directors. He sails between the Scylla of enforced resignation and the Charybdis of indictment; so that practically he is as responsible a public servant as if he held a government commission. It cannot be said, therefore, that government ownership is necessary on the ground of control of the integrity of management.

Nor is government ownership necessary to secure efficient service. It may be doubted whether an American railway operated by government would be as efficiently operated as it is under private management. Despite the recent criticism of the efficiency of the existing regime, Julius Kruttschnitt, himself an acknowledged master of efficiency of railway operation, has stated in his recent Harvard lecture his judgment that, as a whole, the American railways are now, and for many years past have been, operated with an efficiency which is astonishing, and that the public has got the benefit of it. In a striking graphic chart he shows the rates per passenger mile and per ton mile actually collected by the railways during the past fifteen years in comparison with what those rates might have been if they had followed the trend of labor and commodity prices during the same period, and he states his conclusion to be that, by the practice of efficiency methods by the railways, more than seven billion dollars was saved to the public in transportation charges in the fifteen years. For the year 1909 this means a saving to the public of $2,760,000 every twenty-four hours, or nearly three times Mr. Brandeis' famous million dollars a day.

The natural initiative of the American man of business working under the stress of competition leads him to experiment with new devices and adopt new methods from day to day in a way impossible to a government-managed industry. Concentration of responsibility is necessary for this, and the criticism of all government-managed railways in Europe is their rigidity. The individual officer may be fit but he is tied fast with red tape, in a way quite familiar to every one who has done business with

[1]Since this paper was prepared I have seen the following extract from a recent leading editorial in the New York *Sun*, and I am proud to know that the author had in mind some of the ornaments of the railway service: "The country needs men especially trained for the administrative responsibilities of business, men who have studied general, social and economic laws as well as the technicals of a particular industry. Their horizon must be wider and their grasp must be broader than that of those whose view is limited by the immediate balance sheet. There are such men now. They are being developed by the corporate regime, and the time will come when no man will be considered fit for the leadership of a great business who does not combine so-called business ability with economic grasp. When that time comes there will be needed no less than now not only trained leaders of industry and commerce, but trained leaders of finance. That the day of the greedy inflationist and conscienceless promoter is passing is evident. The leaders of finance of the future will develop in higher degree the qualities possessed by the greatest of the bankers of today. They will not be concerned with immediate profit, no matter what the future cost in social discontent, but they will have their minds upon the maintenance of that social condition in which the return to the wage earner, to the man who designs and directs, and to the savings of the man of thrift, will be kept as nearly in equilibrium as the fluctuations in the underlying conditions of nature will permit. The great leaders of finance will in increasing degree focus the judgment of the industrial and commercial world for the benefit of those who would securely invest their savings. That character and genuine ability are becoming more and more a potent factor in the conduct of the processes that promote material welfare is proved not only by the elimination of the malefactor from the positions of responsibility in the industrial and commercial corporations, but by the passing of the financial bounder. Ten years ago a profound remark of President Hadley of Yale met with derision from certain quarters, but the course of events proves that the force which works for righteousness is making good his dictum that the surest punishment for the man who has attained so-called pecuniary success through moral obliquity is social ostracism."

the government of the United States. I have myself met, and measured, with the utmost respect for their individual professional equipment, some of the officers of the most criticized railway in the world—the state-ridden Western Railway of France.

The result of government management is almost inevitably bureaucracy, and what this means in comparison with private initiative in living industry can well be illustrated by the experience of Austria. Mr. Pattai, the President of the Austrian Chamber of Deputies, said in a speech delivered last summer:

"We have always been in favor of the state taking over the railways, but if we had been able to foresee the results of the management I assure you we would have hesitated a little longer. We are still in favor of the principle, but it does seem to us that our government has performed a remarkable feat when it has succeeded in creating a deficit on the Northern Railway (which, under private management, earned 6 per cent. dividends). The government have enlisted an army of new employees[2]; they have gone much too far in the reduction of hours of labor; instead of commercial management they have appointed lawyers to posts that require business men or experts; they have established an entirely unpracticable bureaucracy. At the present moment we are face to face with a deficit of $25,000,000. There would be no deficit at all if the return from our railways were that which it ought to be.[3] I repeat that absolute imbecility has characterized the taking over of our railways. We must introduce business ideas into the government service."

If government ownership and operation is not likely to improve the efficiency of operation, neither is it necessary in the interest of the social uplift. What public opinion, working upon the natural law of competition, does not do in that respect can be and is adequately accomplished by regulation. The modern state concerns itself with many social questions affecting industry without assuming the responsibility of ownership, so today by statute or by order of a commission the railways are scrupulously regulated in the interest of employees as well as the public: safety appliances are prescribed, working conditions and hours of service are modified, compensation for injuries is defined, train schedules are altered or fixed, new stations are built, so-called "full crews" are specified: indeed, it would be difficult to define any act of management in the public interest which the state has not assumed to regulate, for all that the Supreme Court has said that "in no proper sense is the public a general manager" of the railways.

The interest of the public in rates and adjustments of rates is undoubtedly safer under the existing regime of private initiative subject to regulation than it would be under government ownership. The selfish ambition of a part of the public is that rates shall constantly be reduced. Under the stress of competition, and with the aid of improved and cost-reducing methods of operation, the American railways have heretofore constantly met this ambition, and have reduced their rates. Recently they realized that they had gone too far in this process and proposed a general advance in an amount which they considered necessary to compensate them for the additional burden they are now carrying. But regulating authority intervened and the proposed advances were prohibited, the railways being assured that the business of the country was adjusted to then existing conditions and the public interest was such that they must be content. It is not probable that if the government owned and operated the railways and felt the pinch of fiscal necessity it would be as considerate of the public as it is when it is regulating the management of private property: at least that has not been the experience in those countries where the government has been actuated by such responsibility. In Germany the railways were acquired with a promise that rates would be reduced. After the government got control and found the necessity for increased revenue, it not only did not fulfil its promise, but has since actually advanced the rates.[4] General advances of rates to provide for fiscal necessities have also been made against the protests of the public on the government-owned railways in Russia, Austria Hungary, Denmark and Switzerland.

W. M. Acworth, the English economist, prescribes two qualifications for a rate maker: expert knowledge and impartiality. He admits that a government officer may have expert knowledge as great as that of the officer of a private corporation, but he denies that the government officer can be as impartial. His argument is worth quoting at length, but it must be remembered that in speaking of a private company he is referring to English conditions where regulation has not gone nearly as far as in the United States:

"Now we agreed," saiys Mr. Ackworth, "that expert knowledge was just as likely to be found in a state official as in the manager of a private company. But from whom are we most likely to secure our second desideratum, impartiality undisturbed by outside influence? Consideration of the normal organization of a private company and of a state undertaking will enable us to supply the answer. Take first the company. The manager of a private company is responsible to a board of directors who represent the shareholders, being, indeed, frequently large shareholders themselves. Their interest is—indeed, it is a common reproach made against them—the dividend, and nothing but the dividend. We may assume that, being ordinary human beings and disliking unnecessary friction, they will sympathize with Turgot's theory that in levying contributions it is desirable to pluck the maximum of feathers from the goose with the minimum of squawking. In other words, their natural tendency will be to support their manager in refusing to shear any individual lamb too close and in getting as much wool as possible from the lamb that can afford to lose it without making it suffer so much that its bleatings will be audible. In the essential positions of manager, directors and shareholders alike there is nothing to induce them unduly to prefer one locality to another, or one trade to another. In the interest of their own undertaking they will not kill a single goose that is either laying golden eggs at the moment, or is likely to begin to lay such eggs in the future. Indeed, if they are intelligent, they will desire to multiply to the utmost possible extent the breed of golden-egg-laying geese. The individual trader at A will naturally object strongly to any adjustment of rates that may enable traders at B or at C to compete in a market where he has a monopoly. But the natural instinct of directors and shareholders will be to support their manager in over-riding this objection, an objection which it is commonly considered ought not in the public interest to prevail.

"So much for commercial management. Now let us see how far impartiality is likely to be secured under a state railway system. At the head of the state railway system there must be in some shape or other a manager resposible to parliament. In other words, a person who is first and foremost a politician, and only in the second place a railway man. Is it reasonable to expect impartiality from a manager of railways with a seat in parliament, a member of a government whose life may come to a sudden end any day unless some important town, or some important trade can be, in American phrase, 'placated'?"[5]

The greatest positive danger of government ownership lies in politics. There are upwards of 1,700,000 men now employed by

[2] The consequence is that the Prussian state railways, which dominate the German system, pay 5 per cent on the actual cash investment in them. This is twice the percentage of return paid by the railways of the United States on their capitalization; and the investment per mile of the Prussian government railways is twice as great as the capitalization of the railways of the United States. There is nothing in the experience of Germany to give encouragement to those shippers who advocate government ownership on the theory that the adoption of this policy would lead to a reduction in the rates they have to pay. The average rate per ton per mile in the United States in the year ending June 30, 1909, was 7.63 mills. The average rates per ton per mile in some of the European countries where the railways are owned and operated by the state are as follows: Switzerland, 17.4 mills; Belgium, 16.8 mills; Hungary, 14.2 mills; Austria, 14.3 mills, and Germany, 12.4 mills.

[3] The effect that political and sectional influences have on rate making by public authorities is shown by Professor Hugo R. Meyer in his book, Government Regulation of Railway Rates. Professor Meyer says that these influences cause rates to be adjusted in a way that is economically injurious, and that the German government has had to spend millions on the development of inland waterways, on which rates are made strictly on the principle of "what the traffic will bear," in order to repair the damage being done to the industry of the country by the methods followed in making rates on the government railways.

[4] Dana Robert, in an article on German Railway Policy, in a recent issue of [illegible]:

"German railways, state and privately owned, yet under national supervision, give discriminating rates, grant rebates, treat localities and individuals exceptionally, charge all the traffic will bear under one set of conditions and extraordinarily low rates for other circumstances, employing all the devices considered and persecutedly opposed in America, and exercise all the power of abolishment easily."

He says that these things are all done in Germany according to principle of equity. That is what the traffic managers of the railways of the United States have said regarding practices which have been condemned by public regulating authorities, who have then proceeded at once to establish other discriminations which they regarded as based on principles of equity. What are considered principles of equity depends very largely on the point of view

the railways of the United States earning over a billion dollars a year in wages, and if the government owned and operated the railways they would all become office holders. If we may believe the experience of Belgium and Italy, their numbers might be expected to increase rather than diminish under government management. It is not difficult to imagine what the result would be in practical politics, what pressure there would be upon a party in power for the existing jobs, and for the creation of new ones, a pressure which no civil service could altogether resist.[6] A well-organized political machine would undoubtedly seek to control through patronage all railway votes for the party in power, and what this could be made to mean is evident from the mere fact that at the time of the election of 1908 there were over 200,000 more voters in the railway service than the sum of Mr. Taft's popular plurality.

The result of the election in the pivotal state of New York has more than once determined a presidential succession by a small plurality. If the men in railway service in New York could be voted as a unit, as most holders of office under the federal government are now customarily voted, it could not be doubtful how the state would go. Is not this suggestion fraught with real danger to our political institutions?[7]

On the other hand we may consider the compensation which the labor unions might expect for political support. Under the existing regime they have steadily and successfully accomplished advances in wages and modifications of working conditions, which are the equivalent of increased expense to the railways. Is it likely that they would abate their demands upon government when they had the powerful engine of political pressure to supplement their present strength? It is not inconceivable that their success might make profitable operation by government an impossibility. This has been the result in Switzerland.

Having in mind these considerations let us imagine a day with the secretary of the new Department of Transportation.

The secretary has just concluded his first six months of government management of the railways of the United States, but he is not altogether happy in his great office. The statement of the results of the six months' operation which lies before him is only part of his troubles, but that in itself should be enough. In pursuance of the pledge of his party platform on which a year ago he had triumphantly stumped the country, he began his administration by reducing rates. Although business has been fairly good, revenues have shown decreases from week to week from the very start, owing to the reduced rates, and somehow there has not been accomplished that economy which he had proclaimed would come from increasing the wages of employees to the point where their individual responsibility for results would be awakened and high efficiency of labor ensue. This theory had sounded particularly well from the political platform and undoubtedly won many votes, but, while the secretary had done his part and had increased wages in the amount fixed by a board of arbitration consisting of the heads of the various labor organizations, somehow the resulting efficiency was not forthcoming and the operating income was steadily less. The secretary sometimes suspected that his managing organization was responsible for this, because on his coming into office he had reduced the salaries of all the general managers, in response to congressional criticism of the payment of higher salaries to railway officers than were paid to cabinet officers, and as a result most of his competent operating officers had resigned—"to engage in other business," the circulars read. The secretary had heard that this had happened in Switzerland also and had never been quite comfortable in replacing the general managers, who had been born and bred on the road, by lawyers with political pull who were recommended by their Senators.

So the secretary had determined on a reaction and had made several advances in specific commodity rates. This morning he was greeted from the top of his mail by a clipping from a Chicago newspaper denouncing this action, vocally accusing him of graft and demanding his immediate resignation. This was accompanied by a pleasant and clever cartoon depicting the maxim of Philip of Macedon that any fortress can be taken which can be reached by an ass laden with gold, and in this case the fortress was labeled with the secretary's name and its turrets aptly resembled the secretary's peculiar ears.

Further down in the mail was a letter from the Board of Trade of Liverpool demanding the export bills of lading issued by station agents shall be personally endorsed by the president of the United States: a protest from a G. A. R. post against the secretary's new system of scientific divisional organization because it was modeled on that of the Confederate army: a resolution of Congress calling for information as to the movement of switch engine No. 999 from roundhouse to shop without a "full crew," and the all-steel caboose equipped with drinking water as required by the act of such a date: a protest by the federal water-ways commission against reducing rail rates in competition with the water rates obtaining on the rivers recently canalized by the government,[8] a letter from the department of the interior demanding the concessions from published freight tariffs, on supplies shipped to Indian agents, which that department was wont to demand of the railways before the government took them over; and finally a communication from the post office department advising that as the mail was running normally heavy the usual quadrennial weighing to determine mail pay would be postponed until the department should determine that it was more to the interest of the department to have it done.

[6] Edwin A. Pratt, in his book State Railways, relates many incidents that have happened under government management which indicate what might take place in the United States under that policy. For example, after describing the demoralization of operation on the state railways of Italy after the government took them over he says:

"The fundamental reason for the reign of confusion thus brought about is to be found in the combined influences, the one upon the other, of the railways and politics. Under state operation the exercise of strict discipline over railway servants who are mostly electors, and whose votes are a consideration to be reckoned with by the government of the day, has practically disappeared. It is the railway servants who intimidate the minister of railways, rather than the minister of railways who controls the railway servants.

"In proof of this fact I might allude to the serious railway strikes which occurred in nothern Italy at the time the government were proposing to operate the railways themselves. The general manager of the company concerned prosecuted some of the ringleaders; but the government—in order to keep on good terms with the railway men—forced him not only to take these ringleaders back, but even to pay them their wages for the time they had spent in prison, though he would not agree to the latter step until the government themselves found the money. For the foolish concessions thus made by the government, for purely political reasons, they have had to pay by submitting, in turn, and as they might have expected, to the coercion of the men.

"In the height of the present confusion on the lines the minister of the public works, who is also minister of railways, invited the former traffic manager of the Meridionali railways, then district manager of the Milan section of the state lines, to come to Rome, and consult with him as to the best remedy to adopt for overcoming the trouble. The officer in question is one of the ablest and most experienced railway men in Italy. Requested to take over, with all possible despatch, the post of traffic manager of the entire state system, he agreed so to do, disposed of his house in Milan, and made the necessary arrangements for removing to Rome. But when the railway servants heard of what had been done they sent a deputation to the minister to say that if the appointment were persisted in they would all come out on strike. Their objection was, apparently, founded on the fact that the officer was known to be a strict disciplinarian. The minister gave way, cancelled the appointment, and left the officer to go back to Milan and find there another house in place of the one of which he had disposed.

"The example of surrender thus set by the responsible minister has been followed by the heads of departments, so that, in the words of one authority on the subject, 'They are afraid of ordering the railway men about, and the men work as they please.' 'Never,' added my authority, 'has more convincing proof been given of the absolute necessity for the disfranchisement of any large body of workers when the undertaking on which they are employed is taken over by the state. In Italy, at least, though the minister may become a subject of ridicule, he is afraid to risk any prejudice to the political situation, and so he gives way to the coercion brought to bear against him by the very men he is supposed to direct.'"

[7] The political organization of labor in the Australian commonwealth of Victoria had been pursued for some years prior to 1903 and had gone so far that the public service was seriously affected. The aims of the so-called "Trades Hall," composed of labor unions of various kinds, were avowedly as much political as economic; the railway minister ordered the employees of the state railways to sever their connection with it, and the result was a strike of the railway employees. The government, after a bitter fight, won a complete victory, and then in 1906 passed a law which provided that no person employed in any capacity in the public service should either directly or indirectly take any part whatsoever in elections or directly or indirectly take any part in the political affairs of the state of Victoria, otherwise than by recording a vote at parliamentary elections; and that no person or class of persons so employed should directly or indirectly use or attempt to use any influence in respect to any matter affecting the remuneration or position in the public service or himself or any other person. For any violation of these provisions a railway employee or other employee in the public service may be deprived of his position.

[8] The French government strictly enforces a rule upon both privately owned and state railways requiring them to make their rates 20 per cent. higher than the rates of competing waterways, it being considered necessary to maintain this differential to keep the railways from attracting the traffic from the waterways. The policy of making the railways keep their rates higher than those of competing waterways also obtains in Germany, Belgium and other European countries.

Having read these pleasant and encouraging missives, the secretary turned to receive his assembled visitors.

First, there was a delegation from a labor union, accompanied by a United States senator, to demand the removal of the only efficient general manager left in the service (who for very love of the work had remained despite reduced pay), because he had ventured to close his shops when his appropriation was exhausted. Next was an influential member of congress from one of the slum districts in New York, who had a reputation as an authority on political economy and represented the ultimate consumer. He wanted to know whether the generally expected deficit in the income account of the government operated railways was to be met out of general funds of the government and so fall upon the taxpayer at large: he argued, and the secretary could not but recognize the force of it, that this was but another form of special privilege similar to the protection by customs tariff which had weighed upon the country for so many years and only recently had been removed; the reduction of rates for the benefit of the shipper with the effect of creating a deficit to be made up by the taxpayer was, he urged, worse tyranny than Schedule K itself.

The secretary then turned with a heavy heart to delegations from the chambers of commerce of Boston, Seattle and Atlanta, who came to enquire whether the secretary did in fact contemplate, as had been announced in the press, the introduction of the zone system of rates which is in force in Germany, for if so they all wanted to protest (on different specifications it is true) against wiping out the existing systems of rates, based, it was admitted, on apparent discrimination between localities, but they urged that they had done business on those rates for a generation and surely the secretary did not wish to bring on an already nascent panic by throwing all established business into chaos[9]; the secretary was too practical a patriot to do that.

The secretary sighed, and with pure intellectual relief, greeted a group of new and ambitious congressmen who wanted information on which to formulate the annual pork barrel bill for new construction of unprofitable branch lines to all county seats. At least the secretary could sympathize with that: it was practical politics.

Last came the bureaucratic purchasing agent, and, with a complacent smile, reported that he had requisitions for one dozen fountain pens and could save three cents apiece on their cost if authorized to purchase five years' supply. This was the last straw, the secretary exploded, rehearsed the experience of Moses with the green spectacles in the Vicar of Wakefield, and went home to lunch.

The proposal that the government shall acquire and operate the railways is essentially an economic, a business question, but it must be decided in political debate. One is nevertheless encouraged to believe that the American people will, when called upon to do so, decide it right, because the most important and the most difficult economic question of this generation, that of the gold and silver standards, was determined correctly by popular vote in a fierce political campaign. That was a supreme evidence of one of the qualities of our civilization which a stranger cannot always understand. We live in an age when everything "progressive" seems to be considered sacrosanct, when the American people [illegible] for the mere sake of change, yet in the last analysis sober judgment usually prevails. It is confidently expected that no such violent economic revolution as the taking over of the operation of the railways by the federal government will ever get beyond the realm of debate; but, perhaps, even to debate it brings us within the shrewd comment of an intelligent observer in a recent English review:

"A passion for reform has seized the American people," says A. Maurice Low, "and not to take part in the work of reform burdens their conscience. Not to hear the still small voice of reform is to be guilty of mortal civic sin. * * * *

"The historian of the next century will wonder what it was all about. The historian of the present century is equally puzzled to find the logical explanation. The historian that is to come will learnedly prove that the American people in the beginning of the twentieth century were suffering under an intolerable burden, that, sunk in sloth, they had permitted themselves to be robbed of their rights and at last rose in rebellion and were fired with a mission of reform. The perspective of a hundred years may enable a more correct view to be obtained of social conditions than we can get today living in the midst of them, but the raison d'etre for this hysterical wave of reform that is engulfing a sober and intelligent people defies discovery. The Americans were never so well off as they are to-day, their future never appeared so bright, and yet they are discontented, frightened of themselves, fearful of what fate has in store for them."

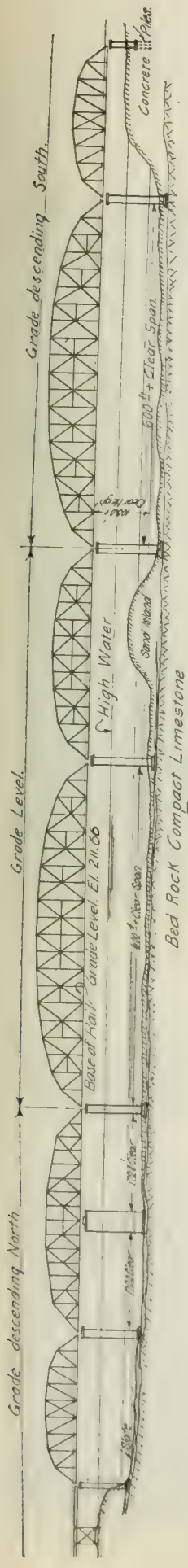
SUBSTRUCTURE OF THE KENTUCKY AND INDIANA BRIDGE.

The Kentucky & Indiana Terminal Railroad Company has about completed the substructure for a new bridge across the Ohio river, connecting New Albany, Ind., and Louisville, Ky., and the erection of the superstructure will begin at an early date. The old bridge is a single track structure designed for train loading equivalent to about Cooper's E 24, and was opened for traffic in 1886. It is used by three steam railways, the Southern, the Baltimore & Ohio Southwestern and the Chicago, Indianapolis & Louisville, and by an electric line connecting Louisville, and by an electric line connecting Louisville and New Albany. There are about 75 steam train movements and about 96 electric car movements over it each day. The steam and electric tracks are gauntleted. It is very difficult to operate this heavy traffic over the single track, and heavy rolling stock can not be moved across the bridge on account of the restrictions in loading.

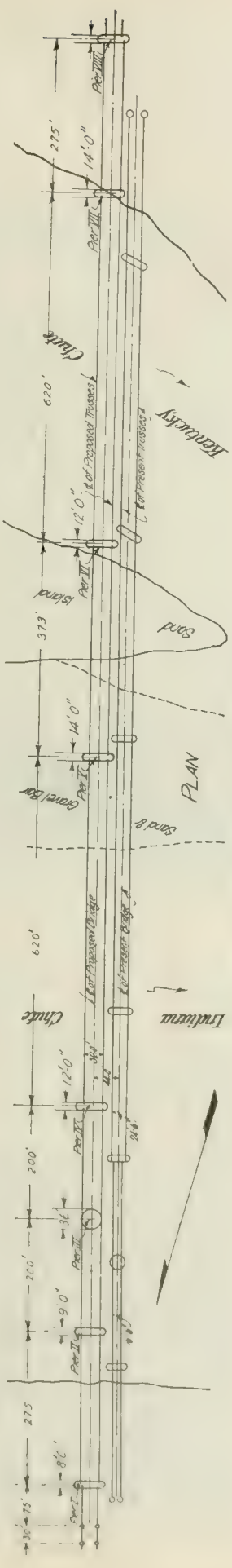
The new bridge will be a plain truss structure carrying double tracks gauntleted for steam and electric traffic between the trusses

Old Bridge, Showing Temporary Turnouts on Highway.

and a highway outside of each truss supported on a cantilever bracket. The alinement is changed enough to allow the new bridge to just clear the old structure, which will continue to handle the traffic during construction work. The accompanying elevation of the new bridge is exclusive of approaches. The choice of span lengths was limited by the requirements of the government that two channels of 600 ft. clear span be provided for ordinary river traffic, and a swing span for traffic which cannot pass under the structure. The river is divided into two channels at the bridge side by a flat island known as "Sand Island." During low water stages the river boats use the government canal, the lower end of which is just above the site of the bridge. This canal connects with the Kentucky channel so that during these periods practically all traffic uses the south or Kentucky shore channel. During high water stages the river



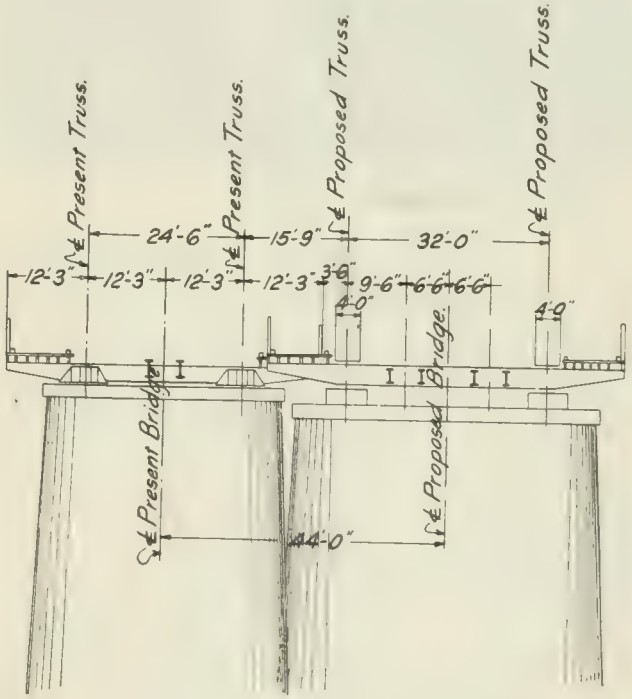
Elevation of New Bridge.



Plan of New Kentucky & Indiana Bridge.

traffic goes directly over the dam at the upper end of the government canal and uses the north or Indiana shore channel to pass Sand Island. The swing span provides two clear channels 172 ft. wide. The south approach is 1,281.3 ft. long, and is a steel viaduct on concrete pedestals, except at the crossings of streets and alleys, where deck girders rest on concrete abutments. The north approach is about 700 ft. long and consists of a fill 550 ft. long and a 150 ft. deck truss supported by abutment III and pier I. The fill includes a deck girder span over the tracks of the St. Louis division of the Southern Railway.

Piers I to VII, inclusive, are carried down to solid rock, and pier VIII and abutment III on the Indiana side are supported on concrete piles. All piers and abutments are of mass concrete. The typical pier has two base courses each 5 ft. thick stepped in 2 ft. all around and the body of the pier is battered ½ in. to the foot on all sides. The pier noses are semi-circular without protection plates. The concrete in the body of piers anad abutments is a 1:2½:5 mixture and in bridge seats 1:2:4. The only reinforcement used is placed 4 in. from all vertical faces down to one foot below the minimum low water level and in a horizontal



Cross Section of Old and New Bridges.

plane below the bridge seats. This reinforcement consists of ¾ in. bars spaced on 15-in. centers and wired at all intersections. This surface reinforcement has effectively prevented surface cracks and the appearance of the finished work leads the engineers in charge to believe that the means adopted for this purpose were fully justified.

The foundation for piers I to VI, inclusive, were laid in puddle coffer dams about 34 ft. by 74 ft. in size. The forms for these coffer dams were made of yellow pine, and were built up in sections on the shore and carried out on barges or floated to place if the water conditions were favorable. The thickness of the puddle wall varied from 6 ft. to 10 ft., the general rule being that the wall should have a thickness equal to the depth of the water in which it was placed. Exceptionally good clay for puddling was available on both shores, its quality being evidenced by the fact that in one case a dam was finished and pumped out in the afternoon and allowed to stand over night with a resulting rise in the water level of less than ⅛ in. A 6-in. and a 10-in. centrifugal pump were used in each coffer dam to keep out the water, and in the cases where gravel overlaid the rock they were also used to excavate this material. In some of the pier locations slate was encountered which was blasted out and removed with

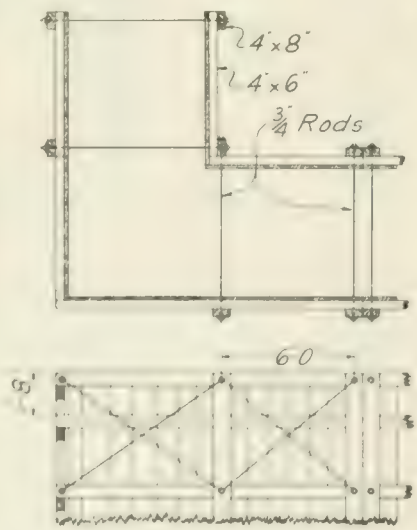
shovels. As the excavation progressed the dams were braced with heavy timbers in both directions.

The coffer dam for pier VII was made of steel sheet piling on account of the fact that the depth of material overlying the rock was considerably greater than in the other piers. A special type of piling designed by H. M. Gould, a member of the firm of contractors doing the work, was used. This piling consists of standard channels driven with the flanges overlapping and with

Excavating by Pumping Sand and Gravel in Coffer Dam VII.

timbers bolted in alternate channels to furnish water tight joints. The wood is covered by a ¼-in. plate and bolted to the channel before driving. The sealing of the joint is effected by the swelling of the wood after it has been in the water a short time. This coffer dam was 33 ft. by 75 ft. in size, and the piles were 20 ft. long, making a total area of piling of 4,320 sq. ft. The cost of materials and fabrication was $2,740 and of driving $730, or a cost of 63.5 cents per sq. ft. for the former and 16.9 cents per sq

Steel Concrete Chute.

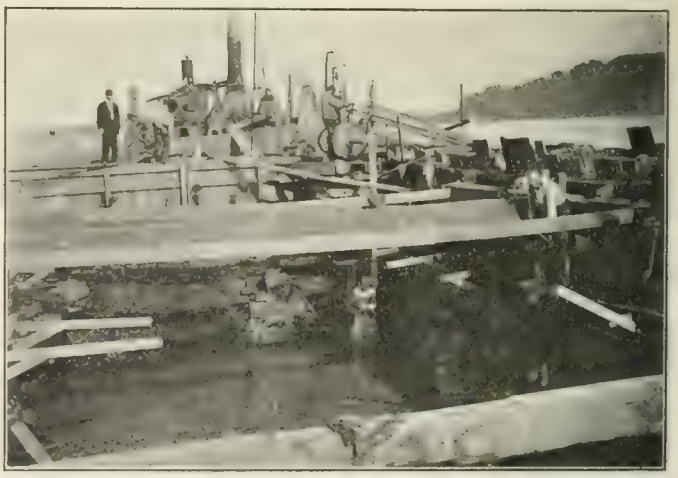


Sectional Forms for Puddle Dam.

enough to permit the dumping of the aggregate into charging cars running on a longitudinal track below the bins, and these cars were arranged to feed directly into the charging hopper of a No. 40 Ransome mixer. A storage house for cement was provided adjacent to the sand and stone bins. The hoisting engine was located in such a position that it could operate the small

Gould Steel Sheet Piling.

charging cars, and could also be used to move standard cars of sand or stone on the trestle. The mixer was dumped into a one yard automatic hoisting skip, supported on a vertical tower which rose above the level of the old bridge and was adjacent to it. The skip was dumped into a hopper at the upper end of the tower which had a capacity great enough to permit the steady operation of the mixer independent of the regularity with which the concrete was taken away. All highway traffic on the old

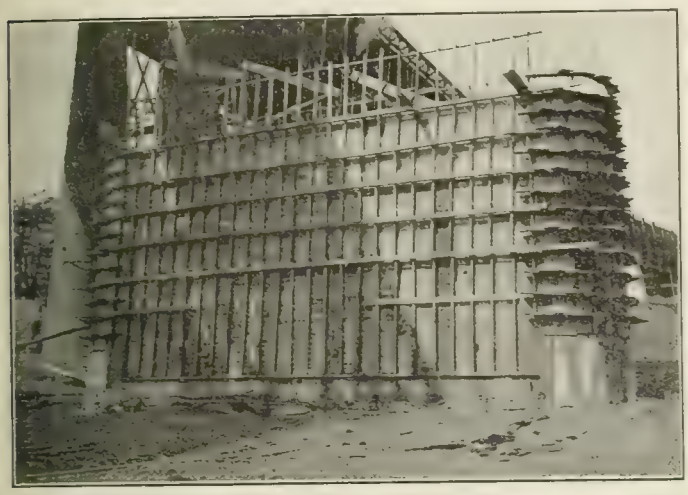


Puddle Coffer Dam at Pier IV.

bridge was diverted to the roadway on the side opposite the new bridge and the adjacent highway was given over to construction purposes. A narrow gage track was laid on this highway and one-yard push cars operated on it to carry concrete from the hopper above the mixer to the point where it was to be placed. Concrete was dropped directly from these cars into the forms through wrought iron pipe ⅛-in. thick, made up in 8-ft. sections, each section being tapered from 10 in. in diameter at the upper

Placing Concrete in Pier VII.

end to 8 in. in diameter at the lower. These pipes were supported by ¾-in. rods connecting a bracket riveted around the pipe near the upper end of each section to a similar bracket on the section above. The top section was supported directly on timbers resting on the floor system of the old highway. These pipes were suspended from points directly over the center line of the new piers so that very little flexibility in the direction perpendicular to the axis of the pier was required to place the concrete.



Pier I.

The pipe was perfectly flexible in the other directions and no difficulty was found in carrying the lower end of the pipe out to the farthest point on the pier. In some cases a little greater flexibility in the direction perpendicular to the pier axis would have made the work easier, and it was suggested that this could easily be secured by making the supports of the top joint chains instead of stiff rods. Concrete was dropped through these pipes from a maximum height of 115 ft., and the results have been very satisfactory. There was no separation of the aggregate apparent, in fact, concrete deposited in this way seems to be fully as uniform as concrete placed in the usual manner.

Abutment I.

The center pier under the swing span is circular, having a diameter of 30 ft. Concrete was placed in 5-ft. lifts, the ribs supporting the forms being wired diagonally across the pier and no exterior bracing being required. In placing the lower courses it was noticed that this type of bracing distorted the circular form of the pier slightly on account of the tendency for the ribs to bulge between the points where the wires were attached. To overcome this tendency six rails were set vertically in the concrete, being spaced equi-distant from the center of the pier and from each other. Three wires were run from each rail to the three nearest points where the circular ribs overlapped. The tops of the rails were wired securely, insuring their remaining in the correct position, and the wires from all the ribs in one lift were attached near the bottom of the rail, which left the center of the pier more open than with the former method of bracing, allowing men greater freedom in placing the concrete. This method of bracing proved very effective and the circular form was perfectly retained. The supporting ribs were placed on 12-ft. centers and 19 sections were used in each ring.

The approach fill on the Indiana side is made from the highway of the old bridge which at that point is supported on a steel viaduct. Extra bents and a reinforced floor system were provided to carry two standard gage gauntleted tracks on this highway for construction trains, the object in laying two tracks being to get as great a lateral range for dumping as possible. No attempt will be made to salvage the steel trestle as it was thought to be cheaper to use it to fill from than to build a temporary wooden trestle adjacent to it for that purpose. After the fill is completed the steel that remains above the grade will be torched off and scrapped. The filling is obtained about four miles away on the Chicago, Indianapolis & Louisville, and is handled by contract in Western air dump cars.

The entire work of rebuilding this bridge is being done under the direction of W. M. Mitchell, manager and chief engineer of the Kentucky and Indiana Terminal Railroad Company. J. E. Greiner and J. M. Johnson are consulting engineers, and James B. Wilson is resident engineer. The Foster-Creighton Gould Company is the contractor and Wilbur Creighton is superintendent for the contractors.

PROPOSED LEGISLATION REQUIRING STEEL PASSENGER TRAIN CARS.*

There are pending at present in Congress two bills requiring the substitution of steel and steel under-frame passenger equipment for the wooden cars now in service. The provisions of these bills are, briefly, as follows:

H. R. 5291, introduced by Mr. Esch, of Wisconsin, April 15, 1911.—After January 1, 1912, prohibits construction or use for the first time of any day or passenger coach, mail, chair, smoking or combination car or tourist sleeper for purposes of interstate passenger traffic not conforming to a standard to be designated by the American Railway Association to the Interstate Commerce Commission. Standards to be designated must include certain specifications as to steel under-frame and superstructure. After January 1, 1918, prohibits use of such cars which do not comply with the standards or models provided for. Penalty, $1,000 for each violation. Does not apply to electric or street car lines engaged in interstate passenger traffic. Inter-State Commerce Commission may, after hearing and for good cause, extend period of compliance.

H. R. 11,822, introduced by Mr. Talcott, of New York, June 17, 1911.—Prohibits use of passenger cars after June 1, 1915, unless constructed of steel, upon a plan approved by the Interstate Commerce Commission. Penalty, $1,000 for each violation. Gives commission discretion to extend period within which the act must be complied with upon full hearing and for good cause.

On May 22, 1911, Circular No. 16 was addressed to all the railways, asking for information as to the equipment in service December 31, 1910, and that which had been received since that date, and also that under construction or contracted for. Inquiry was also made as to the number of passenger train cars acquired in the calendar years 1909 and 1910.

Replies to this circular were received from 193 roads, aggregating 234,834 miles, and covering a total of 54,609 passenger equipment cars in service December 31, 1910, and 4,074 cars put

* A bulletin issued by the Special Committee on Relations of Railway Operation to Legislation.

in service since that date or contracted for. Tabulations, based upon these replies, are shown herewith.

Attention is called to the following:

Acquired Total.	Steel.	Steel Underframe.	Wood.
1909..... 2,000	24 per cent.	21 per cent.	55 per cent.
1910..... 3,783	53 per cent.	14 per cent.	33 per cent.
1911..... 4,074	62 per cent.	14 per cent.	24 per cent.
Approximately in Service.	Steel.	Steel Underframe.	Wood.
December 31, 1908.	0.8 per cent.	1.0 per cent.	98.2 per cent.
December 31, 1911.	9.3 per cent.	3.5 per cent.	87.2 per cent.

Based upon some average known costs, the committee has prepared the following table showing the cost of replacing present wooden equipment in steel:

To Be Replaced.	Number.	Average Cost.	Amount.
Postal	727	$11,000	$7,997,000.00
Mail and Baggage	3,372	10,000	33,720,000.00
Baggage and Express	7,162	8,500	60,877,000.00
Passenger	27,238	12,800	348,646,400.00
Parlor, Sleeping, Dining	7,477	22,000	164,494,000.00
Business and Instruction	749	15,000	11,235,000.00
Motor	176	20,000	3,520,000.00
Total	46,901		$630,489,400.00
Annual Interest charge at 4½ per cent			$28,372,023.00

PASSENGER CARS IN SERVICE OR UNDER CONSTRUCTION.

Class.	Number of Passenger Equipment Cars Operated.	Number Roads.	In Service December 31, 1910. Steel.	Steel Underframe.	Wood.		Received Since December 31, 1910, and under Construction or Contracted for. Steel.	Steel Underframe.	Wood.		Acquired in Calendar Year 1910. Steel.	Steel Underframe.	Wood.		Acquired in Calendar Year 1909. Steel.	Steel Underframe.	Wood.	
A	501 and upward	33	2,499	997	38,198	.....	2,218	352	818	.....	1,668	385	941	.....	403	303	841	.....
B	201 to 500	24	295	250	6,873	.....	241	122	84	.....	221	101	168	.....	74	101	139	.....
C	101 to 200	17	22	27	3,139	.....	32	68	30	.....	19	3	29	.....	.....	.....	28	.....
D	51 to 100	22	80	63	1,459	.....	16	19	10	.....	80	32	52	.....	.....	7	9	.....
E	11 to 50	57	31	130	1,386	.....	11	15	31	.....	22	14	31	.....	9	18	63	.....
F	1 to 50	40	.....	14	156	.....	1	.....	6	.....	.....	5	12	.....	.....	.....	5	.....
	Total	193	2,927	1,481	50,201	54,609	2,519	576	979	4,074	2,010	540	1,233	3,783	486	429	1,085	2,000
Sections:																		
	New England	7	12	40	4,909	.....	29	14	460	.....	.....	26	197	.....	10	6	120	.....
	East	69	1,106	354	15,955	.....	1,110	205	68	.....	576	75	203	.....	165	58	164	.....
	South	29	7	230	4,535	.....	37	180	49	.....	7	34	113	.....	.....	159	90	.....
	Middle West	25	475	631	8,000	.....	362	84	6	.....	372	347	32	.....	74	114	108	.....
	Northwest	15	184	72	3,312	.....	208	20	112	.....	120	.....	350	.....	64	62	147	.....
	Southwest	29	138	129	3,045	.....	47	72	19	.....	90	41	57	.....	24	30	41	.....
	West	11	480	25	1,800	.....	317	1	1	.....	326	17	49	.....	143	.....	6	.....
	Southern Pacific Company	1	525	.....	4,982	.....	409	.....	.....	.....	519	.....	54	.....	6	.....	268	.....
	Canada	6	.....	.....	3,643	.....	.....	.....	263	.....	.....	.....	178	.....	.....	.....	121	.....
	Mexico	1	.....	.....	20	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	20	.....
	Total	193	2,927	1,481	50,201	54,609	2,519	576	979	4,074	2,010	540	1,233	3,783	486	429	1,085	2,000
Classified by Equipment																		
	Postal		210	111	1,132	.....	298	70	11	.....	138	10	12	.....	46	30	4	.....
	Mail and Baggage		67	101	3,601	.....	102	64	43	.....	43	41	81	.....	17	16	85	.....
	Baggage and Express		459	475	7,665	.....	228	125	157	.....	341	106	147	.....	86	154	186	.....
	Passenger		1,845	700	28,969	.....	1,311	287	637	.....	830	346	629	.....	276	206	413	.....
	Parlor, Sleeping, Dining		669	75	7,842	.....	549	27	126	.....	639	35	343	.....	33	22	392	.....
	Business and Instruction		2	19	816	.....	5	3	6	.....	1	2	14	.....	1	1	4	.....
	Motor		72	.....	176	.....	26	.....	.....	.....	18	.....	7	.....	27	.....	1	.....
	Total		2,927	1,481	50,201	54,609	2,519	576	979	4,074	2,010	540	1,233	3,783	486	429	1,085	2,000

The committee further calls attention to the fact that, assuming the approximate book value of the existing wooden equipment to be in the neighborhood of $4,000 for each vehicle, there will be involved ultimately a charge to operating expenses under the classification of accounts of the Interstate Commerce Commission of approximately $187,000,000.

DEAD WEIGHT AND FREIGHT RATES.

Dead weight is that weight which must be hauled by a rail carrier in connection with and to make possible the transportation of freight and the movement of which does not result in an increase of wealth. In other words if "place utility" is not created by the hauling of a given amount of weight, that weight is considered as dead weight. It has sometimes been called non-paying freight, but that term is not well used as will be seen from the following.

For the purpose of this article, dead weight will be considered as of three kinds, viz.: (1) that which is not a part of the shipment itself and is not closely connected with it; (2) that which is a part of the equipment but not of the commodity itself; (3) that which is a part of the commodity itself. The same fundamental principle must be recognized in connection with all of these three, but they present themselves in such different forms that separate discussions of them are necessary.

Dead weight which is not a part of the shipment itself takes at least three forms; weight of cars, weight of preservatives, and dunnage.

By far the largest item of dead weight of this kind is the weight of the car in or on which the freight is carried. Different commodities require different kinds of cars: fresh fruits, packinghouse products, etc., require refrigerator cars; live stock, palace stock cars; coal and gravel, gondola cars, and logs, flat cars. These various styles of cars vary in weight, an ordinary box car weighing about 30,000, a refrigerator car 40,000, a stock or tank car 32,000, and a flat car 26,000 lbs. For this reason the amount of dead weight carried for each unit weight (100 bbls. or one ton) may differ. Then, some of these cars can only be used for the transportation of the particular commodity for which they were designed, as chickens in chicken cars; while others, for only a limited number of articles, as for example, a tank car can only carry liquids, and often only a single kind; stock cars, being open and containing noxious odors, cannot be loaded with such freight as is subject to damage by weather or odor, and the necessity of keeping refrigerator cars clean prohibits the loading of many commodities in them. For these reasons a large per cent. of this special equipment is returned empty to the shipping point, and whenever that occurs, the per cent. which is so returned must be considered as dead weight chargeable to the outbound shipment.

Even though, as often happens, special equipment is returned loaded to its full capacity with freight ordinarily loaded into box cars, there still remains an item to be taken into consideration. To illustrate: A refrigerator car having a tare weight of 40,000 lbs. has carried a shipment of fresh meat from Kansas City to Chicago. The car must be returned to Kansas City for another load. As there does not happen to be any perishable freight, needing refrigeration, to be hauled from Chicago to Kansas City the car is loaded back with a lot of non-perishable freight which will not damage the car. This freight, however, could just as well be carried in a box car having a tare weight of 30,000 lbs. Thus there is an item of 10,000 lbs. which cannot be charged against the non-perishable freight, but must be included as dead weight in connection with the load of fresh meat

from Kansas City to Chicago, making the dead weight for that shipment 50,000 lbs. instead of only 40,000 lbs.

Another large item of dead weight, though not as important as the one just mentioned, is preservatives, as ice placed in the bunkers of refrigerator cars, salt, etc. The weight of preservatives carried free varies in different cases and is determined by refrigeration rules. Sometimes, however, preservatives are not carried free of charge, but shippers are compelled to pay the same rate per 100 lbs. on them as on the freight which they accompany. In such cases they should be considered as belonging to the second kind of dead weight, viz., that which is a part of the shipment itself and which is to be considered later.

The third item included under dead weight which is not a part of the shipment are dunnage allowances, etc. When stakes, blocks, braces, etc., are necessary to keep freight from shifting, also when extra lining in cars are needed, deductions amounting to from 500 to 1,000 lbs. are usually made. Likewise, allowances are made for bedding and manure in stock cars.

All of the above are items of dead weight which are not a part of the shipment itself and for the movement of which the shipper does not pay directly. Because there is no direct payment made on this kind of dead weight, it must be taken into account as an item of cost in connection with the transportation of the freight which makes its movement necessary and therefore an increase in the dead weight per unit of freight means an increase in the rate. In the case of the other two kinds of dead weight, the opposite will be found to be true.

That increased dead weight means increased cost of hauling and consequently a higher rate is accepted by everyone, but the method by which the increased cost is determined is subject to severe criticism. This method has been used numerous times by the Interstate Commerce Commission in its hearings, and has also been regularly used by carriers in presenting facts before the commission.

The following illustration is taken from the reports of the commission. The case in question was for the purpose of establishing the relative rates on fresh meat and on cattle from Kansas City to Chicago. The method used was to compare the rate per 100 lbs. on the gross weight determined as follows:

For fresh meat.

	Pounds.
Car	36,000
Revenue paying load	21,000
Ice and other preservatives	4,000
Car on return trip	36,000
Total	97,000
Revenue on 21,000 lbs. @ 20c. per 100 lbs.	$42.00
Less mileage from and to point of shipment	10.00
Net revenue	$32.00

Revenue per 100 lbs. on gross weight 3 cents and about 3 mills.

Cattle.

	Pounds.
Car	26,500
Revenue paying load	22,000
Bedding, manure, etc	2,000
Car on return trip	26,500
Total	77,000
Revenue on 22,000 lbs. @ 20c. per 100 lbs.	$44.00
Less mileage from and to point of shipment	6.00
Net revenue	$38.00

Revenue per 100 lbs. on total weight hauled 4 cents and a little more than 9 mills.

These rates per 100 lbs on the gross weight were then compared. The trouble with this comparison is that no discrimination is made between the car and the other dead weight on the one hand and the freight on the other. The transportation of the meat and the cattle is a service rendered to the shippers, and for which the carrier receives revenue. This is not true in the case of the dead weight, the hauling of which is merely one of the many items of the freight. The revenue received for carrying the freight is used for two purposes, the payment of direct costs and indirect costs, which include profits. In my previous articles in the *Railway Age Gazette* these two kinds of cost have been fully explained. In the article on "Car Capacity and Freight Rates" it was shown that possible only about one-third of an average rate under average conditions went to pay for the actual hauling of freight, the rest going toward indirect costs and terminal expenses. What does this mean? It means that when dead weight is taken into account, as in the case above, the carriers are earning just as much on every 100 lbs. of dead weight hauled toward maintenance of way, and other indirect costs as on each and every 100 lbs. of freight. It is very evident that such a method of figuring will lead to unfavorable and unjust discrimination against freight which of necessity requires relatively large amounts of dead weight.

The difficulty here, as was found in the case of car capacity and also with distance, is a failure to distinguish between the direct and indirect costs of transportation.

The only fair and reasonable way to consider dead weight is to determine the relative amounts hauled for units of the different kinds of freight transported, and having done this, to fix those portions of the rates which are affected thereby in the same ratio.

As the proportion of a rate which represents actual cost of hauling is different for different commodities, dead weight, just as car capacity, is a more important factor in some cases than in others. Thus, for commodities taking low rates which are almost entirely used to pay for the mere hauling it is of greater importance than for commodities taking high rates.

When considered in the above way, dead weight which is not a part of the shipment itself looses much of the significance which has been attached to it.

The second kind of dead weight is that which is a part of the shipment itself, and on which the regular rate of freight is paid. While the writer believes that too much importance has been attached to dead weight when not a part of the shipment, he believes fully as much that more importance should be given to dead weight when it is a part of the shipment.

This second form of dead weight takes the form of crates, boxes, barrels, cases, bags, etc., which are required for the safe carriage of the freight packed in them. All so-called "carriers," as for example egg cases, drums, bottles, milk cans, and numerous other articles, both when shipped filled with goods and when returned empty to the shipper, as well as all preservatives and dunnage for which no allowances are made, are also dead weight of this kind.

The carriage of this dead weight is not a transportation service which has value to the shipper in the same sense as has that of the freight. It would not be carried were it not necessary for the safe transportation of the freight which it accompanies. In this respect it is exactly like the tare weight of a car, preservatives, dunnage, etc. It is merely an additional expense in the transportation of certain kinds of traffic.

Some kinds of traffic do not require any dead weight, while other kinds require very much. Of the former may be mentioned lumber, bricks, iron, etc., while a buggy, whose gross weight when ready for shipment is one-fifth dead weight in the form of a crate, represents the latter. Because of this difference in the amount of dead weight necessary for different kinds of traffic it should be taken into account, and in so doing it is again important that a distinction be made between the mere costs of hauling and the other costs of transportation. As the hauling of the dead weight is not a direct service to the shipper, this weight should not be made to pay revenue toward the indirect costs of the transportation, but merely to cover the bare cost of hauling. The freight, on the other hand, must pay enough to cover both of these costs. As it is impractical to assess one rate upon the dead weight and another upon the commodity itself, because of the impossibility of determining their respective weights, a flat rate must be charged on the gross weight of the shipment. This means that the part of the rate on the freight itself which goes to pay the indirect costs should be reduced by the same fraction as the dead weight is of the entire shipment, and that the remaining portion plus the cost of hauling will make a reasonable rate for the whole. An illustration will make this clear. The weight of a crated top buggy is, say, 500 lbs., of which 100 lbs. represents the weight of the

crate and 400 lbs. the weight of the buggy itself. By a comparison with the rate on some other commodity which requires no dead weight it is found that 90 cents per 100 pounds is a reasonable rate on the buggy. Of this rate, 30 cents, let us say, covers the cost of hauling and 60 cents indirect costs. Because the 100 pounds of crating should not be compelled to pay anything toward indirect costs the charges should be:

Buggy, 400 lbs. at 90 cents	$3.60
Crate, 100 lbs. at 30 cents	.30
Total	$3.90

But this method of assessing charges was said to be impracticable; therefore the 60 cents per each 100 lbs. of buggy is reduced by one fifth or 12 cents, leaving 48 cents per 100 lbs., and as the 12 cents deducted from each of the four 100 lbs. makes 48 cents for the 100 pounds of crating, a rate of 48 cents for indirect costs plus 30 cents for direct costs, or a 78 cents total rate can be assessed on the entire shipment, making the charges: 500 lbs. at 78 cents = $3.90.

From the above it is seen that if the dead weight is not considered as a mere item of expense in connection with the transportation of the buggy, that commodity is at a disadvantage of 12 cents per 100 lbs. as compared with the article which was said not to require any dead weight. This disadvantage becomes more oppressive when it is remembered that even though proper allowance is made for dead weight, there is an item amounting to 30 cents for the 400 lbs., or 7½ cents per 100 lbs., that must be paid because of the added expense, and in addition thereto is the cost of crating the buggy which the other commodity need not bear.

When empty carriers are returned to the shippers they are of exactly the same nature as the crate of the buggy, and should be carried at the mere cost of handling without earning any revenue toward indirect costs.

The evils resulting from a failure to recognize properly this factor in determining the cost of transportation are brought out by an old, though forcible, illustration. In the case in question, 60 bbls. of oil made a carload shipment of 24,000 lbs., of which 3,900 lbs. was tare weight of the barrels and 20,100 lbs. the net weight of the oil. The 20,100 lbs. represented the transportation service which was of value to the shipper. A competing producer shipped 24,000 lbs. of oil in a tank car at the same total charges as the first shipper did. From the point of view of the value of the service, this meant that if the adjustment of rates was reasonable, the value to the first shipper of transporting 500 lbs. of oil was nearly as great as that of 600 lbs. to the second. The injustice was further aggravated by the fact that the tank car shipper had the dead weight, that is, the empty car, returned free of charge, while the barrel shipper paid for the return of his dead weight. To have brought about full justice due allowance should have been made for the weight of the barrels, and the rate on oil in barrels reduced correspondingly. This was not done. Is it any wonder that the oil business has become monopolized when as important a factor as this has not been recognized in making the freight rates on the products of that industry? While a failure to properly recognize dead weight does not lead to as disastrous results when unlike traffic is considered, the injustice to the freight requiring dead weight still remains, and it is in reality made to bear part of the burdens of traffic which does not require dead weight.

[illegible] it should be said that dead weight [illegible] part in the determination of carload and less than carload differentials. It was shown in the article on "Car [illegible] and Freight Rates" that a strict application of car capacity, which is one form of dead weight, will make these differentials too great. But this is not all. Usually less-than-carload shipments are packed much better than carload shipments (in other words, a larger per cent. of their weight is dead weight). This being true, a failure to make allowance for dead weight will tend to place the less-than-carload shipper and that is usually the small shipper at a disadvantage.

Thus the dead weight which is a part of the shipment itself, though not a part of the commodity, should be taken into account as an element tending to reduce the rate on such commodities as require packing for their safe carriage. This is so because the transportation of this dead weight is of no direct value to society, but merely an expense connected with the transportation of the freight which it accompanies, just as is the hauling of that dead weight which is not a part of the shipment.

The third and last kind of dead weight to be considered in this article is that which is not merely a part of the shipment itself, but also a part of the commodity. That a part of any commodity may be considered as dead weight does not at first thought seem conceivable, but a careful consideration of the matter will show that it is not only reasonable, but in fact necessary to bring about justice in certain rate adjustments.

Just what is meant by this class of dead weight is best shown by a specific illustration. In making the best spokes for buggy wheels, hickory logs are cut into lengths somewhat longer than the desired length of spokes to be made therefrom. These lengths are next split into what are known as spoke bolts. These bolts can be either shipped to the wheel factory, hundreds of miles away, in their original form, they can be turned into club spokes, or spokes in the rough, where they are produced and shipped in the new form to the wheel factory, or they can be made into finished spokes and shipped as such to the factory. The process of turning the split bolt into a club spoke reduces its weight materially, and the second process, that of turning the club spoke into a finished spoke, causes a still further reduction in the weight of the spoke. For the illustration, say that the first process takes away two-fifths of the weight of the split bolt, and the second one-third of the weight of the club spoke or one-fifth of the weight of the bolt. The weight of the finished spoke would then represent two-fifths of the weight of the bolt. This last weight is, in the final analysis, the only weight the transportation of which is of value to society. The other three-fifths of the weight of the spoke bolt is dead weight.

This particular form of dead weight is found only in connection with raw materials, and with those which are partly finished, as in the case of the club spoke. From this it is evi[illegible] not important in connection with a fair adjustment of rates for competing localities. Suppose the split spoke bolts be produced at A and the wheel factory at B. The relative rates on spoke bolts, on club spokes and on finished spokes will, other conditions being equal, determine whether the spokes will be finished at A or B. If the rate is the same or approximately the same on all three, there will be a great saving in freight to turn away the waste wood at A and ship the finished spoke, and that is the form the shipments will take.

As was said before, the transportation of the weight of the finished spoke is the only transportation that is of service to society, and the hauling of the dead weight is merely an expense connected therewith. For that reason, this dead weight should be considered exactly the same as that which is a part of the shipment, but not a part of the commodity; that is, the rate on the spoke bolt should be made by determining what per cent. of it is dead weight and then reducing that part of the rate on the finished spoke which is used to pay indirect costs by the same fraction. In other words, the spoke bolt and the finished spoke should pay equal aggregate amounts toward the indirect costs, and the aggregate amounts contributed toward direct costs should vary directly according to their weights. On this basis it will make no difference to the carrier what form the shipments take, for the net revenue earned will be the same in either case, and as the value of the service to society is the same in both cases, this seems to be the most fair adjustment. It gives neither A nor B an unfair advantage over the other. It is true that A has an advantage over B amounting to the actual cost of hauling the dead weight from A to B, but this is an advantage to which that locality is entitled on account of its proximity to the supply of the raw material.

In conclusion it can, then, be said that a clear recognition of the difference between direct and indirect costs is fundamental to a proper application of the element of dead weight in the determination of freight rates. Having recognized this difference in the two kinds of cost, it is found that all dead weight which is not a part of the shipment, and on which the rate does not apply, must be taken into account as a factor in increasing that part of the rate which covers direct costs, while dead weight which is a part of the shipment reduces the part of the rate which goes toward indirect costs.

LETTERS FROM AN OLD RAILWAY OFFICIAL TO HIS SON, A GENERAL MANAGER.*

XI.

Chicago, June 17, 1911.

My Dear Boy: Not so very long ago the wife of a passenger conductor, running out of a large southern city, sought the assistance of her pastor, a noted divine. She was worried by the fact that her husband was stealing the company's money. With a good woman's intuition she knew that the wages of sin is death; that sooner or later her husband would lose his job and his family its legitimate income. To her good, old-fashioned, unspecialized conscience stealing is stealing, whether called "embezzlement," "holding out," or "trouble with the auditor." The fearless evangelist shortly afterward preached a powerful sermon against stealing, and included passenger conductors in his warnings. So incensed was the conductor in question that he announced his intention of disregarding the protection carried by the clerical cloth and of knocking the minister down. When the two met his bluff was called. The conductor, not the minister, came to his knees, not in fighting, but in prayer.

Here, my boy, is a canker sore that must be cured. Do not tell me that the Order of Railway Conductors is alone to blame. Do not tell me that in the lodge room the order sidetracks the eighth commandment for the working schedule. Do not tell me that the order will expel a member for any other offense rather than for stealing. Do not tell me that our problem is harder and our revenue less because Ed. Clark, the grand chief of an order thus lawless, was appointed by Teddy Roosevelt to sit in judgment on us from the high throne of the Interstate Commerce Commission. Tell me, rather, that we, the official class, are to blame; that we must cease to dodge responsibility. We, the educated and entrepreneur class; we, the elder brothers of society and industry, cannot shift the burden.

Please do not misunderstand me. There are many honest passenger conductors. I have known them on the road and in their homes. Some there are who deserve the more credit for withstanding temptation because of sickness or extravagance in the family. There are, however, too many dishonest passenger conductors. It is not enough for a man to be honest himself. The complexities of modern life make him more than ever his brother's keeper. He must not only stand for the right but condemn the wrong. The Order of Railway Conductors must make the American people believe that it is a great moral force for honesty in all things. We, the officials, must help the conductors to bring about this happy result.

The clerk for the corner grocer will not steal from his employer as quickly as he will from a large corporation. The existence of a personal employer brings home the moral turpitude by visualizing the individual wrong committed. Coupled with this higher moral incentive is the fear of detection through close personal supervison and interest. In a large corporation we have to approximate to this condition. The corporation, an impersonal creation, is vitalized by the men charged with responsibilities. The problem of organization is to give maximum effectiveness to this vitalization, to utilize to the fullest degree the personal equations of those entrusted with authority. Many railways have lost control of their passenger conductors because of a fundamental misconception of the principles of true organization.

On the early railways the superintendent was the only officer the conductor officially knew. The superintendent, close to the president, was interested in the revenue as well as the disbursement side of the company's ledger. If the conductor stole, if the returns were short on a day of heavy travel, the superintendent was among the first to know it, and to preserve his own reputation, and thereby hold his own job, promptly discharged the conductor. By and by some conductors graduated into superintendents. This new condition brought a new temptation. The conductor, if allowed to keep on stealing, and if favored with a run where the stealing was especially good, could well afford to whack up secretly with the superintendent. A few, a very few, superintendents yielded to this temptation. Along came the auditor with his mistaken theory that human nature can be changed and men made more honest by being put in "my department." He said, in effect, "take this away from the superintendent, who is dishonest and busy with other things; let this mysterious specialty of conductors' collections be handled by the only honest department." So the superintendent was relieved from responsibility for making his conductors render honest returns. He soon lost interest in that feature. The roads grew, and superimposed above the superintendent came first the general superintendent, and then the general manager, both also relieved from this responsibility to which the auditor clung with jealous tenacity. The conductor probably could not have told what principles of organization had been violated. He was the first to see the easier mark the company had become, the first to profit by the serious mistake that had been made. He found that his reports were checked by office clerks hundreds of miles away and entirely uninformed as to current conditions of local travel. The superintendent and the other division officials who rode with him and knew conditions were powerless to check him promptly and effectively because his reports and returns were going to somebody else over the hills and far away. These officials, because somebody else was responsible, did not seem to care very much. So the conductor stole under their very eyes and got away with it. Anything like this which begets a wholesale contempt for duly constituted authority is demoralizing to general discipline. The labor unions are not alone to blame for the spread of insubordination.

All men are students of practical psychology, whether conscious of the fact or not. The conductor found that to hold his job he must do well those things for which the superintendent and the division officials were responsible. So the bigger thief the conductor became the more careful was he about other duties. He was a crank on train rules, perhaps, or made courtesy to the public his watchword. All of this stood him well in hand. Sooner or later the spotter caught him and the auditor requested the general manager to order his discharge. When this got down to the superintendent or the trainmaster the conductor was called in. Instead of being berated for a thief, if he acknowledged the corn, the conductor was discharged, half sympathetically, half apologetically. The division official would have resented the imputation of harboring or encouraging a thief. To him the conductor was an efficient, faithful employee meeting all requirements of service. If the conductor failed to please somebody else it really must be the fault of that somebody or the system. This feeling was not unnatural, since the detection came through a discredited channel, the spotter. Rare are the circumstances where secret service should be necessary. There is something inherently wrong in any system which has to gain routine information by indirect methods. The detective should not be necessary for checking the good and the bad alike, but only for following up those who become manifestly bad or notoriously corrupt. The most efficient system is that where open checking and inspection are so thorough that temptation is diminished by the ever present thought of prompt and sure detection. This desirable condition cannot obtain where the system makes such important officers as

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the superintendent and the trainmaster unconscious attorneys for the defense, sometimes openly advocating reinstatement of a thief. On the contrary, from its impersonal nature, a corporation must be so administered as to gain the moral effect of every available force for right, to secure the help, however small, of every person connected with the administration. Views of composite efficiency must converge at a point sufficiently near to be of practical value, not so remote as to be of only theoretical interest. No system is perfect. Under any conditions the very size of a railway necessitates a trifling allowance for peculation which creeps in. This can, however, be reduced to a negligible quantity.

So completely has the old system broken down on most railways—there are a few exceptions—that it has become a farce. It is a sad commentary on organization that many roads are giving the passenger conductor up as a bad job and putting on expensive train auditors who usually are really not auditors, but collectors. They are called auditors probably because they are under the auditor. It is a principle of organization that the staff as such should never command the line. The staff reviews, inspects, audits, studies, advises, suggests and, perhaps, promulgates, but should never execute, except as a representative of the line, the latter being responsible for the results of operation whatever the operation may happen to be. The accounting department is a staff department. When it was given charge of a line function, fare collection, a principle was violated. Ultimate failure of the system was therefore certain and inevitable. The train auditor proposition fails to recognize this underlying cause. It further violates principle, intensifies the evil and wastes more money by increasing the number of staff men doing line work. Its direct effects are vicious and its indirect effects are demoralizing to discipline. How can the young flagman have due respect for his superintendent or other official when he sees the train auditor come to the rear platform and demand to see the pass of the official? If it is an old flagman it is a little hard for him to see why he himself or his friend, the old station agent, might not have been given this new job with its fine pay. Like his superintendent the flagman may have been in the service twenty or thirty years. The train auditor, only last week a country hotel clerk, mayhap, flashes on them both as a would-be superior being from a better world. Neither of the two can become very enthusiastic in helping the train auditor to protect the company's revenue.

It is an awful reflection for the conductors to meet, that, although the railways of this country are now spending hundreds of thousands of dollars for train auditors, they are more than getting it back from increased collections turned in. Is not this more of a condemnation of the old system than a justification of the new? Whether or not the train auditor enters into collusion with the conductor, the former soon learns how easy it is to beat the system. When he does break loose he will be more reckless than the conductor. The latter probably had to work for years as a freight brakeman and a freight conductor to get where he is, and if he loses out may be too old to begin all over again. The train auditor gets his appointment too easily to value it very highly. Off-setting this is the fact that the train auditor is more amenable to some discipline because, as yet unorganized, he can not rely on the support of a labor union to secure his reinstatement. The auditor also has the advantage of examining character from a wider range of selection in choosing his train auditors. The train and engine services have been so badly over-specialized, as I shall show you some other time, that our choice is restricted to men whom the trainmaster happened to hire as extra brakemen years ago. These slight advantages in favor of the train auditor system have been given undue weight. We are all too much inclined to dodge responsibility, to take the course of least resistance and to pass it up to the other fellow. The company pays the bill.

The railways of this country are wasting hundreds of thousands of dollars every year by failure to make the conductors do their honest duty. I would like to have you immortalize yourself by saving your company its pro rata share of this economic waste. The American people at heart are honest, and barring a few dishonest traveling men who short-fare conductors and train auditors with cash, will in the mass support you and the Order of Railway Conductors in any intelligent movement for honesty. On the other hand, if the people at large get an idea that you are omitting to use all the moral forces at your command they will organize some more special commissions to handle another part of your business for you. Do not let the people get the idea that where passenger fare stealing flourishes, freight claims increase because some freight crews are robbing box cars, and expenses increase because some officials are grafting.

If I were your president I would ask authority of the board of directors, a staff body, to say, as a line officer, to you, also of the line, that as chief operating official you are the only passenger conductor with whom the executive and staff departments will normally deal; that your tenure of office depends quite as much upon your ability to prevent stealing as to prevent accidents. To the auditor I would say that he is responsible for certifying to the integrity of all components of your operations by proper examinations *after the fact;* that he has access to all your accounts and records; that he has no direct authority over any operating men; that all his instructions must be in general terms duly approved by the proper executive. Then he would be a real auditor instead of a chief accountant. We would not have to call in the public accountant to do our real auditing. You would be a real general manager.

Assuming that the proposition is up to you, then say to each division superintendent that he is the only conductor on the division in which normally you will be personally interested; that the conductor will send either the original or a duplicate of every report made by him to the superintendent's office, addressing it impersonally, "Assistant Superintendent." Let the superintendent understand that he and his assistant superintendents when riding over the road on duty at the company's expense must openly check the train just as they check train orders. Pitch it on the high plane of self-evident routine duty for duty's sake, above any thought of underhanded spotting. Give the superintendent as many assistant superintendents and clerks as he may need. Do not let him employ specialists for this one simple component of operation. Have him bulletin train earnings by conductors that the dear women may help the cause by sewing society discussion. Let him have the community understand that some explanation is expected from a get-rich-quick conductor. By this time it will dawn on the superintendent and his assistants that their jobs depend upon the prevention of stealing. Their unconscious sympathy with the thief will vanish. Because they are close enough to the proposition to give practical attention they will prevent stealing.

I am aware that passenger conductors often run over more than one division. This presents no serious practical difficulty, although for many other good reasons also it is better, when practicable, for conductors not to run off the division. Pullman conductors run from their home district over the districts of several of their superintendents.

You and the auditor will have to work out the details as to the necessary bureau in your office, depositaries for money, interline relations and numerous other propositions which usually become self-suggesting when the broad working principles are established. You may, perhaps, need another assistant general manager for this work. You will not have the trouble a general manager in Mexico once did. His assistant general manager sold out, it is said, to the conductors. These conductors, mostly Americans, were an enterprising lot. They are also said to have bought the detective agency that was employed to check them up.

On some runs where the conductor is busy with numerous train orders you may find it better to make the head brakeman a collector, but never let him be a specialist independent of the conductor.—Affectionately, your own D. A. D.

Shop Section.

THE International Railroad Master Blacksmiths' Association will meet at the Boody House, Toledo, Ohio, August 15-17, and the Traveling Engineers' Association will hold its annual convention at the new Hotel Sherman, Chicago, August 29-September 1. Very good programs have been provided, and it is expected that the attendance in both cases will be record-breaking.

REMEMBER the general shop kink competition which has been announced to close September 15. Three kinks are required to enter the competition, and the best collection will be awarded a prize of $50; a second prize of $25 will be awarded for the next best collection. Kinks of any kind used in the repair and maintenance of locomotives, cars or other equipment in charge of the mechanical department may be submitted. The descriptions should be made as complete and clear as possible. There seems to have been a misunderstanding on the part of some of our readers as to the preparation of the illustrations. We can use either a photograph, tracing, blueprint, drawing or rough sketch, provided they give a good idea of the construction and operation of the device. Kinks that are not awarded a prize, but which are accepted for publication will be paid for at our regular space rates.

WHAT good did you get from attending the annual convention of the railway association in which you are particularly interested? H. T. Bentley, president of the Master Mechanics' Association, spoke in no uncertain terms of the advantages to be derived from attendance at the various conventions, in his address before the General Foremen's Association. Some executive officers are more or less skeptical as to the value of some of the associations, and we believe that a frank expression from mechanical department officers and foremen as to just how they have been benefited by membership in such associations or attendance at the conventions will do much to make the value of the various organizations more apparent, and to encourage attendance on the part of some of those who have not taken the interest in them that they should. To bring about such expressions we will award a first prize of $35, and a second prize of $25 for the best two papers or articles on this subject which are received before October 15. Articles which are not awarded a prize, but which are worthy of publication, will be paid for at our regular space rates.

LAST month we invited our readers to write us newsy letters telling how they had been benefited by the discussions on efficiency and scientific management which we have carried on during the past six months. We have been delighted by the response to the invitation. Several of the letters appear in this issue and others will be used next month. Our main idea in asking for this expression of opinion was to get our Shop Section readers to realize that we would like at any and all times to have them correspond with us about the work which they are doing, or the problems in which they are interested. We believe, if you would take us at our word, that a correspondence department could be built up for the Shop Section which would not only be of great interest, but of real value to the readers. Will you not take us into your confidence and try to help us bring this about? If you have any special problems which you are having difficulty in solving, if you do not agree with statements which appear in the Shop Section, or if you have found that you can solve the problems which are considered to better advantage than by the methods described, write and tell us about it. A minimum rate of $3 is paid for all articles or letters which are accepted for publication.

FIVE contributions were received in the competition on Reclaiming Scrap Material. The judges have been unable to prepare their decision in time for publication in this issue, and announcement has been deferred until the September Shop Number, at which time we hope to publish most of the contributions.

SHOP SECTION readers will undoubtedly miss the large number of shop kinks which we have been accustomed to publish each month. We have been forced to leave these out because of the amount of space taken up by the two convention reports. However, several kinks accompany the Tool Foremen's report, and a very large proportion of the two reports is devoted to shop practice. Next month we shall resume our regular practice of presenting a large number of kinks in the Shop Section.

A FOREMAN soon gets rusty if he allows himself to become absorbed in the work of his own shop and does not get in touch with what his fellows in other shops are doing. Mr. Bentley, in addressing the General Foremen's Association, told of four ways which the foreman should use to overcome this—visit other shops, attend the conventions, read the best technical papers, and encourage the drummer or supplyman to tell of the good things in shop practice which he has seen in his travels. Attendance at the convention, for instance, he estimated as being equivalent to the earning of six months' salary by working in the shop. His address will be found on another page.

WE desire to call especial attention to the arrangement of the reports of the two conventions which appear in this issue. Shop Section readers are especially interested in both of these organizations, and the conventions of both of them were far more successful than those of last year. In order to give a clear idea of what was accomplished, a considerable amount of time has been spent in abstracting the proceedings of the two conventions and in arranging them in such form that they will appeal to our readers. In the case of the General Foremen's Association, where the discussions, extending over a period of almost three days, covered only two papers, it was necessary to practically rearrange the entire proceedings in order to have the discussions on the different phases of the questions properly grouped.

WE have been taken to task during the past month for not commenting in connection with the competition on how scientific management can be applied to a railway shop on the fact that the efficiency engineers who made the most noise at Washington, and who stirred up the discussion on the subject, did not avail themselves of the opportunity to show that they really meant good when they made the assertions they did and were prepared to show that they were fitted to discuss the question in a practical way. Our reason for not commenting thus was that certain of the efficiency engineers had responded to our invitation to participate in the competition, and had frankly and honestly presented their views. We tried to comment on their contributions in the same spirit in which they were offered. Frankly we were not very much surprised not to hear from some of the efficiency engineers who have been in the limelight in the recent discussion. We have tried hard to find something really new in the various addresses which they have made and in the articles which they have written, which could be applied practically, but have been unable to do so. It is hardly surprising, therefore, that they did not care to enter the competition.

PROPOSED CONSOLIDATION OF GENERAL FOREMEN'S AND TOOL FOREMEN'S ASSOCIATIONS.

THE General Foremen's Association is of the opinion that there are too many mechanical department associations, and that the Tool Foremen's Association ought to consolidate and be absorbed by it. It was only a few years ago that the General Foremen's Association was regarded by some of the higher mechanical department officers as a superfluous organization, and it had to fight hard for its life. It is to be regretted that now that it is giving splendid promise of making good that one of its first thoughts should be to attach and criticise a smaller organization—and that without making a full investigation of the conditions. The only real argument which was brought out in the discussion of the subject was that the tool room foremen were subordinate to the general foremen and that they should, if at all ambitious, train to fit themselves for the higher position by joining the General Foremen's Association. The main idea on the part of the General Foremen's Association appeared to be to swell its own membership list and possibly thereby add to its prestige.

What are the facts in the case? The Tool Foremen's Association, although only organized a couple of years ago and still small in members, has, under the wise leadership of an exceptional presiding officer, demonstrated its right to an existance just as plainly in the eyes of some as has the General Foremen's Association in three or four times that length of time. The tool foremen are specialists, and the tool rooms of which they have charge are the keystones to shop efficiency. Their problems are largely ones of detail, requiring thorough and critical analysis, such as determining the best grinding wheel for certain conditions, or the most efficient design of a tap or reamer. This point will be more clear by looking over the report of the last convention of that association, which appears in this issue. The General Foremen's Association cannot afford to take up its time with these details, important as they are. Its time may be far better expended on the larger problems of shop and engine house management and operation. If it were to devote all its time on these larger problems for several years to come it could not possibly exhaust the subject. Would it pay a tool foreman to come 1,000 miles or more to a convention and spend three days to listen to the discussion of one or two subjects in which he might be interested? Is it not far better to have him spend the three days with men in his own line and in the discussion of problems, everyone of which he is vitally interested in?

If the General Foremen's Association included the tool foremen, how often would the latter be able to get to a convention? It is manifestly impossible for all the foremen to get away at the same time, and the general foreman would hardly step aside in favor of one of his assistants, who would not have nearly as much interest in the subjects which were to be discussed.

There is still another phase to the question. Neither general foreman nor tool room foreman are ordinarily adept in addressing a large audience. Until meeting halls are greatly improved over most of those in which the conventions are held, it will be impossible for the average man to be heard by, or to make himself understood to, many more than forty or fifty of his associates. The average attendance at the meetings of the General Foremen's Association was at least this large. The attendance [illegible] to business, will be much larger, and the limit of size for a good [illegible] house foremen are practically alike. If the general foremen will get busy and make their meetings of greater interest to the latter class of officers, they will not only greatly strengthen [illegible]

[illegible]

is that there are too many mechanical department organizations, and that the executive officers will soon shut down on some of them anyway. The general managers of our railways will hardly take such a step without making a careful investigation of the facts. One place they will go to look for information will be the published proceedings of the various associations, or the abstracts of the proceedings which are published in the technical papers. The account of the convention of the Tool Foremen's Association elsewhere in this issue will show that it needs to make no apologies for its existance.

RAILWAY MECHANICAL DEPARTMENT ORGANIZATIONS.

THE words harmony, co-operation and efficiency have been worked overtime in railway organizations and the technical papers during the past few years. It almost seems sometimes as if they were used mechanically or parrot like, or that they have become so common they have lost their force. If they have not, and if they are so very important, why have not the clubs and organizations put them into effect in a big way in their own associations? For instance, we have two master mechanical associations—the Master Mechanics' and the Master Car Builders'—and a number of smaller mechanical department organizations which are more or less highly specialized, such as the Traveling Engineers', General Foremen's, Master Painters', Master Blacksmiths', Tool Foremen's, Master Boiler Makers' and Air Brake Associations, and also the Fuel Association, which has much in common with the others.

Each one of these is doing splendid and important work, but they might do even better work if they were to co-operate more closely and combine their forces. This does not mean any loss of individuality, but rather a strengthening of it. The associations would be operated separately, just as they are now, but their executive committees would co-operate or receive instructions from a joint executive committee, or possibly from the executive committees of the M. M. and M. C. B. associations. There is not even a pretense of any such co-operation at the present. The nearest approach to it is that the Traveling Engineers' Association has an official representative at the Master Mechanics' convention every year, and that the first vice-president of the Master Boiler Makers' Association attended the recent convention of the Tool Foremen's Association and made certain suggestions as to how that organization might co-operate with the boiler makers to improve the efficiency of the boiler shop.

H. T. Bentley, president of the Master Mechanics' Association, made an address at the General Foremen's Association last week, and in commenting on the response to his address, said he would be glad to use his efforts to have the executive committee of his association refer certain problems, which it could not find time to handle properly, to the smaller organizations for their opinion and advice. It should not be difficult to bring this co-operation about. In the first place these organizations would undoubtedly be glad to co-operate with the Master Mechanics' Association, for it would add greater dignity to their work, and would be an official recognition of their value. It would also result in more effective work being done, and would add force to such conclusions as might be arrived at.

Good managers have awakened to the fact that a one-man type of organization is not the most efficient by any means. The large problems before our mechanical departments are so numerous that the Master Mechanics' and Master Car Builders' associations cannot begin to consider and analyze all of them, and they should demonstrate their knowledge of good organization by calling upon the other associations and assigning certain specific problems for them to analyze. There is no doubt but that they would take sufficient pride in their work to perform it properly, and if they did not make good it could be referred back with instructions as to why it was not satisfactory. The younger organizations would thus receive the proper kind of

coaching and would improve in usefulness. That they need such coaching in some cases is more or less evident to any one who takes the time to attend their conventions or read their proceedings. Fortunately Mr. Bentley has a reputation for accomplishing things, and there is good reason to believe a new era is about to open in the history of our mechanical department associations.

SIDE LIGHTS ON THE TOOL FOREMEN'S CONVENTION.

IT was interesting to sit at the side of the meeting room in an inconspicuous position, and yet where one could study those in attendance. Not very many, it is true, but truly representative. Massachusetts, Connecticut, Pennsylvania, Georgia, Texas, California, Minnesota, Wisconsin and Michigan were represented with a goodly sprinkling from the states within these limits. But the most interesting thing was the faces. Strong and intelligent features were there—faces good to look upon. One could not but feel that behind those keen eyes and determined faces rested a goodly supply of ingenuity and grey matter. German and Swedish seemed to predominate with here and there a Scotchman or an Irishman—but all American. These men work in a convention just as they do in the shops—studiously, critically and hard—and they get results!

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A good example was set which is to be extended next year and which could be followed to advantage by other mechanical department associations. J. W. Kelly, first vice-president of the Master Boiler Makers' Association, was invited to attend the meeting to hear the discussion of the papers on boiler maker's tools, and to speak to the tool foremen on the requirements of the boiler shop in that respect. He told of a number of ways in which the tool foremen could assist in improving the efficiency of the boiler shop. The work of the various departments of a railway shop overlaps and is so intertwined that the extension of this feature should be encouraged, not alone in the Tool Foremen's Association, but also in the other mechanical department organizations.

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It is safe to say, in most instances at least, if an article does not give satisfactory results, and the foreman has called the attention of his superiors to it, and to the fact that there is a another article or device which is better suited to the conditions, that if his recommendations are not followed, the arguments which he advanced were not forcible enough to make the proper impression. Good executives usually like to have men under them who have the courage of their convictions, and who will intelligently keep at a thing until they get it, or are shown that they are mistaken.

A purchasing agent is primarily interested in prices and deliveries. If he can be shown that a high priced article does the work much better, and considering labor and surcharge, is cheaper in the end, he will undoubtedly be glad to utilize the opportunity of making a saving for his company. To make him realize this is not always a simple matter, and an off-hand or incomplete statement of the facts will hardly do it. Foremen generally should study the art of making clear, comprehensive and forcible reports in such matters. Comprehensive does not mean long, for it is well to have such reports as brief as possible consistent with a clear and logical statement of the facts. Is not the purchasing agent too often blamed more or less unjustly?

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The success of an organization does not depend on numbers but upon the spirit which dominates it. Too often the burden of carrying on and developing an organization depends on two or three men. It is therefore necessary to use the utmost care in the selection of the officers. The success of the Tool Foremen's Association has depended very largely on the efforts of a few men, chief among them being M. H. Bray. A year ago the president of the association could not be present, and Mr. Bray, then a vice-president, had to take charge and preside This he did in a most successful manner. At the close of the meeting he was elected president; during the year the secretary-treasurer withdrew and Mr. Bray, in addition to his duties as president, had to take charge of the work of that office. That he made a good job of both of these difficult positions was indicated by the increased attendance at the recent convention, by the successful programme which was arranged, by the dignified and yet informal way in which the meetings were conducted, and in the frank and thorough discussion of the various topics. The future success of the association is largely assured by the fact that Mr. Bray has consented to assume the duties of secretary-treasurer for the coming year in order to actively assist in the further development and upbuilding of the organization, and by the election of E. J. McKernan as president. With Mr. Bray in the East and Mr. McKernan in the West and several enthusiastic members throughout the country, the prospects for next year are exceptionally good.

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When the association was organized, a couple of years ago, many of us believed that there was very little field for it, and that it was a mistake to add to the already comparatively large number of mechanical department organizations. Careful observation of the conduct of the last convention indicates that not only is there a good field for such an organization, but that the members who were present used the opportunity to good advantage. The subjects discussed were those in which the tool foremen are specially interested, and for which they are largely held responsible for results. Most of the subjects were ones which have not been, and probably will not be, considered by other railway mechanical associations, such as the General Foremen's, Master Blacksmiths', Boiler Makers', etc. Most of the foremen seemed to come with certain problems on their minds with which they were having difficulty, and for which they hoped to find a solution. This fact cropped out again and again during the discussions, as one by one they frankly stated their conditions and asked for information. And in most cases some one of the forty odd men present had solved the problem successfully. This practically means that a road whose foreman attended the convention has in effect, not one but several such foremen. The roads represented are surely going to get good returns from this convention.

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The way in which the members decided to frankly compare notes as to the results they are obtaining from different makes of tools or materials which they are using was really refreshing. Obviously, no real progress could be made by "beating around the bush" and not mentioning trade names or referring directly to the names of the manufacturers of the articles under consideration. The manufacturer or dealer should welcome this sort of discussion. For instance, in one case, man after man got up and told how he had tried a certain article and how it had failed. The impression seemed to be general that this particular product was comparatively useless for railway tool room purposes. Then a member got up and said he had had the same difficulty, but had succeeded in overcoming it by calling in one of the manufacturer's experts and securing his assistance in locating the source of trouble. Then one of the men who had most strenuously objected to the article admitted that the tests upon which he based his conclusions had been made two and a half years ago.

Possibly the same thing was true of many of the others who had had unfortunate experiences with the article, and that had the company furnishing it realized the conditions under which it was to be used it could have modified it to suit them. Frank criticism can do no harm in such cases for it either brings out the fact that the article or device was not properly used or that the manufacturer had not rightly understood the conditions under which it was to be used. If the latter is true or if the article is not suited to the work the sooner the manufacturer learns of it the better. The railway supply manufacturer has been a most important factor in the development of American railways, and just as the railway man is benefited by the frank discussion of

the problems with which he has to contend, so the manufacturer is also benefited. True, the supplyman may not appreciate such a public discussion if his device is not giving good results, yet if the speakers are as frank as those mentioned above it must surely result in good, for it enables him to locate where the trouble is and to find out how it has been successfully overcome.

GENERAL FOREMEN'S ASSOCIATION.

THE General Foremen's Association, judging from certain things which took place at the annual convention last week, is in a fair way to develop into an aggressive and effective organization and to take the position in the railway world to which it is rightfully entitled. Few problems are more important at the present time than those concerning the organization, management and efficient operation of railway shops. The men who are best qualified to discuss and solve these problems should be those who are in direct charge of this work. The General Foremen's Association, like the Master Mechanics' Association, is a little unfortunate as to its name. For instance, the Master Mechanics' Association is dominated largely by superintendents of motive power, mechanical superintendents and mechanical engineers, although it, of course, has a large number of master mechanics among its members. A broader title would describe its membership and purpose far better. While the General Foremen's Association is composed largely of general foremen, the purpose for which it was established and on which its life depends—improved shop and engine house efficiency—means that it must include in its membership all those officers who are directly in charge of shops and engine houses, whether their titles be master mechanic, shop superintendent, general foreman or engine house foreman. It should also be open, and it is, to the foremen of the various departments of the railway shop. For some reason, master mechanics in charge of shops and shop superintendents of many roads have not taken an active interest in the organization, possibly because they feel it is not in keeping with the dignity of their titles. The election of a hustling master mechanic—a real live wire—as president of the association should do much to dispel this feeling.

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Practically only one subject was considered at the last convention, and that was shop efficiency. Mr. Pickard, referred to as chairman of a committee on that subject, but really the only member of the committee, had corresponded with all the members of the association and had developed a number of leading questions under the heads of shop organization, accounting and supervision, handling material, and shop kinks and methods. These questions he sent to each member of the association a couple of weeks before the convention with the request that they send or bring with them a written discussion or be prepared to discuss the subject on the floor of the convention. This discussion practically occupied the greater part of five sessions, except for the time taken up by addresses and the report of the shop kinks committee which fitted in so nicely with Mr. Pickard's schedule that it really became part of the discussion of that paper. The scheme is unique, and it worked well. One thing, however, must not be lost sight of, and that is that although only four committees were appointed to report at the convention, two of them defaulted, and that had it not been for Mr. Pickard's ingenious idea the convention might have been in a rather serious predicament. Undoubtedly there were good reasons for these failures. The statement was made on the floor of the convention that in these days an engine failure is regarded as a disgrace. If that is true of such a small thing as an engine failure, should not the members of an organization [illegible] the important duty of considering matters concerning shop output and efficiency be more careful in the discharge of their responsibilities?

There was not time enough to fully discuss the questions in Mr. Pickard's paper, although some few of them were gone into quite thoroughly. It is important, and indeed necessary, that any question worthy of being brought before the convention should be thoroughly and completely discussed before it is dropped. There are few things which the association can take positive action on in the way of making recommendations, because the conditions vary so greatly in the different shops that what might be good for one would be bad for another. The discussions should be so complete, however, that a foreman listening to them or reading them would know whether the methods in question could be used successfully for his peculiar conditions.

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The attendance was splendid, being more than twice as large as that at the meeting in Cincinnati last year. The meeting hall was admirably adapted for the convention. It was much larger than necessary, but the acoustic properties were good and it was removed from the noises of the street and the smells of the kitchen. What little disturbance there was came from the exhibit hall, and with a little forethought that could have been avoided. Arrangements have been made to overcome this difficulty at the Traveling Engineers' convention which meets at the same place the latter part of this month. There were also far more exhibits and they were better arranged than last year.

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The men who have been elected to lead the association during the coming year are all progressive and aggressive; they have already organized and arranged their plans. They have taken such a decided stand for better things that their reputations are practically staked on making good and putting the organization where it really belongs—and there is little possibility of their losing out. They have our good wishes, for few associations have such possibilities before them.

MECHANICAL ARTICLES DURING JULY.

THE articles of interest to our mechanical department readers that have appeared in the weekly issues since July 7, and to which the Shop Number readers may wish to refer, are as follows:

Railway Executive Officers and the Supply Manufacturers' Exhibitions. An editorial on the exhibitions at the recent M. M. and M. C. B. conventions at Atlantic City, in which is mentioned the value of these exhibits to the attending railway officials. The railways are urged to send their mechanical and operating officials that they may receive the benefit of such exhibitions. The members of the American Railway Association are urged to take a greater interest in these exhibitions and the work of the conventions. July 14, page 70.

Educational Value of the Atlantic City Exhibits. An illustrated article on the comprehensive exhibits given at the recent M. M. and M. C. B. conventions. There were 250 exhibitors covering a space of 76,110 square feet on the Million Dollar Pier, and even this did not accommodate all those that applied for space. The range of exhibits was very large throughout both the car and motive power departments. Many machine tools were in actual operation showing what may be accomplished in the shop. The whole exhibit was appreciated as much by the higher officers as by their subordinates. July 14, page 73.

Hanna Locomotive Stoker. An article containing twelve illustrations of the application and details of the Hanna locomotive stoker as applied to locomotives. Its operation and construction is considered in detail and with the service results obtained in actual practice the article is made complete. Runs were made with a 900-ton train over a distance of 137 miles, which included grades of from 10.6 ft. per mile to 60.6 ft. per mile. The boiler pressure was held above 190 lbs. during the whole trip, and the firing was done by an untrained man with apparent physical ease. July 14, page 85.

American Railway Tool Foremen's Convention. A brief account of the third annual convention giving a list of the papers presented and a list of the concerns making exhibits. July 14, page 90.

Boiler Inspection Districts. The article contains a map of the United States, showing the fifty districts allotted to the federal inspectors. July 14, page 91.

Mallet Locomotive. An editorial which expresses some opinions or suggestions that are in the air regarding the Mallet compound locomotive. The criticisms mentioned are not of mechanics, but of economics. The limitations of the Mallet are considered and its cost of maintenance is compared with other locomotives used in the same service. July 21, page 108.

Wide Fireboxes. A communication which gives the credit of the first semi-wide firebox to James Milholland, of the Philadelphia & Reading, in

1857, and af the first wide firebox to John E. Wootten in 1877. July 21, page 110.

Electric Switching Locomotive. An article describing the new articulated truck electric switching locomotive recently received by the New York, New Haven & Hartford which will operate in the Stamford yards on that road. This locomotive is a 79-ton single phase machine, with a tractive effort of 36,000 lbs., and is the first of its kind to be used as a switcher in heavy freight yard service. July 21, page 118.

Coupler and Draft Equipment. This is a circular of inquiry from the M. C. B. committee on coupler and draft equipment which includes a table for the different roads to fill out, that the committee may proceed in a comprehensive manner to design a new coupler to meet the new safety appliance laws. July 21, page 120.

Caboose Cars Made From Box Cars. An article which describes the ingenious way box cars are converted into caboose cars on the Wabash. Details are shown of a 34-ft. car. July 21, page 121.

A Practical Demonstration in Fuel Economy. A report of a test made on the Lehigh Valley with a single engine hauling a through train from Buffalo, N. Y., to Jersey City, N. J., a distance of 446.6 miles. The test was made with a view of illustrating to the engine crews on that road just what could be done in the matter of saving fuel. The coal used per passenger car mile on this run was less than a third of the average amount used in the year 1910. The run was made without the fire being cleaned or raked, and the grates were only shaken slightly six times. July 28, page 175.

Observation-Buffet Cars. A descriptive article of recent equipment furnished the Chicago, Milwaukee & St. Paul. The car described is 72½ ft. long and contains an observation room, a writing room, a buffet, a smoking room, a barber shop and a bathroom. The car is beautifully furnished and is made of steel. July 28, page 176.

International Railway General Foremen. A brief account of the program of the convention held at the New Sherman Hotel, Chicago, with the newly elected officers and a list of the exhibitors and their products. July 28, page 186.

M. M. and M. C. B. Committees. A list of the standing and special committees for both associations to act during the year 1911-1912. July 28, page 188.

Letters to the Editor.

EFFICIENCY.

Albany, N. Y., July 27, 1911.

To the Editor of the Railway Age Gazette:

Several of the correspondents of the *Railway Age Gazette* have mentioned piece work as a panacea for all inefficiency ills. The writer grants that piece work is excellent in some departments. Machine, carpenter and forge shop operations have lent themselves admirably to this treatment on several large roads. But has anyone applied it successfully to the erecting shop? This is the one department whose efficiency, however high, must be reduced by the inefficiencies of all the other departments that supply it with material. If the efficiency of the erecting shop is the actual number of locomotives leaving the shop per week divided by the theoretical number possible, then the plant efficiency is: Erecting shop efficiency multiplied by the average sub departmental efficiency. Assuming reasonable figures for a shop sending out forty locomotives per week, we get:

Machine shop efficiency = 90 per cent.
Forge shop efficiency = 85 per cent.
Boiler shop efficiency = 82 per cent.
Erecting shop efficiency = 60 per cent.
Average = 86 per cent.
.60 x 86 per cent. = 52 per cent. = plant efficiency.

These approximate figures indicate a field in which the efficiency engineers might well direct their efforts.

The writer holds that this great lack of efficiency in the erecting shop can not be remedied by any piece work system that is comprehensive. No scheme can surpass day work guided by competent gang foremen. The gang foreman is the key to the situation. No matter how excellent the general or departmental foremen may be, in the last analysis it is the gang foreman that puts the work through. Personality, knowledge, and daily contact place him in a most intimate acquaintance with his men. He is the one for whom the workmen really work. Make him more efficient and you increase the efficiency of the shops. Following are some suggestions: Select for gang foremen men of atractive personality—men who can and will instruct and influence others. Do not permit them to operate boarding houses or obligate their men in any way. Keep the gangs small in size and alert. Move the foremen from locality to locality; "familiarity breeds contempt" sometimes between the foreman and the workmen. Have a distinct path of promotion available to progressive foremen. "B. B. B."

Buffalo, N. Y., July 15, 1911.

To the Editor of the Railway Age Gazette:

Probably no other subject taken up by the *Railway Age Gazette* during the past six months has awakened wider interest or created more general discussion than the articles on efficient shop management. We have followed them with keen interest and have given each one considerable thought and study. Undoubtedly the so-called efficiency engineers have been pretty thoroughly jolted in these discussions by the high court of mechanical men all over the country and ought to feel like the Irishman who tumbled into a deep well, and who, when his companion looked over the brink and called to him, "Mike are ye kilt?", replied, "No oim not kilt but oim spachless!"

Seriously, though, the general trend of opinion has been and is now that there is undoubted good in efficiency methods, if they are rightly applied. The efficiency men simply got in wrong. They advanced some good ideas, but did not have the practical experience to back them up and pursue their plans to a successful issue and produce concrete results.

Right here let us express our entire accord with one writer who said in part: "While many a shop superintendent, master mechanic or shop foreman may have no proper appreciation of the beauties of the philosophy of efficiency, may be unable to follow the line of reasoning of the efficiency men, may be mistaken in his belief that his men are more efficient than the assays have shown, and may have much to learn, he has usually reached his position because of certain qualifications possessed in greater measure by him than by the other men with whom he has been associated." These men are performing efficiency "stunts" every hour of every day. In fact they must do it in order to meet the complex problems and overcome the difficulties and produce the results that are not alone required but are demanded in the present day railway shop and engine house.

Here are the real efficiency men, full of experience of the most practical kind. Backed up by education, hard study and that most valuable asset, common sense, and given the same freedom to act as the efficiency engineer, and carte blanche as to the introduction of new methods and making changes that they *know* would add to the facilities and increase the output, would not the shop foreman, shop superintendent and master mechanic become our ideal efficiency men, giving us efficiency that is *really efficient,* and results that will stand any test and any investigation? But too often we hear the story repeated of strenuous effort for a new engine house roof; a brave battle for a much needed new sidewalk; urgent requests many times repeated for some modern machine tools; for high speed steel; for better belting; for electric motors to drive machinery; increased shop room; better facilities in the repair yards; tracks repaired, and so on almost without end. All these things and a hundred others are directly along the line of efficiency and scientific management. Why delegate these improvements to the efficiency engineer, full of high flown ideas, and *high priced too?* An outsider whom we are supposed to look up to with awe and veneration, and bow down to the halo around his head. Rather let us keep these things that are worthy of accomplishment in our own inner circle, seeing and knowing that they are good, and letting the honor and glory rest where it rightly belongs, and adds to the record of the man really behind the gun.

To the writer these articles and discussions editorially and otherwise have been of special interest and value in the matter of measuring up and comparing the various lines of shop management and efficiency methods brought out, and have been helpful in many ways. The entire matter has made a profound and asking impression upon us, and efficiency has been adopted as our watch-word and the gage of our progress. C. C. LEECH.

TOOL FOREMEN'S ASSOCIATION

The third annual convention of the American Railway Tool Foremen's Association was held at the Wellington Hotel, Chicago, July 11, 12 and 13. President M. H. Bray, tool room foreman of the New York, New Haven & Hartford, New Haven, Conn., presided. C. A. Seley, mechanical engineer, Chicago, Rock Island & Pacific, made an address in which he commented on the great increase in the efficiency of railway tool rooms within recent years. The efficiency of the shop as a whole depends largely on that of the tool room, and the tool room foreman should strive to improve the efficiency of his department in every detail. E. J. McKernan, supervisor of tools, Atchison, Topeka & Santa Fe, replied to Mr. Seley, thanking him for his address and his interest in the work of the association. Mr. Bray, in his presidential address, directed attention to the watchword of the association—"Higher efficiency in

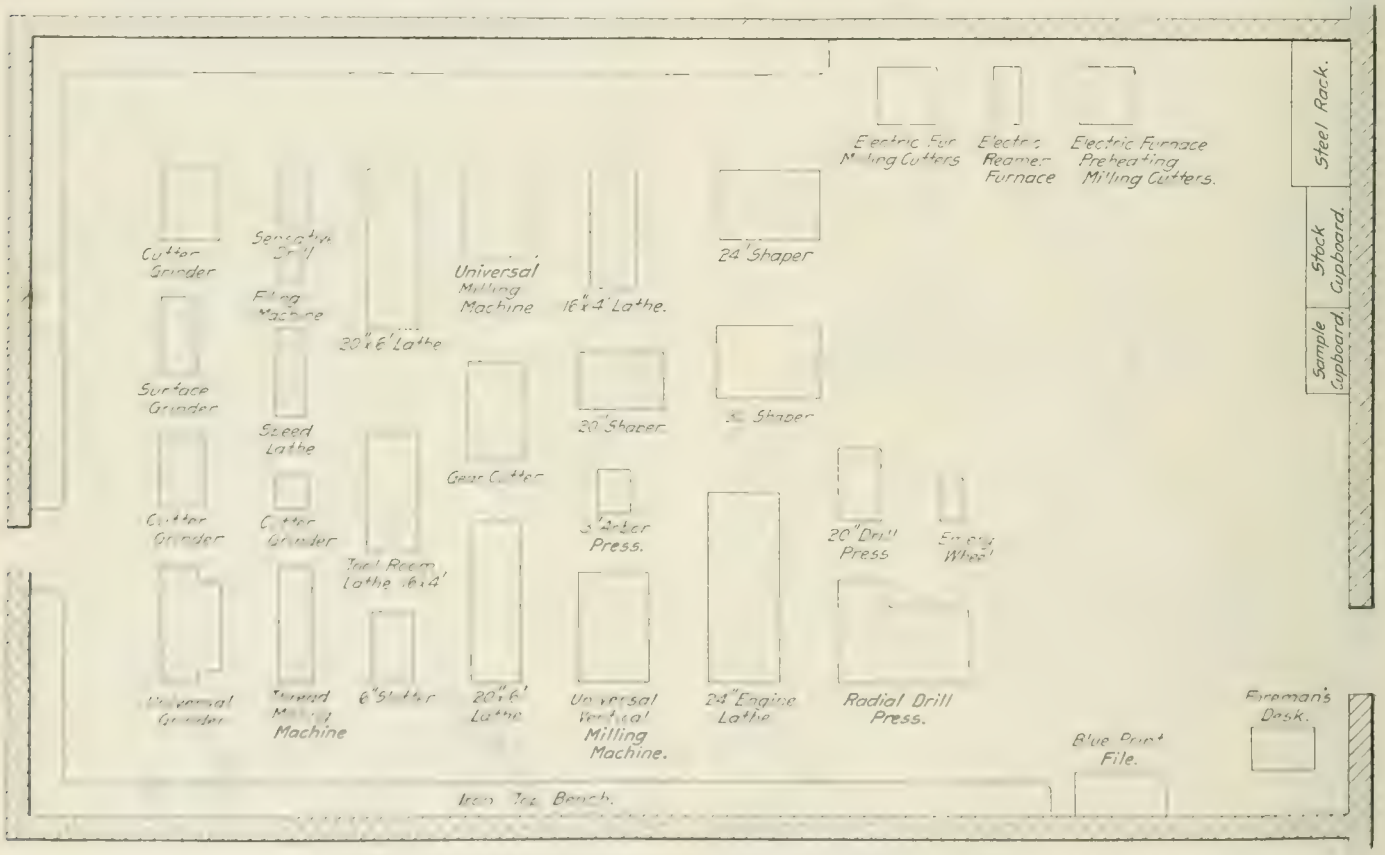


Fig. 1—Arrangement of Machine Tools in an Ideal Tool Room.

hammers, etc., and also the manufacture of dies and new and special tools.

The proper location of the distribution room is in the center of the main shop, at a point convenient to both the machine and erecting shops. The size of this room is determined by the number of tools required for the monthly engine output. The tool racks should be arranged to give the greatest accessibility to the tools; pigeon holes and pockets should be plainly indexed and of such a number as to accommodate every tool. An iron-covered counter should circumscribe the racks and be protected on the outside by a high wire screen. Openings of ample size for handling shop tools should be provided in the screen at points opposite the tools most used. For instance, there should be a window opposite taps, drills and reamers; another opposite dies, wrenches, etc.; another opposite air motors and the heavier tools. Such an arrangement greatly facilitates the quick handling of the tools.

The stock of taps, drills and reamers should be of such size that the breaking of a few of the same dimension will not necessitate the holding up of shop work. The damaged tools should be repaired at once and be placed in their proper racks. In the average size shop there is work enough in the grinding of small tools to require the continuous attention of one man, and the employment of such a man is economy. The distribution room should be equipped with a twist-drill grinder, a reamer grinder, an efficient grinder for lathe and planer tools, and a grinder with two 12-in. wheels for general work.

The second function of the tool room—the repair of machine parts and the manufacture of new tools, dies, etc.—is of such importance as to require an especially equipped room. This room should be located away from the noises of the erecting and machine shops in a building annexed to the machine shop. This location prevents night men from trespassing in the search for tools, and the consequent misplacing of important work.

[illegible] tool [illegible]" and commented on the splendid growth of the association during the past year.

TOOL ROOM EQUIPMENT.

[illegible] Chicago & Northwestern, Chicago, presented a paper on this subject, in which he said the proper equipment for a railway tool room is determined by the special conditions at every shop. The number of engines to be repaired and the kind of work and the extent of work done are factors to be considered in its equipment. The ideal tool room should be so located, equipped, organized and managed as to give the quickest and best repairs to broken shop tools, and to do the most efficient work in the manufacture of new tools, dies and special machine parts. The tool room of a large locomotive repair shop has two functions. The distribution and proper care of small tools for the daily use of shop men, and the repair of machine parts and special tools, such as pneumatic motors,

It also provides a quiet place for the careful and painstaking labor of die and tool makers. The room should be so constructed as to give a maximum amount of light and air. The roof lighting system with prismatic glass windows facing the north, together with wall windows, affords excellent lighting.

The machine arrangement in the ideal tool room is shown on the accompanying sketch, Fig. 1, and consists of the following tools:

1 24-in. lathe.
2 20-in. lathes.
2 16-in. special tool-room lathes equipped with taper attachments.
1 Speed lathe, 12-in. swing, 5-ft. bed.
1 Milling machine.
1 Universal gear cutting machine capable of cutting spiral and bevel gears.
1 48-in. radial drill press.
1 20-in. power feed drill press.
1 Sensitive drill for work up to 1½ inch.
1 Vertical milling machine.
1 Tap milling machine with automatic cutter grinders.
1 42-in. universal grinding machine.
1 Universal cutter grinder.
1 Grinder for two wheels, 16-in. diameter.
1 Up-to-date filing machine.

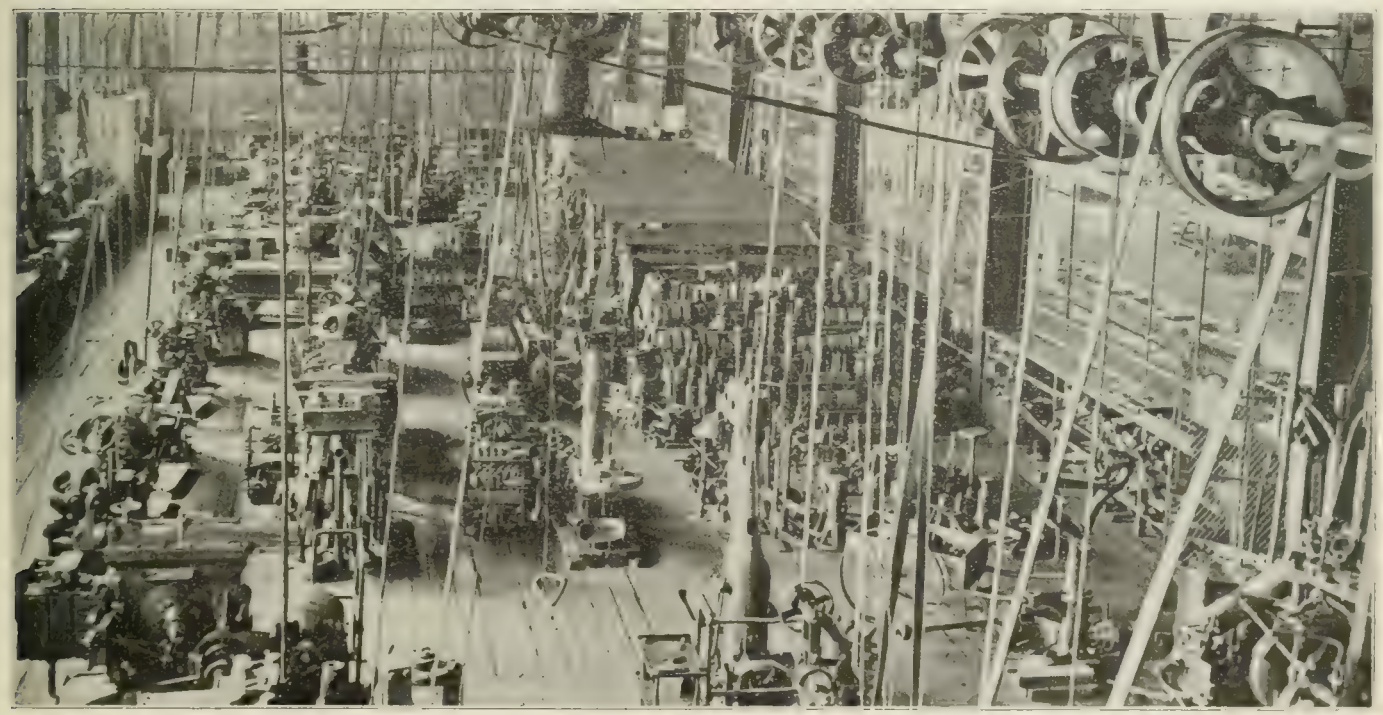


Fig. 2—Tool Room; Chicago, Rock Island & Pacific, Silvis, Ill.

1 6-in. slotter for die work.
1 30-in. shaper.
1 24-in. shaper.
1 20-in. shaper.
1 Cutting-off saw for cutting up stock.
1 Electric center grinder.
1 Portable floor jib crane to handle heavy work at machines.
1 3-in. arbor press.
1 Electric furnace for hardening high-speed reamers.
1 Electric furnace for hardening high-speed milling cutters.
1 Electric furnace for pre-heating high-speed milling cutters.
1 Full set B. & S. plug and collar gages.
1 24-in. steel gear rule.
1 8-ft. B. & S. standard steel rule.
1 12-in. vernier caliper.
1 24-in. hardened steel try square.

In grouping the tools it has been found that where grinders have been placed near lathes and other machines having exposed wearing surfaces, the emery dust has caused an increased wear on these parts. It is well to separate machines that have such surfaces or apply suction fans to the emery wheels to remove the flying emery.

The machine tools should all be individual-motor driven. This system eliminates the cumbersome shafts and belts and the unnecessary wear on them when the machines are not in operation. It prevents the possible "tying up" of the whole tool room when a main belt breaks, and eliminates the necessity of running the whole shop when the use of only one machine is desired. The direct motor drive allows an absolute independent location of every machine, which is impractical in the belt-driven shop where the best belt arrangement often determines the location of tools.

Benches with iron tops, drawers and locks should be provided for the men; swivel jaw vises should be placed at convenient places on the benches. Cupboards for sample work, and for the filing of blue prints should be provided at convenient places. The ideal tool room is provided with a suitable rack for a light stock of annealed tool steel. Pin racks placed on the walls for milling cutters and emery wheels are very necesary. Cupboards for the proper storing of finished tools should also be provided.

DISCUSSION.

Benches.—Several members objected to benches with iron tops because of the danger of damaging certain classes of work. J. W. Pike (Chicago, Rock Island & Pacific, Silvis, Ill.) said that they used tote boards to hold work that might be damaged, but that they were scattered about and broken and were not satisfactory. He recommended a bench top made of narrow pieces of hard white maple. While expensive as to first cost, it is durable and holds the vises true. A. R. Davis (Central of Georgia, Macon, Ga.) said that they used iron-topped benches for all repair work, but hard maple for new work. The size of a tap will be lost if thrown on an iron-top bench. E. R. Purchase, Boston & Albany, Springfield, Mass., recommended an iron-top bench for heavy work. By making the iron about 18 ins. wide, work, which would be damaged by the iron top, could be laid on the wood.

Turret Lathe.—Mr. Pike recommended the addition of a turret lathe to the list of tools, and said that one installed in his tool room had displaced three engine lathes. It can almost work up a bar in the time it would take a hack saw to cut it. John T. Fuhrman, Great Northern, St. Paul, Minn., advocated the use of a turret lathe for making flue expanders, sectional expanders, flue rollers and for blocking out stock for taps and reamers. It

formerly required an hour to finish a sectional expander on an engine lathe. Three may now be finished on a turret lathe in the same time.

Surface Grinder.—Mr. Purchase recommended the addition to the tool list of a surface grinder. It is handy for grinding dies after they have been hardened and for finishing blades for milling cutters. Mr. Davis said that a surface grinder had cut down the milling work about 30 per cent. in his tool room. In making blades for bolt-turning machines the stock is hardened and ground down. Mr. Fuhrman thought the grinder was a good tool, but it should be equipped with a hood and suction fan to carry away the emery dust. It is injurious to the workmen and damages the tools on which it collects. It cannot be wiped from taps and reamers and grinds or cuts them when they are put in use..

Hack Saw.—Mr. Purchase recommended the use of a hack saw for cutting high speed steel. A circular saw is usually damaged in doing this work.

Disc Grinder.—Mr. Pike recommended the use of a disc grinder with emery cloth attached to the disc. He uses it for reducing the stock for bolt-threading dies, etc. The disc is 18 ins. or 20 ins. in diameter and the grinder is operated by a boy.

Rock Island Tool Room at Silvis, Ill.—This tool room, a general view of which is shown in Fig. 2, is 40 ft. x 145 ft. In it are seven tool racks containing the tools for general circulation. These can be called for from any point along the 145-ft. counter. Two benches are fitted for pneumatic tool work, all the repair work to such tools for the entire system being done here. The machine tool grinding is done on two Seller's tool grinders, which are operated by especially trained handymen. The tool tempering is also done in this room. The equipment consists of four engine lathes, one 2-in. x 26-in. motor-driven turret lathe, one motor-driven shaper, one planer for forging die work, two universal milling machines, one vertical milling machine, one automatic gear cutter, fourteen grinding machines for all kinds of special and general grinding, and four drill presses. In the foreground of Fig. 2 is shown a two-wheel cart. This is used for taking up and delivering machine tools and supplies, such as files, chisels, punches, electric lamps, emery cloth, hammers, monkey wrenches, oil cans and other supplies needed by the workmen in the different departments. All tools needed in repairing locomotives and all repairs to machines and traveling cranes are taken care of here. The tool foreman, Mr. Pike, has under his charge forty-five men, including tool checkers, delivery men, handymen, tool temperers, machinists, tool makers and die sinkers.

TAPS AND REAMERS.

The latter part of the discussion of the paper on tool room equipment was devoted to the making of taps and reamers. Mr. Purchase said: "We have lead pots, and harden in oil and water. We annealed a lot of 24-in. reamers, recut them and hardened them over again. They sprung quite a little, some of them ¼ in. We placed them in oil at 375 deg., put them on a lathe, adjusted a jack and sprung them up. They were allowed to remain for a while in this straightened condition with a torch playing on them, being careful not to let the reamer get beyond a drawing color."

E. J. McKernan, supervisor of tools, Atchison, Topeka & Santa Fe, said: "We allow 1/32 in. over size; then they are taken to the tempering room. They are 28¼ in. long over all, and come out straight enough to go to the grinder and finish up with the 1/32 in. over-size removed." G. L. Linck, Houston & Texas Central Lines, and Ernest Metz, Pere Marquette, Grand Rapids, Mich., follow the same practice. J. C. Breckenfeld, Frisco, Springfield, Mo., said: "In getting carbon steel from the [illegible] at a smaller size, you straighten it when you get the temper out it will spring back. I find that preheating the steel before using it at all—putting it in a furnace and bringing it to a low red—seems to release the strain in the material to a certain extent and does away with the shrinking of taps and long reamers."

GRINDING WHEELS.

H. E. Blackburn, of the Erie Railroad, Dunmore, Pa., presented the following paper on this subject: If Webster was to come back and make a trip through a modern shop, he would certainly have to revise a few things about "to grind." Instead of a slow, severe, continuous process of rubbing of material, it would read, "a rapid cutting process of reducing material to accurate size." The old method of reducing metal by machining it in the lathe and leaving it large enough to allow for filing and polishing to size, never did gage up to be round or straight. The next move was to machine the metal and allow enough to finish on the universal grinder. Now cast metal or drop forgings are made large enough to grind to size from the rough in some form of an automatic grinder, thus eliminating all machine work and allowing hardened surfaces to be finished to accurate sizes.

Just as much judgment is required in selecting wheels and speeds, as in selecting tools, speeds and feeds for machine work. While no absolute rule holds good in ordering wheels, when you ask for soft wheels most of your troubles are over (that is if you can get them). The storekeeper may tell you that he notices that hard wheels last longer. Well, so does the work you are trying to get out. The management may say that the soft wheels wear away too fast, and that they do not keep their shape, and here is where it is up to you to "get busy."

Cobblestones, flour or emery and glue do not go far in making up a wheel in this progressive period. Still there are a few firms trying to convince you that it is a good combination. With such grits as alundum or carborundum you can pass over the question of material used, and study the grain and grade question. If the grains (commonly called grits) are too fine, they soon clog up. If the grade is too hard, the grains, fine or coarse, cannot break away to expose a new set of grains, and the work becomes burnt from this "life-everlasting glazed wheel." There is only one place that you can use a hard wheel —put it on a bolt for a washer.

If you are allowed soft wheels of from 40 to 60 grains, you can grind or finish all the work that comes to a tool room. Do not be deceived into believing that it takes a 90 grain wheel to do finished work. A good all around grinding and finishing wheel is a 24 and 36 grain mixed soft wheel, speeded up to a mile per minute surface speed if it is allowed plenty of water; with a traverse feed of ¾ the face of the wheel to one turn of the work, you will have a fine finish. If you wish to take a roughing cut use from 15 to 30 ft. per minute feed.

Keep the face of the wheel as narrow as possible. Wide faces on small work cause chattering, a fatal thing for both work and wheels; a ¼ in. face on 8 in. wheels is a good size, but if you value your good looks use the elastic wheel instead of the vitrified when using these slim widths in deep gashes. A wheel that works well on large work does not as a rule cut well on small work, and it is always advisable to use the smallest wheel that the work will admit of, so as to get a good clearance.

Cast iron or steel requires a soft coarse wheel.
Rolled iron or steel requires a soft medium wheel.
Cast or rolled brass requires a soft fine wheel.

A good rule is, the harder the stock to be ground the coarser the grain of the wheel, and all wheels should be soft enough to be scratched with a scriber before you mount them for use.

While it is necessary now and then to violate tradition in order to get there with what wheels you may have left over from your last order, avoid the slim, slick looking hard boy, for like the aeroplane, he will do stunts in the air, and remem-

ber that the devil himself cannot make one wheel for "all comers," if he can furnish the sparks. Teach the operator to have the wheel fit the arbor "neat." Be sure the arbor and washers run true and that the drive-washer is keyed on the arbor, this washer to be one-third the diameter of the wheel. Use rubber pads between the washers and the wheel, and "for the good of the order," don't allow the operator to "soak" up the nut with a hammer. When everything runs dead true you can feel safe for a good job, as a wheel out of true is only a one-eighth producer.

True the wheel with a diamond, and dress it frequently with a spur cutter. Instill into the operator's mind that dressing is not trueing. With rough diamonds at $12 mounted, there is no excuse for not having one. The operator should dress and true the wheel between heavy and finishing cuts.

Remember that old machines and methods and slow operators soon start a graveyard in any shop. If you have any civic pride, keep clean and set the example for the operator to do likewise. If you wish to find out all the bad points about the wheels you are using, ask the wheel agent of a rival firm—you will be surprised at the outburst. Last of all, do not "knock" any wheel until you have tried it on different metals with variable speeds and feeds.

Discussion.—F. W. Lugger, Big Four, Delaware, Ohio, said that he had tried several times to use a hard wheel but that the soft wheel is better and gives a smoother surface, provided the speed is high enough. The clogging up of the grain is not to be entirely avoided. From 40 to 60 grain is a good wheel.

Mr. Pike:—The writer has considered machines having fixtures for holding the work; a soft wheel is the ideal one for general machine grinding where the pressure can be regulated, but where it is held by hand an altogether different wheel is necessary. We are doing two-thirds of our work by grinding, and the more knowledge we can get on grinding wheels and their use the better.

Judging from the discussion a wheel between 40 and 60 grain, depending on the class of work, gives the best results; it must not only be free cutting but must keep its size. The general opinion seemed to be that high-speed steel should be ground dry, although Mr. Bray said that some grades seemed to grind better with a wet wheel. Gust Gstoettner, Chicago, Milwaukee & St. Paul, West Milwaukee, Wis., thought that bad results, sometimes attributed to a poor wheel, were often due to its being run at too low a speed.

STANDARDIZATION OF STEEL.

Henry Otto, Atchison, Topeka & Santa Fe, in speaking on this subject, said: Steel for making the various kinds of tools should be standardized. We all know that there is a great liability of the purchasing agents being deceived in purchasing steel for tool work by the low prices quoted by manufacturers, more attention being paid to the purchase price rather than to the quality of the material. I know of several cases where steel has been purchased at a very low cost which was not fit for the class of work for which it was intended, and the breakage of tools was so great that the company would have been 50 per cent. ahead if it had paid twice as much for a better steel. We all know that we cannot use the same kind of carbon or high-speed steel for the various classes of work, and we also know that it is impossible to use steel containing the same percentage of carbon for all kinds of tools. We cannot make a shear blade and a frame reamer from the same grade of steel, and if we were able to adopt a standard for this class of work, we would make a large saving during the course of a year. If each of us were to make a study of the subject and arrange to discuss it at our next meeting, we would be able to adopt standards of high-speed and carbon steel for each particular tool used in our shops.

DISCUSSION.

J. Martin (Big Four, Beech Grove, Ind.):—I believe all standard steel companies make a good grade of steel, and the most important thing is the treatment which we give it. Steel is injured more in heating than in any other process of handling.

Mr. Fuhrman:—If a man understands how to select steel for the different classes of work, he is generally successful; if he does not, he is a failure.

Mr. Davis:—We order all steel by a blue print—A1 and A2 are high-speed steel; B1, B2, B3, B4, B5, B6, the carbon steels. For reamers we use from 1.00 to 1.12 carbon, and for boiler punches .80 to .90 carbon steel. We have a rack in the tool room and as soon as the steel is brought in it is painted a color corresponding to its grade. A chart shows what each color represents, and when a man wants a bar of steel he knows just what he is getting when he goes to the rack.

A. M. Roberts (Bessemer & Lake Erie, Greenville, Pa.):—I have not found any tools that I felt afraid of making of high-speed steel. We do not make a ball reamer or a radial reamer of any kind except of high-speed steel. We use high-speed steel for most of the taper reamers and taps. We use milling cutters of high-speed steel, and we have milled a crucible staybolt tap about 30 ins. long in fifteen minutes, provided nothing went wrong. It almost looks impossible, but it is a fact, and if we were in a hurry or holding up a job we could do a little better. The solid tap is almost a thing of the past with us. We cannot afford to put in time making solid taps. They crook and it costs money to straighten them. There are some things in coke and coal that are detrimental when used in connection with the tempering of steel. The electric furnace is ideal for this purpose and gives an accurate heat. The trouble has been that the men handling the steel have not studied it sufficiently to keep up with the progress of its development. Get your heats right and use a proper grade of steel for the work, giving the right temper, and you will not have trouble. The class of men who use reamers are not mechanics, therefore there will be some breakage, but if we get the full efficiency of the steel, hardened in the proper manner, we will have less breakage than if we guessed at it and hardened haphazardly.

Reamers.—Mr. Pike said that they used high-speed steel for the larger reamers.

Mr. Fuhrman.—High-speed steel makes a much better tool than carbon steel. For rod reamers carbon steel can be used by putting in four grooves and inserting high-speed steel blades. This kind of a reamer is liable to bend if it is used very hard, but I have one that has been used every day for almost a year and it is still in good condition. The large knuckle reamers are made the same way.

Mr. Hendrikson.—We make all our frame reamers and rod reamers of high-speed steel and temper them in oil. We tried the air blast but it was uneven and caused soft spots.

Mr. McKernan:—We make a great number of reamers 28½ ins. in length and our experience is that carbon steel gives the best results. High-speed steel reamers, driven by an air motor in the hands of unskilled labor, are easily snapped off. That has been our experience, and we have to use carbon steel in order to get the output and keep the cost down. High-speed steel shell reamers are all right, but not the solid ones. Some one remarked that high-speed steel reamers will last twice as long as those of carbon steel. If they do not last six times as long, they are expensive reamers, because you are paying on an average from $.45 to $.70 per lb. for high-speed steel, regardless of whose make it is, and handling it very carefully; you have to reduce the speed of your machines to machine it. Your milling cutters are of high-speed steel and are expensive. For the tempering of high-speed reamers or any high-speed steel, if you can possibly secure it, use the barium chloride process, especially for threading dies and tools with keen-cutting edges; they come out as highly polished as possible. You can draw

them up to 350 degs. or 500 degs. and have a clean thread and no marring.

Mr. Pike:—We make a great many reamers 36 ins. long. The largest diameter is 1⅜ ins. High-speed steel is not the proper material for a reamer of that kind. Considering the great cost of the reamer and the possibility of breaking it, you can readily see that we can make six carbon steel reamers for

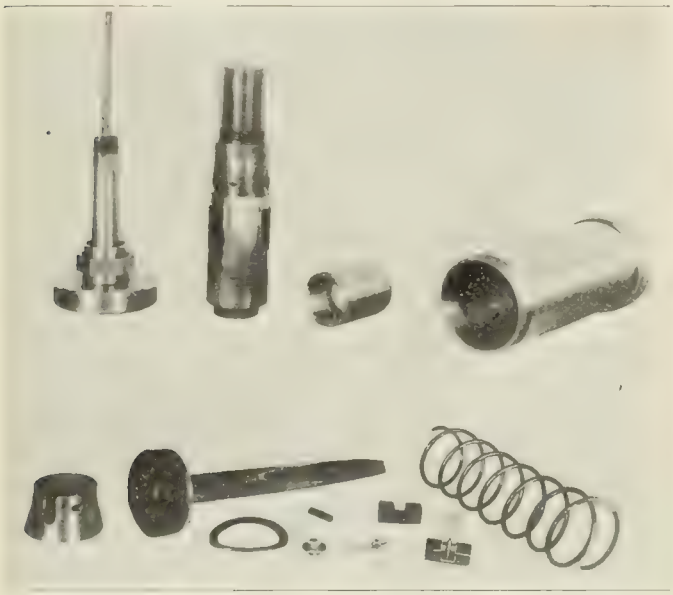


Fig. 3—Details of Tool for Cutting Out Flues.

the cost of one of high-speed steel. From my experience I would recommend steel of about .90 carbon; it is stronger and more durable.

Mr. Lugger:—High-carbon steel has proved most efficient for fluted reamers. For cutters and rose reamers the high-speed steel has given better results.

Mr. Meitz:—The best results we have had have been with

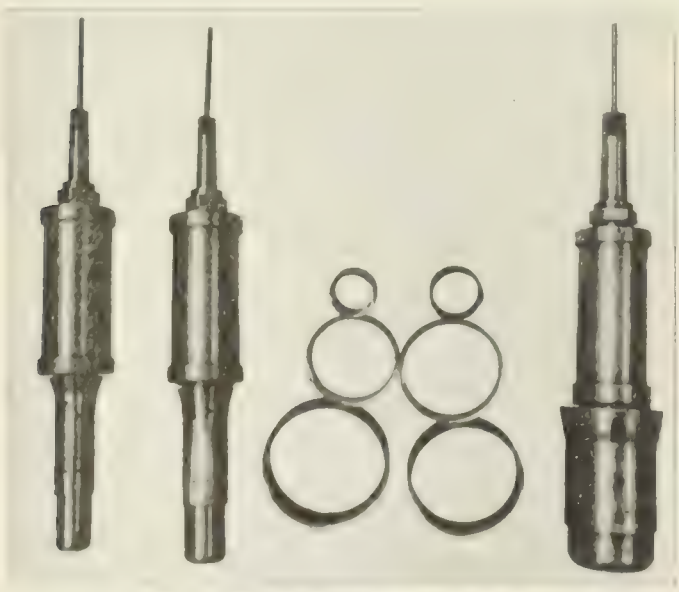


Fig. 4—Tools for Cutting Out Flues.

be until our high-speed steel becomes more elastic than it is now. We use the .85 or .90 carbon steel for reamers.

Tempering High-Speed Steel Tools.—Mr. Hendrikson said that they had had trouble with barium chloride in tempering dies and taps. Small hard beads formed between the threads and the taps were worthless. The beads were as hard as glass. The same trouble was experienced with bolt-cutter dies, but it was because the barium had been used several times. Oxide of iron will get into the barium and float on top, and it unites with the hardened steel in little globules. After using the barium several times it should be thrown away.

Mr. Davis:—I have had the same experience with the barium. In tempering small stuff it mottles the work very quickly. The first time you see a sign of mottle, throw the bath away or it will ruin the work.

Mr. Gstoettner:—In tempering high-speed tools, we use barium to a large extent. We make our reamers of high-speed steel. Carbon steel will not last as long.

Fig. 5—Flue Cutter in Operation.

Miscellaneous Tools.—J. B. Hardman (Southern Railway, Atlanta, Ga.) said that the greatest trouble they were having was with the beading tools, snaps and pneumatic tools. They break in the shank, and the snaps also break in the fillet. He took an old tire and had the blacksmith forge it. A lot of boiler snaps were made and gave better results than anything else they have ever tried.

Mr. Roberts said that they used a vanadium steel, costing 60 cents per lb., for punches. It is tough, hardens nicely, and is also being used for dies, chisels, beading tools and taper pins for the expander.

FLUE CUTTERS.

John I. Lehman (Great Northern, St. Paul, Minn.) said that cutting out flues was a helper's job and that it was also important that it be done in the shortest possible time. Efficiency in a flue cutter is gaged by three things—rapidity of cutting, clean cutting and durability. He described a flue cutter that he had designed and patented, which is driven by a corner-drilling motor, and will cut the flues at both ends without any

change in the cutter; it is operated by one man and will cut a 5-in. flue as easily as a 2-in. one. As shown by the photographs, Figs. 3, 4 and 5, it has three disc cutters, each set in a sliding block, the blocks being fitted into grooves to bring the cutters in line and equally distant apart. The blocks rest on a three-sided taper spindle inside the sleeve. The other end of the spindle is connected to a piston in the cylinder, which is controlled by an air-valve in the motor, but independent of the motor throttle. The three cutters are expanded equally by the taper spindle, thereby forcing them through the flue as they are

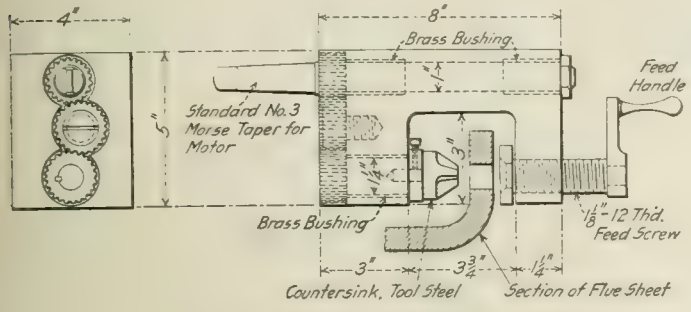


Fig. 6—Tool for Countersinking Tube Sheets.

revolved by the motor. The result is a rapid cut, leaving a flue with a clean finish on the end without the usual burr.

The advantages of the pneumatic cutter are: Less power than required to drive the knife-blade type. A motor that is strong enough to drive a 1¼-in. drill will drive a 2-in and 2¼-in. cutter. It does away with the rigging belted to the front end and the knuckle joint shaft which is used with the knife-blade cutters. The same cutter will cut the flues at both ends without any change. Only two men are required to remove the flues from the boiler; and if the flues are not cut at the back end it will take three men. It saves one handling of the set of flues in the flue room, as they are ready for welding when they come from the rattler. One man can handle the cutter, and it is ready for use as soon as the air hose is connected to the motor.

To remove a set of 350 flues with the knife-blade cutter requires one man five hours for cutting flues, three men six hours removing them, and one man one hour to remove the burrs at the front ends. With the pneumatic cutter above described, one

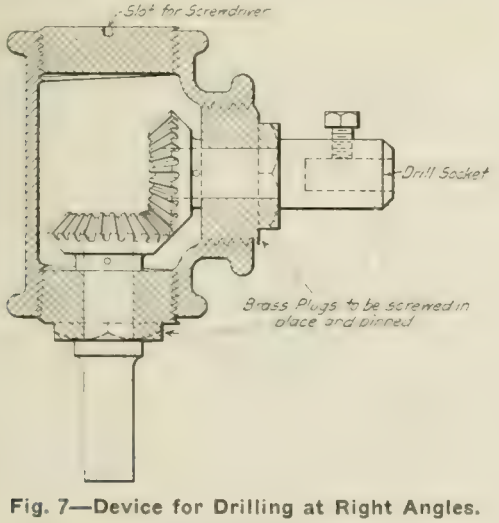


Fig. 7—Device for Drilling at Right Angles.

man can cut both ends of the flues in two hours, two men will remove them in three hours, and it will take one man two hours to remove the burrs. This leaves fourteen hours in favor of the pneumatic cutter, or about four dollars to a set of flues. The cutter is reliable, even in the hands of an unskilled workman. The parts that wear most are the small disc cutters and the pins that hold the cutters in the sliding blocks. These parts cost only a few cents and are easily replaced. An air pressure of from 90 to 110 pounds is required to obtain the best results.

PNEUMATIC TOOLS AND APPLIANCES.

In a paper on this subject A. M. Roberts, Bessemer & Lake Erie, Greenville, Pa., said: The increased use and wider application of pneumatic tools within the last few years has put a heavy burden on the shoulders of the tool foreman. I have constructed several devices for use with motors and hammers, which we have been using for several years with good results. The first consideration in the designing of air tool appliances is a good, strong, rugged construction to withstand all kinds of rough usage, as they are operated by all classes of workmen. The abuse of pneumatic tools is harder on them than all the labor to which they are put. For illustration, a workman took a reversible motor with a ¾ inch drill, and after working for about thirty minutes, returned to the window and complained of the drill not cutting. Upon examination we found that the motor had been running backward.

We countersink a flue sheet wherever it happens to be—on the wagon or floor—by a small device used with an air motor. A flue sheet may be countersunk with it in about two hours. This is a great improvement over the old way where the flue sheet was stood on edge at the radial drill press, with two men

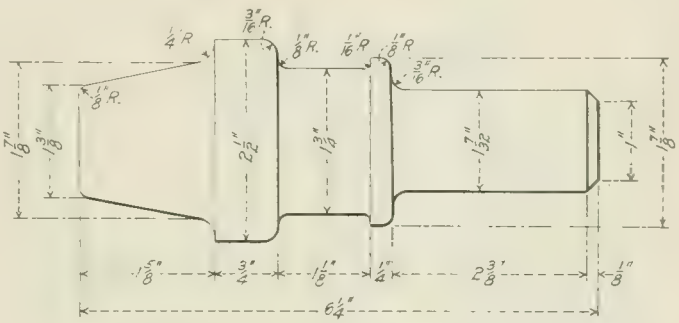


Fig. 8—Tool for Belling Tubes With an Air Hammer.

to hold it, the pressman using a long bar of steel with flat drill at the end. This method required about seven hours a sheet. A drawing illustrating the application of the new device is shown in Fig. 6.

Another device which has proved very successful is an angle drilling tool, with which we bore at right angles through car sills underneath the cars. Holes are now drilled in about one-eighth of the time formerly required. This device is shown in Fig. 7.

A belling tool for belling flues, and which is used in a 9-in. stroke hammer, is shown in Fig. 8. This tool will bell out about seventy flues in twenty minutes, making a large saving over the old way of belling by hand.

It would pay a company having a large number of pneumatic tools in operation to employ a competent man to go among the men, instructing them in the use and care of the tools. The elimination of abuse of tools and loss of time of men through ignorance would more than pay the inspector's wages. I understand that this is being done in some of the large shops at the present time. I have known cases where at least three hours could be saved per job by using the motor best suited to the work. Such an inspector would take care of this.

BOILER SHOP TOOLS.

Gust Gstoettner, toolroom foreman of the Chicago, Milwaukee & St. Paul, West Milwaukee, Wis., read a paper on Boiler Shop Tools, of which the following is an abstract:

Drilling Tell-tale Holes in Staybolts.—A home made rotary

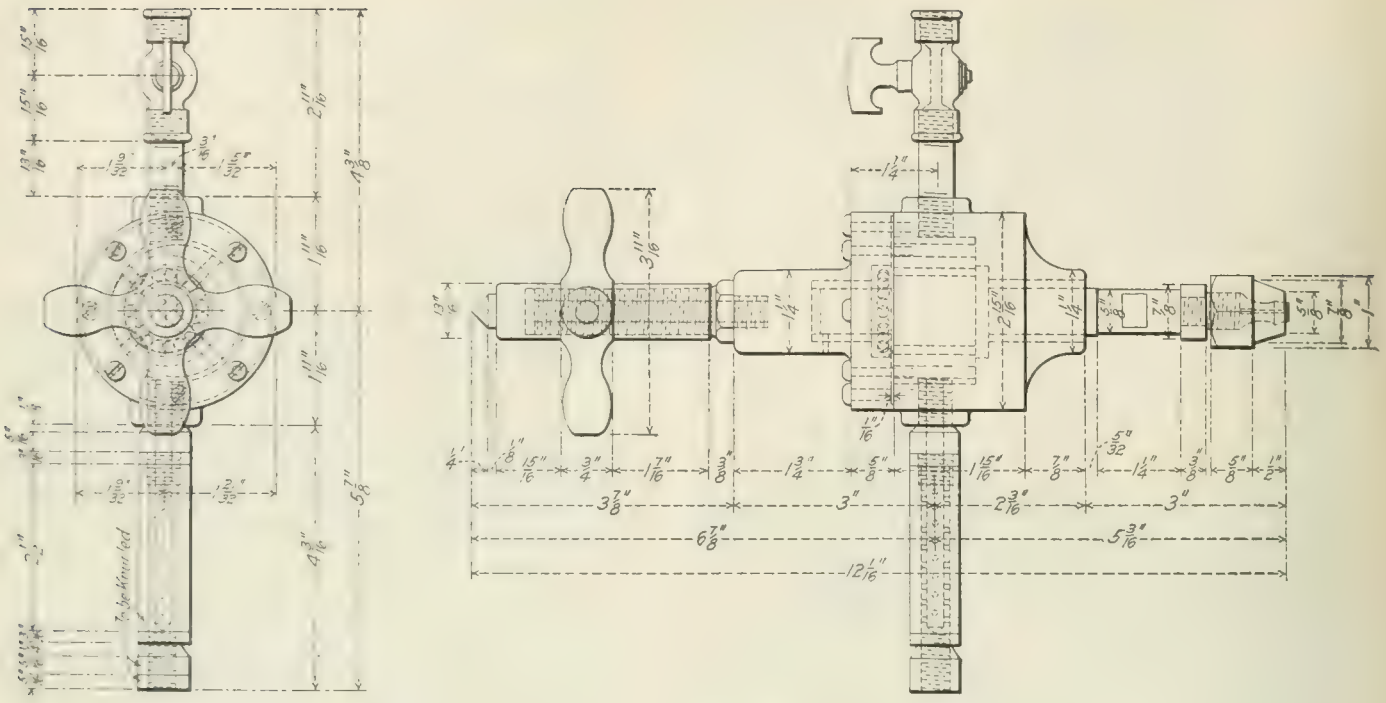


Fig. 9—Rotary Air Motor for Drilling Staybolt Tell-Tale Holes.

air motor for drilling tell-tale holes in staybolts is shown in Figs. 9 and 10. The capacity of the motor, with 90 lbs. air pressure, is up to 3/16 in. holes. The speed of the drill is about 2,000 revolutions per minute. High speed steel drills should be used. The motor runs smoothly and the breakage of drills is practically eliminated. While we use hand pressure for feeding the motor, it is so arranged that a screw feed can easily be applied. A small, durable chuck is used for holding the drills, making it possible to get into corners. Aluminum blades will give the best results. The first motor was in constant use for 16 months before it came to the tool room for repairs. The output has been trippled by its use.

Flue Scarfing Machine.—A flue scarfing machine in which safe ends for the flues are cut, beveled off and the burrs taken out in one operation is shown in Figs. 11 and 12. The flue is fed into the machine through a hollow spindle and is pushed against a stop to get all the pieces the same length. It is held rigidly in the automatic chuck which is operated by an air cylinder. A taper reamer is used to remove the burr and break the sharp corner of the flue. The cutting and beveling is done by a high speed tool which is ground to the proper angle. The jaws in the chuck are adjustable, and can be used for different size flues. They are bored out to run perfectly true and are hardened. The operation of the machine is simple and it does the work in an effective manner.

Flue Swedging Machine.—A flue swedging machine is shown

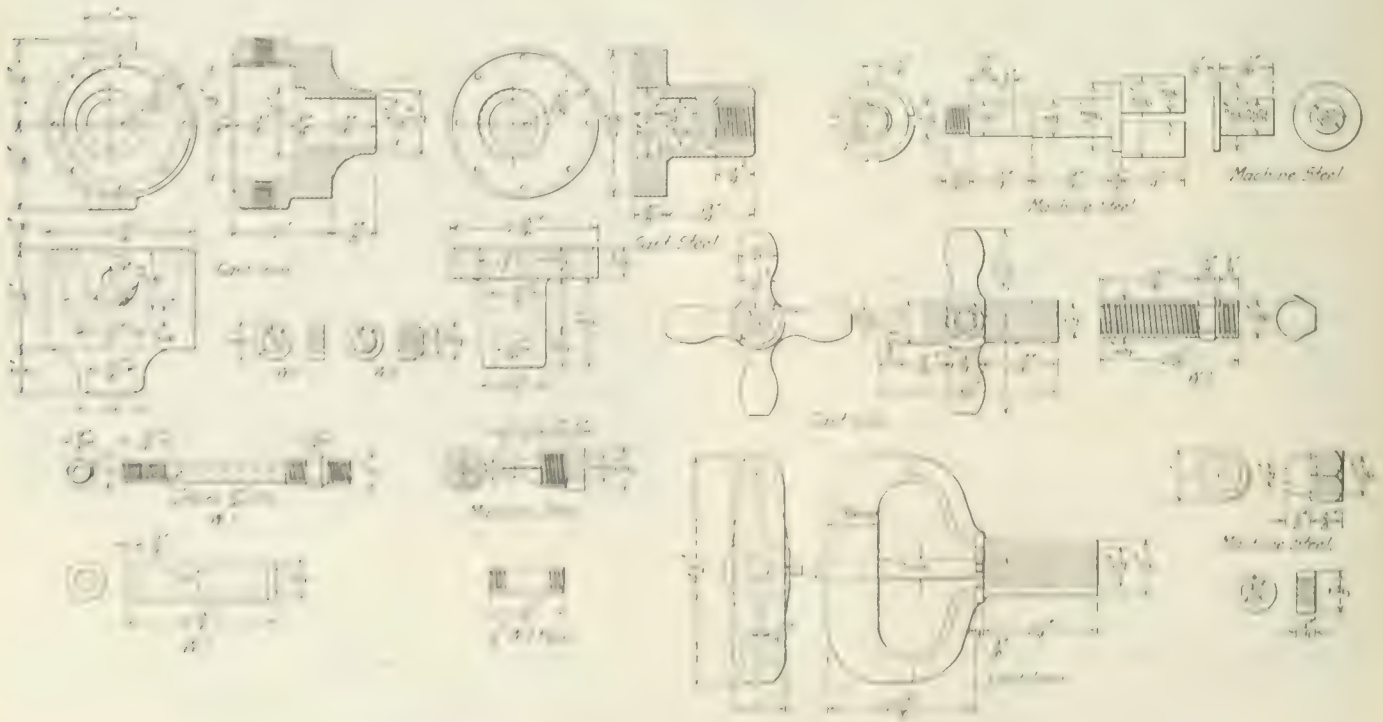


Fig. 10—Details of Rotary Air Motor for Drilling Tell-Tale Holes.

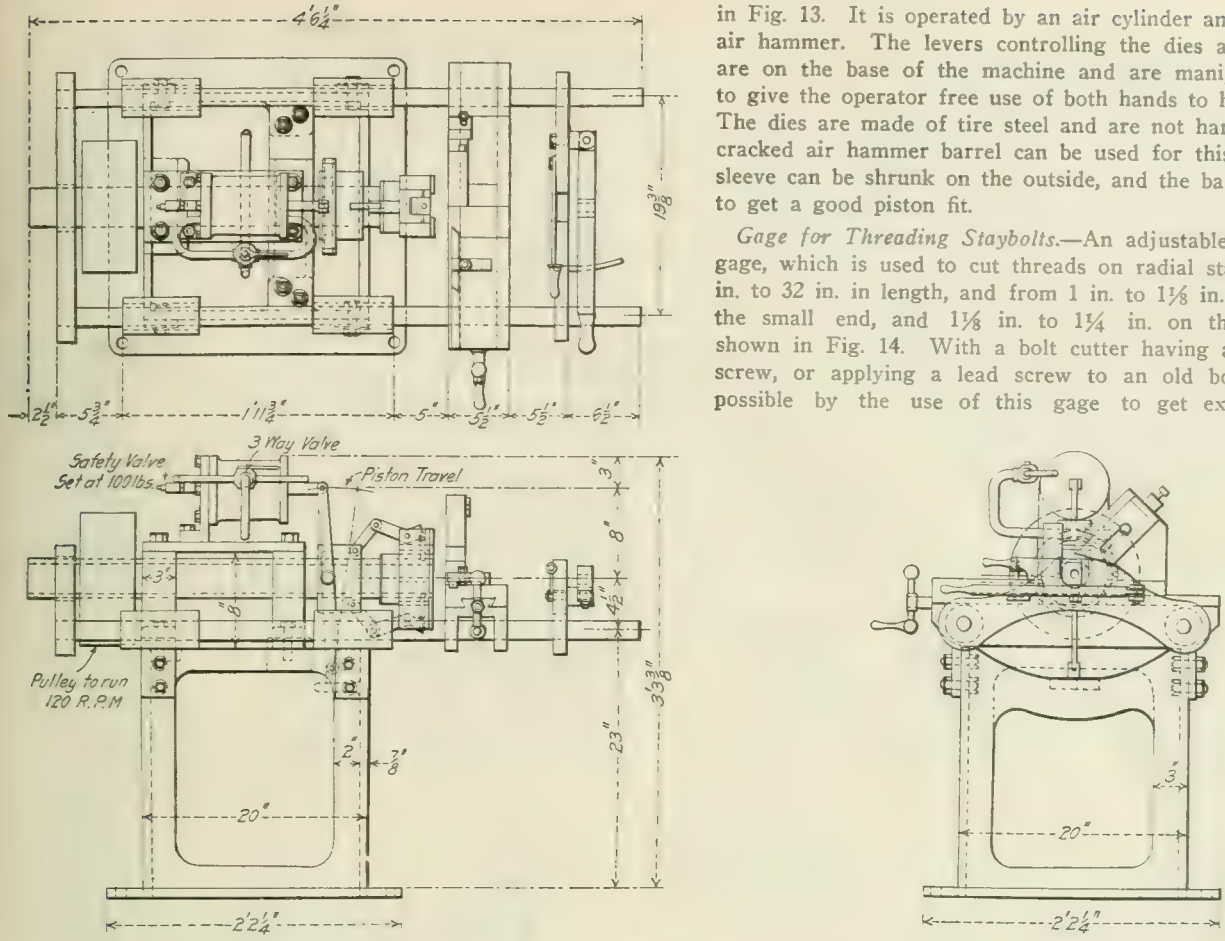


Fig. 11—Flue Scarfing Machine.

in Fig. 13. It is operated by an air cylinder and a long stroke air hammer. The levers controlling the dies and air hammer are on the base of the machine and are manipulated by foot to give the operator free use of both hands to handle the flues. The dies are made of tire steel and are not hardened. An old cracked air hammer barrel can be used for this machine, as a sleeve can be shrunk on the outside, and the barrel reamed out to get a good piston fit.

Gage for Threading Staybolts.—An adjustable radial staybolt gage, which is used to cut threads on radial staybolts from 12 in. to 32 in. in length, and from 1 in. to 1⅛ in. in diameter on the small end, and 1⅛ in. to 1¼ in. on the large end is shown in Fig. 14. With a bolt cutter having a 6 thread lead screw, or applying a lead screw to an old bolt cutter, it is possible by the use of this gage to get exactly the same

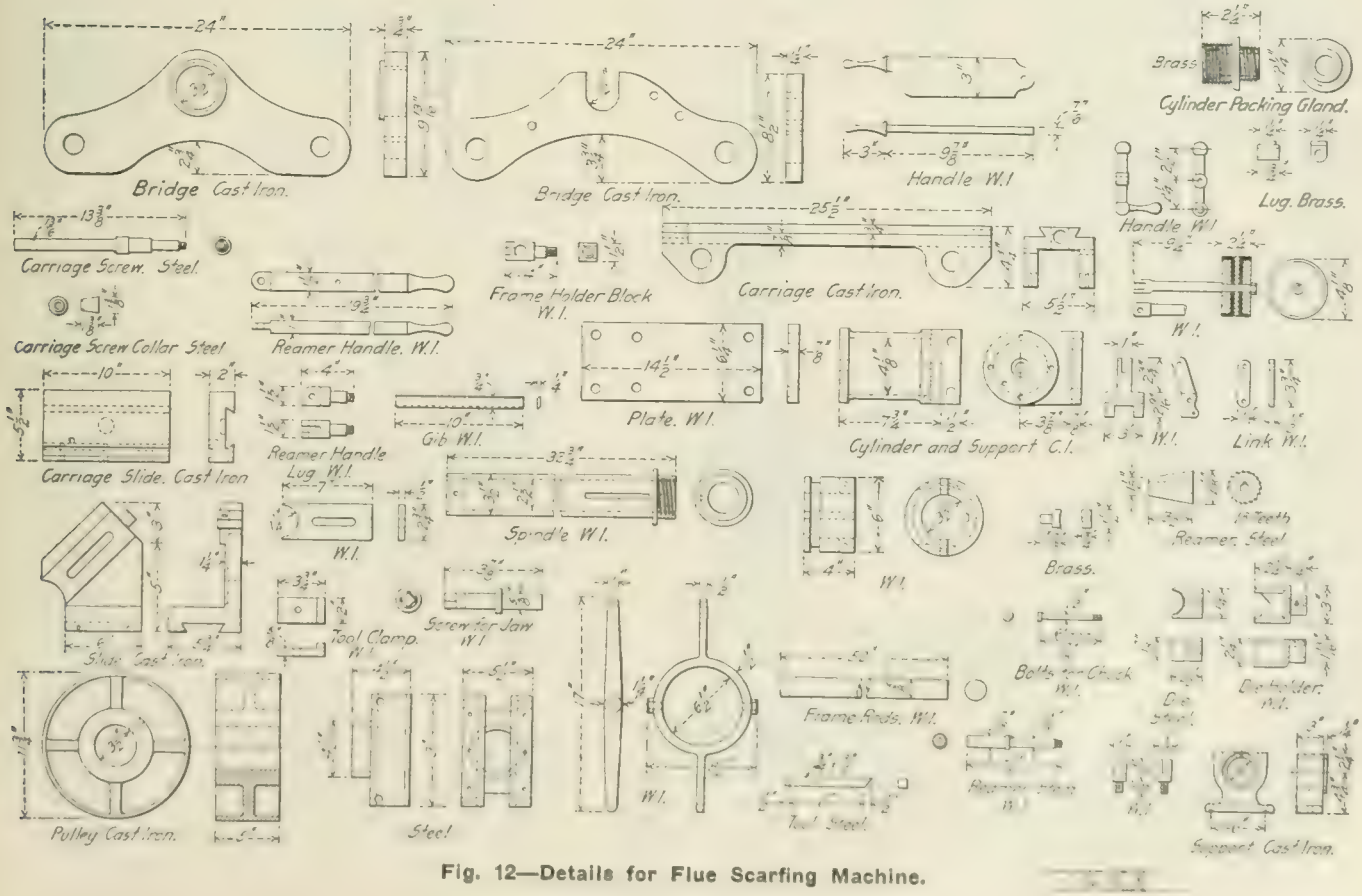


Fig. 12—Details for Flue Scarfing Machine.

thread on the radial staybolt as on the radial staybolt tap. There is always some variation in the pitch of a tap, especially when it is from 30 in. to 42 in. long; no matter how careful the manufacturer may be it is bound to get out some in hardening. Take the tap that you use for tapping out the holes in the boiler and place one end of it carefully in the die head of the bolt cutter and the other end in this gage (adjust the gage so that the pitch will correspond) which is fastened on the carriage, central with the die head and directly back of the jaws. Remove the tap, cut the thread on the large end of the bolt and place in the gage carefully, then cut the thread on the other end of the bolt. You will get exactly the same thread on the bolt as on the tap, thus ensuring a good steam tight fit in both of the boiler sheets. Often the thread on the small end of the tap is not in line with the large end; this may be easily overcome by using the adjustable gage. I have seen cases where the radial bolt has been stretched to conform with the tap by hammering it. This is bad practice, as it helps to take the life out of the bolt and leaves it more or less crooked. By using this gage you can save considerable work by the boiler maker and his helper and have better staybolts in the boiler.

Flanging Machine.—A flanging machine which is simple in design and a big time saver is shown in Fig. 15. It is operated by hydraulic pressure of about 1,500 pounds per square inch. The cylinder has a 10 in. bore and is made of cast steel to provide sufficient strength. The press is operated by a three-way valve. The frame is made of steel and consists of a yoke

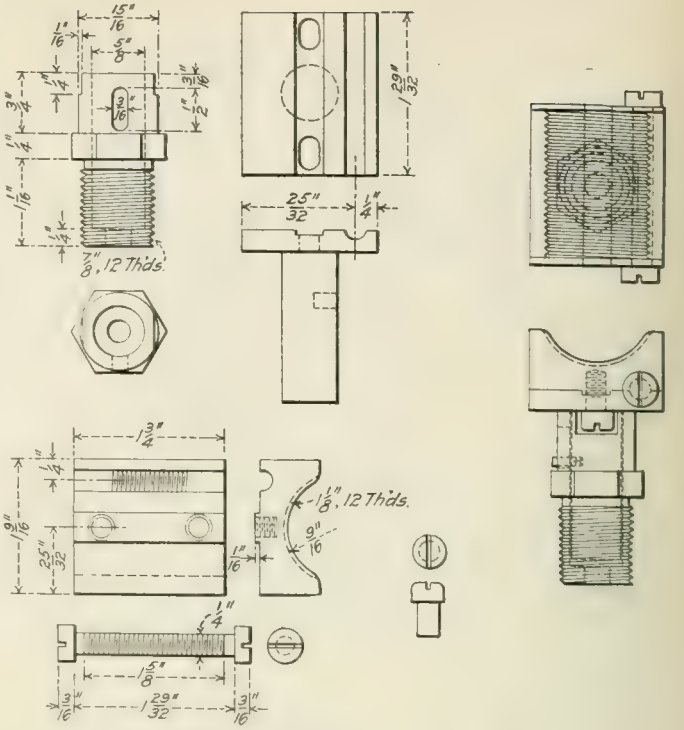


Fig. 14—Gage for Threading Radial Staybolts.

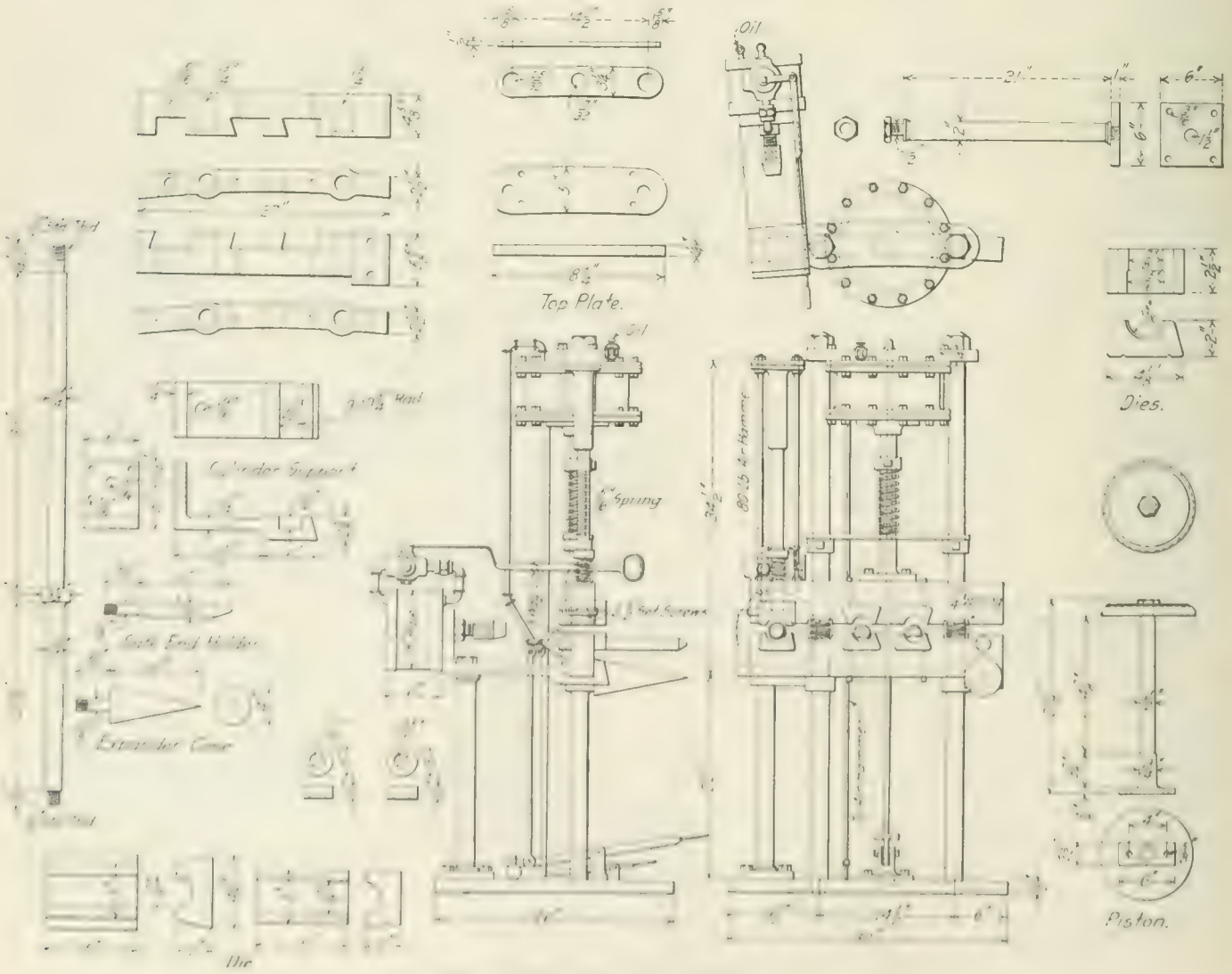


Fig. 13—Flue Swedging Machine.

built over a foundation block. A 2-ton chain hoist is fastened on an arch above the yoke for handling the male die. This machine is capable of flanging in a single heat such parts as front end doors, cylinder head covers, air drum heads, door holes, etc. Locomotive front ends up to 75 in. in diameter have been flanged on it.

MR. KELLY'S ADDRESS.

James W. Kelly, first vice-president of the Master Boiler Makers' Association made some suggestions as to how the tool room foreman could co-operate with the boiler maker foreman in improving the efficiency of the boiler shop. Among other things he said: "You can determine methods of doing work which will be cheaper and faster. I remember when it took two minutes to cut a flue hole. The tool room foreman with the aid of the steel men have improved this, but there is still room for improvement.

"By the proper tempering of staybolt snaps and rivet sets and selecting the right kind of steel, a great saving will be accomplished. We have lots of leaky radial staybolts and the tool foreman is the man who can help us by seeing that the tap will tap the holes so that they will be perfectly in line and properly threaded. We want self hardened drills for removing staybolts. We want a drill that we do not have to use oil with; one that will do the work rapidly. It is up to the tool foremen to get the right steel for that purpose.

"Every tool room foreman has developed a cutter for cutting out flues. Each cutter is the best, and it is up to this organization to get a committee to find out which is really the best cutter. We want a cutter that will remove a set of flues in the shortest time under hard service and stand up. I do not believe in having a cutter that requires five hours to rig up. Appoint a committee and request each man to give facts of what he is doing and how much it costs to maintain the cutter during the year. We boiler foremen have got to have that and you tool foremen can get it for us.

"I have found from experience that making each man responsible for his own drill and tapping machine is a good plan. If they are checked out by numbers and the men are held responsible for them they will keep their machines oiled. When a man is not busy drilling out staybolts he is required to tap out staybolt holes. It is the same with air hammers. The chippers and caulkers have their own hammers all the time, and there is a great saving. If there is a checker and he reports any carelessness to the foreman, you get good results."

PNEUMATIC TOOLS, HANDLING AND MAINTENANCE.

The first part of the discussion following the reading of the above three papers was devoted to a consideration of the problem of lubricating, handling and maintaining pneumatic tools. This discussion in abstract follows:

Mr. Martin:—We had a great deal of trouble with air motors,

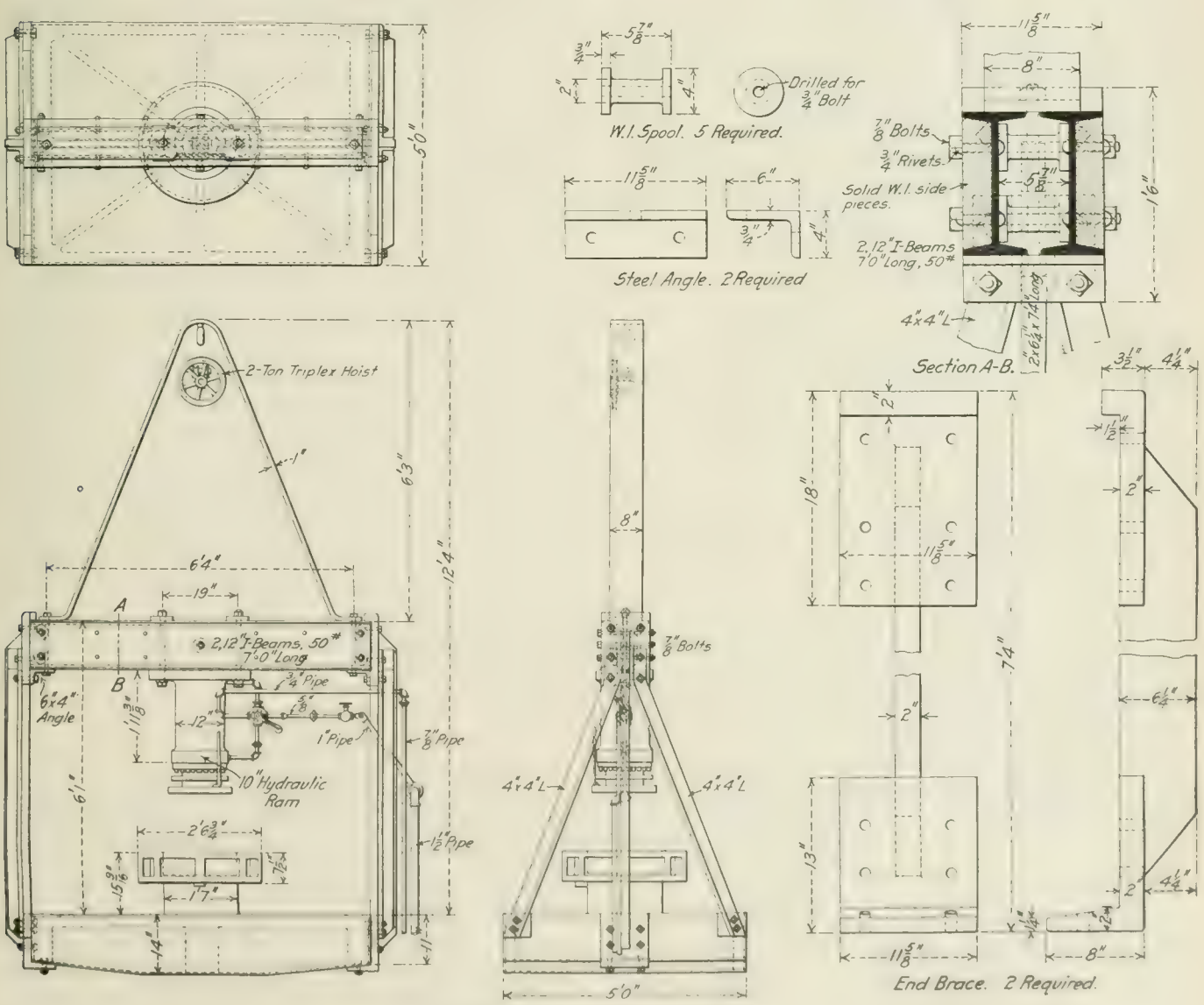


Fig. 15—Hydraulic Flanging Press.

and employed a man who does nothing but oil and take care of them; it has been a paying investment.

Mr. Hendrikson:—We have the air motors turned in every night and they are oiled every morning.

Mr. Linck:—There are lots of machines that ought to be oiled during the day.

Mr. Meitz:—We had considerable trouble with the motors, but we now fill the inside of the motor case with artificial engine grease. It holds the oil in the motor and the motor is better lubricated all through. It lasts twice as long and is always lubricated.

Mr. Breckenfeld:—We have a helper go around the shop twice a week; he opens the motors and packs them with No. 3 grease, as they call it; I do not believe that we have had any trouble with a motor on account of not being lubricated in six months. On Saturday night we have all tools turned in and the helper examines the motors to see that they are properly oiled.

Mr. Fuhrman:—It is a good thing to have an atomizer for oiling pneumatic tools. Fill it up twice a day; it does away with a good deal of trouble. Our system is to always keep after the motors in the tool room, and if one is not running right it is immediately returned to the tool room.

A. Sterm (Chicago, Rock Island & Pacific, Chicago):—We use the automatic oilers.

J. B. Hasty (Atchison, Topeka & Santa Fe, San Bernardino, Cal.):—We pack air motors with grease once a week, over Sunday, and use grease altogether. We use a bath for the air hammers. They are turned in every evening and placed on pegs 5 or 6 in. long and are flooded at night with coal oil. The flooding arrangement is made of a reservoir in two sections; the lower section contains the oil, and the upper section the hammers; by admitting air to the lower part, it forces it up under the hammers and completely covers them with oil; they remain until morning. Just before the hour of opening, the night watchman opens the valves and the oil goes back to the lower tank; then we give them a touch of signal oil and pass them out. Nothing is done to them during the day.

Mr. Lugger:—We use the same system at our shop, but the oiling process during the day is worrying me considerably. A boiler maker takes a hammer out and after it passes into his hands in the morning, there is no oil put in it during the day. We send out an apprentice at different times during the day who puts in a little airolene, and that has to a great extent overcome our difficulties. In our air motors, we use aerolene entirely, and have no trouble. The only difficulty we have experienced of late is in the air motor throttles. They get dry, due to the men neglecting them, and we have to overhaul them frequently.

Mr. Breckenfeld:—When we know a new man is going on a job—generally an unskilled laborer in the boiler department—we try to have the men in charge of the motors go out and give him a few minutes' instruction. It has a tendency to save in the breakage of air motors.

Mr. Pike:—We have a young man go around the shop every two hours; he oils the machines through the throttle and in the case, and the gasket if necessary. If a section of hose is leaking he condemns it. These duties keep him busy. The atomizer may be all right, but it added to our troubles in that it made an additional part to maintain; also when the air line became old, small particles of rubber would pass through and clog it up; the man using the machine expected the atomizer to be on the job when it was not, and as a consequence the machine went dry. It pays to have one man be the judge of when a machine [illegible] to the tool room for repairs. If he hears a squeaking or grinding, it must be taken out of service. A man using a machine will use it hours after the time when it should have been stopped. We placed all air tools in an oil bath until the insurance agents objected to the large quantity of oil being kept in the building, and we now find the individual [illegible]. We experienced some difficulty after the shop had been closed down for a few days with the throttle clogging owing to dampness. We used mineral lard which amalgamates well with the moist air. It is cheap, and we use it generously and have very little trouble.

Mr. McKernan:—When a hammer is brought in throw it in a tank of coal oil. When you check it out, blow it out and oil thoroughly, and I do not think you will have very much trouble. When a hammer is kept out any length of time the man who takes it out is held responsible for oiling it. If the hammer comes back in bad shape he cannot get his check until there is a satisfactory explanation, and that has to be O. K.'d by the general foreman in addition to his own foreman.

Mr. Meitz:—In our shop all tools are supposed to be turned in every night. The hammers go in a bath and lie there until five minutes before work time. No tool goes out without an oiling. When they come out of the bath we hang them up to drip, and they are oiled with valve oil and signal oil mixed. Valve oil alone is a little too heavy.

William Thomason (Pennsylvania, Renova, Pa.):—We have little or no trouble as far as the use and abuse of hammers is concerned. If a hammer is neglected we find out very quickly who is responsible. When a man checks a hammer out the boy knows what hammer he gets.

Mr. Fuhrman:—I believe the foreman who has charge of the men using the tools is the man who should be responsible for their proper use. He is the best judge. Sometimes he is not in favor of saving the tools; he wants the work and may abuse the tools worse than any man. There is a limit to everything, and every foreman ought to know what will bring the best results for his company. It does not pay to spend a day making a tool and have somebody spoil it in a half hour, even though you get the work out.

Mr. Lugger:—We should not confuse severe use with abuse. A machine designed for any kind of work should be used to its full capacity all the time; we should try only to eliminate the abuse of the tool. I do not believe in nursing a tool.

Mr. Fuhrman:—A tool should be used for the purpose for which it is intended. A carbon steel tool should not be used as a high speed steel tool. If we do not care what kind of a tool we have and always use it at high speed we have trouble. It is the same way with small machinery. The men ought to know when a tool needs to be sharpened. When a reamer is used a certain length of time, it should be sharpened. Sometimes a tool is used until it breaks off, when if it had been brought in in time it could have been repaired.

Mr. Pike:—When we purchase a motor we attach a brass plate to a prominent part before it goes into service. On the plate is the name of the shop, number and size of work for which the tool should be used, i. e., "Machine shop, No. 20, ¾ in. to 1¼ in. drill; 1 in. to 1⅛ in. tap." If the motor is not doing that work, we know it is the fault of the motor; it is not liable to be used on a larger tap or drill.

Mr. Martin:—We send in a breakage report which goes to the superintendent and he sends it to each foreman of the shop with a list of names and what they did in the way of breaking or damaging tools.

FLUE SHEET CUTTERS.

Mr. Pike:—The cutters for our flue sheet cutting tool cost us for labor only about one cent apiece. When they are laid out they are simply a flat piece of steel with a half circular hole punched on one side. We drill a hole in six seconds.

Mr. Otto:—We had considerable trouble getting a flue sheet cutter that would cut as fast as we thought it ought to. We use a spiral cutter with a pilot. We make them ourselves, and they give better satisfaction than anything we have had and will stand more abuse without breaking.

Mr. Thomason:—We are using a sort of twist drill with a

removable soft steel shank and a pilot. We punch an inch hole into which the pilot just fits.

Mr. Sterner:—We punch a 1⅜-in. hole and use a high speed twist drill, drilling about 85 holes an hour.

C. W. Irving (G. C. & S. F., Cleburne, Tex.):—We have a cutter with a ¾-in. pilot.

Mr. Martin:—We have a cat head tool with two small cutters.

Mr. Lugger:—We have always used a cat head cutter. It has a guide made of an old tap and a drill on the end, so that it can drill its own lead hole and then cut the flue hole. We have always been able to do the work in from 30 to 35 seconds per hole.

Mr. Meitz:—That is the cutter we use, except that we punch the flue sheets and use a rose reamer. We make 255 holes in about 3 hours and 55 minutes.

Mr. Martin:—With the two-cutter tool the strain is equal on each side of the pilot. If you have a three-wing cutter it is a hard matter to get all three of the cutters cutting even. I have tried them both and have done away with the three-wing cutter.

Mr. Meitz:—I agree with that for the heavier jobs. The three-cutter tool is the best for flue sheets because of lost motion on the head of the radial drill. When you grind the cutter straight on the bottom, you have all three cutting edges alike and there is no vibration in it.

Mr. Lugger:—It is almost a necessity to have three cutters for accuracy, but for speed two will do better.

Mr. Sterner:—When you go home put a high speed twist drill in your drill press and speed it up, and you will find that you will drill two holes to the one you are doing now. No cutter ever made can compete with it.

Mr. Fuhrman:—We punch an 11-16 in. hole. The layer-out is careful to get his centers all in line. We have a small rose bit reamer under the pilot. If one lip of the cutter cuts a little harder than the other it does not make any difference; you get a true hole and get it right where you want it. With the twist drill a little strain one way or the other will make a difference. I prefer a tool that has a pilot with a close fit.

C. A. Cook (C. I. & L., Lafayette, Ind.):—I am up against the proposition of cutting flue holes 5½ in. in diameter. What style cutter is used for that?

Mr. Martin:—We block up under the sheet and use a two wing cutter, and do not have any trouble.

Mr. Hendrickson:—I have a four-cutter tool, the cutters being adjustable. Two of the cutters are ground to cut on the outside and two to cut on the inside. In the center of the cutter is a twist drill, No. 3 shank. We drill the hole and the drill forms the pilot. The cutter is easy to repair, and nothing can break but a little piece of steel.

Mr. Pike:—We make one of our cutters with a round nose and the other square, the round one in advance.

Mr. McKernan:—Up to five years ago we made a cutter with a pilot in the center and two blades inserted parallel to the shank, but we found by taking a piece of high speed steel 2 in. long and milling it similar to a twist drill, putting a pilot 3-16 in. diameter on the end, that we were able to drill through a ½-in. sheet in 20 seconds.

MAKING OF DRILLS.

George F. Linck (Houston & Texas Central) presented a short paper on the making of drills, from which the following is taken. "We have stopped making twist drills with the exception of those for special jobs, but we are making a good many straight, flat shank drills of high speed steel. For example, take a 1 1-16 in. drill made from ¾ in. round bar 8 in. long over all, allowing 3½ in. for the shank. This piece of steel is flattened out to about ⅜ in. thickness at the shank end, tapering down to about ¼ in. thick at the point. The tool dresser can easily forge one of these in a very few minutes, the steel weighing about ¾ lb. The whole cost is less than 75 cents, as compared with about four times that amount for factory made drills, according to catalog prices. We have tested these drills by drilling through 3 in. soft steel in 1 minute 29 seconds—240 revolutions per minute—leaving the hole in good condition for any ordinary purpose. We have cut the time of drilling flue sheets from four days, to only nine hours, by using a combination flat drill of high speed steel with a 13-16 in. rose bit reamer on the end. This drill has been in use for over three years, and is in very good condition yet."

DISCUSSION.

Mr. Martin:—We make our own flat twist drills. The labor cost on the drill—¾ in. to about 1¼ in.—will be only about 52 or 53 cents. We have obtained excellent results from it.

Mr. McKernan:—Up to a short time ago we made a flat drill, but I do not think it is accurate enough for ordinary work.

BOILER TAPS.

The standardization of threads for boiler work and the merits of the V-thread, Whitworth and United States standards were discussed at length. Most of the roads have adopted 12 threads to the inch, 1-16 in. taper to the inch, or ¾ in. to the foot. The members generally favored the Whitworth thread for boiler work. The taps last longer and staybolt breakage is less with the Whitworth than with the V-thread.

TEMPLATES.

F. W. Lugger (Big Four, Delaware, Ohio) emphasized the necessity of promptly providing templates for repairs to new classes or types of locomotives. He presented a drawing of a template for laying off the cylinder saddle (Fig. 16) to fit the arch of the boiler.

It can also be used to advantage where the application of one or a pair of cylinders is required without changing the position of the frames at the rear part of the boiler. The base of the

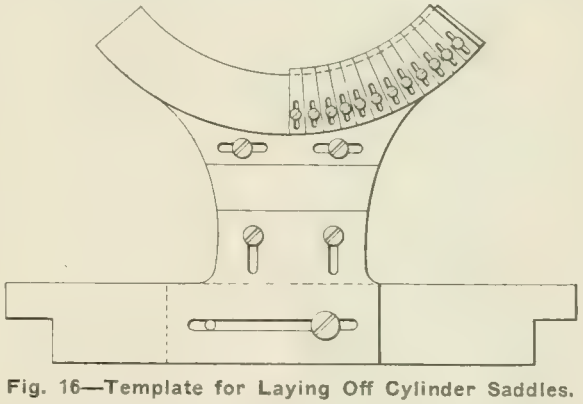


Fig. 16—Template for Laying Off Cylinder Saddles.

template being adjustable, allows it to be set on the frames where the cylinder must rest. The body of the template has room for adjustment to the height of the saddle, and the different lips can be adjusted to the exact shape of the boiler arch. The lips necessarily have to have sufficient range of adjustment to apply to the smallest, as well as the largest boiler; in case of the larger arch, a small gap will be found between the lips, but that can easily be taken care of. The arch piece must have lateral adjustment, in order that it may always be placed in the center of the template.

DISCUSSION.

Mr. Martin:—An accurate drawing and an accurate method of laying out work is in some cases better than a template, especially if it is constructed of some flexible material that is not very reliable. I recommend its nearest kin—the jig—wherever it can be used. For large work where a jig cannot be used the template is the next best thing.

Mr. Meitz:—We have jigs for every style and class of engine cylinder head, all eccentric work, valve rings, etc. We use steel bushings for drilling in all our jigs.

Mr. Martin:—We are standardizing as much as possible. At present we have two standard eccentric blocks and are standardizing our cylinder heads. It is a paying investment. No rule can be applied for the construction of jigs because each one is a problem in itself. The first thing to consider is accuracy; the next convenience of handling.

Mr. Otto:—We make standard jigs at Topeka and send them over the whole system.

MAKING DIES FOR FORGING MACHINES.

In a paper on this subject J. Martin of the Big Four, Beech Grove, Ind., said: Each forging machine die is a problem in

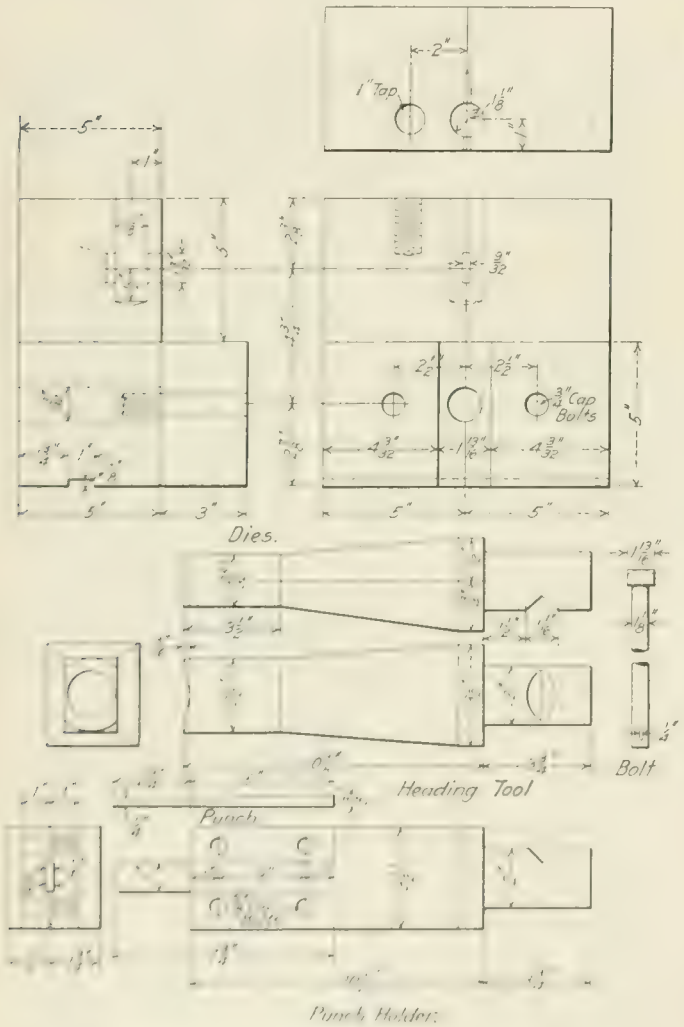


Fig. 17—Dies for Heading and Punching Slot in Bolt.

kind; this, in my opinion, is a great mistake, and the cause of delays and extra expense. The workman does not understand just what is wanted and the job becomes a cut-and-dry one which is very expensive. Each tool foreman, having the forging machine dies to handle, should make a strong plea to the management to have set aside a sufficient number of machine tools to take care of the die work and also insist on being furnished with drawings, so that the dies can be finished to a design which has been previously worked out and determined as the most successful one.

A general outline of straight upsetting, which was furnished by The Ajax Manufacturing Company, is as follows: In order to determine how many operations are required to form an upset forging, a general rule may be given as follows: The die grip should be made about 5 in., or 5½ in. long, and where this amount cannot be allowed the back stop against which the forging is thrust should be taken into account. The amount of stock in the upset should be figured in inches of stock of the original bar, and this amount of metal is usually termed so many inches of working stock. Thus, taking the size of the bar of stock as a unit, a general rule for the amount of stock gathered in a single operation is three times the diameter of the stock; that is, if you are working 1 in. round you can gather 3 in. of 1 in. stock. However, sometimes it is possible to gather 3½ in., or even 4 in. without causing a buckle or cold shut in the upset. If the amount of stock to be gathered is in excess of three times the diameter, it requires two or even sometimes three separate upsetting operations to finally form the finished upset shape, the several operations being necessary in order to avoid buckling or cold shutting. For instance, if 8 in. of 1 in. round stock or 6.28 cu. in. (obtained by multiplying the area of the 1 in. bar by 8 in. length) is to be upset to form a 2½ in. diameter disc head, which will be about 1¼ in. thick, it will require two upsetting operations. The first operation, which should be made in an upper groove, would gather or shorten the stock 3 in., or possibly 3½ in. to the diameter of approximately 1⅜ in. An important point in the design of the heading tool for such an upset is to cup the tool about ⅛ in. deep, the diameter of the cup being a little in excess of the diameter of the stock so that when the tool strikes the end of the stock it will hold itself central and not glance off. This will reduce the tendency to buckle the stock. Thus, after forming the first upset the stock is made considerably shorter, and consequently stiffer, and there is also the added value to the grip due to the first upset, which will hold the stock more firmly in the die. In the second operation a greater shortening can be affected than in the first operation. The first upsetting groove should be made a little larger in diameter at the heel, or where the upset groove connects to the gripping groove.

One of the most useful practices with forging machines is the punching of slots in pins, such as the king or center pins and brake rigging pins. The dies are made to grip the stock, and a punch enters through them and punches out a slot without disorting the shape of the bar. This is clearly shown in Fig. 17, which illustrates the dies, header and punch for heading and punching the 1⅛ in. bolt.

The forging machine is specially adapted for welding and upsetting jaws on bars or rods, which process or method is used when the jaw is excessively large as compared to the size of the rod or shank. This method of taking a flat bar, bending, punching or drifting a hole in it and then welding and upsetting the bar or shank into the jaw thus formed, is clearly shown by one of the drawings, Fig. 18.

The best material for forging machine dies is a special steel of about .40 to .60 carbon, .35 to .55 manganese, and not over .02 phosphorus and sulphur. Such steel can be had from many of the steel makers at an approximate price of 4½ cents per lb. The die blocks are usually ordered about ¼ in. larger than the finished size. If only a comparatively few forgings are to be made the die blocks may be of what is generally termed a steel

mixture, which is a good quality of grey iron with about 22 per cent. to 28 per cent. of steel cuttings poured into the ladle and stirred just before pouring the metal into the molds. This gives a very much tougher iron and is more serviceable for forging machine dies than ordinary grey iron castings; such castings can be obtained at approximately 2½ cents to 3 cents per lb., and have the further advantage of being available on comparatively short notice. The die block pattern can be quickly made and very often the foundry can pour the casting within 24 hours after it is ordered, whereas it sometimes requires from 1 to 3 weeks to get the forged steel blocks. Heading tools which have a tendency to wear rapidly should be made of a very high carbon steel. However, in general practice this precaution is not necessary. The heading tools should be rough forged and annealed.

After the die blocks are finished to size they should be taken

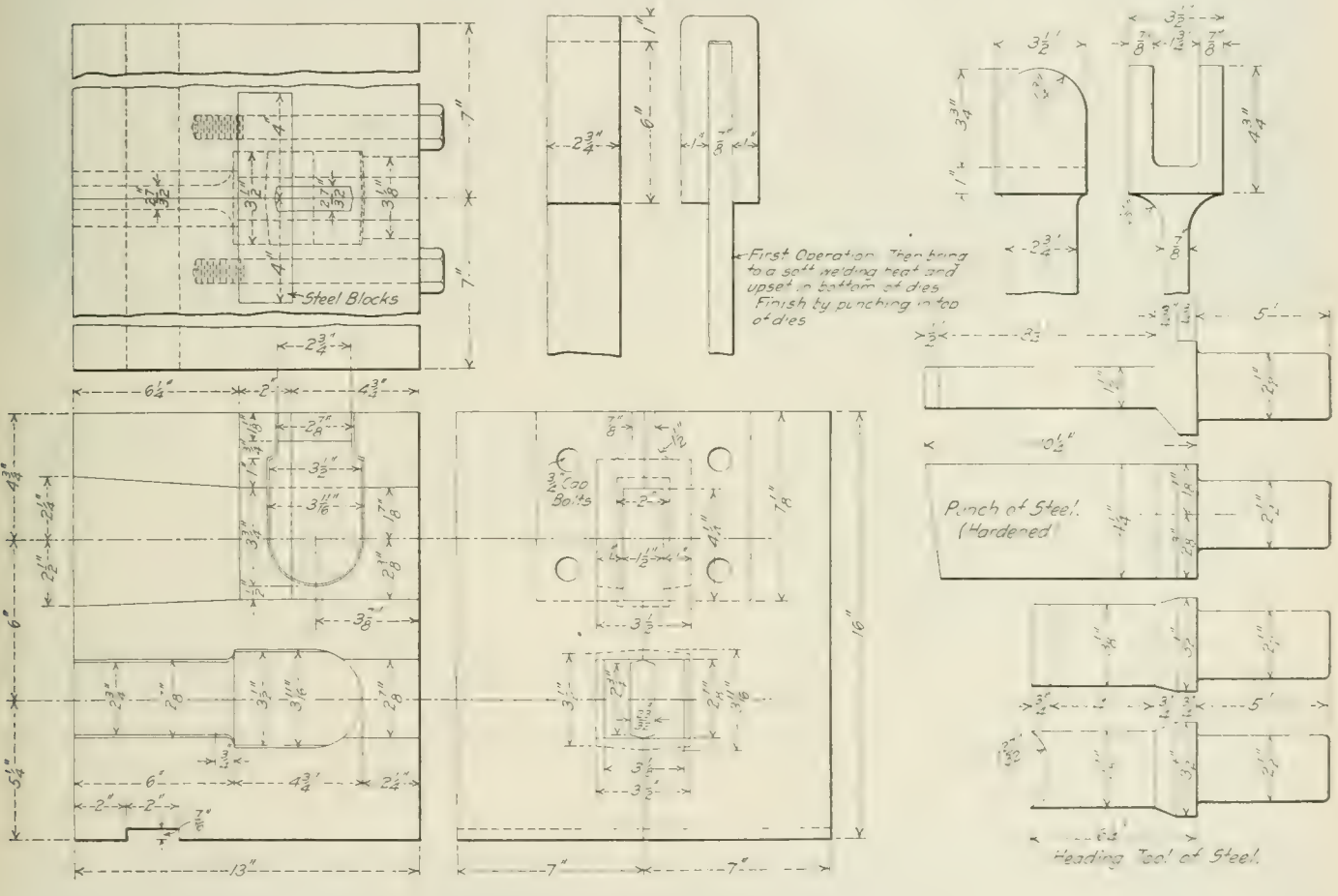

Steel Blocks
First Operation. Then bring to a soft welding heat and upset in bottom of dies. Finish by punching in top of dies
Punch of Steel. (Hardened
Heading Tool of Steel.

Fig. 18—Dies for Forming Jaws on End of Bar.

to a layout table and have the form laid out in accordance with the drawing. The round grooves in the dies can best be machined on a universal miller and a great many recesses into which the stock is to be upset can also be machined in a miller to a better advantage on any other machine tool. After the die blocks and heading tools are machined they should be hardened. Each die block should have a hole tapped in the top of the face so that an eye-bolt can be screwed into it, thus facilitating handling it in and out of the forging machine.

DISCUSSION.

Mr. Pike:—We have about the same practice, except that we use a cast steel block for the base of the die, and high carbon steel for the die itself.

Mr. Hendrikson:—Dies that we use a great deal we make of cast steel. For plungers we use an old driving axle. No matter what you put in a plunger, it is bound to crack on the face in the course of time. For small plungers we use tool steel. It breaks easily. Nickel steel is stronger, and will stand more than the common tool steel will.

President Bray:—We use old open hearth steel driving axles for forging our dies and caseharden them. We seldom have any trouble with these dies. For the plunger we use a high grade of steel. We tried cast iron, but had very little success; that is, with dies that had to be used a great deal.

Mr. Martin:—I do not believe that it pays to make cast iron dies, if it is necessary to put much labor on them. Cast iron dies for a few forgings that are not very complicated might pay.

Mr. Pike:—Frequently we perform a great deal of labor in making a pair of cast iron dies, and when they are finished discover a blowhole in a very unfortunate place. We decided that cast steel was the proper material to use. It is durable and can be repaired without any great cost. We have had trouble in making the grate shaker rest with a taper socket. After making about 100 the corners have rounded considerably. We are trying out dies of high speed steel. The first ones we made too light in the socket and held too rigidly, and they broke off; the second ones we made with good generous fillets in the corners, and they are standing up well.

Mr. Hendrikson:—I have used a low carbon steel and a common tool steel plunger; they have been in service a couple of years and seem to be all right.

Mr. Davis:—We tried high speed steel for the plunger, but it was not successful. Carbon steel has given better results than anything we have used. The Interstate Commerce Commission requires all brake staffs to be made without a weld. You have to upset 11 in. We tried a high speed steel ram and thought we could do it all at one stroke, but found it impossible, and are doing it now with two strokes. The high speed steel did not stand up. With one stroke the carbon steel did better than the

high speed steel. We use cast iron where we do not have many pieces to make.

Mr. Otto:—We use steel castings for lots of dies; also steel and axle steel. The rams we make of carbon steel.

Mr. Purchase:—We make all our dies of axle steel.

Mr. Fuhrman:—How about tempering the dies?

President Bray:—We use axle steel and case harden.

Mr. Pike:—We do not temper them. I have tempered them, but it is very plain that the white hot metal remains in the die long enough to destroy the fine points, and we are liable to lose the die. We think it is more profitable not to temper them, and when they are dull to sharpen them. I do not think it best to temper the ordinary die.

Mr. Martin:—I do not think that it is practicable to temper some dies. It is not necessary to temper the die block all the way through; the face is all you want hard. Whenever it is possible I think the die block should be tempered, as it prolongs the life of the die.

Water Level Indicator at Zero Grade.

OTHER BUSINESS.

The secretary was instructed to invite the General Foremen's Association, Master Blacksmith's Association, Master Boiler Makers' Association, Master Mechanics' Association and Master Car Builders' Association to have representatives attend the meeting next year. It will be in Chicago, opening the second [illegible] in June.

The exhibitors were given a vote of thanks for their efforts to make the convention a success. A list of the exhibitors and a description of the exhibits will be found in the *Railway Age Gazette* of July 14, page 90.

The following officers were elected: President, E. J. McKernan, Atchison, Topeka & Santa Fe, Topeka, Kan.; first vice-president, J. Martin, Big Four, Indianapolis, Ind.; second vice-president, G. W. Jack, Illinois Central, Burnside shops, Chicago; third vice-president, A. R. Davis, Central of Georgia, Macon, Ga.; secretary-treasurer, M. H. Bray, New York, New Haven & Hartford, New Haven, Conn.; chairman executive committee, August Meitz, Pere Marquette, Grand Rapids, Mich. O. A. Dollman, Pennsylvania Railroad, Chicago, and E. R. Purchase, Boston & Albany, Springfield, Mass., were also appointed members of the executive committee.

MODEL FOR INDICATING WATER LEVEL IN LOCOMOTIVE BOILERS.

A device showing the distribution of water in a locomotive boiler while on different grades is used by the Atchison, Topeka & Santa Fe for the instruction of its enginemen and firemen. It consists of a frame, to which a blue print of any boiler may be attached. The frame is pivoted at its center of gravity, which allows the model to be swung at any vertical angle. An indicator is connected to the frame, through a system of levers and shows, on a suitable index, the corresponding grade to

Water Level Indicator Set for a 3½-Per-Cent Ascending Grade.

which the boiler center line conforms. A string is stretched across the boiler drawing, so arranged as to be parallel to the center line of the boiler when the indicator reads zero. This string may be raised or lowered to any desired height showing the different water levels in the boiler.

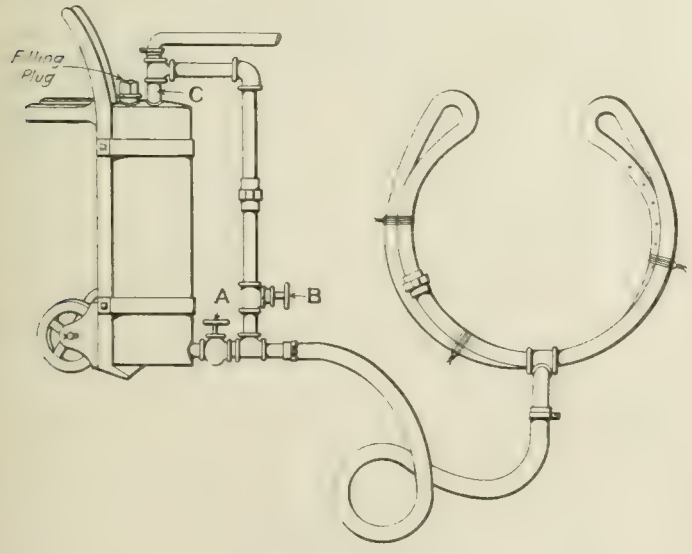
With this arrangement the engineer may set his boiler to the maximum grade he runs over on his division, and by raising or lowering the string can determine the minimum amount of water allowable, as shown by the glass or gage cocks, when passing over this grade, and in this way can assure himself that his crown sheet is completely covered at all times. The device has proved successful, and the engineers have considered it carefully, often times remarking that they would thereafter carry more water in the boiler when passing over certain points in the road. It has proved of great advantage in the mountainous districts where the grades sometimes run as high as 3 to 3½ per cent. The accompanying illustrations show this model with boiler in the level position and on an ascending grade of 3½ per cent. The model was originated by W. F. Buck, superintendent of motive power of the Santa Fe, and will be on exhibition at the next Traveling Engineers' convention in Chicago.

TIRE HEATER.

BY W. W. REEVES.

Machinist, Illinois Central, Pyramid Shops, Carbondale, Ill.

The principal features to be considered in the construction of a tire heater are simplicity and cost, and the accompanying illustration shows one which may be easily made in any locomotive shop. The absence of reducing valves, check valves, perforated mixers and other special devices will be noticed. These fixtures only tend to complicate matters and present just so many more chances for leakages, disorders and the like. This tire heater consists of a double ring of 2½-in. pipe, arranged side by side, bent to the desired diameter and bound by wire to prevent them working apart and breaking. Loops are used



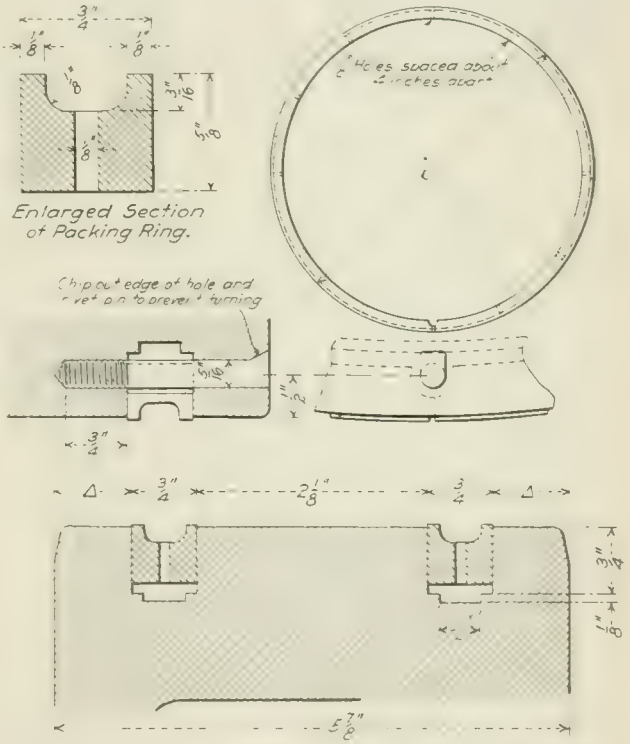
Portable Tire Heater.

at the ends, which limit the joints in the ring to a union, with an asbestos gasket and a tee connection to the supply tank. Holes 1/16 in. in diameter are drilled in the inside pipe only, and at intervals of 3 in. to within one-third of the top of the ring. The outside ring is used to heat the gas, which aids its combustion as it leaves the holes on the inner ring. The holes in the top third of the ring are omitted to prevent overheating the adjacent parts of the locomotive, the heat from the lower flame jets being sufficient to heat the whole tire. With this arrangement no jackets are necessary except to protect the paint on the cab. All scale and dirt should be removed from the pipe before using, and all the holes should be left open and free.

The oil tank shown is made from an auxiliary reservoir of about 10 or 15 gal. capacity, and is fastened to a truck to provide a means of easy transportation. It is set in an upright position while being used. The air enters the top head at *C*, and also passes around from the tee to the air valve *B*, controlling the air supply to the feed pipe, which is located at the bottom of the tank just far enough above the bottom head to eliminate the chance of drawing any sediment into the heater ring. By regulating the air and feed valves the desired mixture may be obtained. The oil should be regulated through a needle valve as a more even distribution may be attained. Care should be taken that a correct mixture of oil and air is obtained, as considerable waste of oil may be eliminated and a hotter flame maintained. The heaviest tire should be removed in 20 minutes with this apparatus, and thin tires in 10 to 15 minutes. This device has been in successful use on the Illinois Central.

CYLINDER PACKING RING.

The cylinder packing ring shown in the accompanying illustration is used on the Baltimore & Ohio, and is a modification of the Leighton cylinder packing ring, as used by the Illinois Central, and described in the *Railway Age Gazette* of May 5,



Cylinder Packing Ring Used by the Baltimore & Ohio.

page 1057. The difference between the two is in the width of groove and the arrangement of the holes. As used by the Illinois Central two sets of holes are drilled, one through the ring and the other at right angles to the bottom of the groove through the side. This arrangement was first used by the Baltimore & Ohio, but the side holes were found to be unnecessary and the ring as shown herewith was adopted. This road also found that by the use of this ring, the number of cylinders requiring reboring on account of the high pressure under the ring was greatly reduced.

Sanction has been accorded to the construction of a branch line to serve certain coal properties lying between the Barachuck branch of the East Indian Railway and the Sanctoria branch of the Bengal-Nagpur Railway in the Sanctoria coal fields.

GENERAL FOREMEN'S ASSOCIATION

The seventh annual convention of the International Railway General Foremen's Association met at the New Sherman Hotel, Chicago, July 25, 1911. C. H. Voges, Big Four, Bellefontaine, Ohio, presided. After a prayer and the singing of America, Edward T. Wade, assistant corporation counsel for Chicago, welcomed the convention to the city in behalf of Mayor Carter H. Harrison, who had left the city for a much needed rest after two rather severe campaigns. T. H. Ogden, of the Santa Fe responded, thanking Mr. Wade. The report of L. H. Bryan, the secretary, showed a membership of 215 and a splendid balance in the treasury. President Voges made an address in which he emphasized the necessity of every member being a live wire. The convention held two sessions for each of the three days it was in session. As may be seen the entire time of the convention was taken up in discussing various phases of the shop efficiency problem. In addition to the reports three addresses were given as follows: Tuesday afternoon J. F. De Voy, Wednesday afternoon H. T. Bentley, and Thursday afternoon Dr. Angus Sinclair.

MR. DE VOY'S ADDRESS.

James F. De Voy, assistant superintendent motive power of the Chicago, Milwaukee & St. Paul, addressed the association at the Tuesday afternoon session. He congratulated it on the splendid increase in membership since the last meeting he had attended, and emphasized the necessity of thoroughly investigating various methods of shop practice and recommending standard practices.

MR. BENTLEY'S ADDRESS.

H. T. Bentley, assistant superintendent motive power of the Chicago North Western, and president of the Master Mechanics' Association, addressed the convention on Wednesday afternoon. He said among other things: I do not believe the majority of our general officers appreciate the work that the general foremen are doing. Having been in that position and having had some of the best general foremen in the country under me, I can truthfully go on record as stating that a first class general foreman is one of the greatest helps a superintendent of motive power or his assistant can have. What are the duties of a general foreman? That is easy. He has got to do everything. The emergencies that frequently come on a big railway make it necessary for a general foreman to do a little bit of everything. He has to be a very active man.

I notice a good many of the supply fraternity among the audience. In the olden times a supply man was considered to be—well, they put up with him and that was about all. He was considered a necessary evil, and when he came around to spread the glad tidings of a new tool or something of that sort, sometimes they would speak to him, but often I have known [illegible] to do so. To-day the supply men are doing wonders. The general foreman and every mechanical officer ought to be very grateful to them. I generally try to give the supply man a [illegible] know what he has got and say his piece. This country is pretty large and we are pretty small. As general foremen we cannot get over the country as we should do, and we [illegible] here, there and everywhere. It frequently happens that one will come into my office and say: "I am going to install [illegible] Do you know anything about it?" If I do not I usually get right after [illegible] I suppose some one is [illegible] or a drill [illegible] You know me, to the extent I said [illegible] I am going to the convention and [illegible] and get full information. He will often find a good [illegible] will make the machine [illegible] If he knows of such a machine [illegible] he is not selling it, he will put you next to the man who is selling it. He wants everybody to know the good things that are going around, and we owe a debt of gratitude to him for the information that he furnishes us, and the way in which he takes up any suggestions that we make for the betterment of the tool he is selling. The exhibit that I have just had an opportunity of looking over makes me realize the importance of a gathering of this sort. I presume there are a lot of men in this association who never had an opportunity of seeing so many exhibits under one roof. It would take them several weeks, and they would have to go to several places to see the things that are so generously exhibited here.

There is another class of people to whom we owe a debt of gratitude, and that is the men who represent the railway mechanical papers. I hope that all of you general foremen, if you intend being anything more than general foremen, are subscribers to mechanical papers. If not, you ought to be. I have a number of mechanical papers coming to my house every month, and I get some of the most valuable information from these papers that is possible to imagine. You get information from all over the world. With the supply men you get it locally, or from the United States, but with the mechanical papers, if you get the right kind, you get it from all over the world, and you get acquainted with what others are doing.

Some people say that we are not getting the results that we ought to, and I do not believe we are. But if we analyze the things that the mechanical department is doing, we find it is about keeping up with the pace. A few years ago we had 17 in. engines to repair in the shops; the men would get the blocking, jacks and bars, and would finally get the engines up and the wheels out. The engines gradually got bigger and heavier, and it necessitated heavier jacks, heavier lifting mechanism and heavier tools to do the work. Today the tremendously large locomotives are repaired just as quickly, or more quickly, than the 17 in. engines were 30 years ago, because everybody has kept pace with what is going on.

I want to talk to you particularly about getting results. What are general foremen for? What are master mechanics for? What are roundhouse foremen for? What are assistant superintendents of motive power for? They are here to get results as a business proposition. The companies pay the men a certain compensation for doing certain things. Are we earning the money that is paid us? Are we getting the results that we ought to get? I believe that by your attendance at this meeting you are doing more to earn your salary, than you would by sitting in your shop for six months. We do too much staying in our own shops. To get the best results you have got to see what the other fellow is doing once in a while. Unfortunately, in my position I have not been a very good traveler to see what the other fellow is doing, but I have instructed our general foreman and his assistants that they must go out once a month to see what the others are doing. To illustrate the importance of this, we were working on a little proposition, but were going about it left handed. It was suggested that our foreman boiler maker find out how it was being done somewhere else; we found another shop had us skinned a mile. Other people come to our shop and probably get pointers about short cuts. There is no question but that some of you gentlemen who are members of this organization are up against a hard proposition that some other fellow has overcome. It saves a lot of trouble, time and expense if you can get that information from the other fellow, not forgetting that when an opportunity presents itself you must do as much for him. We cannot afford to be selfish in this business.

How can a shop foreman best promote efficiency. As I read it, that is just exactly the same as getting results. That is what we are after. The man who never take a mechanical paper

and who sit in your own shop and think you have the best of everything are back numbers. You have got to read; you have got to exchange ideas; you have got to see what the other fellow is doing. My advice to a man who wants to succeed is, work hard and work constantly. It is no use working hard and doing nothing. I know lots of people who do that, but you want to work hard and get results; read all the books and papers that treat on the subject you are interested in, and in case you want a little recreation, take a visit to one of the other shops and see what they are doing, and attend gatherings such as we have today.

R. V. Wright:—In behalf of our association, Mr. Bentley, I want to thank you for the inspiration and advice that we have received from your talk. We are sorry that mere words cannot translate the appreciation and the spirit of the applause which has just greeted you. There are two reasons why we are glad to have you with us this afternoon: In the first place we have been discussing the subject of shop efficiency since yesterday morning. One of the important points which has been brought out is the necessity of having a man with a strong personality and magnetism at the head of our shops and departments. One reason that we are glad to see you is that we realize that from the time you started in as a machinist at the Chicago shops until the present, when you hold a most important position in the mechanical department of your road and have been honored by your fellows in being elected as the head of the American Railway Master Mechanics' Association, a great deal of your success has been due to your strong personality and magnetism. We wanted to get you up here so that we could if possible get some idea of what that personality and magnetism is.

There is another reason why we are glad to have you with us. During the last few years the Master Mechanics' and the Master Car Builders' associations have found very little time to consider subjects pertaining to shop management, shop organization, shop efficiency and shop methods. They have given time to the consideration of the construction and arrangement of shops and things of that sort, but they have not gotten down to the heart of shop organization and management, and possibly never will, for they have larger problems to contend with. They have Uncle Sam to think of, safety appliances and boiler inspection, and they have large problems in the management of the mechanical department as a whole. Our superiors hold us responsible for the efficiency and output of our shops, and it is up to the general foreman and the foremen of the various departments to bring that efficiency up. Inasmuch as the larger mechanical associations cannot find time to take up this work, it devolves upon associations such as ours to study, to discuss and to try to bring out those good things in organization, supervision and methods which will help to bring our shops to the very highest point of efficiency, and to make the output as large as possibile with the facilities that we have at hand. Inasmuch as this important work, which cannot well be handled by the more important associations, has devolved upon us, we feel that just as it is necessary to have co-operation between all the departments of a railway shop to get the best results, so these various organizations ought to co-operate more closely. Speaking to you as president of the Master Mechanics' Association, I think members of the association would like to have you consider this problem, talk it over with the executive committee of your association and see if it is not possible for us to assist your organization by handling some of these specific problems and by making reports to them of our findings, thereby getting closer together.

Mr. Bentley:—I will be very glad to bring up the question of asking the General Foremen's Association and kindred associations to dig up some of the details that the Master Mechanics' Association does not have time to dig up. I believe that the General Foremen's Association will do the work well, and it will certainly relieve our association of a lot of detail work that we are not competent to take care of.

DR. SINCLAIR'S ADDRESS.

Dr. Sinclair commented on the growth of the association, and especially dwelt on the difficulties encountered during its early history, at which time he had been able to be of considerable assistance to it. He also spoke on the history of the development of machine tools and shop kinks.

HOW CAN SHOP FOREMEN BEST PROMOTE EFFICIENCY?

F. C. Pickard, master mechanic of the Cincinnati, Hamilton & Dayton, prepared a paper on this subject, which is certainly unique, as compared with reports ordinarily presented before railway mechanical associations. By study and correspondence with the members of the association he arranged 44 questions under four heads—organization, accounting and supervision, handling of material, and shop kinks and methods. The questions were intended to cover all of the important duties which come under the supervision of the general foreman and which effect the efficiency of the shop. In introducing the subject Mr. Pickard said that the average general foreman was the best efficiency engineer that could be found. The report had been sent to the members with the request that they come prepared to discuss such parts as they were specially interested in.

The program called for four committee reports, but two of the chairmen fell down on their jobs. The report of the shop kinks committee dovetailed with Mr. Pickard's report on promoting efficiency, so that practically the entire time of the convention was given over to this subject. In our report the discussion has been carefully arranged under the various heads. Each section is preceded by the questions asked in the report, and then each one on which there was any discussion is considered separately. The limited amount of time of course prevented a thorough discussion of all the topics, indeed some of them were not considered at all.

ORGANIZATION.

What plan of organization do you find to be most effective?

Do you find that strong leadership, force of personality and a way of doing things will accomplish much?

That the test of an organization is to maintain efficiency during the absence of a unit?

Should mechanics be paid according to their merit, or should they all be compensated alike?

Is it not an incentive for mechanics who are working for a small compensation to endeavor to reach a higher rate of pay?

Who gains by the step rate of pay?

What method of organization have you in vogue in your shop? Is it effective?

What constitutes a good organization, and do you not find that the underlying principles of good leadership, team work and enthusiasm have a good effect?

What effect does it have upon the mechanics to take officers and foremen from the ranks?

What should be the relation of officers to subordinates?

Young men and responsibility: What is their ability in the direction of foremen and executives?

In opening the subject Mr. Pickard said: We cannot accomplish very much unless we have the organization arranged in complete detail to begin with. We would like to know the type of organization that you find most effective in your shop, not only in a general way, but for the various departments. I went into a shop the other day and saw a tinsmith putting in a front end. In another shop the boiler makers put them in at about 25 per cent. increased cost in labor. The fellow with the tin shop

proposition is getting more for his dollar. Under the present labor conditions, these are points well worth looking into by the general foremen.

What plan of organization do you find to be most effective?

William G. Reyer (N. C. & St. L.). Within the past year I took an extensive trip, visiting a large number of railway shops in this country and Canada. Before the trip we were handling eight or nine engines a month. After my return, I changed the plan of organization, and in the month of June we handled thirty engines, of which fifteen were overhauled. The rest were light and heavy repairs. We did not engage an extra machinist. The force was nominally the same as it was when we were handling the smaller number of engines. I bring this out to show the force of improved organization. The management allowed me to appoint an assistant foreman. The gang bosses have special duties and report to the assistant general foreman.

We have specialized our work to a great extent. Formerly a man would have guides to set today, tomorrow he would work shoes and wedges, the next day he would have valves to face, and the next steam pipes. We have stopped all that, and each man has his special work to perform. He is generally assisted by an apprentice and a handy man. We had fifteen pits. I closed three to make room for other work, and feel that we get better results than from the fifteen. Each man on the machines has a special class of work to do.

L. O. North (Ill. Cen.):—Our policy as nearly as I can explain it is a co-operative one with the men and the foremen. The general foreman of the locomotive department reports directly to the shop superintendent. The general foreman of the transportation department reports directly to the master mechanic. Under the supervision of the general foreman of the locomotive department is the machine side foreman and erecting foreman with seventeen gang foremen. The blacksmith shop has a foreman and two assistant foremen. The tin shop has a foreman and three assistant foremen. The boiler shop has a foreman and six assistant foremen. This works very satisfactorily, and there is no discord of any kind between any of the foremen or of the men employed. This is best illustrated by the action taken by the different foremen who assist each other in different ways. If one foreman notices something out of the ordinary that would be apt to cause a delay to the work of the other foreman, he takes it upon himself to consult with this foreman so as to assist him as much as possible, realizing that this is for the common good of all.

The transportation department, which controls the engine house, co-operates with the back shop, and if there is any work in the back shop which this organization is in need of, the general foreman consults with the back shop general foreman. By so doing we get very satisfactory results. The work performed by the engine house consists of light repairs and running repairs with a few general repairs in between. The special work on these engines, except for the actual erection, is done in the machine shop. This works very much more satisfactorily than it would to have each individual work on the engine in question and repair all of the special work, such as the steam chests, rocker boxes, links, cab work and other parts.

[illegible] wherever practical. We have a rule that when a specialist has been [illegible] with other work, it is granted to him. This will mean in time, as the men have been shifted from one position to another, that they will practically become experts on any part of the locomotive. [illegible] and who will give us the best possible results.

Another system which gives good results is a weekly sheet [illegible] in the general foreman's office by the general foreman, boiler [illegible] shows the pit number, engine number, date in shop, date boiler to machine shop in case of firebox work, date boiler ready for pressure, date wheels and boxes ready, date engine on wheels, dates valves set and engine on trial. By using a schedule of this kind we obtain satisfactory results in a great many ways. Each department thoroughly understands when its work on the locomotive must be ready for the erecting side. Formerly confusion resulted from the number of engines in the shop and the number of pieces at the different machines, the foremen not knowing which pieces to finish first. With this schedule these foremen know which piece to have ready first and there is no chance for an argument between the different departments as to who shall have the preference in the completion of the particular work, either in the bench gang or on the machine side.

We have twenty-five pits at the Burnside shops; one is used for stripping the engines for the boiler shop. We have four machinists and four helpers in the stripping gang, with one foreman in charge, who has additional duties assigned to him from time to time. This gang strips two engines complete for the boiler shop each week. They also handle odd jobs from time to time, as we find it necessary to use them on other pits to strip other engines than the ones assigned to the regular stripping pit. This is brought about by the pit men following the engine they have overhauled to the roundhouse to complete it, and also to do necessary work after the trial trip. As the pits are kept filled with locomotives, this would leave the pit practically unprotected. By using the stripping gang for this purpose the work is taken down and distributed much more promtply than could be done in any other manner. As the work is stripped it is placed in a pile at the rear end of the pit; it is then taken by a gang of laborers to the lye vat, and thoroughly cleansed and distributed to the different departments which handle each class of work.

T. H. Ogden (Santa Fe):—The best form of organization depends entirely on conditions. There are too many men who have not confidence in the foremen under them. They will go to a man doing a certain class of work and say, "Don't do it that way." Do not interfere with your foremen. If they are not competent, get others. I want a man competent to take my place if I should be gone for three or four days. Have confidence in your men and appreciate the work they do for you. There are too many of our foremen who do not appreciate the men's work. Let us try and measure out a little of the milk of human kindness. That is necessary in a shop. We cannot succeed without the men behind us.

F. C. Pickard:—The first thing to take into consideration is the local conditions and the environment. An organization is similar to a large gear wheel. The general foreman is the axis upon which it swings. If there is one irregular tooth in the gear the organization is not going to move smoothly. If there are two, it is a whole lot worse. If three are out and you do not have somebody to fill in, you are gone. You must have a man to bring in in the absence of the unit. As a general plan, dependent on the number of men employed, a good organization would be to have a general foreman who would have entire supervision over the shop. I do not believe one gang foreman should have over six pits. The machine foremen should be based upon the same methods of output. In turn each one of these men should have their forces so organized that in case they must be absent, right-hand men are available to take their places.

T. F. Griffin (Big Four):—Referring to the engine house. The boiler foreman should have charge of the boiler makers for the washing out, staybolt testing and hydrostatic tests required by the government. He should have a complete record, and if called upon by the claim agent should be able to give the exact state of any engine on a certain date. Have inspectors, both for engines and for air. Our engineers nowadays depend only on the inspector, and if we have a poor inspector

we will have failures, and a failure nowadays is a disgrace. To overcome the failures we should have good inspectors and have the machinists manifest enough interest to see any defects and report them. We should have good hostlers, who will get the engines in the engine house as soon as possible. After the engine is in the house, the inspector reports to the roundhouse foremen and they distribute the work to the men. Any failures after the engine leaves the shop and goes out on the road are referred to the inspctor..

T. H. Ogden:—We make the hostler or roundhouse clerk an assistant to the round house foreman. He takes care of the blackboard in marking up the engines and starts them going; the roundhouse foreman tells him when he can have an engine and when he cannot.

W. W. Scott (C. H. & D.):—The success of your work depends upon how you are organized. The general foremen must possess a knowledge of roundhouse work, the despatching of engines, and some knowledge in a general way of all classes of repairs, so that he can pass on work from time to time. The responsibility of the shop rests on the general foreman. If there is any criticism, he is the man who has got to stand it. In our shop we have a general foreman and sub-foremen over all departments. Harmony ought to prevail. When you have men who cannot get along with one another, it is time to make a change.

William Hall (C. & N. W.):—The form of shop organization usually depends upon the size of the shop. If the shop warrants it there should be a general foreman, who should have supervision over every other foreman on the ground. He should have under him the machine shop foreman and the erecting foremen; they in turn will have their assistants, such as gang bosses. The roundhouse foreman, if the house is large enough, will want an assistant in order to enable him to conduct his business properly. The great difficulty comes from lack of supervision.

W. W. Scott:—I believe in building up the shop organization from the men in the ranks. I find this to be very effective in keeping up the "hope eternal" for better things which burns in the breasts of most men. Successful organization is kept alive by the relation which should exist between officers and subordinates. Do not erect any insurmountable barrier between yourself as general foreman and your men. You can command respect and still be tolerant to the point of good nature if you try. I do not place much confidence in the general foreman who struts around wrapped in the mantle of assumed dignity, and is a passing joke with the men on the job. I like to know my men personally and make it a point to be interested in my men's personal welfare, and I want to say it is an honest interest.

I believe in frequent meetings of the staff officers with the master mechanic as presiding officer. Many little kinks are straightened out at these meetings and much good has resulted on our road from it. I heartily recommend a card system in the general foreman's office covering data on locomotive repairs; this data being furnished by the roundhouse foreman, road foreman of engines, or from any other source possible. This gives advance information on actual conditions.

I also recommend and use a system of keeping in touch with repair parts. A card is put in circulation when an engine arrives in the shop. Inspection is made by the erecting foreman, who fills in the repairs needed and the time when the parts are turned over to the machine foreman. The erecting foreman retains the original and the machine foreman is given copy of the report. When the several classes of repairs are made the foreman checks off from the list until the work is completed. You can readily see how a foreman can keep in touch with his work by consulting his repair sheet and the erecting foreman and checking up daily without walking all over the shop to note the progress of the work.

W. Smith (C. & N. W.): Some one has spoken of the lack of supervision in most organizations; that is a point that it would be well to bring out, especially in the large roundhouses. Where there are forty or fifty stalls the roundhouse foreman is often expected to look after all the work. He is so busy he cannot gain the most efficient results. Some master mechanics seem to be averse to increasing supervision; they think it is nonproductive. I think it is a mistake. The organizations in the roundhouses of the Lake Shore and Pennsylvania are ideal in this respect. They have a passenger foreman, freight foreman and boiler foreman—with the roundhouse foreman over all. The organization is ideal. Where the roundhouse foreman has everything to carry in his head he cannot give the most efficient results; he may overlook certain important work, with the result that engines go out and make failures. When the passenger foreman is in charge of such engines and is responsible for them, he can see that the work is properly done and can plan ahead.

J. A. Boyden (Erie):—In our engine house we have working leaders who report direct to the roundhouse foreman. We have a leader over the passenger department and one over the freight department; they report to the roundhouse foreman, and he to me. We also have engine despatchers; the roundhouse foreman has nothing to do with the despatching of engines. In the back shop we have an assistant to the general foreman, who handles all piece work. We have a system whereby each gang foreman, when he finishes his part of the work, sends a note to the general foreman's office, *i. e.*, "rocker box complete." It is thus easy to follow up all the separate parts of a locomotive.

W. C. Stears (C. H. & D.):—A general foreman should have an organization such that each foreman knows just exactly how far he should go and where the line is drawn between his department and the other departments. This facilitates the work in the shop considerably and eliminates work going out of the shop not up to standard, due to one man looking to another to take care of it.

J. Schlageter (Toledo Ter.):—We have only a little handful of business, but it includes everything. The foremen of the different departments attend weekly meetings in the general foreman's office and discuss various subjects. We find out a lot of things the general foreman would otherwise never find out. It is surprising how much good comes out in this way. The general foreman issues a shop list weekly, showing what should be accomplished by the following Saturday. It is typewritten and sent to each department head. Every man in the shop can see what is expected of him. You will be surprised to see how much it has accomplished. Diplomatic handling of men will certainly accomplish more than the headstrong man who wants every man to be his own way of thinking. He will never be a success. He cannot keep the men nowadays. Our master mechanic or myself can be gone a week, and when we return, are surprised at how much more has been accomplished than we thought could be done. A man must be gentle, but he must be firm. When he says, "yes," he must mean "yes."

U. T. Gale (C. & N. W.):—We have an organization of our foremen that meets once a week. Each one submits any shop propositions that he thinks worthy of consideration. We have a stenographer who takes notes of the proceedings, and a chairman, who, as a general rule, is the general foreman; he leads the meeting and directs the discussion on the various subjects. We find just where the weak points are as far as the work on hand is concerned. We come in touch with each other in that way and gain a closer understanding of the possibilities of what can be done. By these weekly meetings we perfect our organization in its details. We bring matters right before the various leaders of the different departments. They have a complete and proper understanding of the matter before it is passed along to the gang foremen, and then the gang foremen pass it along to the men. They have a regular programme or schedule arranged. This schedule is detailed among the individuals who are interested—I mean the workmen. We have leaders of the different groups of men and give to each one an understanding of the program for the coming week.

W. W. Scott:—Sometimes a foreman in his zeal to get out a certain class of work will criticize the tardiness of the other foremen. The pit foreman will have a criticism of the machine foreman for not getting out work; the machine foreman will put it on the blacksmith foreman, and the blacksmith foreman on the storekeeper, and so on down the line. If that condition is allowed to exist, you are going to get in bad. I find the best way is to make a systematic check on the work. When an engine arrives over the pit, we show on it the date in and the date at which it is to be out. The several foremen meet in consultation once a week, and the storekeeper is also called in. We find out what we have to do in the way of repairs and then prosecute the work.

Do you find that strong leadership, force of personality and a way of doing things will accomplish much?

W. W. Scott:—Men should be picked who will make strong leaders. They must be men of positive dispositions—men who will say, "I cannot do it"; not, "I hardly think it possible." The tendency of the present times among shop men appears to be a positive disinclination to assume responsibility. Working conditions in our railway shops have improved so rapidly that mechanics are well satisfied to stay at the work bench and leave the responsibility of carrying all the mechanical grief on the shoulders of the very small proportion of men who are inclined to advance in their several mechanical trades. This condition retards effective shop organization. Proper organization of your shop forces must be the key note of high efficiency in your shop methods. You may adopt any plan of organization you choose (your local conditions must govern in that respect), but whatever plan appeals to you most strongly you will find strong leadership absolutely essential at all times.

Mr. Pickard:—This question is a very broad one and is a great factor in shop efficiency. If a leader of any shop goes down through it with his hands in his pocket, the others are liable to do likewise; but if he sets a good example his men usuall follow it.

W. D. Bunker (Col. & Wyo.):—A drone cannot lead men. A man who will step to the front and be ready and willing at all times to help out is the man that is necessary. We find in the western country that those are the people who handle the work.

H. D. Kelley:—Take any shop and just as you find the foremen, so you will find the work. If you have a man who is a real leader, it will follow all the way down the line. A leader must go ahead of the man in the shop, whether it is getting up shop kinks or getting to the shop on time. I was recently in a shop where they were getting out 200 engines a month. The man at the head of the organization got down at 7 o'clock in the morning, and he was out through the shop. Every man who held an official position was a wideawake one. The tool department had an excellent lot of tools and a system for handling them. On the other hand, I was in a shop not quite as large, where the work was of a different type entirely. You could go through the shop and note a lack of neatness, tools lying around and the men standing around talking. There were no kinks, and what tools they had were inferior. The foreman had none of the [illegible] of the one described above. You may have the very best mechanics in the world, but without strong leadership, you are behind.

U. T. Gale:—While I believe that foremen should have a strong personality, there are various aspects that this personality should be manifested [illegible]. In the first place a man who [illegible] should be kind to the men who employ him, considering to the smallest detail their interests; then he should consider the men he has charge of. We should not lose sight of the fact that every man is a human being and entitled to consideration at all times. If things are not what they should be, [illegible] in the rule of [illegible] and [illegible]. On the other hand we should be kind to the men and make them feel that they are our equals as far as humanity is concerned.

L. O. North (Ill. Cen.):—I do not know of any one thing in the shop that has a tendency to bring out better results than encouragement, from the apprentices to the foremen. If they know that they are appreciated by the head of the organization, it has a tendency to inspire them in developing their ideas. We know that there are men who desire to hold back progress. They are to be found in any place. I think it may be easily overcome. When a man advances an idea, compliment him upon it and try it. It does not do any harm. It has a tendency to bring the foreman in closer touch with the men. The proper amount of encouragement at the proper time has as much to do with the successful management as any other feature.

That the test of an organization is to maintain efficiency during the absence of a unit?

F. C. Pickard:—I have seen organizations in which when a man stepped out, there was no one to take his place. That idea is all wrong. If I have a man to step into my place when I leave the office, so much the better for me, for the men and for the company.

William G. Reyer (N. C. & St. L.):—With the organization we have in our shop I can leave at any time and it goes on as well as if I were there, if not better.

F. C. Pickard:—The weekly meetings are a splendid means of educating your subordinates to step in and do your work while you are absent. You impart to your men at that time just what you desire to accomplish, and it trains the next men in line to see what you want. Take your assistants freely into your confidence. We have these meetings in order to do so. We have in each gang a man who can step in and take the place of the gang foreman during his absence.

Member:—The best way to find out whether the absence of a unit affects the organization is by the unit absenting himself. We know under the old school that there was a great deal of jealousy; in other words, the man above was afraid the man next to him was after his job. It is for the man above to enlighten and educate the man next to him, so that if it is necessary for him to absent himself, things will go along as well or better.

W. G. Reyer:—We have a general foreman and an assistant. The assistant is in position to drop into the general foreman's place in his absence, and the work moves on just the same. There is always a machinist that can take the gang foreman's place. At such times we pay this man at the gang foreman's rate. Any man that is put into another man's place is paid his rate. We find the practice beneficial and it gives an incentive to do better. We have weekly meetings. Before these meetings we had a great deal of friction. They have brought the men together.

Should mechanics be paid according to their merit or should they all be compensated alike?

T. F. Griffin:—The man who does the work gets paid for it under the piecework system. We have not touched the piecework rate for the last five years. We have the piecework rates printed and placed where the men can find the rate on any piece of work at any time.

Young men and responsibility. What do you find is their ability in the direction of foremen and executives?

J. A. Boyden:—We have a system that gives the young fellow a chance. We take a fourth year apprentice and give him a chance at all vacancies. It gives us an opportunity to find out what sort of an organization we have. We work all piece work. If you give your young boys a chance, something to work for, something to encourage them, you will meet with very good success. We endeavor to keep our eyes upon the apprentice boys. If they know that they are going to get a chance, they will produce the goods. We have five fourth year apprentice boys going as foremen in our shops.

ACCOUNTING AND SUPERVISION.

How do you arrive at the cost of locomotive repairs so as to know from day to day and week to week how much money is being expended on engines in the erecting shop?

Have you any system of arriving at the cost of each job?

Have you had any experience in the use of job numbers? If so, have the results obtained been satisfactory?

What system have you of acquiring advance information as to the repairs necessary to engines to be shopped at a future date?

What system of inspection have you for machine and erecting work? This applies particularly to steam pipes, nozzles, stand pipes and such other parts as are concealed when the engine is erected?

Have you any system of inspection of completed work in the erecting shop and roundhouse, both before and after the work is performed upon the locomotive?

What system of inspection do your axles, crank pins, piston rods, side and main rods, which are to be reapplied, pass through?

Do you have a limit of service governing the reapplication of these parts, as well as a limit of wear?

How do you arrive at the cost of locomotive repairs so as to know from day to day and week to week how much money is being expended on engines in the erecting shop?

F. C. Pickard:—We want to know what records the shop has for arriving at the cost of various operations and repairs, and of knowing from time to time what expenditures have been made upon locomotives.

L. O. North:—The general rule is to get the cost of repairs after the locomotive has been turned out. Then if the cost runs higher than it should for the amount of repairs, everybody gets combed with a fine tooth comb to see why it cost more than another engine. I believe some system should be devised whereby you would know every day the exact amount of labor and material expended on each engine.

J. W. Finch (C. R. I. & P.):—We have a clerk that checks the service cards over each day. Engines in the shop are each given a shop number. The machinist that works on the engine charges his time to the shop order number, and the clerk takes the time and compiles it. In that way we know just what each engine costs us from day to day. This piecework proposition I do not know much about, but I find that I am able to give the master mechanic an answer to any question that he asks me in regard to the cost of an engine. It gives us a chance to know where we are spending our money. If we are spending more money in the machine shop and are a little short in the boiler shop, we can increase the boiler shop and vice versa. We have our foremen's meetings once a week and talk the situation over. Every morning at 8 o'clock the foreman knows just what he has spent the day before.

Have you had any experience in the use of job numbers? If so, have the results obtained been satisfactory?

F. C. Pickard:—This question was suggested through the minutes of a railway club. A certain general foreman inaugurated such a system. It seemed to be a compromise between piece-work, time and bonus, and was a matter of getting a check on the individual of the time consumed in doing a job. Every operation on the locomotive was enumerated. When the man did the work he placed upon his daily time slip the time he took. They had an elaborate system of checking these slips and in that way made comparisons. While they worked on a day rate it gave a very good check on the cost per piece or operation. It has been stated that the unions object to piece work. Probably this proposition would appeal to them.

L. H. Bryan:—In our shops everything that comes in for any kind of repairs is done on a shop order. There is no complication at all in regard to men charging their time to the wrong shop order, as we assign two machinists and their helpers or apprentices to an engine. They do all the work, and if they happen to be changed are very careful, as they know we have a system showing the cost of each engine. The foreman of the machine shop checks the slips over each day as they are turned in. If there are any mistakes he corrects them before the time keeper gets them. We started doing that several months ago. It is working out to better advantage than when we charged work to the engine number. We also charge tank work or anything like that to a shop order number, because our tanks may get changed about from one engine to another. It would hardly be fair to charge the work on a tender to the engine that it was on, if it was only out for one trip.

F. C. Pickard:—I believe we could have a system, such as we have on the locomotive individual performance sheet, by which the mechanics or operators of the shop may be checked. Each individual operation that is performed upon an engine in classified repairs would have its respective number, and the work when accomplished by the workman could be charged to that number. A comparison could then be made as to the time it took different men to hang a set of guides. This performance sheet could be posted in the shop or be put in the hands of the foreman who has charge of the work, so that he would know just what each individual was accomplishing. The system appealed to me because of the opposition to the bonus and piecework systems.

J. A. Boyden:—We have our piecework checkers. They have a schedule, giving the number of every operation. It does not make any difference to us whether a man is ten hours or two hours in hanging a set of guides, but we do keep a record of the actual time every man expends on a particular job.

F. C. Pickard:—I would like to know how many of our members represent piecework shops. Will they please stand up? (Three members stood up.)

What system have you of acquiring advance information as to the repairs necessary to engines to be shopped at a future date?

W. W. Scott:—From time to time while an engine is in service a record is taken of its condition. We have in the general foreman's office a card index system showing the condition of all locomotives; if anything has occurred to an engine in the way of necessary repairs that can be put off until the next shopping, it is noted on the index card. If at any time it becomes necessary for the engine to go over the drop pit for work, the card is examined by the general foreman and the work is done, if it can be, without shopping the engine for classified repairs. We find the system very effective because we know in advance the nature of the repairs to be made, and if there is any material necessary we have it ready. If we have an engine with a defective driving box, but not broken so badly that it cannot be kept in service for a month or two, it is reported on the card. The cost of repairs is reduced because we do not have to wait until an engine is on the pit to see what material is necessary for repairs.

HANDLING OF MATERIAL.

Have you a system of advising the store department of material required for engines to be shopped, 30, 60 or 90 days in advance?

In what manner do you handle the manufacture of new material?

Have you a system of shop orders? If so, how do you handle them?

In the handling of material, by whom are the orders issued to the store department? If done by the foreman, how does he credit the scrap removed?

What is your idea as to the best method of handling this?

Is the ordering of material done by the mechanical or store department upon weekly or monthly requisitions; what is your recommendation for handling material in the most expeditious way from the store house to the shop? From where placed in shop to machines? From machines to erecting floor?

Lack of time prevented a discussion of these topics in detail, although some of them were commented on in connection with other parts of the report, with which they are closely allied.

SHOP METHODS.

Have you a method of shopping engines on your road and as general foreman are you notified in advance of their shopping? Would this information be beneficial? If so, in what way?

Do you specialize your work throughout the shop both on the erecting and machine sides?

Do you deem it advisable to manufacture parts of a locomotive before you intend shopping the locomotive?

Have you a system of delivering material to the engine or machine? If so, what is this system and how handled?

Do you advocate the location of a sub-store room in the center of the shops?

Is it advisable to permit high priced men to go to the store room to get material?

How do you handle the manufacture of material for outlying points? Charging of material, scrap credit, etc.?

In allotting various operations in repairing locomotives, what class of labor do you use in handling them? The wheeling of locomotives, by whom supervised? Application of ash pan, front end, draft appliances, shaker rigging, etc.?

What sort of schedule have you for shopping engines? That is, when an engine is taken into the shop, do you arrange a systematic schedule based on some previous performance of the date when the engine should be and must be out?

How do you manage the up-keep of machine tools so that efficiency is not imperiled by their wear and abuse?

How do you handle tools issued to mechanics and others for use during the time they are employed? Are these tools charged to the employee and signed for by him? If so, should any be purloined what action is taken? Would you deduct the value of the tool from the wages of the mechanic?

What [illegible] tools at the tool room do you have in vogue in your shop? Are these returned at the end of each day's work?

Do you have a system whereby the tools are delivered to the [illegible] on the job, not permitting them to go to the tool room?

What method of selection and maintenance of suitable tools have you inaugurated? Outline your procedure.

In the [illegible] of shop engines what is the relation of [illegible] to current production?

[illegible] that are to be returned on a [illegible] system? If so, [illegible] they may be [illegible] and returned to the next shopping? Poorly located minor parts, and particularly the careless running [illegible] tight joints broken to permit the simple tightening of [illegible]

[illegible] the difference between the [illegible]

sometimes has a leaky joint and frequently has to come off. Difficulty is then experienced in getting at it as the casing is made up in two pieces; the lower section, a cylinder of heavy planished iron surmounted by a heavy rounded top. The top mentioned has no provision made for taking hold of it with tackle and is hard to handle. Springs are often so located that it is necessary to drop the wheels to change them.

For inaccessible locomotive parts and details, can there not be a system of records arranged with a view of bettering the conditions?

What system have you for keeping account of repairs on locomotives? What record is kept so that duplicate parts may be shipped to outside points for repairs?

H. D. Kelley:—A few manufacturing shops have despatchers to despatch the work. There is a possibility of conflict between the machine foreman and the erecting foreman, when the work is delayed. I believe we should have certain men to follow the work around—to despatch the work through the machine shop and to the erecting shop. In that way you are absolutely in touch with the work and know at once where the delay is. Considerable friction can be avoided. It is followed out very successfully in one of the large manufacturing shops of this country. The despatchers have absolute charge of the work. When it is completed on one machine, it is taken to another and the time is noted. It is the same with the next operation, and so on from the time the work is started until it is finished.

W. W. Scott:—We have started a system of cards for locomotives in the back shop, noting the repairs necessary. The gang foreman, or somebody designated by him to do the work, goes over the engine; if it is necessary to renew a driving box, crank pins or other parts, it is marked down. The card is kept in duplicate. The machine foreman in the morning, or at any time during the day that he sees fit, can refer to his card without running around to find out how the men are getting along with a certain set of repairs. He will find that the eccentric straps were finished at a certain time. This method is a little crude, but it opens a wide range of effectiveness. We all know that each foreman thinks that his department is getting a little the worst of it. The machine foreman will complain that if the gang foreman had delivered the work to him he would have had the engine out without delay. The gang foreman will say that he had the job over there three days before the machine foreman touched it. The general foreman can cover this. He can now tell the exact hour at which it can be finished.

Have you a method of shopping engines on your road and as general foreman are you notified in advance of their shopping? Would this information be beneficial? If so, in what way?

William Hall (C. & N. W.):—I have always been a strong advocate of advance information, not only regarding going into the shop for repairs, but as far as possible for running repairs also. It is apparent that if this advance information can and is given, engines can be gotten into service much sooner than if the information has to be gathered after the engine is shopped. The practice in vogue at the principal shops of the Chicago & Northwestern is as follows: Engines are put on what is termed the hospital track. Here they are checked up daily as to the number and class of engines and the nature of repairs required. The nature of the repairs is gathered from what is called an X and O sheet, which should be sent in with each engine. These X and O sheets are gone over carefully by the shop superintendent, who selects such engines from the hospital track as will keep all departments busy and not crowd one department to the detriment of another. For instance he is careful not to have in too many engines needing heavy boiler repairs at one time, nor too many engines with broken frames etc. but distributes the work as evenly as circumstances will permit, by this means we get out an average number of engines each day.

The timekeeper and the heads of the various departments are

advised that certain engines, giving their number and class and nature of repairs required, are coming to the shop. The material is looked up and conveyed to the various departments. The boiler shop foreman takes his measurements, and makes the necessary preparations, such as flanging flue sheets, punching and shearing side sheets. Other departments can be getting their material worked up into shape and make all preparations as per the advance information. When the engine is shopped the work is pushed through to completion with the least possible delay. If an engine requires new cylinders, the cylinders are on hand before it is shopped, thus avoiding any delay, and the taking up of unnecessary shop room.

Do you specialize your work throughout the shop both on the erecting and machine sides?

William Hall:—I am a firm believer in specializing the work, wherever and whenever it is possible to do so. It was my privilege to inaugurate the system of specializing in vogue at our Chicago shops at the present time. When I started it I did so by degrees. I was watched very closely and criticised more or less, but the results obtained proved that I was on the right track. That was about twelve years ago; since that time the system has been extended and elaborated upon. In support of my theory, I wish to say briefly that in specializing the work, the men have the necessary tools and appliances for doing their particular work, and become so proficient at it, that the time required is reduced to a minimum and there is no lost time moving from one job to another. I fully realize that this system cannot obtain in all shops as local conditions would not warrant it, but in all large shops, or shops where work is done in large quantities it can be made to work most satisfactorily.

William G. Reyer:—(See his remarks under: What plan of organization do you find to be most effective?)

Ferdinand Bauer (C. C. C. & St. L.):—The best shop practice is to divide the work into classes and to have the men specialize. We found we could get better results by doing this. We have four gang foremen. Each one has a special line of work and carries it through from one engine to the other.

R. W. Burnett (Ill. Cen.):—I believe the standardizing of work is one of the best things tending toward good organization in the shop and the reducing of the cost. I represent a small shop, but we do as much of it as we can, especially, on the machine side.

S. E. Mueller (C. R. I. & P.):—We have not a very large shop, but I find the best efficiency is maintained by specializing all classes of work.

C. L. Dickert (Cen. of Ga.):—We have our work specialized and have carried out this plan on the machine side as well as in the erecting shop. All our mechanics are union men. We have a man who does all the lining of guides and facing of valves, another one for valve setting, squaring up engines, and laying off shoes and wedges. We use handy men on drill presses, and bolt cutters and some few in the blacksmith shop and boiler shop.

Thos. Zinkan (C. C. C. & St. L.):—If we consider a shop that works on a large number of engines at one time, specialization is the best plan for keeping every man busy and getting a full day's work from them. If we specialize the work, however, we will more or less demoralize the trades. For instance, if we specialize our men on setting flues, in the years to come we will have a class of flue setters. If we have the work specialized, our apprentices will not get the full information that they should have and we will hamper ourselves in the near future. For the smaller shops specialization is a detriment.

T. H. Ogden:—I find that keeping men on one class of work all the time is a failure under certain conditions. My shop is small. We handle about twelve engines a month, doing the running repairs. Tomorrow I might have twenty engines, and the day after sixty. How can I specialize the work and keep these men busy? Our system is to specialize wherever it is possible to do so.

E. J. Brewster (C. & N. W.):—We believe in specialization, both on the floor and the machine side. We have quite a number of apprentices and we give them a very good show. They go through just the same course as they did before the specialization took place.

W. Smith:—If you can specialize any work in either the shop or engine house, the men who are specialists will figure ahead and get wrenches and special tools made for the work; they will also have on hand a supply of the material that they are going to use. They will, for instance, have such tools as boiler check reamers. When these are kept in the tool room they are, as a rule, neglected; but when the men do nothing else but use these tools they will keep them in shape, and they can do the work with despatch. In some roundhouses they never know where they will find a tool and lots of times new men will not know that there are certain tools, but will go ahead and use something that requires twice the time. If you can specialize the work they will have the tools kept up in first class shape. With a man on one job today, and on another tomorrow, he will not go ahead and develop new ideas as readily as does the specialist.

Do you deem it advisable to manufacture parts of a locomotive before you intend shopping the locomotive?

William Hall:—I believe that every progressive man will answer the question in the affirmative, and say by all means to do so whenever it is possible and to bring the work as near the point of completion as circumstances will permit. Here is where your advance information will stand you in good stead, so that the required material may be manufactured before the engines are shopped.

Have you a system of delivering material to the engine or machine? If so, what is this system and how handled?

William Hall:—When a requisition is made the storehouse delivers the material directly to our manufacturing department by cheap labor. Here it is delivered to the machines by laborers, and after manufacture is delivered to the engines by laborers. The system is a step in the right direction: viz., efficiency in using cheap labor for this class of work, thus keeping the high priced men on a better class of work.

Do you advocate the location of a sub-store room in the center of the shops?

William Hall:—That depends largely on the size of the shops and the proximity of the shops to the main storehouse. If these sub-storerooms were adopted it would mean an increase in the stock to be carried, consequently an increase in money invested in stock, and that is what we are all guarding against. However, much time will be saved and less material will be used by the judicious use of sub-storerooms for small supplies, such as nuts, pins, bolts, washers, etc. I have tried this with great success. The carrying of a sufficient stock on hand is a great factor in the output and efficiency of any shop. I am strongly opposed to an overstocked storehouse, but I am as strongly in favor of carrying a sufficient stock for the safe and economical operation of the shop forces. There is no money saved and lots of time and money is lost by waiting for material, or by having to rob Peter to pay Paul. It is every foreman's duty to watch the stock and assist the storekeeper in keeping it to a minimum just as closely as he would watch his own financial affairs, using every pound of usuable material he can find, and keeping a sharp eye on the scrap pile to see that nothing that can be used again gets away from him.

Is it advisable to permit high priced men to go to the store room to get material?

William Hall:—This must be governed by local conditions, and the help at one's command. All things being equal I should deem it a great waste of time and money to permit high priced men to leave their work and get their material from the store

house. In small shops where an insufficient amount of help is employed this cannot always be avoided, but in the larger shops, messengers should be employed for this purpose.

How do you handle the manufacture of material for outlying points? Charging of material, scrap credit, etc.?

William Hall:—Most of the material for outside shops is manufactured in Chicago where we have a distinct department for that purpose. Manufacturing is done by lot numbers. The storekeeper issues an order for so many pieces of this or that to be manufactured, at the same time issuing a lot number. To this lot number is charged all the material used and the time and labor expended in its manufacture, including cartage; when the lot number is completed, the manufactured articles are returned to the storehouse and lot numbers are signed by the various departments, stating the time commenced and the time completed, and the number of articles manufactured. The cost of manufacture is then computed, and when the articles are drawn out for use these prices are used in computing the cost of repairs. All scrap from locomotives is charged to an engine general account. Thus every locomotive gets credit for its quota of scrap.

In allotting various operations in repairing locomotives, what class of labor do you use in handling them? The wheeling of locomotives, by whom supervised? Application of ash pan, front end, draft appliances, shaker rigging, etc.?

William Hall:—In our Chicago shops, as in several other of our larger shops, the stripping of engines, removing of wheels, and wheeling of engines is done entirely by common labor, supervised by a gang foreman who is a machinist. At other points this is done by at least two machinists and as much common labor as necessity requires; these under the supervision of the foreman, as required by the machinists' schedule. The removal and application of ash pans, front ends and draft appliances is done by handy men employed in the boiler and tank shop.

What sort of schedule have you for shopping engines? That is, when an engine is taken into the shop, do you arrange a systematic schedule, based on some previous performance, of the date when the engine should be and must be out?

William Hall:—At all our large shops we have a schedule in force which is giving great satisfaction. Everything on the engine is done according to schedule—from the stripping of the engine to the last operation before it is ready to leave the shop [illegible]

How do you manage the up-keep of machine tools so that efficiency is not imperiled by their wear and abuse?

William Hall:—The up-keep of machine tools, both big and [illegible] tool room and under the supervision of a tool room foreman. Any irregularity tending to impair the usefulness or efficiency [illegible] gives it his prompt attention. All lathe, planer tools, etc., are [illegible]

How do you handle tools issued to mechanics and others for use during the time they are employed? Are these tools charged [illegible]

[illegible] it is generally understood that they must return all tools as- [illegible] before they can receive their time check. As a rule we have very little trouble from this source. I am not so sure that the courts would uphold one for deducting the value of a lost tool from a man's wages.

What method of selection and maintenance of suitable tools have you inaugurated? Outline your procedure.

William Hall:—The selection of tools is done by recommendation of the foreman and master mechanic to the superintendent of motive power and machinery, who allots each shop its proportion of a general appropriation for the purchase and maintenance of tools.

In the promoting of shop efficiency what is the relation of standards to the cost of production?

William G. Reyer:—The foreman who would successfully operate his shop must have a system, as system is the foundation of all well governed institutions. So it is with the equipment; it must be systematized or it will be an enormous expense. I have seen the time when all the corners and available spaces in the shops have been piled full of all sorts of odds and ends to meet the requirements of the odd locomotives and cars. If the locomotives and cars had been standardized the stock room would have taken care of the equipment in a surprisingly small space. In some cases it seems almost impossible to make changes to conform to this, but: "Where there is a will, there is a way." For instance, we have had to put eccentric shaped studs in the boiler to make them come within the radius required to fit standard boiler check flanges, we have put in offset pop extensions to make room for whistle valves, and enlarged cylinder cock holes to bush them down to suit regulation cocks.

I found that the cheapest and easiest way to make these changes was to find the greatest number of locomotives using a certain size of whatever I wanted to change and by making the rest to conform to these. It often pays to use the largest size of an article, as you can easily tap holes in boilers larger when it would be inconvenient to bush one to suit. The production of the standard parts is where most of the economy is realized. After a man has set up his machine for a certain class of work he can produce a large stock in a very short time, whereas if he had to make each job to fit in a special place he would accomplish very little at the end of the day. A part which is used as a template should be marked or drilled in such a way as to make it useless for anything except a template. All reamers, cutters, taps, etc., should not be allowed to vary from the standards in the least. Variation in cutters and reamers is responsible for many roads not being able to make their injector parts. It is just as easy to make work accurate as it is to make it inaccurate, if the machine man does not get careless. It is very important that reamers, cutters, taps, etc., be kept accurate, as they should be depended on to do their work without having to gage each piece after it is made.

One thing has given me a great amount of trouble, and that is odd-size washout plugs. We have just solved the problem by keeping four sizes of plugs on hand and when retapping is necessary seeing that the next size larger plug is used. This requires a larger stock, but will save the time of the man changing his machine and the roundhouse man standing around waiting. Since we installed a taper bolt machine and standard taper reamers one man makes five times the number of taper bolts for frames, rods, etc., as before, and I am satisfied that they are [illegible] standard taper taps and the corresponding dies. There is no delay in putting in new studs, as the man draws the tap and stud at the same time and applies it to the boiler; there is no delay in waiting to have the stud made to order.

Another saving by having a standard is in applying parts to the engines. It does not take a skilled mechanic to do it. You can send any part to an engine on a branch line, and all that [illegible] the faulty or broken part and apply the new one. I have known of several cases where an engine was

badly needed and allowed to leave the shop with some part not made standard, but it cost heavily to send a man to make it right—possibly one hundred miles out on one of our branch lines. I could enumerate a number of similar examples, but this is enough to convey the idea that we must first establish the standards and equip our shops with proper facilities for doing the work, and then make the work in large quantities, to get the best results.

The age of standards in the industrial world began in earnest when our great railway systems adopted a standard gage for tracks, thus enabling us to send a car loaded in Boston to any point reached by rail on the Pacific coast, Gulf of Mexico, and now even to the Republic of Mexico. The establishment of that standard has saved in the cost of transportation beyond computation. Our progress has been so rapid that we have not been able to get the advantage of the standard locomotive or car. We are continually outgrowing the older ones, and in keeping up with the demands of traffic we must increase the capacity of the locomotive. A certain stationary engine sold for $800,000, the cost being about $750.00. After adopting a system of standards for everything and every process it was built at the cost of $395.00. In order to do this it was necessary to put in tools that were suitable for standard work and which did not need so much skill to operate.

After a system of standards has been adopted there must be intelligent use made of the tools to maintain it. The establishment of standards and standard methods means 50 per cent. or more saving in the cost of production. In the preparation of this discussion I wish to acknowledge assistance from Mr. Adams, apprentice instructor, and Mr. Quinn, brass work inspector.

William Hall:—I am not prepared to give any figures on this important question, but the maintaining of standards is very good practice, as it is economical in various ways. It is much cheaper to manufacture in large quantities, parts are interchangeable, and this adds quite materially to the efficiency of the shop.

W. Smith (C. & N. W.):—Mr. Reyer has hit the nail on the head. It especially appeals to one at an outlying point where you have to depend upon the main shop for repairs, because there is always a great deal of trouble with parts coming back for repairs that are not standard. And at any outlying point the tools are limited and it is hard to get the part that is not standard up to standard.

For inaccessible parts that are to be repaired on a locomotive have you a system whereby they may be recorded and remedied at the next shopping? Poorly located minor parts, and particularly the careless running of piping, which in some cases must have several tight joints broken to permit the simple tightening of nuts behind it, are innumerable.

Or though a dome casing never needs any repairs in the life time of the engine, the dome cap which it covers sometimes has a leaky joint and frequently has to come off. Difficulty is then experienced in getting at it as the casing is made up in two pieces; the lower section, a cylinder of heavy planished iron surmounted by a heavy rounded top. The top mentioned has no provision made for taking hold of it with tackle, and is hard to handle. Springs are often so located that it is necessary to drop the wheels to change them.

For inaccessible locomotive parts and details can there not be a system of records arranged with a view of bettering the conditions.

William Hall:—We have no regular system that I am aware of covering the question of remedying inaccessible parts, etc., but if we find parts of this nature they are remedied the best that circumstances will permit. We have so little trouble of this nature that I am not prepared to say what system should be inaugurated.

A. F. Bradford (Big Four, Urbana, Ill.):—It is well known that the efficiency of our machine shops is more than 100 per cent. greater than it was a few years ago. First, because of the design of the machines and the tools; second, the transmission of power has been changed from the belt drive to the direct motor drive. In spite of the greater shop efficiency, the most economic methods of making repairs can only be accomplished by simplifying the most complicated parts and the arrangement of others so that they can be repaired by removing the smallest number of parts. One instance of a poor arrangement was the location of the air pump, which was placed on the firebox; when the staybolts had to be examined or renewed it was necessary to remove the pump to do the work. This unnecessary work has been eliminated by changing the location to a position where it is out of the way of any running repairs and is just as suitably located for its own purpose.

The main air reservoir on another class of engines was placed between the frames directly behind the cylinders; when repairs had to be made to the air drums or pipes, it was necessary to jack up the engine and remove the trucks. This was a very expensive operation and would often delay the engine from its run. These reservoirs are being changed from their location between the frames and are being suspended from the running board brackets; here they can be worked on and repaired more conveniently. They are also more securely fastened in this position, which will reduce the amount of repairs.

One case of the inaccessibility of parts is the connecting rod of a 22 in. x. 30 in. locomotive. This rod has six small parts, not including the brass, all of which are very difficult to make because of their wedge shape and curved surfaces; this requires much machine work, and in a small shop very often falls to the work of one shaper, or one milling machine. These six parts are used for the purpose of tightening up the brass; in another class engine of the same type and size the brass is keyed up by two very much simpler parts; less work is also required to key up the brass with these parts than it is with the parts mentioned above. The man in the drawing room is not always familiar with the running repairs of engines, or he does not take time to think about the order in which he is placing the parts; he often puts one part that very seldom needs any repairs where it must be removed in order to repair another part that needs it more frequently. It is our duty as foremen to use our best efforts in remedying these difficulties.

What system have you for keeping account of repairs on locomotives? What record is kept so that duplicate parts may be shipped to outside points for repairs?

William Hall:—The system used on our road for keeping account of repairs to locomotives is that of checking up the X and O sheet which I have mentioned before—the X standing for new articles applied, and O for articles repaired. The foreman's orders for articles drawn from the storehouse are also checked up; also the time slips. The X and O sheets contain the names of all the important parts of the locomotive, and these parts are numbered. There is also ample room for remarks, covering the work done to minor parts not mentioned. When an engine, after undergoing repairs, is ready for service, the X and O sheet properly filled out is sent to the storekeeper, who then by the aid of the X and O sheet, the requisitions for material, and the labor slips, computes the cost; all papers are sent to the superintendent's office. In ordering parts for outside points, such as eccentrics and straps, driving boxes, brasses, etc., which are wanted for stock, the class of material wanted is given, such as Class A—locomotive material. If wanted for immediate use the class of engine the material is wanted for is given. In some cases a serial letter or number is also given; for instance, "driving axle No. 1 main for engine number 1402, Class R-1." In the case of piston rod and valve stem packing, we have a chart giving the number and class of each engine on the division, also giving the size of each piston rod and valve stem. When packing is required reference is made to the chart, and the packing is bored

and sent out ready for immediate application. When the piston or valve stem is turned or renewed the charts are corrected.

TOOL ROOM EFFICIENCY.

Mr. Pickard's suggestions for the discussion of shop methods contained three questions which might properly be grouped under the head of tool room efficiency. They are as follows:

What system of checking tools at the tool room do you have in your shop? Are these returned at the end of each day's work? Do you have a system whereby the tools are delivered to the mechanics on the job, not permitting these men to go to the tool room?

E. L. Fay, assistant master mechanic of the Union Pacific, Cheyenne, Wyo., sent in a paper on these questions in which he said:

No department of a modern shop engaged in either manufacturing or repair work has so much to do with the output of the plant as does the tool room. A sufficient number of the best tools, conveniently accessible to the greatest number of employees, is of sufficient importance to merit the personal attention of those whose duty it is to supervise and on whom rests the responsibility for economical repairs. This applies with particular emphasis to the locomotive repair shop, because the repair work on a locomotive covers a wide range and a great variety of tools, each variety ordinarily of several sizes. Certain tools, not used elsewhere, are used in the construction and repair of the boiler. This applies also to machinery, cylinders, ash pan, steam pipes, front end, etc.

It is essential that the tool room be so located that the various departments may have access to its tools with the least possible expenditure of time. It is possible (though I have never seen it tried) that a basket or bundle system, such as is in use in many department stores might be economically installed in the buildings of a locomotive repair shop, not within reasonable distance of the central tool room. The foreman under whose direction the tools are to be used should in all cases be consulted in their selection, as frequently we find that the tool shapes recommended by various manufacturers differ in efficiency because of some slight difference in the shape. This would also apply to taps; a short tap will in most cases do the work of the long tap just as well. Then there is always one tool or one variety of a tool which we find to possess some point or points of superiority over all others. It should, therefore, as far as possible, be our aim to secure the best, which should always be that which will produce the quickest, most satisfactory and most economical results.

Tools should be grouped in the tool room with reference to the frequency with which they are used. The tools most frequently called for should be nearest the point of delivery. Those for which there is the least demand may be farther away. A proper grouping of the tools may also be considered, since certain jobs require several tools, and the tools in each of these groups should be together to avoid loss of time on the part of those charged with issuing them.

Tools should be issued to employees only on checks, and should be returned periodically, the larger number of them daily, all of those at the end of each week. There are many simple check systems in vogue at the present time; in fact nearly every shop has its own system. There is, however, one which especially appeals to me because of its simplicity. It is termed the double check system and is used by some of the largest machine tool manufacturers. To illustrate: With our present system an employee presents himself at the tool window and requests a certain tool and hands out his check. This check is carried on a ring with him) to the tool room attendant. He receives the tool, and the latter places it in some convenient place on the rack from which he took the tool. Assume that the employee receives six tools, all taken from various tool room racks, for none of which he has checks. He cannot leave the service without returning them. He cannot obtain his time until the six checks which were furnished him are returned to the tool room and his time order approved by the tool keeper. What is the result? Since these checks are in various places in the tool room it is necessary for the tool keeper to practically check the entire room before he can locate those against which the employee's checks stand, in order to know what action to take in charging their value against the employee, or at least making an effort to locate them.

With the more elaborate system each tool in the tool room rack carries a check; for instance a ½ in. twist drill would have a check. If there were six twist drills in that particular place there would be one hook underneath with 6 checks stamped "½ in. twist drill." There would be another hook for the checks of the employees drawing such twist drills. Very close to the window would be a board with numbered hooks corresponding to the checking in numbers of the employees in the various shops using the tools. The operation of the system is as follows: An employee presents himself at the window for a tool for which he gives a check; the check is placed on the hook underneath the tool taken and the stamped check showing what the tool is and the tool itself are removed. The tool is given to the employee and the stamped check is placed against his check on the check board. Then if an employee leaves the service or advises the tool keeper that he has lost a check, reference to his "checking in" number on the board determines whether he has the tools out on check or whether the facts are as he states. This system eliminates the possibility of error to a very marked extent.

In places where tools are not manufactured and the tool room is under the direct charge of the tool keeper, who is not a mechanic, he must of necessity be subordinate to some department head, presumably the machine shop foreman. This being the case the machine shop foreman should be charged with the weekly inspection of the tools and the tool room conditions. His tool keeper should give him weekly at least, oftener if necessary, a list of the new tools required, or of the repairs required to old tools. This list should be checked against actual conditions and such replacements as are necessary arranged for in ample time to insure their being on hand when wanted. There is no virtue in a worn out tap, a dull reamer, or a reamer that has been reground so frequently that there is no further room for a chip in the flutes; neither is there any virtue in an improperly ground air hardening twist drill, therefore, these tools should be looked after frequently by those who exercise supervision over the tool room.

There is no excuse for the tool room being other than neat and orderly. Where I am situated we check out all wrenches, pneumatic tools and hose, sledges, chisels and punches, drawings, etc. We carry in the tool room a stock of standard boiler studs, hexagon nuts of all sizes, piston valve stem packing, tee headed slot bolts, etc.; also Armstrong tools of various kinds and sizes, hydraulic jacks for removing bolts and air hammers.

We have a complete equipment of ratchet wrenches of various sizes. These are economical and effective tools; mechanics will very seldom use an open wrench when a ratchet wrench is procurable. We carry them in sizes up to 1½ inch. Above that we use a single and open wrench made for the application of pieces of pipe, if necessary. We find, however, that the ratchet wrench with the drop forged handle is much to be preferred to the cast steel or malleable iron handles ordinarily furnished by the manufacturer.

The personnel of the tool room force should be closely watched, as it is no place for drones. Our system is to use boys in the tool room who have made application for apprenticeship. We usually take them six months before they enter the shop as apprentices and try them out in the tool room. This is an excellent plan and works to the advantage of the boy while he is serving his time, because he knows where to find the tool that he wants when he wants it. To obtain efficiency from the tool room we must have enough tools of the right kind, well cared for, promptly

issued on demand, and in their proper place when not in use. No tool should be replaced on a tool room rack for further issuance unless in condition for satisfactory use.

W. G. Rose (C. H. & D.) in a written discussion said: A great amount of money may be saved in every shop where the tool room is operated systematically, even though you are not equipped with all modern tool room machinery. And there is hardly any reason why one could not have a tool room arranged for systematically taking care of all tools, templets, jigs, etc. There should be suitable racks for taking care of all wrenches, taps, reamers, air tools, jigs and templets. These should all be recorded in a book provided for the purpose, so that you will always have an actual inventory of just what your tool room equipment consists of.

These tools should all be numbered and assigned to a specific place; have a check system for issuing these tools to the mechanics, and have an individual record of every tool and its whereabouts. Just as soon as a man is through with a tool, either on the machine side or on the floor, it should be returned to the tool room. Allowing such tools to lay around the shop will prevent other mechanics from having the use of them. I believe that there should be a historical record kept of certain reamers, cutters, taps, dies and drills; by so doing, it will be an easy matter to arrive at the class of tool steel that is giving the best average service.

William Hall:—When a man, such as a machinist, boiler maker or any one that may be required to use the company's tools, enters the service, he is assigned a given number of tool checks. Upon his application to the tool room for a tool he must give one of these checks for each tool he takes out; upon the return of the tools in good condition he receives back his checks. If a man has not completed his job at the end of the day he is permitted to retain any tool he may be using, with the exception that at the end of the week all tools are expected to be returned to the tool room. It is good practice to allow an employee to retain a tool over night, as it saves time in the morning. He is held responsible, however, for all tools he may have out, until the man in charge of the tool room returns his tool checks to him.

As far as the delivering of tools to the men is concerned, both systems have been tried, that of delivering the tools by messenger, and that of allowing each man to get his own tools, but not having gone into the matter deeply enough am not prepared to say which is the most economical.

SHOP KINKS.

H. D. Kelley, chairman of the shop kinks committee, presented a paper on this subject. Shop kinks were also, of course, included in the items enumerated in Mr. Pickard's paper on shop efficiency. An abstract of Mr. Kelley's report follows:

When the subject of shop kinks was assigned to me I was at a loss to how to get up a paper to present before the convention. It would be no small task to get up such a paper, and we did not have the time or money to make it as complete as we wanted.

Roy V. Wright, mechanical department editor of the *Railway Age Gazette,* was in my office one day after the Cincinnati convention. I told him that I was called upon to write a paper on shop kinks for the 1911 convention, and that neither I nor the General Foremen's Association had the money to get out a good paper. I asked if the *Railway Age Gazette* would not publish a book on shop kinks for the General Foremen's Association, just as it had published the Locomotive Dictionary under the supervision of the Master Mechanics' Association. I knew the *Railway Age Gazette* had a number of shop kinks that it had published from month to month. The *Railway Age Gazette* consented to get out such a kink book, and I then wrote the executive committee of the International General Foremen's Association to authorize its publication, which it did.

I consider shop kinks one of, if not the most important problem a foreman has to contend with, for it is through methods of this kind that he is able to increase the output of his shop and keep down the cost of work, and that is what general foremen are for. If he does not succeed in this he is a failure. He should strive to run the most efficient shop in the country. Should a foreman fail to develop better methods in getting out his work he will soon find that he is a back number. There are about 700 kinks in the Railway Shop Kinks book, taken from actual shop practice from shops in different parts of the country. Most foremen can find kinks in this book that can be applied to their particular shops to good advantage.

I have in mind a certain shop, built about 40 years ago, that was getting out about 25 engines a month. A few years ago this output did not suit the motive power officials, and an increase was asked. Most, if not all of the foremen thought the limit of output had been reached, but after the introduction of a few new shop kinks and a few other improvements the output was steadily increased until 70 engines were reached, and I do not think the men worked any harder than when the shop was getting out 25 engines a month. This gives an example of what shop kinks will do.

It is surprising to go into some of the large shops in this country and see them using the same methods that were practiced 25 years ago. I was in a large eastern shop recently and saw them boring driving boxes by putting them on a boring mill and bolting them down with clamps and setting to a line from the boring bar. I was in this shop for several days; kinks and jigs were very conspicuous by their absence. The blacksmith shop, however, was one of the best equipped shops I ever saw for kinks and jigs. If the blacksmith shop could get kinks and jigs, why could not the machine shop get them?

I was in another large shop and saw two men chipping a smoke arch fit for a cylinder by hand when it should have been chipped with an air hammer or planed off. I was in two other shops recently, where, in the case of broken frames they were taken down and welded in the blacksmith shop under a steam hammer, when they could have been welded under the engine much cheaper and quicker with thermit. There are other instances, too numerous to mention, of where shops are very lame in kinks, although in every shop you will find that the general foreman thinks he is making a record on some particular job. If you can make a record on one job, why not make a record on all jobs? It would certainly be a paying investment for your company. A general foreman often advances the argument that he has not the men to put on this kind of work—claiming he is too crowded. I firmly believe if he would put a man on jigs and keep him there, the time would soon come when he would not be crowded with work. I recall the time when a shop that I was connected with could not keep ahead of the cylinder spring ring job. We were at that time paying 25 cents per ring for labor. By a few improvements in our methods of turning these rings we were able to keep ahead, besides cutting the labor down to 4 cents per ring, and the machinist made more money than he did at the former price.

I hope each member of the General Foremen's Association will get one of the Railway Shop Kinks books, and I wish to take this opportunity to thank the *Railway Age Gazette* and R. V. Wright for getting out the book under the supervision of this association.

DISCUSSION.

William Hall (Chicago & North Western, Escanaba, Mich.):—Great inventors, like poets, are born, not made; we cannot all be Edisons, but very happily it does not require a great inventor for most of our shop kinks. Nor is it always the most intricate pieces of mechanism, that it has taken years to develop, that are the most useful and count most for efficiency. More often the home or shop made tools, the result of a few hours thought, the tools that can be made use of every day, give us the best of all around results. These kinks, or short cuts if you please, are de-

signed for the purpose of reducing the exertions on the operator's part, and decreasing the time on certain operations. All shop kinks, however, are not applicable to all shops, for what would be practical in one shop could not be used in another, owing to local conditions.

A great many more shop kinks would be designed and used were it not for the prejudice of some men in authority, and this same prejudice has killed the ambition and aspiration of many a good man. Probably I should have used the word selfishness; the terms, however, are synonymous. A man may be intensely earnest in endeavoring to produce something very practical and very efficient, but if his efforts are not appreciated, and he receives no encouragement, they count for nothing. The practice of devising shop kinks and methods should be fostered and encouraged to its fullest extent, for it will be to the best interest of all concerned.

I believe in giving every man his honest due. If a kink has been developed from a suggestion of some workman, however humble a sphere he may be filling, let him get the credit for it, for possibly if he had the facilities at his command, he could have brought out the kink himself. I believe that the *Railway Age Gazette* would have had more kinks to publish but for the fact that all of us are not draftsmen, and are unable to procure tracings or photographs to send to the editor of the Shop Section of that most valuable magazine. Too much cannot be said in praise for the *Railway Age Gazette* for the deep interest displayed, and the publication of these shop kinks. I am sure there is no foreman but who can derive more or less benefit from the study of its shop kink section. That great service is rendered by these various and numerous kinks is without question; there is a great saving of energy on the part of the operator, reserving his forces for further operations, and the efficiency of the shop is increased according to the merit of the kink.

I have said that it is often the simple little kink that counts greatest for efficiency, and as an illustration will cite a small tool which I designed for testing crank pins. Sometimes we find the pins do not coincide with the main or wheel centers, indicating that one or more pins are either sprung or were not quartered correctly. In order to find which pins are out, the wheels must be removed and placed in the quartering machine, requiring the services of from four to six men. The simple kink mentioned eliminates this difficulty. Pins can be tested without removing the wheels, and it is so simple that it can be operated by any intelligent apprentice boy.

I recall a case, where, when it was necessary to finish a set of shoes and wedges from the rough, the planer hand would finish each shoe and wedge separately in a chuck. By the introduction of a simple angle iron five shoes or five wedges were finished in one operation, the number being limited to the length of the planer bed. This was on a single headed planer. I could cite numerous cases just as simple, and as equally efficient, such as using arbors for planing crossheads instead of removing the piston; the introduction of frame spreaders made from piping, instead of using heavy jacks, thus not only increasing the efficiency of the men and the shop, but eliminating the element of danger of the heavy jack falling and hurting someone. The gain in efficiency of a shop using these various kinks is difficult to estimate, the gain depending upon the kinks themselves and local conditions, ranging from 10 per cent. to 500 per cent., as in the case quoted above.

W. G. Rose, master mechanic, Cincinnati, Hamilton & Dayton, Cincinnati, Ohio, presented a written discussion on this subject from which the following is taken: "Any shop in which machinery or parts are manufactured, and which is in competition with other shops, depends largely on kinks and jigs to increase the output of a designed unit. The man who thought out and provided a method to do work with a saving of time or effort, and with an inventive mind to devise and with sufficient help to put what he plans into effect, is the man that is the most valuable to the railway company. Such a man should be paid a liberal salary and allowed to use his time as he thinks best. He should understand how to use it. In a great many shops where a good labor saving device is installed, certain mechanics will hang back and not show the proper spirit towards using the tool. It is necessary at times to get the men together and insist on certain tools being used. After they have once fallen into line and realize its advantages they can hardly be persuaded to get along without it.

In most manufacturing establishments a jig or kink is devised for almost every operation, and a limit of cost is seldom placed on the cost of a tool which can be shown to be a paying proposition in facilitating the work and decreasing the cost. If it were not for competition, in all probability they would not be so active in this respect; they would simply build a machine and set a price on it. As a general rule most railway shops set aside a very small portion of their appropriation for the tool room. They are generally limited for space, tool room machinery, and men to operate it. As a rule the tool room men are kept busy repairing broken tools, broken down machinery, and doing other outside work.

We manufacture all kinds of parts and material for locomotives and cars and are doing it with practically no competition. If the railways were selling these parts in competition with each other tool room facilities would quickly improve and more attention would be paid to up-to-date machine tools.

I was shop demonstrator for about four years on a road which took a great interest in installing devices which employees would suggest, providing they could be shown to be a paying proposition. During that time one of my duties was to visit all the important shops throughout the country and exchange ideas with other people. Some might imagine that it was copying other men's tools and ideas. There are some foremen that think they must not adopt anything that is not original with them. This is wrong. A man, to make a success, must not hesitate to copy anything that is legitimate; as a general rule he will try to add improvements to the other men's ideas, which will not only be beneficial to him, but to the next man that calls at his shop seeking ideas.

It was surprising to find some large shops that were operating as they did years ago, without the least effort to develop any devices to help reduce the labor cost. To illustrate, I visited a shop which had seven pits and some very good machinery; the general lay-out was good. The first thing that attracted my attention in passing through the boiler shop was two men welding flues by hand. They also had a night gang on this work in order to keep up with it. I asked if they did not think it was a slow and expensive process. They said it might be slow, but they were doing good work. I asked how much it cost to remove, prepare and re-set a flue. They replied that they did not know. I merely cite this as an example of how some shops will go along day after day, not knowing what their neighbors are doing. One of the most important things that can be done in railway shops today is to have the general foreman and all his subordinates take their turn in visiting different shops about the country, and exchanging ideas with their neighbors; in so doing there will be hardly a man but will pay for his expenses, if not for his monthly salary on every trip.

The master mechanic came to me before I became a shop demonstrator and said: "I am going to send you to look over a large shop in Nebraska. If you can bring back any ideas and show me that the company has been paid for your trip, I may send you out again." I can assure you that I was not in the shop one hour before I had made enough notes of improved methods of doing work to pay my salary for several months. After that, for four years, it was one of my duties to travel through the country getting ideas and putting them into effect in our shop.

I do not want to be misunderstood as to the condition in a good many of our shops or to intimate that the foremen are not first class men, for I believe that most of them are. But the general rush in most of the railway shops prevents them from

figuring out and developing many good ideas and kinks which they could if they were not so badly handicapped. The master mechanic, general foreman, and machine shop foreman generally have entirely too much to look after to devote the necessary amount of time to tools and shop kinks.

That is why I believe there should be some live mechanic on every road with an inventive brain to follow up this line of work, and with a liberal appropriation for the tool room to work out standards and develop standard tools for doing the work; also to make templets for every class of work possible. The laying off of new material at drill presses or other machines would then not be necessary. Each part should be interchangeable. There should be standard reamers for cross-heads, wrist pins, knuckle pins, etc. Whenever a good tool is gotten up for one shop, and it has been demonstrated that it is a good tool, it should be made a standard tool. If the road is only able to support one large first-class tool room, the tools should be manufactured at that one point and be sent to the different places along the line. You will often find a good tool installed in an engine house near a large shop, but the fellow that has the little roundhouse away from the main shop has not got the tool because he cannot make it; he is really the fellow that ought to have all the labor-saving devices. They should be manufactured in the main shops and forwarded to all small shops and roundhouses on the system.

This will also apply to the manufacturing of standard appliances such as cab fittings, including injector throttles, blower throttles, air pump throttles, etc. This material can be manufactured in large quantities by having a full set of tools and jigs for doing the work, and it can be done much cheaper and be forwarded to other points on the road. This of course should be done at one of the shops that maintains a brass foundry.

F. C. Pickard:—Every foreman is aware of the economy which shop kinks produce. You might just as well start to eat your dinner without a knife and fork as to try to accomplish results in a machine shop without shop kinks. You might just as well try to saw wood with a hammer. You have got to have shop kinks.

W. G. Reyer:—Every general foreman will find it to his interest if he can take a trip and see what the other shops are doing and make a note of what he sees. As to shop kinks, I have not many original ideas, but in the shop I have charge of I put a young man in charge of this special work. We call him the shop demonstrator. Besides having charge of the apprentices we look to him to get out tools for the different work. I explain what we would like to have and outline the work, and he and the draftsman work the jig out. I get a good many ideas from the drummers who see what is going on in other shops.

L. O. North:—The idea of having the general foremen and shop foremen visit with the other fellow and see what he is doing is good. I could cite several instances where we followed out that plan right here in Chicago. Take as an illustration a device which we saw in the North Western shop. It was for chucking and machining rod brasses on a shaper. Formerly a shaper and small slotter were used to take care of this work. By adopting the improved chuck, the shaper was able to take care of the entire amount of this work and also do other work, thereby releasing the slotter for other purposes.

W. Smith:—A few years ago when working as a machinist I made it a practice to work in different shops, not because I was dissatisfied with any one of them, but because I wanted to see what was done in other shops, and pick out those features which I thought would be best to put in practice if I got to be a foreman. It was a very good experience. I remember many a time when I have worn out my hands trying to ream holes with dull reamers. What impressed me more than anything else was the lack of tool equipment. I remember in one shop which repaired thirty engines a month there was only one hack saw to serve about four hundred machinists. It is a very cheap affair. A hack saw frame costs about fifty cents. The tool foreman did not seem to be far sighted enough to see the lack of small tools of that sort. In almost every shop there was a lack of pipe wrenches. All of these things are comparatively cheap.

What impresses me more than anything else is that the workmen should have individual tools and the gangs should have their own tools. I am in favor of the portable tool box and portable racks for boiler washing. I think more time is saved in that way than anything else. In roundhouses all machinists should have portable tool boxes for carrying hammers, wedges, etc., that they are sure to use during the day. Of course where there are twenty or thirty machinists employed in a roundhouse it is a big expense. It takes a great many tools, but it is money well spent and pays for itself in a very short time.

Another thing that impressed me was a portable lathe. It can be set alongside the engine. I know of some shops where the machine shop is located five hundred feet from the erecting shop, and the boys have to run back and forth. When these portable tools are used it saves two or three hours a day. In the roundhouse there is generally a lack of proper reamers for gage cocks and that sort of thing. These are really shop kinks, because they are labor-saving. One shop that I worked in did not have anything at all in the way of proper reamers. When anything was needed the machinist would go to the foreman and get an order for a new one. I suppose a great deal of this material was afterwards reclaimed from the scrap pile at the main shop. Another thing that impressed me in some shops was the method of carrying shoe and wedge liners already cut, and liners for taking up slack between engine and tender. It saves time and promotes efficiency.

C. L. Dickert:—Unless a foreman visits other shops and sees what is going on, he soon becomes a back number. I visited a shop not very long ago where I got next to a kink that increased the output of one article from twenty in nine hours to two hundred and seventy in the same length of time. It was a die for making fire rakes. We had an order to build three hundred new box cars and we had to make the yokes. We made dies for upsetting and punching three holes in each end in one operation. The stock was 1¼ in. x 5 in. A man could upset and punch thirty ends an hour. In the machine shop we have a shoe and wedge combination tool and have planed them at a cost as low as four cents apiece; the average is seven cents.

Member:—It is almost impossible for some of the foremen to get off long enough to attend this convention or to visit other shops, but they can all have the benefit of the mechanical journals.

F. C. Pickard:—I would like an expression from the general foremen as a body as to the way in which to handle shop kinks. Do you have a man who is assigned to this work as an assistant or aid to the general foreman or tool foreman? Do the general foremen as a body advocate the sending of the foremen of the various departments to other railways to get ideas of shop kinks?

U. T. Gale:—I presume that it is the opinion now, if not before, that it is necessary that the general foreman should be a live one. He should be alert all the time. He should be ready to receive suggestions, no matter how humble a person they may come from. He should be broad minded and fair and should take advantage of every opportunity to increase the efficiency of his department. I believe that we take it for granted that it is absolutely necessary in order to get out of the fossil condition that men should communicate and get in touch with their fellowmen. I believe that it is taken for granted that we do not individually possess all the good ideas. I have known of poor ignorant laborers expressing ideas, which possibly they did not know the value of, in the way of creating some efficient method. We ought to have some system whereby the individual employee should be given an opportunity to express an idea.

I believe there ought to be some method whereby we could gather up those ideas and give the men due credit.

T. E. Griffin:—There is a firm in Indianapolis which has adopted a system of that kind. They allow each man, laborer or machinist, to write a paper on some improvement. Every three months these are sent to the office and a committee is appointed. If they do not amount to anything, they thank them just the same. If they do, they give them a premium, small, but enough to encourage them.

H. D. Kelley:—You frequently get up a shop kink and later find that it is not a new idea but has been used in some shop for years. This useless expenditure of energy may be eliminated to some extent by visiting shops or by taking the mechanical papers.

OTHER BUSINESS.

Election of Officers:—F. C. Pickard, master mechanic, Cincinnati, Hamilton & Dayton, Indianapolis, Indiana, was elected president; J. A. Boyden, of the Hornell shops of the Erie, was elected first vice-president; T. F. Griffin, of the C. C. C. & St. L. at Indianapolis, was elected second vice-president; W. Smith, of the Chicago & North Western at Fremont, Neb., was elected third vice-president; L. A. North, of the Illinois Central at Chicago, was elected fourth vice-president, and L. H. Bryan, Duluth & Iron Range at Two Harbors, Mich., was elected secretary and treasurer. The three new members of the executive committee are W. W. Scott, Cincinnati, Hamilton & Dayton, Indianapolis, Ind.; W. C. Reyer, Nashville, Chattanooga & St. Louis, at Nashville, Tenn., and U. T. Gale, Chicago & North Western, Chicago.

The last session of the convention, Thursday afternoon, was given over to the consideration of the future work of the association and plans for the coming year.

The exhibits occupied the rooms leading from the banquet hall in which the meetings were held, and were most attractively arranged. A list of the exhibitors and of the material and apparatus exhibited appeared on page 186 of the *Railway Age Gazette* for July 28.

SHOP KINKS.*

BY THEODORE ROWE,

[illegible], Great Northern, Jackson Street Shops, St. Paul, Minn.

PISTON ROD ROLLER.

The roller shown in Fig. 1 provides a smooth hard rolled surface for piston rods. The old method of finishing these rods is simple. The roller is placed in position and adjusted to give the necessary pressure. The adjusting end is allowed to rest on a tool in the tool post; the lathe is started up and as the carriage is fed along the bed the roller follows.

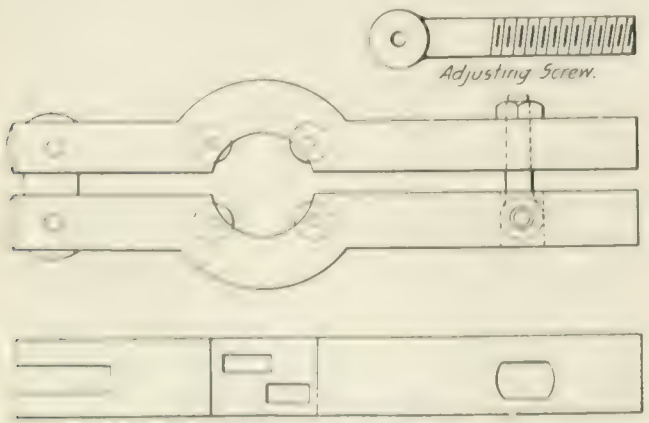


Fig. 1—Piston Rod Roller.

MOLD FOR PISTON ROD PACKING.

An ingenious device for molding piston rod packing is shown in Fig. 2. It consists of two shells, as shown, which are placed on the piston rod and clamped together; the metal is poured through a hole in the top. Molds are made for the different size piston rods. This arrangement has a decided advantage over the old method of making rod packing in that as soon as the metal has cooled, the dies have been removed and the pouring neck has been cut off, it is ready for use. A perfect fit is always assured and a solid packing is obtained which gives much better service on a locomotive.

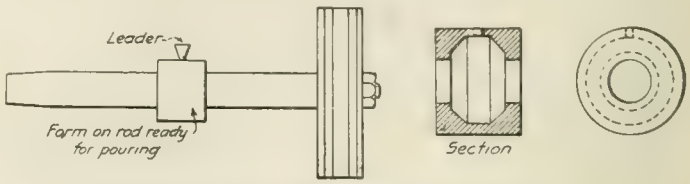


Fig. 2—Mold for Piston Rod Packing.

EJECTOR FOR DRAINING WATER FROM DROP PIT.

A home-made ejector for removing water from a wheel drop pit is shown in Fig. 3. It is simple in construction and may be made in any pipe shop. A 1-in. steam line, provided with a valve in a convenient location, is run to the bottom of the pit and there connected to a 2-in. tee, which is reduced for a 1-in. pipe at both ends. A steam nozzle is placed inside the tee, blowing directly across it, and a perforated pipe is screwed in the nozzle opening. The other end of the tee is connected to the sewer. To operate, simply turn on the steam which when passing from the nozzle draws the water in through the perforated pipe, thus emptying the pit. The pipe is perforated so as to keep [illegible] from stopping up the pipe.

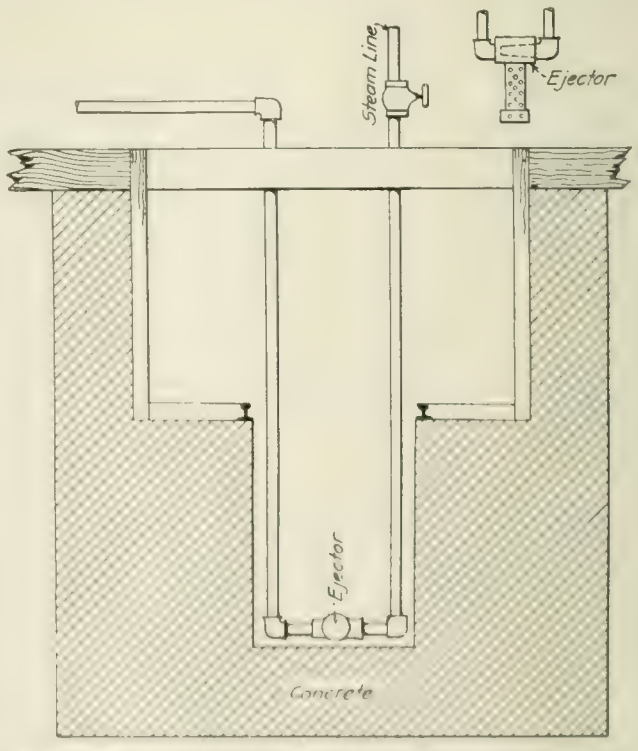
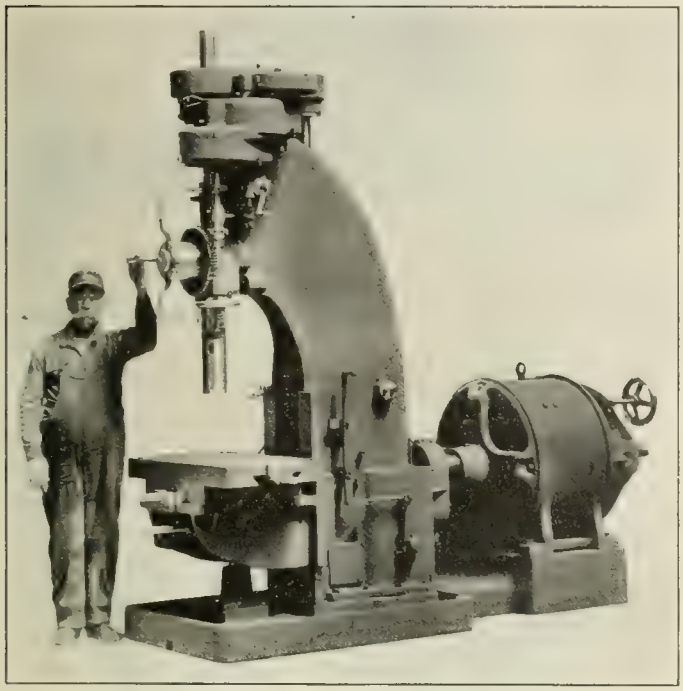


Fig. 3—Ejector for Draining Water from Wheel Drop Pit.

*[illegible] at the convention, June 14, 1911.

HIGH-SPEED DRILL TESTS.

The drill tests made at the Atlantic City convention with drills furnished by the Cleveland Twist Drill Company, Cleveland, Ohio, on a 25½-in. high duty drill made by the Foote-Burt Company, also of Cleveland, presented some new high speed records. The tools were taken from stock, their diameters varying from 1¼ in. to 3¼. The highest rate of speed was made by a 1¼ in. Paragon flat twist high speed drill, which successfully removed



Foote-Burt 25½-in. High Duty Drill.

70.55 cu. in. of cast iron in one minute, repeatedly cutting through a heavy billet at the rate of 57½ in. per minute, or nearly an inch per second. This drill ran at 575 r. p. m., with .100 in. feed per revolution, and successfully withstood the strain of the speed and the feed. Another noteworthy test was made with a 2½-in. milled drill taken from stock. It drilled 68 holes through a billet of machinery steel, 4¼ in. thick, without being reground. This drill was operated at 150 r. p. m., with a feed of .015 in. per revolution, removing a total of 1,418 cu. in. of material. This test demonstrated what can be done, and is indicative of what results should be expected in economical high speed drilling. The following is a record of the tests:

Size and Kind of Drill.	Material	R. P. M.	Feed Per Rev.	Inches Drilled Per Minute.	Peripheral Speed in Feet Per Minute.	Cu. Ins. Metal Removed Per Minute.
1¼ in.	Paragon C. Iron 3½ in..	500	.050	25	163.6	30.68
1¼ in.	Paragon C. Iron 3½ in..	325	.100	32½	106	39.88
1¼ in.	Paragon C. Iron 3½ in..	475	.100	47½	155	58.29
*1¼ in.	Paragon C. Iron 3½ in..	575	.100	*57½	188	70.56
1½ in.	Paragon C. Iron 3½ in..	300	.030	9	117	15.90
1½ in.	Paragon C. Iron 3½ in..	325	.100	32½	127.6	57.43
1½ in.	Paragon C. Iron 3 in..	335	.100	33½	131.5	59.19
1½ in.	Paragon C. Iron 3½ in..	355	.100	35½	139.4	62.73
1¼ in.	Paragon C. Iron 3½ in..	235	.100	23½	107.6	56.52
1¾ in.	Paragon C. Iron 3½ in..	350	.100	35	160	84.19
25 16 in.	Paragon C. Iron 3½ in..	190	.050	9½	115	39.90
3 in.	Paragon C. Iron 3 in..	120	.100	12	94	84.82
1¼ in.	Paragon Mch. S. 4¼ in.	380	.030	10½	113.7	12.88
1⅜ in.	Paragon Mch. S. 4¼ in..	225	.040	9	94.8	18.66
25 16 in.	Paragon Mch. S. 4¼ in.	165	.020	3¼	100	13.65
25 16 in.	Paragon Mch. S. 4¼ in.	400	.020	8	121	16.80
2½ in.	Milled Mch. S. 4¼ in.	150	.015	2¼	98	11.04
2½ in.	Milled M h. S. 4¼ in.	150	.040	6	98	29.45
2½ in.	Milled Mch. S. 4½ in.	175	.040	7	114.5	34.36
1⅝ in.	Paragon Mch. S. 4¼ in..	275	.030	8¼	118	19.84
3 in.	Paragon Mch. S. 4¼ in.	150	.030	4½	117.8	31.81
3¼ in.	Paragon Mch. S. 4¼ in..	150	.030	4½	127	37.33

This is the highest [illegible] record.

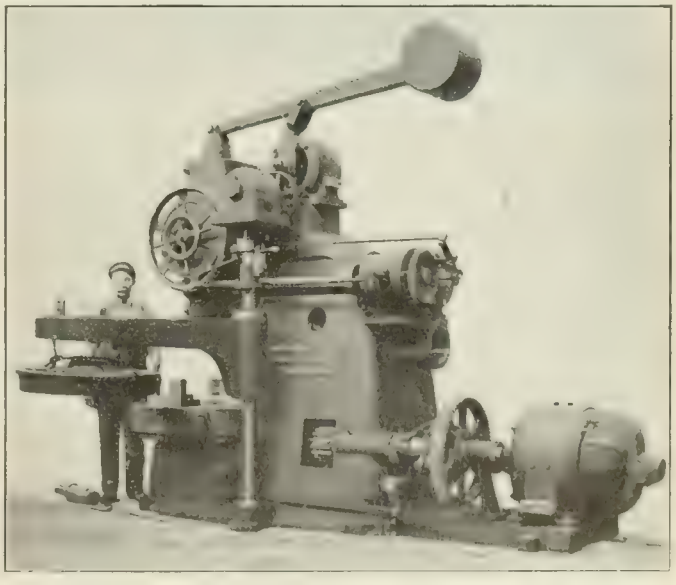
The machine was of the makers' standard type being a regular stock machine. It was driven by a 20 h. p. variable speed direct connected motor of from 300 to 1,200 r. p. m. It has nine changes of geared feed, any one of which is instantly available without the necessity of stopping the machine. The feed is operated by levers located at the front of the machine within easy reach of the operator at all times. The power feed is provided with an adjustable automatic stop, as well as a hand stop. The hand feed is operated through a worm and wheel, and a quick movement of the spindle in either direction is accomplished through a spider hand wheel located at the front of the machine, which, with either the in or the out movement of any or all of the handles, engages or disengages it.

The table is of the bracket knee type, having a large square lock bearing surface on the upright, to which it is securely gibbed. It is further supported and elevated by a square thread telescopic jack screw, located underneath, slightly back of the spindle, so as to permit boring bars and other tools passing through the table. It is also provided with liberal oil grooves and two T slots for clamping the work to the table. The spindle is made of forged high carbon steel, and is fitted with a ball bearing thrust of special make, which is guaranteed not to crush under the most severe duty. All the bearings are bronze bushed, except the main driving shafts at the base and top of the machine, which are equipped with Hyatt high duty roller bearings.

CAR WHEEL BORING MACHINE.

The accompanying illustrations show an extra heavy 48-in. boring mill for car wheels, made by the Niles-Bement-Pond Company, New York. It is of new design and is built to perform the heaviest kind of work in boring and facing both cast iron and steel wheels. The machine, though strong and powerful is, at the same time, adapted to handle work with great facility. It will chuck wheels 42 in. in diameter down to 26 in., and will bore holes from 4¾-in. to 9-in. diameter.

The table, which is 48 in. in diameter, is driven by bevel gear and has an annular bearing near its circumference. The main shaft, driving the table, is supported on its outer end by



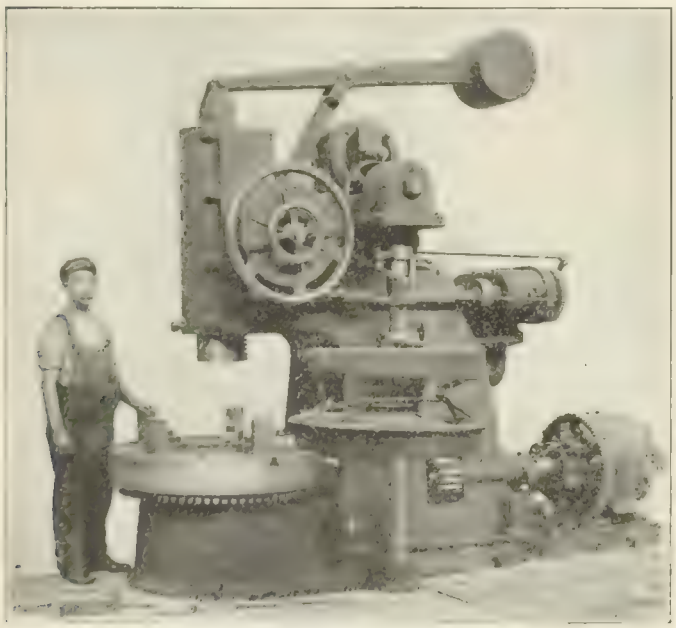
48-in. Boring Mill for Car Wheels.

a bearing integral with the machine. The bevel gears are kept in proper mesh by a filler plate attached to the table which bears on the track in the bed. The table spindle is provided with an adjustable taper split bushing, so that the wear in the spindle may be taken up at any time without throwing it out of alinement with the boring bar. To take up the upward

thrust of the table, should it tend to lift, an adjustable collar is attached to the bottom of the table spindle which bears against the bed. The table is provided with a five-jaw, self-centering, universal chuck, operated by a single motion of a cam lever. The chuck slides have a small movement used for gripping only. They are corrugated and slotted on top to fit the corresponding corrugations on the jaws, which may be set at any point on the slides.

The boring bar, which is 10 in. in diameter, and has a travel of 32 in., is furnished with six boring feeds ranging from 1/12 in. to 9/16 in. per revolution of the table. The hub facing bar is 9 in. diameter, and is furnished with the same number and amount of feeds as is furnished with the main cutter bar. Suitable speeds for boring both cast-iron and steel wheels are provided. They range from about 12 to 36 r. p. m., but the machine can be arranged for any other speeds, within reason, that may be selected within the total range of 1 to 3.

At a speed of 40 ft. per minute, the machine will take a cut of ⅜ in. on the radius with ⅛ in. feed. At a higher velocity the machine will take a smaller cut and at a cor-



Motor Driven Car Wheel Boring Mill.

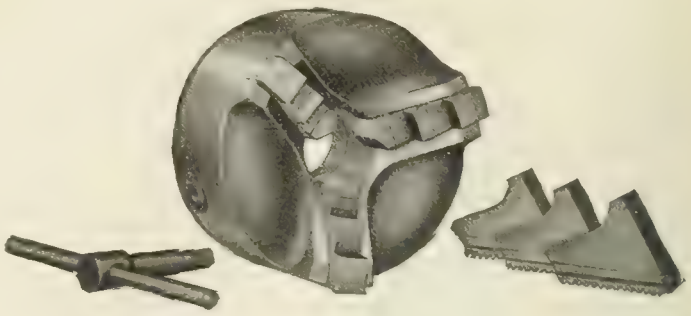
respondingly lower velocity will carry a heavier cut. In other words the [illegible] a cut within the limit of the endurance of the cutting tools. The travel of the boring bar is suitable for 8-in. hub lengths, so that the cutters pass entirely through the [illegible]

The [illegible] is used for a pipe leading from the outside of the table. Attached to it is a stand pipe which insures flooding the track with a steady flow of oil. The table spindle is [illegible] provided with a stand-pipe. A power crane for handling the [illegible] with the machine. When belt driven the machine is equipped [illegible] countershaft is provided, with the equipment which gives six speeds. When motor driven, a 20 h. p. variable speed motor is provided for the main drive and a 2 h. p. constant speed motor for operating the crane.

[illegible] miles long, from Meiringen to Engelberg, over the Joch pass. [illegible] around the [illegible]

HIGH-SPEED UNIVERSAL CHUCK.

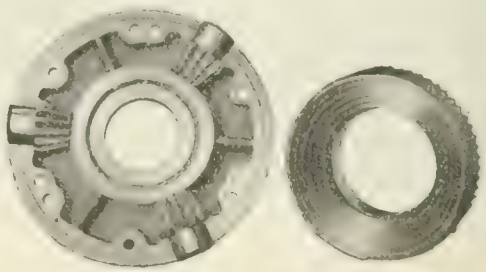
A new self-centering chuck, called the Columbia high-speed universal chuck, has recently been placed on the market by Schuchardt & Schutte, New York, to meet the demands of heavy work with high speed steel. The spiral thread for moving the



Columbia High-Speed Universal Chuck.

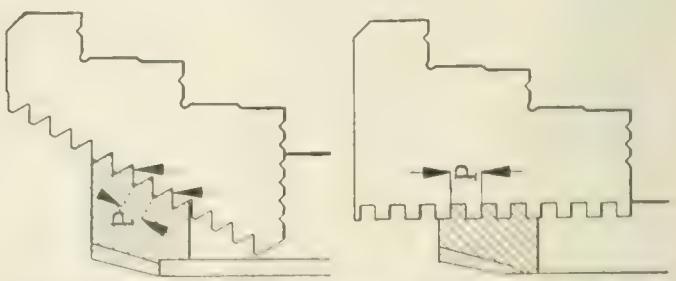
jaws of the chuck in and out, is V-shaped and is cut on the inside sloping surface of a steel ring. This ring is hardened and ground, which increases its accuracy and holds the chuck true for a longer time.

The pitch of the thread, as shown in the illustrations, is finer



Interior of Columbia Chuck.

than that of the ordinary scroll chuck, which increases its gripping power and the area of the wearing surface. The sloping surface of the body gives greater support to the jaws and insures rigidity. The jaws are made as short as possible, so that



Pitch of the Conical Spiral Compared with the Flat Spiral.

they will, in most cases, be covered by the chuck body and not protrude, so as to be caught in the hands or clothing of the operator. Owing to the ground surfaces of the spiral steel ring the friction on the ways is considerably reduced.

The Chilean government engineers have completed the surveys and estimates on nine short lines as feeders for the trunk line between the Longitudinal and [illegible] miles, and are now surveying seven lines, covering 248 miles, that are expected to be ready for contractors by the close of 1911. When this line is completed from Arica to Puerto Montt the Chilean government will have a direct line covering 2,132 miles, of which about [illegible] are now in operation and 240 miles under construction, while the balance is being surveyed.

General News Section.

The Missouri Pacific has created a publicity department in charge of John W. Kearney, whose headquarters will be at St. Louis, Mo.

The government has brought suit in the United States District Court at Des Moines, Iowa, against the Iowa Central for violations of the 16-hour law.

The Norfolk & Western is conferring with city officials at Columbus, Ohio, in order to arrange for eliminating grade crossings and making other improvements on the east side of the city.

The Chesapeake & Ohio last week offered its shop men an increase of two cents an hour, and the committee representing the employees is reported as recommending that the offer be accepted. The men had asked for an increase of five cents an hour.

According to press despatches, boiler makers on the Houston & Texas Central have struck and the Texas & Pacific and St. Louis Southwestern boiler makers are about to demand different working conditions and an increase of about three cents an hour.

St. Croix Johnstone, flying in a Moissant monoplane at Garden City, L. I., on July 27, broke all American records for duration and distance of sustained flight. He remained in the air 4 hours and 2 minutes, traveling 176 miles. The world's records are 11 hours, 45 minutes and 463 miles, made in France.

Mayor Harrison of Chicago has appointed a board consisting of City Engineer John Ericson (chairman), E. C. Shanklin and James J. Reynolds to prepare tentative plans for a passenger subway. The traction fund available for building such a subway now amounts to about $12,000,000, and is being increased at the rate of $1,500,000 a year.

The state auditor of Kentucky has filed suit against the Louisville & Nashville to collect about $500,000 in back taxes. It is alleged that the company's reports for the last four years have been incorrect, and that the counties and cities that the road passes through are entitled to four times the amount of the taxes collected during this period.

Fire destroyed 30 freight cars and two transfer sheds at Nashua Junction, N. H., on the Boston & Maine, on August 1. The fire is attributed to the explosion of a barrel of cement (presumably a rubber cement containing alcohol or a volatile oil). The barrel was leaking and an employee took a lantern into the car when he went to investigate.

The forestry branch of the Canadian Department of the Interior has collected statistics of the tie consumption in Canada for 1910. There were 9,212,962 ties purchased in 1910 by the steam and electric roads of Canada at a cost of $3,535,228. This is a decrease of 35 per cent. from the number purchased in 1909. The steam railways used 95 per cent. of all the ties, and these ties cost them on the average 38 cents. The electric railway used 302,540 ties—an increase of 183 per cent. over 1909. They paid for their ties 41 cents each.

The old Bureau of Railroads, which was established in the Interior Department in the early eighties for the purpose of looking after the earnings of railways that received financial assistance from the government, has been revived by Secretary Fisher. About fifteen railways are affected by the order. No reports of the gross and net earnings have been received from these roads since 1904, and an attempt will be made to have them submit their back data. Congress, since 1904, has failed to make an appropriation for the maintenance of the bureau and it was allowed to drop into obscurity.

The Long Island perfected plans for eliminating 30 grade crossings near Long Island City. The New York Public Service Commission has granted a certificate of convenience and necessity allowing the railway to change the route of its main line just east of the Sunnyside yards. The change straightens out a sharp curve and makes it simpler to eliminate eight grade crossings. The railway has been negotiating for some time to this end. The other grade crossing eliminations will be made in connection with the other improvements the Long Island has been making between Long Island City and Jamaica.

Last week Governor Dix, of New York, signed the bill authorizing the New York Central & Hudson River to make an agreement with the board of estimate of New York City for the removal of its freight tracks from the surface of Eleventh avenue on the west side of the city. While the measure does not settle the controversy which has been going on for years regarding these tracks, it clears the way for definite negotiations between the railway and the city. Each party has been anxious to get the tracks off the street, but they have been hampered by local politicians and newspapers who have made impossible demands.

The five railwayless counties of southwestern Kansas get more railway surveys and fewer railways than any other stretch of country in the civilized world. During the last twenty years more than twenty-five railways have been surveyed in that section. At the present time six different surveys are being run. At first the settlers out there took the matter seriously and had great hopes. But they pay no more attention now to a surveying party than to a howling coyote. Nearly every township in the five counties has been gridironed with surveys, but before the people get excited again they insist that they must see the rails and ties being laid.

Chicago, Burlington & Quincy train No. 7, a fast mail train running between Chicago and U. P. Transfer, Council Bluffs, has arrived at U. P. Transfer on time every day since March 15, and is still maintaining that record. This is in spite of the fact that it was obliged to leave Chicago late over 27 per cent. of the time, due to waiting for eastern connections. Train No. 15, another fast train between the same points, has maintained a record of reaching Union Pacific Transfer on time 94 per cent. of the time, although delayed in leaving Chicago 27 per cent. of the time. Neither train was late into Union Pacific Transfer a single trip during the month of June.

The Maine courts in sustaining a verdict for the Lewiston, Augusta & Waterville Electric, define the lack of rights of unauthorized persons on the car of a railway company. Isadore Drouin sued the railway for damages sustained while on one of the company's cars. He was in the employ of the street department of the city of Auburn, and was one of a crew receiving gravel which the railway company was hauling for the city and delivering by dumping beside the track. The city's foreman sent workmen, including Drouin, on the cars to clean them out after they had been dumped. The court finds that there is no evidence that he was on the car by "request or consent" of the railway, and, therefore, the railway cannot be held responsible for his injuries.

In addition to the Pennsylvania's superannuation and pension disbursements, the latest reports of the system's relief funds show that since 1886 there have been paid in benefits a total of $31,006,116. This amount represents benefits paid to members who were incapacitated for work and also to the families of those who died. During the month of June, 1911, $185,309 in benefits was paid to members or their families on the lines east and west of Pittsburgh. On the lines east, $132,186 was paid from the relief fund during June. In benefits to the families of members who died $43,301 was paid, while to members incapacitated for work the benefits amounted to $88,885. The relief fund of the lines west paid $53,122 in June, of which $16,350 was for the families of members who died, and $36,772 for members unable to work.

Two Head-on Collisions.

On the evening of July 28, a regular southbound passenger train collided with a northbound excursion train near Grindstone, Me., on the Bangor & Aroostook. Eight people were killed and sixteen badly hurt. The engineman of the excursion train and the firemen on both trains were killed. Nearly all the killed and injured were in the smoker of the northbound train, this car was telescoped, none of the other cars being much damaged. It is

understood that the northbound train had orders to take a siding south of Grindstone, the southbound train being the superior train; but that, being behind time, the engineman tried to make the Grindstone siding. Neither train was moving at high speed.

On July 27 an excursion train on the Seaboard Air Line struck a freight train head-on at Hamlet, N. C. Eight passengers (negroes) were reported killed, and 88 people injured, including four trainmen. The excursion train was southbound from Durham. The freight was northbound from Washington and was entering the Hamlet yards at slow speed. The collision was on a curve, and a string of freight cars on the siding cut off the view of each engineman. It is understood that the freight was on the main line without authority.

Pennsylvania Railroad Lost and Found Statistics.

Lost articles are turned in to the parcel room at the Pennsylvania station in New York City at the rate of about twenty a day. Between the time the station was opened, November 27, 1910, and July 12, 1911, 3,630 such articles were received. So far, the most valuable find was a pocketbook containing $144, which was immediately claimed by its owner. About 18 out of the 20 parcels received daily at this station are called for. When they are brought in they are registered in a book, a duplicate ticket is given to the finder, and a tag bearing the same form and number is attached. If, at the end of 90 days, the owner has not appeared, they go back to the finder. Perishable goods are given to the finder after 12 hours.

In December, 1910, there were 1,204 losses recorded at Broad Street Station in Philadelphia. Of these, 806 have been returned to their owners.

The books in Union Station, Pittsburgh, show that 93 items were recorded during five days taken at random from last May. This is a little less than the average for a like period in New York, and the percentage of those restored to the loser is very much less. Inquiries were received for only 43; the other 50 still remain unasked for.

Canada's Projected Lines.

An active railway construction program is projected for the Dominion generally and for Saskatchewan particularly, in the present fiscal year. In Saskatchewan over 1,000 miles of new line will be laid. Last year, this province led the others with total new track amounting to 476 miles. According to the plans so far announced by the three principal railways of Canada, the Canadian Northern will construct 330 miles in the province, the Grand Trunk Pacific 342 miles and the Canadian Pacific about 350 miles, making a total of about 1,120 miles. In addition to this new construction work, about 1,350 miles of new grading will be done.

Concerning the completion of the Grand Trunk Pacific and the Grand Trunk from ocean to ocean, President Hays, who recently completed a six-weeks tour of inspection of the greater part of the system, says the line will be completed in 1914. This is a year later than the estimate made early in 1910. Mr. Hays explained that in certain sections of the line good construction progress had been made, while in other sections, owing to the difficulties presented by the rough country and [illegible] construction has been carried forward very slowly. Good construction progress has been made [illegible] the road running through the clay belt of Northern Ontario. The main section is completed a considerable [illegible] and the present terminus of the Temiskaming Railway. On both sides of the line there is good grazing and farming land. From Winnipeg to Edmonton [illegible] of the territory on both sides of the line is excellent wheat growing land, while the remaining is adapted to grazing. The present wheat belt [illegible] settlers. The Grand Trunk Pacific will be able to furnish con[illegible] This will compare with about 5,575,000 bushels hauled last year. The Grand Trunk Pacific, when completed, will be made up as follows: Moncton to Winnipeg (National Transcontinental, under construction), 1,805 miles; Winnipeg to Edmonton, construction of which section is completed, 793 miles, and Edmonton to Prince Rupert, partly constructed, 962 miles. By the time the main line is finished to the port of Prince Rupert, the company's branch line, from Montreal to the main line will have been built and put in condition to handle traffic.—*Wall Street Journal*

Notes on Japanese Railways.

Japanese engineers favor the English type of locomotive, principally because the center of gravity is considerably lower, and they feel it is safer on their curves with the narrow gage. I understand that the most satisfactory locomotives ever operated in Japan were built in America from English designs. This information was given me by a firm in Japan which has handled upwards of 4,000 locomotives of various types. That first order of 50 locomotives was followed by orders for some 500 of the same type, and they proved very satisfactory. Locomotive and car works have recently been established, and much new work is done at home.

Station platforms as in England and Europe are level with the car steps. The station master is quite a dignified official, has a uniform and carries a sword on special occasions. The uniform consists of the ordinary regulation blue, with gilt buttons and gold braid, and a bright scarlet band around his cap. He is rather a showy individual when he gets it on, and as he walks along the platform things move. When there is a celebrated dignitary passing through, such as the Emperor or a member of Parliament, he buckles on his sword.

About 130 lbs. of free baggage is allowed on each first-class ticket, and baggage will be delivered by station porters within a radius of four miles at 2½ cents per piece.

Trains are in charge of a guard. Tickets are punched when passengers pass through the wicket on the platform, and given up when passing out at destination. All tickets are good for stop-overs at most stations, within the limits of expiration date, all that is necessary being to show your ticket to the collector at the wicket and pass out. Special platform tickets are issued at one cent each to accommodate those coming with or to meet friends. In that way they take advantage, in a financial sense at least, of the feelings of the people, which in Japan lead them to appear in large numbers when their friends leave or when they wish to welcome someone coming. It is my own recollection that when we left Kure, the naval station, homeward bound, upwards of 100 appeared and lined up on the platform, to say "Good bye" in his best English. It is considered a mark of very great disrespect in Japan not to go to the station to see your friends off.—*James F. Paige,* before New England Railroad Club.

Sale of Stock to Union Switch & Signal Employees.

The Union Switch & Signal Company has set aside 2,000 shares (par value $50 per share) of its common stock to be sold to employees, and 1,000 shares of common stock are now offered to employees not general officers. Employees are offered the privilege of subscribing for stock at $75 per share, payment to be made in installments covering a maximum period of 50 months. As soon as 24 per cent. of the purchase price has been paid, all dividends accruing on the stock are credited to the purchaser's account. After the subscription price has been fully paid, if the employee continues in the employ of the company he is entitled to a participation certificate, which entitles him to all cash or stock dividends, and also to voting rights to be exercised through the treasurer. In addition, the company is to declare a 5% per share dividend each year for five years on the participation certificate; this, of course, in addition to any dividends that are paid on the stock itself. It will be seen, therefore, that the employee will, at the end of the five year period after the completion of his payments, have received his stock at $50 per share or par. The last allotment of stock of the Union Switch & Signal Company to its stockholders was at 75 and the stock is now selling in the open market in the neighborhood of $80 per $50 par value share.

It will be noted that the subscriber gets no interest on the first 24 per cent. of his subscription, but after the first 24 per

cent. is paid, he receives all cash dividends on the full amount of the stock that he subscribed for and is not charged any interest on his deferred payments.

When the stock has been fully paid, stockholders may take stock certificates instead of participation certificates. These stock certificates, of course, are negotiable, while the participation certificates are not negotiable; but if stock instead of participation certificates are taken, the stockholder loses his privilege of getting an extra dividend of $5 per share for each year for five years.

If a subscriber leaves the employ of the company, or wishes to discontinue his subscription before the full amount is paid up, or dies, he or his heirs are entitled to receive the full amount of money that he has paid in, with interest at 5 per cent.

Employees who are getting $1,000 a year or less are offered five shares or less; employees who are getting $3,000 a year are offered 5 shares for the first $1,000 of salary, and one additional share for each additional $250 of salary or fraction thereof; employees who are paid more than $3,000 have the right to subscribe for 13 shares for the first $3,000 of salary and one additional share for each additional $500 of salary—the maximum subscription, allowed, however, for employees of any class is 20 shares.

Completion of the Kinshu Railway.

The section of the Kinshu Railway, Japan, which has been up to this time winding between Hitoyoshi and Yoshimatu, and which was begun in the first half of 1906, was finished last November. The completion of the section, which is 21 miles long, was not expected before this year, but the difficulties that were offered by the mountainous district through which it passes, were more rapidly overcome than was at first believed possible. There are in all through the Yataka mountains 21 tunnels, with a total length of 4.19 miles. The railway attains at the point of the highest tunnel an altitude of 1,776 ft. above the level of the sea; the Hitoyoshi station is only 295 ft., and that at Yoshimatu 210 meters, or 689 ft., above the sea. The new section was given over to traffic on November 20. On the same day there was an opening celebration in Edgoshima. With the opening of this section there will be direct railway communications between Moji and Kagoshima, and also with the railway to Tokio, on the main island. The governmental authorities intended to operate through trains, which will make this entire run of 327 miles in 13 hours.

Further, it is intended to make regular steamer communication with the railway from Kagoshima and Formosa. When this is done, the present direct steamer connection between Mojit and Formosa will be discontinued.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

Air Brake Association.—F. M. Nellis, 53 State St., Boston, Mass.

American Association of Demurrage Officers.—A. G. Thomason, Scranton, Pa.

American Association of General Passenger and Ticket Agents.—C. M. Burt, Boston, Mass.; next meeting, St. Paul, Minn., Sept. 19, 1911.

American Association of Freight Agents.—R. O. Wells, East St. Louis, Ill.

American Association of Railroad Superintendents.—O. G. Fetter, Carew building, Cincinnati, Ohio; 3d Friday of March and September.

American Electric Railway Association.—H. C. Donecker, 29 W. 39th St., New York; October 9-13, Atlantic City, N. J.

American Railway Association.—W. F. Allen, 75 Church St., New York; November 15, Chicago.

American Railway Bridge and Building Association.—C. A. Lichty, C. & N. W., Chicago; Oct. 17-19, 1911, St. Louis, Mo.

American Railway Engineering Association.—E. H. Fritch, Monadnock Block, Chicago; annual convention, March 19-21, 1912, Chicago.

American Railway Master Mechanics' Association.—J. W. Taylor, Old Colony building, Chicago.

American Railway Tool Foremen's Association.—O. T. Harroun, Bloomington, Ill.

American Society for Testing Materials.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.

American Society of Civil Engineers.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

American Society of Engineering Contractors.—D. J. Hauer, 13 Park Row, New York; 3d Tuesday of each month, New York.

American Society of Mechanical Engineers.—Calvin W. Rice, 29 W. 39th St., New York.

Association of American Railway Accounting Officers.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.

Association of Railway Claim Agents.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 22, 1912, Los Angeles, Cal.

Association of Railway Electrical Engineers.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago; annual, November 6-10, Chicago.

Association of Railway Telegraph Superintendents.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.

Association of Transportation and Car Accounting Officers.—G. P. Conard, 75 Church St., New York; December 12-13, Louisville, Ky.

Canadian Railway Club.—James Powell, Grand Trunk Ry., Montreal, Que.; 1st Tuesday in month, except June, July and Aug., Montreal.

Canadian Society of Civil Engineers.—Clement H. McLead, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

Car Foremen's Association of Chicago.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

Civil Engineers' Society of St. Paul.—D. F. Jurgensen, 116 Winter St., St. Paul, Minn.; 2d Monday, except June, July and Aug., St. Paul.

Engineers' Society of Pennsylvania.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

Engineers' Society of Western Pennsylvania.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

Freight Claim Association.—Warren P. Taylor, Richmond, Va.; annual, Buffalo, N. Y.

General Superintendents' Association of Chicago.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

International Railway Congress.—Executive Committee, rue de Louvain, 11 Brussels; 1915, Berlin.

International Railway Fuel Association.—D. B. Sebastian, La Salle St. Station, Chicago.

International Railway General Foremen's Association.—L. H. Bryan, D. & I. R. Ry., Two Harbors, Minn.

International Railroad Master Blacksmiths' Association.—A. L. Woodworth, Lima, Ohio; annual, Aug. 15, Toledo, Ohio.

Iowa Railway Club.—W. B. Harrison, Union Station, Des Moines, Ia.; 2d Friday in month, except July and August, Des Moines.

Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York.

Master Car Builders' Association.—J. W. Taylor, Old Colony building, Chicago.

Master Car and Locomotive Painters' Association of United States and Canada.—A. P. Dane, B. & M., Reading, Mass.; Sept. 12-15, 1911, Atlantic City, N. J.

New England Railroad Club.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

New York Railroad Club.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

Northern Railway Club.—C. L. Kennedy, C., M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.

Omaha Railway Club.—H. H. Maulick, Barker Block, Omaha, Neb.; second Wednesday.

Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

Railway Club of Pittsburgh.—C. W. Alleman, P. & L. E., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

Railway Industrial Association.—G. L. Stewart, St. L. S. W. Ry., St. Louis, Mo.; annual, May 12, 1912, Kansas City, Mo.

Railway Signal Association.—C. C. Rosenberg, Bethlehem, Pa.; annual, Oct. 10, Colorado Springs, Colo.

Railway Storekeepers' Association.—J. P. Murphy, Box C, Collinwood, Ohio.

Richmond Railroad Club.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

Roadmasters' and Maintenance of Way Association.—Walter E. Emery, P. & P. U. Ry., Peoria, Ill.; September 12-15, St. Louis, Mo.

St. Louis Railway Club.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

Society of Railway Financial Officers.—C. Nyquist, La Salle St. Station, Chicago; Sept. 12-14, St. Paul, Minn.

Southern Association of Car Service Officers.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.; annual, October 20, Atlanta, Ga.

Southern & Southwestern Railway Club.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

Toledo Transportation Club.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

Traffic Club of Chicago.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.

Traffic Club of New York.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

Traffic Club of Pittsburgh.—T. J. Walters, Oliver building, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

Train Despatchers' Association of America.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.

Transportation Club of Buffalo.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

Transportation Club of Detroit.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.

Traveling Engineers' Association.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.; annual, August 29-September 1, Chicago.

Western Canada Railway Club.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

Western Railway Club.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Wednesday in month, except July and August, Chicago.

Wood Preservers' Association.—E. J. Angier, First National Bank Bldg., Chicago; annual, January 16-18, Chicago.

Traffic News.

The assistant attorney general of Washington has told the Washington Public Service Commission that in his opinion railways and steamship companies cannot legally exchange with newspapers intrastate transportation for advertising.

The Board of Supervisors of Denver, Colo., have appropriated $500 to engage a lawyer to compel the Colorado & Southern to carry freight between Denver and points on the line running via Leadville to Breckenridge. This line is the old Denver, South Park & Pacific.

The Missouri Pacific and the Texas & Pacific are to put in operation a through dining car service on their trains between St. Louis and New Orleans; and a through dining car service is also to be put in operation between New Orleans and El Paso on the Texas & Pacific.

The Atchison, Topeka & Santa Fe has reduced its first and second class rates from El Paso, Tex., to points between Belen, N. Mex., and Clovis by 18 cents; its third class rates by 17 cents; its fourth class rates by 19 cents; its fifth class rates by 5 cents, and its class A rates by 12 cents per 100 lbs.

The American Hawaiian Steamship Company has leased about three acres of water frontage at Los Angeles from the Southern Pacific, and it is surmised that hereafter the company will make Los Angeles a port of call. At present freight for Los Angeles is delivered to the Atchison, Topeka & Santa Fe at San Diago.

The government of Canada has decided to rebate the duty on bituminous coal brought into Manitoba, Saskatchewan, Alberta and Eastern British Columbia from the United States within the next two months. This is in consequence of the failure of coal miners and mine operators to settle the strike in the Alberta mines, which has been carried on throughout the summer.

Representative Adamson of Georgia, a member of the Interstate and Foreign Commerce Committee, has introduced a resolution in the lower house of Congress, authorizing the Interstate Commerce Commission to make a valuation of all railways in the United States. The information was obtained "to be submitted as prima facie evidence of facts in investigations or trials before the Interstate Commerce Commission, or in any court."

In the 12 months ended June 30, 1911, the total value of manufactures exported from the United States was $910,000,000, of which $601,000,000 was manufactures ready for consumption and $309,000,000 manufactures for use in further manufacturing. This is the largest total value for any year in the history of the country, and also represents a larger gain over the previous year than has ever been made before. The increase over 1910 was $143,000,000, or about 18½ per cent.

The Philadelphia & West Chester Traction Company began on August 1 a freight service between West Chester and Sixty-third street and Market street, Philadelphia. There will be an interchange of cars at Sixty-third street with the Philadelphia Rapid Transit, which will haul cars and freight from and to its main freight station at Front and Market streets. It is said that this is the beginning of a general scheme to extend freight service by trolley to a number of towns in Pennsylvania.

A press despatch from Monterey, Mex., says that experts employed by the United States government are investigating the

while seven years ago there were none, and it is estimated that only about 10 per cent. of the land which could be used to raise rice is now under cultivation, and it is claimed that 85 per cent. of the total cultivatable rice lands are tributary to the St. Louis Southwestern's lines.

It is understood that the Atchison, Topeka & Santa Fe and the St. Louis & San Francisco have made a narrangement by which a through passenger train is to be run beginning in the latter part of this year between New Orleans, La., and Los Angeles, using the the Frisco out of New Orleans and the Coleman cut-off of the Atchison, Topeka & Santa Fe. This would bring the Santa Fe in competition for passenger business with the Southern Pacific's through trains from New Orleans to Los Angeles and San Francisco. Roughly the distance from New Orleans to Los Angeles by the Santa Fe-Frisco line would seem to be 2,202 miles, as compared with 2,003 by the Southern Pacific.

For use in July, 19,496 commutation tickets were sold by the Long Island Railroad. This is the greatest number of commutation tickets ever sold on the Long Island in one month, being 2,142 more tickets than were sold in any one month last year. This gain in commutation traffic is attributed to the opening of the Pennsylvania East river tunnels which, of course, very much shortens the time between Long Island and the uptown business district of Manhattan, but does not shorten the time between the downtown business district and Long Island points. The subway to Flatbush avenue, Brooklyn, and the electric service between there and Jamaica is still the quickest way to get from the Battery to points in Long Island.

An inexhaustible source of editorials for southeastern daily papers has been a comparison of the methods of the Canadian Pacific and the Southern Railway in colonization work. In reply to criticism in a more than ordinarily progressive Southern newspaper, President Finely said.: "In comparing the work of this character being done by the railway companies of the Southeast with that being done by the Canadian company referred to, and by some of the western transcontinental lines in the United States, we should not lose sight of the fact that many of these western lines, both in the United States and Canada, are owners of large tracts of agricultural lands, granted to them in aid of their construction. The revenues which they obtain from the sale of these lands constitute funds on which they can draw for expenditures in connection with the solicitation of immigration and other development work. The companies operating in the Southeastern states, however, must draw on their operating revenues for all expenditures of this character. The western lines, in addition to the money realized from the sale of lands, for use in the solicitation of immigrants, are in position to offer their own lands direct to immigrants at definite prices; whereas, the lines of the Southeast, having no such large bodies of lands of their own, can do no more than bring prospective buyers into touch with those having lands for sale.

F. W. Stevens, chairman of the New York Public Service Commission, Second district, in a talk delivered at the Chatauqua at Jamestown, N. Y., recently said: "I have never believed for a moment the oft repeated sentence, 'A public officer is a public servant.' A public officer is a man named to an office wherein he is to exercise his own best judgment in performing his duties, and if he responds to any demand or clamor in opposition to his own judgment of what is best and right, then he is betraying the most sacred trust. The work of the Public Service Commission is in the nature of a court, and its decisions are based on evidence and facts placed before it and are not influenced by public clamor or personal influence, no matter from what sources. Distrust the public official who keeps in the limelight; it is bad for the sight, bad for the hearing, and conducive to a big head. When you find a public official who prefers the limelight, it is a good thing to keep him there and get some other person to perform the duties of his position. The work of our commission can be summarized in part by referring to honest capitalization, end of rebating, reduction of complaints, better understanding between the public and corporations, better service, trains on time, new stations, protection at crossings. The chief functions of the commission are threefold: First, to act as a tribunal for the adjustment of differences between the public and corporations; second, requiring honest capitalization; third, controlling rates and service.

Immigration Traffic Increase.

The following is a comparative statement of passenger revenues of the six important trunk lines operating out of New York for the 11 months ended May 31 of this year:

	1911.	Increase.	P. C.
Delaware, Lack. & Western..	$6,934,250	$557,910	8.6
Erie	8,266,415	374,934	4.8
Lehigh Valley	4,111,739	198,499	5.1
New York Central & H. R....	28,161,961	1,238,808	4.2
New York, New Haven & H..	23,977,622	1,217,039	5.3
Pennsylvania R. R.....	30,302,413	1,726,119	6.0

Since its withdrawal from the immigrant pool several months ago the Lackawanna has been getting the greater part of the traffic by having its independent office on Ellis Island, which, in some measure, it is understood, accounts for the showing made in increase of passenger revenue.

The same is also true of the Lehigh Valley, which followed the example of the Lackawanna, and to some extent cut down the latter's advantageous position. Previous to these withdrawals the Erie had been the leader in the handling of this class of business.

Car Surpluses and Shortages.

Arthur Hale, chairman of the committee on relations between railways of the American Railway Association in presenting statistical bulletin No. 99-A, giving a summary of car shortages and surpluses by groups from March 30, 1910, to July 19, 1911, says:

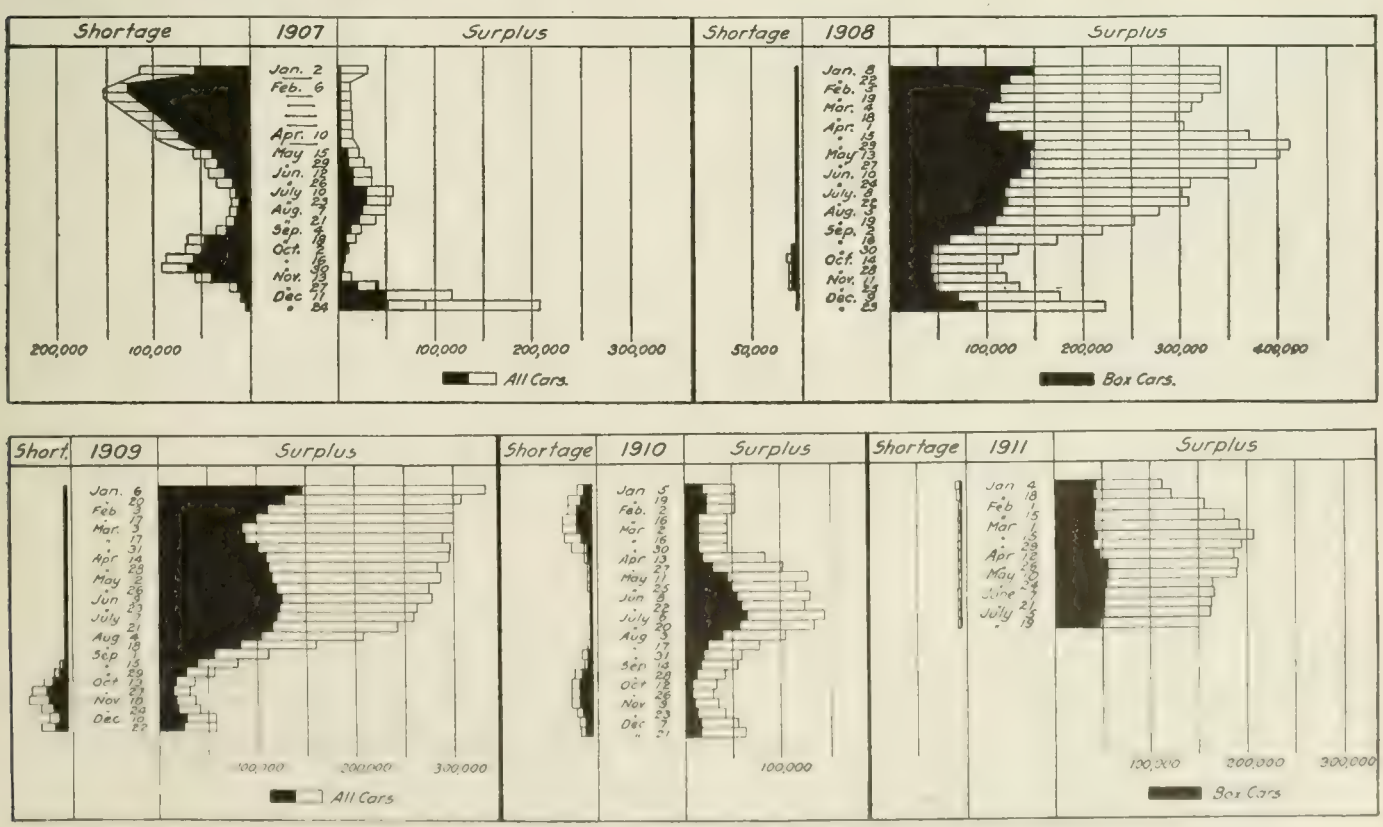
"The total surplus for the date of this report is 150,433, a decrease of 15,075 since our last report. Of this decrease 7,674 are coal and gondolas, and 6,200 box cars. There are also slight decreases in flat and miscellaneous cars. The bulk of the decrease in box cars is in groups 3 (Central), 5 (Southern), and 10 (Pacific), while the coal car decrease is general. There are also some scattering shortages which are as yet unimportant. A study of the charts for previous years shows that without exception the decrease in surplus has started with either the first or second period in July, and the reports seem to indicate a similar tendency in the supply this year."

The accompanying table gives surpluses and shortages by groups in the last period covered by the report, and the chart shows total bi-weekly figures in 1907 to 1911.

Car Surpluses and Shortages.

Date.	No. of roads.	Surpluses: Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.	Shortages: Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.
Group *1.—July 19, 1911	7	2,057	702	1,484	294	4,537	25	13	275	0	313
" 2.— " 19, 1911	25	3,328	129	15,746	5,437	24,640	0	0	389	5	394
" 3.— " 19, 1911	26	7,544	751	32,694	3,499	44,488	22	0	0	3	25
" 4.— " 19, 1911	10	1,817	214	2,094	1,281	5,406	23	0	0	0	23
" 5.— " 19, 1911	19	2,580	320	2,430	1,534	6,864	10	0	0	0	10
" 6.— " 19, 1911	25	10,672	821	3,294	7,602	22,389	2	22	0	5	29
" 7.— " 19, 1911	4	1,771	96	648	937	3,452	0	0	0	0	0
" 8.— " 19, 1911	17	6,803	206	2,116	4,086	13,211	0	0	0	0	0
" 9.— " 19, 1911	11	2,266	541	388	939	4,134	0	0	0	0	0
" 10.— " 19, 1911	21	7,205	1,212	1,768	9,618	19,803	10	0	0	0	10
" 11.— " 19, 1911	7	632	221	27	629	1,509	487	70	0	0	557
Total	172	46,675	5,213	62,689	35,856	150,433	579	105	664	13	1,361

*Group 1 is composed of New England lines; Group 2—New York, New Jersey, Delaware, Maryland and Eastern Pennsylvania lines; Group 3—Ohio, Indiana, Michigan and Western Pennsylvania lines; Group 4—West Virginia, Virginia, North and South Carolina lines; Group 5—Kentucky, Tennessee, Mississippi, Alabama, Georgia and Florida lines; Group 6—Iowa, Illinois, Wisconsin, Minnesota and the Dakotas lines; Group 7—Montana, Wyoming and Nebraska lines; Group 8—Kansas, Colorado, Missouri, Arkansas and Oklahoma lines; Group 9—Texas, Louisiana and New Mexico lines; Group 10—Oregon, Idaho, California and Arizona lines; Group 11—Canadian lines.



Car Surpluses and Shortages in 1907 to 1911.

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF JUNE, 1911.

Name of road	Mileage	Operating revenues			Maintenance		Operating expenses				Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or dec.) comp. with last year.
		Freight.	Passenger.	Total.	Way and structures.	Of equipment.	Trafhc.	Transportation.	General.	Total.					

Condition of the Cotton Crop.

August 2, 1911, 12:00 Noon.

The crop reporting board of the United States department of agriculture estimates that the condition of the cotton crop on July 25 was 89.1 per cent. of a normal, as compared with 88.2 on June 25, 1911; 75.5 on July 25, 1910; 71.9 on July 25, 1909, and 79.4 the average of the past ten years July 25.

Comparisons of conditions, by states, follows:

States.	July 25, 1911.	June 25, 1911.	July 25, 1910.	July 25, 1909.	Ten-yr. Av.
Virginia	102	98	80	71	81
North Carolina	87	89	71	71	79
South Carolina	86	84	70	77	79
Georgia	95	94	70	78	80
Florida	95	96	70	84	82
Alabama	94	93	71	68	79
Mississippi	86	87	71	64	79
Louisiana	84	89	69	58	78
Texas	89	85	82	70	79
Arkansas	94	89	73	76	79
Tennessee	92	87	76	80	82
Missouri	96	90	72	85	83
Oklahoma	88	87	87	79	81
California	99	100	98	..	..
United States	89.1	88.2	75.5	71.9	79.4

Keeping Everybody in Business.

The principal cases of complaint of existing rates that have been brought before the Interstate Commerce Commission during the past several years have been those of communities dissatisfied with relative rate adjustments that they think have placed their producers and merchants at a disadvantage in competition with competing merchants and producers of other communities.

Arguments advanced by the shippers in such cases have often been based upon what they designate as their "natural advantages of location." They have complained against the railways for endeavoring to deprive them of the "natural advantages of location." It is usually considered commendable for an individual to endeavor to overcome natural disadvantages, whether entailed by physical infirmity, lack of training, or other handicap. Spectacles, ear-trumpets, wooden legs, study, application, the saving of money, are all devices for overcoming natural disadvantages, and the person who by use of such a device is enabled to hold his own in a field with those more favorably endowed is usually accorded credit rather than discredit. If he has the ability to perceive his natural disadvantages and the will to overcome them, all the better for him. Now many railways have been built either to overcome the natural disadvantages of a community or to afford opportunity for the use of natural advantages. Indeed, they have never been built for any other reason. The Baltimore & Ohio was constructed to bring to Baltimore traffic which was going to Philadelphia. The first railways from Boston, New York, Chicago and other cities were built to overcome the natural disadvantages of those cities or to promote their natural advantages. When capital, energy, and enterprise have combined to provide a community with railway transportation what is to be the limit to the benefit to which it is entitled from the advantage thus gained? It is to overcome the natural disadvantages that the government spends millions of dollars to improve a harbor here and a river there. Bridges are built and tunnels are bored to overcome such natural disadvantages, as the great Shoshone dam was built and irrigation provided to reclaim the thousands of square miles of arid West. The more we reflect the clearer is our perception that all of the effort that has led to what we call civilization has been to overcome natural disadvantages.

Now a railway serving a particular community finds it to its interest to enable that community to place its products in the widest markets. It is the pursuance of this policy that has developed the industry and commerce of the United States. The clamor of shippers to be protected in the natural advantages of location would seem to be a confession of weakness, for if the natural advantages of location were reinforced with strength, skill, foresight and industry, there would seem little need for them to cry for governmental protection. Natural advantages and economic strength are not synonymous. It would seem that a railway company is justified in promoting the interests of the communities which it serves so long as it is not obliged to carry their traffic at a positive loss, but with a reasonable profit. To rule otherwise is to do for the communities of this country what the trades unions do for their members, reduce their energy and ability to the dead level that stifles enterprise.

Yet it is hardly an exaggeration to say that it is the desire of the weak for protection against the strong that had underlaid all the clamor against the railways. That the weak should be protected from rapacity and injustice is perhaps the motive that underlies nearly all of law, but at the same time that strength, skill, foresight, wisdom and perseverance should be protected in the rewards that accrue to these qualities is essential to the progress of civilization. That railways should charge the same rates under the same conditions to all alike; that by secret practices and stealthy devices one should not be favored at the expense of another is any obligation of the public character of their service. To protect the weak against the strong at all times, under all conditions and by all means is to reverse the process of evolution, to promote the survival of the unfit.—*L. E. Johnson,* before the Southern Shoe Wholesalers' Association.

A Farmers' Market Bureau.

B. F. Yoakum, in an aldress before the Texas Farmers' Congress, at their annual meeting at College, Tex., said in part:

"The farmers do not get as much as they should for their products, and no one can improve this but the farmers themselves. According to government reports, the producer receives 46 cents for products of the farm for which the consumer pays $1.00.

"Last year's agricultural products were worth $9,000,000,000 to the farmers. Assuming that the farmers kept one-third of the products for their own use the consumers paid over $13,000,000,000 where the producers received $6,000,000,000. The cost of getting the year's products from producers to consumers amounted to the enormous sum of $7,000,000,000. The real problem to deal with is not hight cost of living. It is high cost of selling.

"The business end of husbandry has been sadly neglected, and that is the chief reason why agricultural growth makes such a poor showing in comparison with other national developments. To receive better prices, farmers only have to copy what others are doing successfully. For instance, the people of Denmark thirty years ago received $12,000,000 for their butter, eggs and bacon. Then they began the organization of market societies. Now the same character of products brings in over $100,000,000 a year. There is no such talk of high cost of living in that little country because they have a system of economical marketing. The farmers there have organized under trust methods.

"The co-operative creamery and co-operation in marketing fruits, vegetables, grain, cotton and other products is sure of success when practiced under correct business rules. Add ice storage, poultry and egg distribution facilities and the marketing plant becomes complete.

"It will be urged by some that development of thousands or hundreds of thousands of these farm market places to the limit of their usefulness will result in damage to existing business. This alarm is not warranted. Commerce is always aided and not retarded by labor saving machinery and reductions in cost of distribution. In England, Scotland and Ireland there are 1,500 co-operative stores with a membership as large as the population of Texas—eight million people receiving the profits. They do a business of more than $500,000,000 a year.

"These neighborhood marketing establishments will place every farmer with ten or forty acres on the same footing as another with more land and greater harvests.

"The government should assist in finding a way for better farm marketing. There should be a market bureau of the Agricultural Department devoted to accumulating and distributing information on best methods and best markets for selling."

INTERSTATE COMMERCE COMMISSION.

The commission has further postponed from September 2 to March 2 the advance in rates on ice that were filed by the Chicago & North Western.

The Greater Des Moines Committee has complained to the Interstate Commerce Commission of the rates from Des Moines to Colorado common points, as compared with the rates from Missouri river cities.

The commission has further suspended the advance rates filed by the Missouri Pacific and the St. Louis, Iron Mountain & Southern on cotton from the southwest to New England points, from August 15 to February 15, 1912.

The commission has granted an extension of time to September 1 as the effective date for its order requiring all of the roads operating into Nashville, Tenn., to cease giving reshipping privileges on grain and hay at that city.

The commission has granted permission to the Central of New Jersey to continue to charge a higher passenger rate from New York City to Bound Brook, N. J., and a higher joint passenger rate with the Baltimore & Ohio to points beyond Pittsburgh, Pa., than the sum of the intermediate fares, providing the joint through fares now in effect are not exceeded.

The commission has granted the application of the Southern Railway to charge a lower rate on stone and granite from Chester, S. C., Spartanburg and Winnsboro, to all points of destination in the West and North than are in effect to intermediate points. Permission was given in order that South Carolina producers might be given a chance to compete in the markets with the producers of North Carolina and Georgia.

The commission has denied the request of the New York Central & Hudson River, and connections, to charge 7.8 cents per 100 lbs. on coarse salt in bulk, from Syracuse, N. Y., to Detroit, Mich., at the same time that higher rates are charged to intermediate points. The petition justified the lower rate on the ground that Syracuse would then be given a chance to compete with other shipping points in New York in Detroit markets.

The commission has suspended until November 29 the tariffs filed by western lines cancelling the class rates from St. Paul, Minn., Duluth, Winona and similar points to Buffalo and Pittsburgh and other points east. The western roads had through class rates to about 7,000 points in eastern, central freight association territory and trunk line territory. The tariffs which have been suspended by the commission cancel rates to about 2,000 of these points.

A general denial of all applications by express companies for relief under the long and short haul provision of the law has been entered by the commission in cases where commodities are shipped from points of production to points of consumption, the same or similar rates not being applicable to or from intermediate points. It was not shown by the applications what particular rates they were intended to cover, and the commission declines to flatly grant any general permission under the law.

The National Mohair Growers' Association has complained to the Interstate Commerce Commission against the rates on mohair from the goat-raising territory west of the Mississippi to Boston, Providence and New York.

The Consolidated Fuel Company and the Castle Valley Coal Company have complained to the Interstate Commerce Commission against the present rates on coal out of southern Utah. The commission has begun a special investigation.

The American Hardwood Lumber Company and other shippers in Arkansas and Louisiana have made a complaint to the commission against the rates on lumber to the New England [illegible] New York and eastern rates as far south as Virginia and West Virginia.

The commission is to begin an investigation of the rates and business of the Texas City Terminal Company. This investigation follows a complaint made by the railways against the [illegible] Wharf Company, which said that an increase of about 100 per cent. in the charges of the Galveston company was unreasonable.

Commission merchants doing a business in fresh fruits in New York [illegible] complained to the commission against the freight rates on grapefruit and cantaloupes shipped from southern points to northern and eastern markets. Recently the railroads made a reduction in the rate on melons, but refused to deliver them in New York City, the tariffs reading to Jersey City.

The Allegheny Iron & Steel Company has filed with the commission a complaint against the Pennsylvania Railroad and the Philadelphia & Reading, which owns the three railroad companies, in granting certain switching allowances to steel companies, including the United States Steel Corporation, were guilty of discrimination and the complainant asks for reparation.

Exceptions to the Long and Short Haul Clause.

In re rates that are carried from producing points to consuming points, and that are not made applicable from or to intermediate points. Fourth section order of the commission.

The commission is of the opinion that situations in which rates are carried from producing points to consuming points and are not made applicable from or to intermediate points for the sole reason that the intermediate points are not producing or are not consuming points, do not constitute special cases within the meaning of the fourth section of the act to regulate commerce, as amended June 18, 1910, and that such rates should be made applicable from or to the intermediate points, or else that the tariffs containing these rates should be corrected by the addition of rule 77 of Tariff Circular No. 18A.

It is therefore ordered that, in all those instances where commodity rates are made from producing points to consuming points, and are not made applicable from or to intermediate points for the sole reason that the intermediate points are not producing or are not consuming points, such portions of the applications, general in character, by which these rates are sought to be protected, be, and the same are hereby, denied, effective January 1, 1912.

The Commission Claims the Right to Decide on Reasonable Commutation Rates.

Investigation and Suspension Docket Nos. 1 and 8. Opinion by Commissioner Harlan:

There were filed with the commission on June 23, 1910, ten petitions against the Erie, the Delaware, Lackawanna & Western, the Pennsylvania Railroad, the Central of New Jersey, the Philadelphia & Reading, the Lehigh Valley, and the New York Central and Hudson River, as lessee of the West Shore, in seven of which the board of railway commissioners for the State of New Jersey was complainant. The allegation running through them all is that the proposed new commutation fares between New York city and points in the State of New Jersey were extortionate and unreasonable.

The tariff schedules naming the new fares were evidently prepared after a full conference and agreement among the carriers; they were filed on May 22, 23, 26, and 29, 1910, and by their several terms were to become effective on or shortly before July 1, a few days, as will be observed, after the complaints were filed.

The purpose of the carriers to increase the fares had been made known in advance. In compliance with numerous petitions to suspend the operation of the new fares, an order was entered on June 23, the date on which most of these petitions were filed. It provided for the postponement of the effectiveness of the schedules until October 15, 1910.

As we understand the attitude of the defendants, it is admitted that commutation fares are fully subject to the provisions of sections 2, 3, and 4 of the act, and that the commission may exert its full authority when they are in violation of either of those provisions; but it is insisted that section 1 has only a limited application to such rates. This contention, expressed in another way, means that under the language of section 22 the issuance of mileage, excursion, or commutation passenger tickets at a lower price than the normal fare is a right that may be exercised by the carrier in its sole discretion without hindrance or control by the commission, so long as the normal fare between the same points is itself reasonable and so long as the rules and regulations governing the use of such tickets do not offend the provisions of sections 2, 3, or 4 of the act. As originally enacted in 1887, section 22 contained this provision:

That nothing in this act shall *apply to* . . . the issuance of mileage, excursion, or commutation passenger tickets.

It had been contended in some quarters that the language of the original act took commutation, mileage, and excursion tickets entirely out of the law, and that carriers were not required even to publish or post such rates; and to meet the point the section was amended on March 2, 1889, so that the clause now reads as follows:

That nothing in this act shall *prevent* . . . the issuance of mileage, excursion, or commutation passenger tickets.

In the amended form the clause was first construed in *In re Pas-*

senger Tariffs, 2 I. C. C. Rep., 649; 2 I. C. C. Rep., 445. This was not a contested case, nor was there any formal complaint. It was merely the response of the commission to an informal inquiry in which among other questions asked was this: Shall round-trip tourist rates be published and posted in the same manner as one-way through rates?

A case that touches the question more closely and is strongly relied upon by the defendants in support of their contention that the commission is without such jurisdiction over commutation fares is *Spriggs* v. *B. & O.*, 8 I. C. C., 443. The defendant there had withdrawn from sale the 180-trip quarterly ticket which, for several years, had been available over its lines between Washington and Baltimore. After explaining the contention of the complainants that as carriers are permitted to sell commutation tickets they may therefore be compelled to do so, and that if a carrier has sold such tickets for a considerable period it may be required to continue to sell them at less than the general public fares, the commission says, p. 452:

"There is no legal basis for such a contention. If we had full rate-making power as ample and complete as that possessed by the congress, we could not make such an order. We could in that case prescribe a rate which would be reasonable for everybody to pay . . . but we could not under any circumstances compel the granting of a special and lower rate for the benefit of a particular class."

Again at page 450 it is said:

"Carriers are allowed to issue mileage, excursion, and commutation tickets, but ordinarily they cannot be compelled to do so. The permission does not create an obligation."

Apparently even the right to correct an undue preference in commutation fares is claimed by the commission in that case with some hesitation. It is to be noted, however, that the defendant had not withdrawn all its commutation fares, but only its 180-ride quarterly ticket. The real point in the case, so far as that contention is concerned, seems to be expressed at page 52, where it is said:

"The commission has no power to prescribe rates for the future. . . . The Supreme Court has distinctly held that our power does not go to that extent."

That is as far as the prayer of the complainant required the commission to go, and that, perhaps, is to be regarded as the real ruling in the case.

From this review of the few complaints that have come before us involving the effect and meaning of section 22, it will be seen that the precise question now in hand has never been squarely considered and decided. In 1900, when *Spriggs* v. *B. & O.* was before us, the commission was without authority to enter an order fixing a reasonable rate for the future.

Another case strongly relied upon by the defendants is *L. S. & M. S.* v. *Smith*, 173 U. S., 699. The case, however, involved mileage tickets which, we must repeat, differ very essentially in character from commutation tickets.

It will not be necessary to dwell here upon the importance of the question not only to the particular suburban communities involved on the record before us, but to many other such communities throughout the country, the prosperity and growth of which largely depend upon an efficient and reasonable commutation service.

Nor need we stop to point out the distinction between commutation tickets on the one hand and excursion and mileage tickets on the other. Compared with the normal one-way fare all such tickets may be said to be abnormal. But the resemblance stops at that point. Although they are mentioned together in section 22, the force and effect of that provision must necessarily differ with the differing character of the several kinds of tickets. It seems to be settled under that section that a carrier may enter upon the policy and practice of issuing mileage books and excursion tickets at less than its regular normal fare for the one-way journey, and, having adopted such a policy, may subsequently withdraw from it and refuse longer to issue such tickets. It by no means follows, however, that a carrier under section 22 may exercise the same scope and freedom of action with respect to commutation tickets.

The literature relating to the origin and history of commutation rates is surprisingly meager and incomplete. As applied to passenger traffic, commutation seems to signify the payment in a single sum of the cost to the traveler for transportation, limited in point of time or in the number of trips, between two designated points; apparently it implies also a fare per trip that is less than the normal fare for a one-way journey. That use of the word is probably as old as steam transportation itself; the commuter not improbably antedates steam transportation although possibly not under that name.

An interesting account of the steps taken to build up suburban traffic is found in the history of the Old Colony Railroad. With the object of inducing a large class of artisans, who worked in shops in Boston, to move their families into the country, the company agreed to transport them back and forth daily at a charge closely approximating the actual cost of the service. It did this on the theory that the natural increase of general traffic that would come from the closer settlement of the country it served would justify such an arrangement.

A circular letter, complaining of abuses practiced by commuters, issued in 1856 by the president of the New Jersey Railroad & Transportation Company, now a part of the New Jersey division of the Pennsylvania Railroad, indicates that commutation tickets were first sold on that system in 1839 in order "to accommodate heads of families doing business in New York who desire to purchase or rent residences in New Jersey." During the first year or two annual tickets only were issued, and there were but three commuters. Subsequently the privilege was opened to all persons, whether heads of families or not, and half yearly tickets were introduced.

With the increase of commuters the circular states that—"quarterly commutations were granted for reasons of convenience and advantage to commuters."

At this time the number of persons holding commutation tickets was so small that they were individually known to the conductors and were not required therefore to exhibit their tickets when on the trains. But after a few years the number had so increased that, as the circular states—

"The conductors can no longer distinguish the commuters, and it has become indispensable to adopt more safeguards, as many persons were known to be riding without any right whatever, and some, after passing themselves off for a year, had the effrontery to boast of it in their congenial circles. Persons who had been commuters had continued on after their privilege had ceased, for a number of months, and in one instance for a year and a half before he was discovered, though riding with the oldest conductor. It is due to him, however, to say that on demand being made he promptly and honorably made restitution by paying for the whole time in arrear—a most remarkable fact, and nearly the only instance among the large number who have been similarly apprised of like delinquencies."

As we have been able from various sources to gather some impression as to the history of commutation rates, there can be little doubt that commutation traffic was regarded originally as a mere incident to through traffic and was attractive because it could be handled at little additional cost to the carrier. But it is undeniable that the enormous growth of suburban communities in recent years, and particularly around the great cities such as New York and Chicago, has resulted in material changes both in the character and the cost of commutation service.

The commutation service of the Lackawanna is an instance of that kind. It operates 102 passenger trains a day in each direction, into and out of New York, of which but 7 trains each way go beyond the limits of the State of New Jersey. And the traffic in some cases is highly competitive; the electric lines actively reach out for it often to the limits of the most distant suburban zones of the regular lines.

Without going further into the history of commutation or the details that distinguish it from other passenger traffic, we are led to conclude from all these considerations that it stands by itself as a special and distinct kind of service for which the carrier may demand no more than a reasonable compensation.

This being so, we see no reason why the reasonableness of the fares demanded for the service may not be looked into by the commission under section 1. It is conceded on behalf of the principal complainant that a carrier may not be compelled, under the present law, to undertake a commutation service and to establish commutation rates. That is probably true. But having undertaken a definite and regular commutation service, such as is shown of record on the part of each of the defendants in this proceeding, the power as well as the duty of the commission under section 1 to examine into the reasonableness of the charges exacted, when complaint has been made, seems to be be-

yond question. We therefore pass to the question whether the rates complained of are reasonable.

The increased fares are justified by the several carriers on their briefs and arguments on the following grounds:

1. That the former fares were unduly low and that the commutation traffic was not bearing its due proportion of the operating expense.

2. That the commutation traffic had outgrown the facilities devoted to it, and in some cases had required the practical rebuilding of the tracks by which it is handled. In the case of the Lackawanna, for example, it is stated that nearly $15,000,000 have been spent in ten years on the suburban lines and substantially the whole of it for the benefit of the suburban traffic.

3. That wages have been substantially increased. On the New Jersey division of the Pennsylvania the increase granted in 1910 amounts annually to $1,186,416.

4. That there has been an extraordinary increase in taxes in the state of New Jersey. On that division of the Pennsylvania the taxes in 1906 amounted to $637,564.50. In 1909 they aggregated $1,640,092.02, or an increase in three years of 157 per cent.

5. That in some cases it has been necessary to elevate the tracks to avoid grade crossings; in other cases there exists a need of such an expenditure in the immediate future.

6. That the increase in the number of commutation trains and the shortening of the time schedules have added to the cost of the service.

Some of the old fares on some of the respondent lines had been in effect without change from 15 to 30 years, and in some instances for as long possibly as 40 years.

In the new fares of the Central of New Jersey we find a general test by which we may fairly measure the reasonableness of the present fares of all the defendants. So far as we know no objection had been made to the former fares of that company, although they seem to have been somewhat higher than the former fares of other lines leading into New York city. In general the increase over its former fares amounted to but 25 cents a month, although in a few cases it was somewhat in excess of that amount.

The increase in the present fares on the Lehigh Valley, as compared with its old fares is also very slight. If now we are to recognize its right to increase its fares somewhat in view of the increased cost of conducting the traffic, the present fares of that line may also be accepted with those of the Central of New Jersey as a fair general test of the reasonableness of the present fares of the other respondents. Only on the Erie and the Lackawanna, and in a few cases on the West Shore, were the increases substantial in amount, and yet the new fares of these lines, when compared with the new fares of the Lehigh Valley and the Central of New Jersey do not differ from them materially except in particular instances. Of course, no absolute scale could be adopted for use on all these lines. Local conditions must necessarily require and justify slight variations in each case. Nevertheless, taking the general scale of the Lehigh Valley and the Central of New Jersey as a general measure and test of the fares of the other lines, and considering the situation from the standpoint of the carriers as well as from the standpoint of the commuter, a broad view of the matter requires us to find that the new fares of the Erie, the Lackawanna, and the West Shore, considered as a whole, are not unreasonable. In particular cases they are excessive. For example, the new monthly fares on the Erie to points 31 miles distant from New York are equal to those of the Central of New Jersey and Lehigh Valley to points at substantially equal distances or $1.35 or more, and in these cases the increases over its old monthly fares vary from $1.10 to $3.67. While the service of the Erie is efficient and satisfactory, we cannot find any acceptable explanation for the higher rates in those cases. We therefore find these fares to be unreasonable. The fares of the Lackawanna and West Shore to points beyond the limit of zone system zones are also unreasonably high. Same with the fares of the Central of New Jersey and Lehigh Valley to points at equal distance and should be reduced. With respect to all the general increases here mentioned, we find further that the defendants should at once revise their tariffs so as to bring these fares more into conformity with the fares of the Central of New Jersey and the Lehigh Valley to the distances named, and that no order in this case should be necessary.

We come now to the new fares of the Pennsylvania. A comparison has already been made between the new fares of the Central of New Jersey with the monthly cost to the commuter under the old 180-trip quarterly ticket of this company. The extent of the increase is shown in the following table:

	Miles.				
	11.4	17.3	21.5	25.8	31.3
60-trip ticket....	$6.50	$8.00	$9.50	$11.00	$12.00
180-trip ticket...	5.40	6.00	7.33	7.67	8.33
Increase ...	$1.10	$2.00	$2.17	$3.33	$3.67

Comparing the cost of the present monthly 60-ride tickets with the cost per month to the commuter under the old 180-ride quarterly tickets, we get the following results:

	Distance from New York. (*Miles*).	Rate per month based on old 180-trip quarterly tickets.	Present rate of 60-trip monthly tickets.
Newark	8.7	$5.40	$6.00
Elizabeth	14.1	5.40	6.50
Linden	17.3	6.00	8.00
Rahway	19.4	7.00	9.00
Menlo Park	23.9	7.66	10.50
Metuchen	25.8	7.67	11.00
New Brunswick	31.3	8.33	12.00

Such increases per month as these certainly require a definite explanation on the part of the carrier. Its contention was that the increased charges are justified by reason of the great cost of elevating its tracks, because of its increased taxes, the increase in its pay roll, and because of the cost to it of the use by its commuters of the McAdoo tunnel which now forms a part of its suburban service. Obviously it may fairly take these matters into consideration in readjusting its fares, but in doing so it cannot demand of its commuters more than a reasonable charge for the service.

After a careful study of the record we see no justification, either in the value to the commuter of the service rendered by that line or in the cost to it of the service, for such a large difference in the fares demanded of the commuter. Many exhibits were offered on both sides on which the cost of the service to that defendant is analyzed with differing results. We shall not here go into the details of these computations. It will suffice to say that they have been examined with great care and that the result of our study of the whole record with respect to the new fares of this company is the conclusion that they are unreasonable and excessive.

We see no occasion to disturb the 50-ride and 10-ride fares of the Central of New Jersey or the Lehigh. That the new 50-trip fares of the Erie, the Pennsylvania, the Lackawanna, and the West Shore are higher than they should be, we think is clear, but we sall not enter an order with respect to those tickets at this time. We shall expect those defendants, however, promptly to take those fares under advisement and to suggest to the commission the reductions which should be made in order to meet the general conclusions here expressed.

The proceedings against the New York, New Haven & Hartford were instituted by the commission on informal complaints, and the record touching the reasonableness of its new fares is largely confined to testimony by the officials of that company. It does not give us sufficient information upon which to reach satisfactory conclusions. (21 I. C. C. 426.)

STATE COMMISSIONS.

The Louisiana Railway Commission has ordered all railways to provide step boxes for passenger cars except where there is a filled-in and elevated platform.

The Public Utilities Board of New Jersey has suspended until October 3 the increases in passenger rates which were filed by the Pennsylvania Railroad, the Erie, the Lehigh Valley, the Central of New Jersey, the Buffalo, Susquehanna & Western, and the Philadelphia & Reading.

The Railway Commission of Louisiana has ordered all railways to charge only actual fare for mileage traveled between points in Louisiana; and the order provides that when the amount ends in less than ½ cent, the fraction shall be dropped, and when the amount is ½ cent or more, the next highest whole cent shall be charged.

Public Service Commission—Second District.

The New York Public Service Commission, second district, has denied permission to the Long Island Railroad to discontinue L. C. L. freight service at Hewlett station and to transfer the handling of such freight to the Woodmere station.

The company claimed that the stoppage of freight trains for the freight on the main track at Hewlett interfered with passenger trains. Definite proof of such actual interference was not submitted. It appeared that no material economy in operation would result from the change beyond saving the cost of stopping the local freight trains at Hewlett. The desire of a railway which is more largely engaged in the transportation of passengers than of freight to consolidate the freight operations of expanding small localities where they practically merge physically and become general communities while remaining separate village entities is recognized as having weight, and where this can be done without considerable public inconvenience, while at the same time it appears that the passenger service would be relieved of serious interference so that the net result to the public is beneficial, special applications of that character should receive favorable consideration; but this case does not fall within that rule, and therefore the petition is denied.

COURT NEWS.

Suit has been brought against the Louisville & Nashville by the state of Kentucky, to collect about $500,000 back taxes, which it is claimed were due during the past four years.

Attorney general Wickersham has directed the government's special counsel in the Union Pacific-Southern Pacific merger case to prepare and file as quickly as possible an appeal to the supreme court against the ruling of the circuit court, which found that the acquisition of the Southern Pacific by the Union Pacific was not in conflict with the Sherman anti-trust law.

President Ripley of the Atchison, Topeka & Santa Fe, is quoted as saying in regard to the Spokane and Inter-Mountain rate decisions of the Interstate Commerce Commission: "We will fight the decision of the commission and appeal to the Commerce Court. What the Southern Pacific, the Hill Lines and the Denver & Rio Grande will do we do not know as yet, but the Atchison will not stand without appeal a judgment which means a reduction of many millions yearly in the net earnings of the companies mentioned. It is an unjust decision."

PROJECTED LINES IN RUSSIA.

The Ministry of Ways and Communications of Russia has been granted credits from the 1911 budget aggregating $6,027,000, of which $75,000 has been allotted for preliminary surveys of a route crossing the Caucasus mountain range and $500,000 for constructional works on the Kars-Sarakanytch line. Preliminary surveys have been authorized for a line from Baguerovo, via Taman to Abinskaja, connecting the Southern and Vladikavkaz systems with a branch line to Temriouk in the Kuban area, and also for a route between Beljetz and Travniki, via Tomachef, Zamostii, and Krasnostav, to connect up the Lioubline district and the Vistula system. Work has begun on the Mlava to Plotzk and Radom to Laska sections. Surveys have been completed for the Chlobine-Kamenetz-Podolsk line via Mozyr, Ovrytch, and Stara-Constantinov, for which the Minsk Zemstvo has sent in formal application for immediate construction, and they are in progress for the line between Uman and Nikolo-Kozelsk, linking the Southwest system and the Katherinski lines. The surveys of the projected Millerovo-Saratov line have been lately extended. It is now proposed to connect the Siberian railways and the Black Sea ports by this line, and supplementary surveys from Samara to Saratov have been made. It is anticipated that the Riazan-Uralsk Company and the Southeastern system will co-operate in completing the construction of the line, the permanent way from Samara to Krasni-Iar being built by the former, and thence on to Taganrog by the latter. The committee for new railways has agreed to permit the merchants of the Kubantowns Eisk, Temirouk and Ekaterinodar to form a company for the construction of 185 miles of permanent way between Kouchevska and Kremskaja, and a further 100 miles between Ekaterinodar and Akuhutari. Sanction has also been granted for a line from St. Petersburg to the Finnish frontier.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

Guy J. Bunting has been appointed general accountant of the Chicago, Milwaukee & St. Paul, with headquarters at Chicago.

Henry G. Herbel, assistant to the vice-president and general solicitor of the Missouri Pacific and the St. Louis, Iron Mountain & Southern, has been appointed interstate commerce attorney, with headquarters at St. Louis, to succeed James C. Jeffery, resigned.

E. H. Fitzhugh, first vice-president of the Grand Trunk and of the Central Vermont, has been elected president of the Central Vermont in addition to his duties on the Grand Trunk, succeeding as president of the Central Vermont, Charles M. Hays, who becomes chairman of the board.

W. L. Roach, secretary of the Live Oak, Perry & Gulf, with office at Dowling Park, Fla., has been elected president, with office at Live Oak, succeeding J. Lee Ensign, resigned. J. H. Powell, treasurer, has been elected also vice-president, and R. P. Hopkins, general manager, has been appointed also secretary, succeeding to the duties of Mr. Roach.

John Glenn Livengood, whose appointment as auditor of the Erie Railroad, announced recently in these columns, has been appointed auditor of disbursements of the Missouri Pacific and the St. Louis, Iron Mountain & Southern, with office at St. Louis, Mo. Mr. Livengood was born on October 28, 1873, at Rockville, Ind. He began railway work in April, 1890, with the Milwaukee & Northern, now a part of the Chicago, Milwaukee & St. Paul, and was engaged in station work for that company until August, 1892, at Marinette, Wis., and at Appleton. He was then yard clerk on the Chicago, Milwaukee & St. Paul, and in April, of the following year he went with the Minneapolis, St. Paul & Sault Ste. Marie as freight trainman. From October, 1893, to April, 1900, he was engaged in station work on the Great Northern at Minneapolis, Minn., and Superior, Wis., and then went with the Erie & Wyoming Valley, now a part of the Erie Railroad, as auditor, at Dunsmore, Pa. In March, 1901, he was appointed chief clerk to auditor of disbursements of the Erie Railroad, and from July, 1903, to July, 1911, was auditor of disbursements of that road. He was promoted to auditor on July 1, and now resigns to go to the Missouri Pacific as above noted.

Operating Officers.

C. A. Shoemaker has been appointed assistant superintendent of the Southern division of the Chicago Great Western, with headquarters at St. Joseph, Mo., succeeding F. R. Blunt, transferred, effective August 1. In our issue of July 28 Mr. Blunt's former title was incorrectly given as trainmaster.

Brown Ring has been appointed chief despatcher of the Texas & Pacific, with office at Marshall, Tex., succeeding W. H. Mulcahy, assigned to other duties.

H. L. Hill has been appointed superintendent of transportation of the Guatemala Railway, with office at Zacapa, Guatemala, succeeding G. C. Wendorf, resigned.

F. P. Abercrombie has been appointed acting superintendent of the Bedford division of the Pennsylvania Railroad, with office at Bedford, Pa., succeeding W. L. Cooper, deceased.

C. W. Bradley, formerly manager of the Western New York Car Demurrage Bureau, at Buffalo, N. Y., has been appointed superintendent of telegraph of the Chesapeake & Ohio.

Traffic Officers.

C. G. Amendt has been appointed industrial agent of the Hocking Valley, with office at Lancaster, Ohio.

Charles Letts has been appointed contracting freight agent of the St. Louis & San Francisco, with office at Los Angeles, Cal.

J. M. Allen has been appointed freight claim agent of the Chicago, Milwaukee & Puget Sound, with office at Seattle, Wash.

L. M. Turnbull has been appointed traveling freight agent of the Chicago, Rock Island & Pacific, with office at Los Angeles, Cal.

F. G. Frieser has been appointed assistant foreign freight agent of the Canadian Pacific, with office at No. 1 Broadway, New York.

F. S. Wetherby has been appointed contracting freight agent of the Great Northern at Spokane, Wash., succeeding L. J. Fitzpatrick, resigned to engage in other business.

G. J. Allen, traveling freight agent of the Atlanta, Birmingham & Atlantic, has been appointed soliciting freight agent of the Georgia Railway, with headquarters at Nashville, Tenn.

H. C. Franks, commercial agent of the St. Louis & San Francisco at San Antonio, has been appointed traveling freight agent of the San Antonio & Aransas Pass, with office at San Antonio.

J. T. Brooks has been appointed commercial agent of the St. Louis & San Francisco and the Ft. Worth & Rio Grande, with office at San Antonio, Tex., succeeding H. C. Franks, resigned.

J. D. Boylston has been appointed traveling freight agent of the Atlanta, Birmingham & Atlantic, with headquarters at Chattanooga, Tenn., succeeding G. J. Allen, resigned to go to another company.

Lyman Sholes has been appointed division freight and passenger agent of the Chicago, St. Paul, Minneapolis & Omaha, with office at Omaha, Neb., and Daniel J. Shea has been appointed traveling freight agent, with office at St. Paul, Minn.

J. M. Cousins has been appointed commercial agent of the Missouri & North Arkansas, and William B. Durrett has been appointed traveling freight agent, both with offices at New Orleans, La. The traffic office at New Orleans is a new one.

The office of C. W. Chears, division freight and passenger agent of the Central of Georgia, at Chattanooga, Tenn., has been abolished, and all communications should be addressed to Charles T. Airey, freight traffic manager, or J. C. Haile, general passenger agent, Savannah, Ga.

C. A. Torrence has been appointed foreign freight agent of the Missouri Pacific, the St. Louis Iron Mountain & Southern, the Denver & Rio Grande, the International & Great Northern, the Texas & Pacific and the Wabash, with office in the Royal Insurance building, Chicago, succeeding F. G. Frieser, resigned to go to another company.

Daniel J. Shea has been appointed traveling freight agent of the Chicago, St. Paul, Minneapolis & Omaha, with headquarters at St. Paul, Minn. Henry W. Truelsen has been appointed traveling agent, with office at Omaha, Neb. Robert L. Holmes, traveling agent, with headquarters at Omaha, has been transferred as traveling freight agent to Kansas City, Mo.

Engineering and Rolling Stock Officers.

M. Marea has resigned as master mechanic of the Toledo, St. Louis & Western.

E. E. Bradley has been appointed signal engineer of the Western Maryland, with office at Baltimore, Md.

[illegible] has been appointed to the new position of division engineer of the Amarillo division of the Chicago, Rock Island & Pacific.

J. W. Thompson has been appointed chief electrician of the Chicago & Alton, with headquarters at Bloomington, Ill., to succeed S. W. Dietrich, resigned.

R. L. Holmes, assistant engineer of the Texas & Pacific, with office at Dallas, Tex., has been appointed division engineer of the eastern division, with headquarters at Dallas, effective August 1.

[illegible] has been appointed superintendent of machinery of the Kansas City Southern and the Arkansas Western, with headquarters at Kansas City, Mo., to succeed J. W. Small, resigned to accept service with another company.

A. S. Clopton, general foreman of bridges and buildings of the Missouri, Kansas & Texas, has been appointed superintendent of bridges and buildings, with office at Parsons, Kan., succeeding F. W. Bailey, resigned.

M. H. Clapp, district superintendent of the Western Union Telegraph Company, with office at Chicago, has been appointed superintendent of telegraph of the Northern Pacific, with headquarters at St. Paul, Minn., succeeding O. G. Greene, resigned.

R. B. Seymour has resigned as chief engineer of the Chicago, Indiana & Southern and the Indiana Harbor Belt, and the office is abolished. G. C. Cleveland, assistant chief engineer of the Lake Shore & Michigan Southern, with headquarters at Cleveland, Ohio, will have charge of maintenance work on the Chicago, Indiana & Southern, and Otto Gersbach, engineer maintenance of way of the Indiana Harbor Belt, with office at Gibson, Ind., will have charge of the maintenance work on the Indiana Harbor Belt.

Special Officers.

John W. Kearney has been put in charge of the new publicity department of the Missouri Pacific.

J. A. McFarland has been appointed chemist and engineer of tests of the St. Louis & San Francisco, with office at St. Louis, Mo.

OBITUARY.

Franklin Price, formerly general advertising agent of the Chicago & North Western, died at Coatesville, Pa., on July 25, aged 90 years. He was connected with the North Western for 23 years, having begun as advertising clerk in the passenger department in 1879.

Benjamin S. Moore, said to have been the oldest railway man in New Jersey, died on August 1 at his home in Roselle in his eightieth year. For 58 years he was an engineer on the Central of New Jersey. He was engineman of the first train that ran over the Newark bay bridge. A few years ago he was retired on a pension.

John B. Ludlow, general traffic manager of the Wells, Fargo & Company Express, died on July 31, at Deposit, N. Y., at the age of 44 years. Mr. Ludlow was born in England and began railway work in this country on the Union Pacific. In 1888 he went to Wells, Fargo & Company, at New York, as a clerk, and was later made superintendent of traffic, then traffic manager, and when he died was general traffic manager.

Edward P. North died on July 20 at his home in New York. Mr. North was 76 years old. He graduated from Union College in 1856, and began his professional career with E. S. Chesborough, Chicago. His railway engineering experience was mostly in work on the early western roads, particularly on the Union Pacific, where he was superintendent of tunnel construction. He was also chief engineer of the New Canaan Railway, and at another time chief engineer of the Durango & Sinaloa of Mexico. He served as a delegate to the International Congress on Waterways. In 1895 he was made water purveyor of the city of New York. Much of his work has been in highway construction, and in 1879 he won the Normal medal of the American Society of Civil Engineers for a paper on this subject.

Harry F. Campbell, secretary of the per diem Arbitration committee and chief clerk to Arthur Hale, general agent of the American Railway Association, died Friday morning, July 28, on a Pennsylvania train, between Harrisburg and North Philadelphia, while en route to his home in New York. Mr. Campbell entered the service of the American Railway Association as the first secretary of the Arbitration committee at the time of the adoption of the per diem rules agreement in 1902. He subsequently served as chief clerk to Ralph Peters, president and general manager of the Long Island. In 1906 Mr. Campbell was appointed chief clerk to Mr. Hale, chairman of the committee on Car Efficiency of the American Railway Association, which position he held up to the time of his death.

In this capacity Mr. Campbell organized and has supervised the working of the American Railway Clearing House. His early railway work was in the transportation department of the Pennsylvania Railroad, where he was acting as special agent at the time he left the Pennsylvania to enter the service of the American Railway Association.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Wabash is asking prices on 15 consolidation and 5 switching locomotives.

The Pennsylvania Lines West, it is rumored, will order 60 locomotives in the near future. This item has not been confirmed.

The Grand Trunk has ordered 10 compound consolidation locomotives from the American Locomotive Company. The dimensions of the cylinders will be 22½ in. and 35 in. x 32 in., the diameter of the driving wheels will be 63 in., and the total weight in working order will be 210,000 lbs.

The Bingham & Garfield has ordered 1 Mallet articulated compound locomotive (0-8-8-0) from the American Locomotive Company. The dimensions of the cylinders will be 26 in. and 41 in. x 28 in., the diameter of the driving wheels will be 51 in., and the total weight of the locomotives in working order will be 450,000 lbs.

The Louisiana & Northwest has ordered 3 ten-wheel locomotives from the Baldwin Locomotive Works. The dimensions of the cylinders will be 18 in. x 26 in., the diameter of the driving wheels will be 56 in., and the total weight in working order will be 130,500 lbs.

The Canadian Northern, as reported in the *Railway Age Gazette* of July 21, has ordered 20 consolidation locomotives from the Canada Foundry Co. The general dimensions and specialties are as follows:

Tractive effort	45,000 lbs.
Weight on drivers	190,000 lbs.
Weight on leading truck	25,000 lbs.
Total weight	215,000 lbs.
Cylinders	24 in. x 32 in.
Boiler, type	Wagon top
Working pressure	180 lbs.
Superheater	Schmidt
Firebox	110 in. x 64 in.
Tubes, number	272
Tubes, diameter	2 in.
Grate area	49 sq. ft.
Valves, diameter	12 in.
Driving wheels, diameter	63 in.
Driving journals	10 in. x 14 in.
Engine truck wheels, diameter	30 in.
Engine truck journals	6 in. x 12 in.
Water capacity	6,000 gal.
Coal capacity	10 tons

The Atchison, Topeka & Santa Fe, as mentioned in the *Railway Age Gazette* of July 7, has ordered 24 Mallet, 29 switching and 28 Pacific type locomotives from the Baldwin Locomotive Works. The principal dimensions of these locomotives will be as follows:

Type	Mallet	Pacific
Simple or compound	Compound	Compound
Weight on drivers	304,300 lbs.	160,000 lbs.
Total weight	370,200 lbs.	250,000 lbs.
Diameter of cylinders	24 in. and 38 in.	17½ in. and 29 in.
Stroke of pistons	28 in.	28 in.
Diameter of drivers	69 in.	73 in.
Type of boiler	Conical waist	Wagon top
Working steam pressure	220 lbs.	210 lbs.
Heating surface, tubes	4,823 sq. ft.	3,088 sq. ft.
Heating surface, firebox	236 sq. ft.	234 sq. ft.
Heating surface, superheater	.....	811 sq. ft.
Heating surface, total	5,059 sq. ft.	4,133 sq. ft.
Tubes, number	290	290
Tubes, diameter	2¼ in.	2¼ in.
Tubes, length	19 ft. 7 in.	18 ft. 2 in.
Firebox, type	Jacobs-Shupert	Jacobs-Shupert
Firebox, length	120 in.	110 in.
Firebox, width	76 in.	76 in.
Firebox, material	Steel	Steel
Grate area	63 sq. ft.	58 sq. ft.
Tank capacity	9,000 gal.	9,000 gal.
Fuel capacity	12 tons	12 tons

Type	Switching
Simple or Compound	Simple
Total weight	141,880 lbs.
Diameter of cylinders	20 in.
Stroke of pistons	26 in.
Diameter of drivers	51 in.
Type of boiler	Wagon top
Working steam pressure	180 lbs.
Heating surface, tubes	1,703 sq. ft.
Heating surface, firebox	180 sq. ft.
Heating surface, total	1,883 sq. ft.
Tubes, number	275 sq. ft.
Tubes, diameter	2 in.
Tubes, length	11ft. 9 in.
Firebox, type	Jacobs-Shupert
Firebox, length	110 in.
Firebox, width	32 in.
Firebox, material	Steel
Grate area	24 sq. ft.
Tank capacity	3,900 gal.
Fuel capacity	12 tons

CAR BUILDING.

The Atlantic Seaboard Dispatch, Chicago, is in the market for 100 refrigerator cars.

The Wabash is asking prices on 6 coaches and 6 combination passenger and baggage cars.

The Grand Trunk is in the market for 25 steel underframe coaches and for 25 express cars.

The Chilean State Railways have ordered 288 freight cars from the Middletown Car Works.

The Baltimore & Ohio is in the market for 4 dining cars and some baggage and postal cars.

The Havana Central has ordered 360 sixty-ton box cars from the Standard Steel Car Company.

The Arms Horse Palace Car Company, Chicago, has ordered 25 special horse cars from the Pullman Company.

The Grenville, Anderson & Spartanburg (Electric), Charlotte, N. C., has ordered 17 high speed interurban cars from the Jewett Car Company.

The Missouri Pacific is in the market for 1,000 box cars, 500 stock cars and 400 automobile cars. This is in addition to the equipment mentioned in the *Railway Age Gazette* of July 28.

IRON AND STEEL.

The New York Central is in the market for 1,500 tons of bridge material.

The Canadian Pacific has ordered 3,000 tons of rails from the Lackawanna Steel Company.

The Georgia Central has ordered 11,000 tons of rails from the Tennessee Coal, Iron & Railroad Company.

The Lake Shore & Michigan Southern has ordered 900 tons of bridge material from the American Bridge Company.

The Missouri, Kansas & Texas has specified that one-tenth of 1 per cent. metallic titanium shall be used in the 6,000 tons of rails recently ordered.

General Conditions in Steel.—During the past week the Steel Corporation produced steel at the rate of about 14,000,000 tons a year. The record output for a full year was in 1910 when 14,179,369 tons were produced. The Steel Corporation is now operating at 76 per cent. of its capacity—the high record of steel operations since the first of the year. The volume of orders is satisfactory and inquiries are large, especially for railway equipment. It is generally believed that equipment inquiries and orders will be heavy from now until the end of the year. Satisfactory business in the other steel departments is also expected.

Supply Trade News.

The Parkesburgh Iron Company, Parkesburgh, Pa., has moved its New York offices to 30 Church street.

The Isthmian Canal Commission will receive bids until August 21 on miscellaneous supplies, including locomotive tires.

N. S. Reeder, vice-president of the Western Steel Car & Foundry Company, Chicago, has been made second vice-president of the Pressed Steel Car Company, Pittsburgh, Pa., with office in Chicago.

The McKeen Motor Car Company, Omaha, Neb., has received orders from the Oregon Short Line for a second 70 ft. motor car, and from the Ann Arbor for a fifth car. There are now 116 of these cars in service in the United States.

Edward F. Pride has been elected secretary and assistant treasurer of the Standard Coupler Company, New York, succeeding the late Alexander W. Taylor, who died on June 19 last, after an honorable service of 17 years with that company. Mr. Pride has been in the employ of the Standard Coupler Company for 14 years, having been for several years assistant superintendent of its works at Bridgeport, Conn.

Edwin M. Herr, vice president of the Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., was made president of the company at the special metting of the newly elected board of directors held in Pittsburgh on August 1. Mr. Herr succeeds Edwin F. Atkins, who was made temporary president of the company a year ago. H. P. Davis, manager of the engineering department of the East Pittsburgh works, was elected vice president. Calvert Townley has been made assistant to the president. Mr. Atkins will continue to be a director of the company.

The United States Light & Heating Company, New York, has received an order from the New York, New Haven & Hartford for 100 axle-lighting equipments and National storage batteries. Orders have also been received recently from the St. Louis & San Francisco, the New York Central, the Erie, the Missouri, Kansas & Texas, and the Pullman Company. The company reports that 3,300 equipments are in use on 51 railways and transportation companies throughout the country, and that the new plant at Niagara Falls, N. Y., is now operating with 600 men.

The Hayes Track Appliance Company, Richmond, Ind., recently placed on the market a new style of derail, model CP, for use in connection with interlocking. This derail is similar in form and size to model C but has the reversible central eyebolt like model AP. This permits of three connections to the derail. The operating rod is attached to the eyebolt while the facing point lock and wire bolt-lock are attached to the cast lugs. The eyebolt is drop forged and passed through two webs of the derail block. It is reversible and is held in place by double jam nuts.

TRADE PUBLICATIONS.

Car Curtains.—The Curtain Supply Company, Chicago, has published a full catalog of its car curtains, curtain fixtures, roller diaphragms and curtain materials. The illustrations and descriptions show the simplicity of the mechanism and ease of operation of these curtains.

[illegible] Pacific.—The passenger department of the company has published a new attractive illustrated booklet on The Dalles, Oregon, which tells of the great productivity and the [illegible] resources of this locality, as well as the low prices at which land may be secured.

[illegible].—The [illegible] Steel Company, New York, has published a [illegible] on interlocking, illustrating and describing the use of automatic signal appliances. Order numbers and price lists are included. Additional parts will be published from time to time, for insertion at their proper place.

[illegible] Cars.—The General Electric Company, Schenectady, N. Y., has published bulletin No. 4855 on its double-track type gas electric motor cars. The bulletin is fully illustrated, contains a detailed description of this car and considerable other data relative to the subject. Plans and elevations of cars of various sizes are also given.

Southern Pacific.—The passenger department of this company has issued an illustrated pamphlet on the John Day Valley, Oregon. The purpose of this booklet is to interest prospective home seekers in that region, and, judging from the accounts of the general conditions and great productivity and the diversity of resources that may be found there, it will accomplish its end.

Michigan Central.—The passenger department of this company has issued a small booklet devoted to vacation tours between Chicago, New York and Boston. Prices are given. The company has also published a small illustrated folder on the vacation resorts of Michigan. Pastimes and attractions are described in an attractive manner and the prices of accommodations are given.

Northern Pacific.—This company has published a booklet on the atractions of the Minnesota lakes. The many illustrations show the variety of pastimes and the scenic beauties which may be found in this region. A brief account of each resort is given, and a list of hotels, boarding houses and their rates, is included. This company has also published a very attractive booklet called Through Wonderland, which is devoted to Yellowstone National Park. Large colored illustrations show the great variety of scenery that is to be found there and an interesting account of the park and its many interests are included.

The London & North Western.—This company has published seven booklets telling of the ideal vacation spots in England, Ireland, Wales and Scotland. These booklets deserve more than a casual perusal; they are worthy of close study. Compiled with characteristic British thoroughness, they cover their field admirably. The easy style and vivid descriptions, supplemented by carefully selected photographs, make delightful reading even if there is no ulterior object in view. Countless historical and literary allusions are worked in in such a fascinating manner that there is scarcely an inn, a rock, or a castle mentioned that was not once the scene of some romantic episode or heroic feat. These books are guide books rather than railway advertisements. Only the briefest mention is made of train accommodations, and even that is in the form of an introduction. Many hotels, boarding houses and even shops advertise in them, for it is known that these booklets are not merely glanced at and thrown aside. Little tours are planned and the prices of each are included. The importance and value of such booklets to the passenger department is a recognized thing, and while it would be impossible to use these as exact models in this country owing to the far greater area and the comparative dearth of historical and literary associations, yet these particular books should be studied carefully by our passenger departments. The ideal to be striven for is not to publish literature which has served its purpose when the trip is planned, but to publish booklets which are worth reading for themselves alone and which will be taken on the trip. If this is accomplished an increase of trips will necessarily follow.

FOREIGN RAILWAY NOTES.

The Chilean government has 1,491 miles of railway under construction at an estimated cost of $74,933,300. The work already done on these lines has cost $24,645,790. In addition to the foregoing, there are 694 miles of railway under consideration. When these lines are completed the government will control about 3,600 miles of railway. Parties desiring to get in touch with this work should correspond with the Director General de Industrias y Obras Publicas, Santiago, Chile.

The boring of the tunnel under Kao Ping mountain, on the Northern Railway of Siam, which was begun on April 17, 1908, was completed on April 3, 1911. It has thus taken about three years to bore through 330 yds. of very hard stone, the length of the tunnel. The cost of the work has been officially placed at about $300 per yard, or a total of $97,384. Chinese labor was used at first, but was discontinued on account of sickness, and local native workmen were employed, and these successfully completed the work.

Railway Construction.

New Incorporations, Surveys, Etc.

Atchison, Topeka & Santa Fe Coast Line.—According to press reports, a line will be built from Ivanpah, Cal., to the Yellow Pine mining district, near Good Springs, Nev., about 25 miles.

Atchison, Topeka & Santa Fe.—The Port Bolivar Iron Ore Railway, which is under construction from Longview, Tex., to Ore City (a new town), will, it is said, be extended from the latter place to Clarksville, about 74 miles. This project is backed by the Atchison, Topeka & Santa Fe.

California Roads (Electric).—The Co-Operative Electric Power Company will build a line, it is said, from Portersville, Cal., north to Lindsay, 10 miles, and from Portersville, northwest to Tulare, 20 miles, in all 30 miles. Rights-of-way have been secured.

Canadian Roads.—See article on Canada's Projected Lines under General News.

Central of New Jersey.—According to press reports, this company has awarded a grading contract for a detour at Glen Onoko, Pa., to take the place of a tunnel condemned some time ago. This work will cost about $1,000,000.

Corning, Keuka Lake & Ontario.—An officer writes that this line will be built from Corning, Steuben county, N. Y., north to Sodus Bay, Wayne county, on Lake Ontario, 90 miles. The prospects of building the line are good, but no track has been laid as yet. Contracts have been let to W. J. Kelly, New Orleans, La. The road will carry coal, lumber and farm products. J. C. Zimmerman, president, and W. J. Sloan, chief engineer, both at Bradford, N. J. (July 28, p. 198.)

Fresno, Hanford & Summit Lake (Electric).—This line will be extended, it is said, from Fowler, Cal., south to Hanford, about 23 miles.

Illinois Central.—An officer writes that this company is double-tracking its line from Ponchatoula, La., to Orleans Junction. about 36 miles.

Lakeview Traction.—An officer of this company, which now operates a 10-mile electric line, writes that the line will be extended from Memphis, Tenn., southwest to Clarksdale, Miss., 80 miles; from Memphis, Tenn., northeast to Covington, 35 miles, and from Memphis, east to Collierville, 24 miles, a total of 139 miles. The prospects of building the line are good.

Laramie, Hahns Peak & Pacific.—According to press reports, contracts have been let to P. J. Cain for the greater part of the grading from Cowdrey, Colo., to Walden and Hebron. It is expected that the grading to Walden will be completed by the end of September. Rails are being laid on 25 miles extending southwest from Foxpark, Wyo. (March 3, p. 433.)

Long Island Railroad.—See an item regarding grade crossings under General News.

Mexican Roads.—According to press reports, the line which is to be built from Guadalajara, Jalisco, Mex., to Chamela, on the Pacific coast, will not enter Guadalajara at first, but will connect with the Ameca branch of the National Railways of Mexico at La Viga. It will pass through Autlan and other important mining districts. The plans for construction are well advanced.

Midland Pennsylvania.—An officer writes that this company will build from Millersburg, Pa., on the Susquehanna river, northeast via Sacramento and Gordon to Ashland, on the Philadelphia & Reading, 44 miles. The prospects of building the line are good and some track has already been laid. Contracts have been let to the Pinkerton Construction Company and the Lykens Valley Construction Company, Philadelphia. W. E. Harrington, president, and William McLean, chief engineer, both of Philadelphia. (March 3, p. 434.)

New York, Westchester & Boston.—The main line between New York and Mount Vernon is expected to be ready for operation by the winter of 1911. See this company under Railway Financial News.

Norfolk & Western.—See an item under General News, concerning the proposed elimination of grade crossings near Columbus, Ohio.

Oakland & Antioch (Electric).—Bids for the construction of a tunnel between Oakland, Cal., and Walnut Creek are being asked for by J. G. White & Co., Oakland. (July 21, p. 159.)

Ogden Rapid Transit.—This company, it is said, will extend its line from Brigham City, Utah, northeast to Logan, about 20 miles.

Pacific & Idaho Northern.—This road, it is said, will soon award a contract for the construction of the line from New Meadows, Idaho, to Lardo, about 10 miles.

Pasadena Rapid Transit.—This company, which was incorporated some time ago with a capital of $3,000,000, has secured right-of-way, it is said, between Los Angeles, Cal., and Pasadena, about eight miles, and will commence construction work soon. Horace M. Dobbins, president.

Port Bolivar Iron Ore.—See Atchison, Topeka & Santa Fe.

Red Oak & Northeastern.—See Wabash Railroad.

Sacramento-Woodland (Electric).—This company, with $1,000,000 capital, has filed articles of incorporation at Woodland, Cal., to build from Woodland to Sacramento, 20 miles. T. T. C. Gregory and William Pierce, Suisun, and C. J. Goodsell and G. A. Posey, San Francisco, are incorporators.

Southern Pacific.—A line will be constructed, it is said, from Colfax, Cal., northwest to Nevada City, thence south to Grass Valley, about 18 miles.

A cut-off will be built, it is said, from Battle Mountain, Nev., southwest to Hazen. The estimated cost of the work is $7,000,000. The elimination of the Humboldt river curve will save about 50 miles.

Southwestern Traction & Power Company (Electric).—An officer writes that the first division of this line will be built from Spanish Lake, La., via New Iberia to Jeanerette, 17 miles. The general contract has already been let, and construction work will be begun within a month. The engineering work will not be difficult as the country is level. Passengers, freight and interurban express will be carried. Electricity for power and lighting will also be furnished. The offices of the company are at New Orleans.

Springfield Northwestern Interurban.—Incorporated in Illinois with $15,000 capital and office at Springfield, Ill. The plans call for building from Springfield, north via Athens, Petersburg and Greenview to Mason City, about 40 miles. The incorporators include: H. T. Tice, Greenview; R. Y. Kinkead, Athens; W. F. Workman, Springfield, and S. F. Prather, Springfield.

Stockton & Bay City Short Line (Electric).—This company has been organized at Stockton, Cal., with $750,000 capital, and will soon file incorporation papers to build a line from Stockton to Byron, about 20 miles.

Wabash Railroad.—An officer writes that the Red Oak & Northeastern will be built from Imogene, Iowa, on the Wabash Railroad, northeast to Red Oak, 13 miles. The line will later be extended from Red Oak, northeasterly via Greenfield and Winterset to Des Moines, about 110 miles in all. The prospects of building are good, but no track has been laid as yet. Contracts for grading work will be let immediately. The work will not be heavy. The road will carry agricultural products and manufactures. (July 14, p. 105.)

RAILWAY STRUCTURES.

Buffalo Creek, N. Y.—The Lake Shore & Michigan Southern will put up a 125-ft. span, single-leaf double track bascule bridge over the Buffalo creek. This bridge will be built by the Strauss Bascule Bridge Company, Chicago.

Chambersburg, Pa.—Work has been commenced, it is said, by the Cumberland Valley on a viaduct through Chambersburg, Pa. There will be a 30-ft. cut at Waynesboro Junction. The work will cost about $900,000. This company has also com-

pleted plans, it is said, for a new passenger station to be built at Chambersburg.

Colfax, Wash.—The Spokane & Inland Empire will, it is said, build a new depot at Colfax.

Fort Smith, Ark.—The Kansas City Southern is asking bids on a large modern passenger station to be built at Fort Smith in the near future.

Ft. Wayne, Ind.—The Wabash has prepared plans for a brick freight house, one story, 200 ft. x 30 ft., to cost about $50,000.

Glen Onoko, Pa.—The Central of New Jersey will build a bridge across the Lehigh river at Glen Onoko, near the Lehigh Valley Railroad bridge.

Kenmore, Ohio.—The Northern Ohio Traction & Light Company, Akron, Ohio, will build a central car house and repair shops at Kenmore, at a cost of about $135,000.

Manchester, Ia.—The Illinois Central will build a freight house 30 ft. x 100 ft., together with the necessary side tracks and platforms, at an estimated cost of $12,000.

Oakland, Cal.—The Southern Pacific, according to press reports, has awarded a contract to the MacArthur Concrete, Pile & Foundation Company, Seattle, Wash., for piling for the new station at Oakland. The general contract for the building has been given to James Stewart. The cost, it is said, will be about $200,000. (June 9, p. 1335.)

Port Bolivar, Tex.—The Gulf, Colorado & Santa Fe has authorized an expenditure of $340,000 for improvements at Port Bolivar. These include a lumber shed, three sunken tracks to run next to the lumber shed, a skidway 1,200 ft. long, a 10-ton movable derrick and a bulkhead 2,770 ft. long, to cost about $60,500. In addition to the above the company will build a new steel re-enforced concrete ore docks which will have a capacity of 50 tons of ore per hour, and will cost approximately $200,000.

Portland, Ore.—The Mount Hood Railway & Power Company will build a new terminal at Portland, it is said, at a cost of $45,000.

St. Louis, Mo.—The St. Louis Southwestern will probably build a freight warehouse at St. Louis, to cost about $750,000.

San Pedro, Cal.—According to press reports, the Southern Pacific has started work on a large single span lift bridge at San Pedro. This bridge will be 187½ ft. long and will carry double tracks. It will be operated by electricity. The bridge must be finished within a year.

Sibley, Mo.—The Atchison, Topeka & Santa Fe, it is said, will start building a bridge across the Missouri river at Sibley within a short time. The material for the bridge is already on the ground.

Slaton, Tex.—The Atchison, Topeka & Santa Fe has awarded the contract for a passenger station and eating house, 60 ft. x 80 ft., two stories, of reinforced concrete construction, to cost about $35,000. The building will be used by the Pecos & Northern Texas.

A decree has been promulgated by the president of Chile directing the manager of the government railways to enter into a contract with Chilean manufacturers for a period of 10 years for the construction of all the cars needed on the government railways for that time. The cars are to be of steel construction and finished in native woods at maximum price as follows, ready for delivery to the railways: First-class vestibuled coaches, $10,950; third-class coaches, $6,950; baggage cars, $5,475; 20-ton coal cars, $1,259; 20-ton stock cars, $1,825; 20-ton box cars, $1,752; 20-ton flat cars, $1,314. There will be an opening [illegible] couplings, etc. From present indications it seems doubtful [illegible]

Railway Financial News.

Baltimore & Ohio.—See Big Level & Kinzua.

Big Level & Kinzua.—This railway, less than a mile long, connecting the Baltimore & Ohio with the Erie and the Buffalo, Rochester & Pittsburgh, has been bought by the Baltimore & Ohio.

Chicago, Rock Island & Pacific.—This company has bought, it is understood, the 24 miles of track of the Little Rock, Hot Springs & Western running from Little Rock, Ark., to Benton, for $480,000. This line from Little Rock to Benton has heretofore been leased by the C. R. I. & P., and the track from Benton to Hot Springs is leased to the St. Louis, Iron Mountain & Southern.

Detroit, Toledo & Ironton.—The receivers have called for payment $10,000 receivers' certificates issued February 21, 1910.

International & Great Northern.—A press despatch from Austin, Tex., says that it is learned "from an authoritative source" that the railway commissions have told the receiver that they will refuse to place a valuation of $35,000,000 on the property. This is the valuation required under the plan for reorganization.

Little Rock, Hot Springs & Western.—See Chicago, Rock Island & Pacific.

Louisville & Nashville.—See item in regard to this company under Court News.

National Railways of Mexico.—It has been rumored that control of the National Railways of Mexico was no longer held by the Mexican government. D. P. Bennett, vice-president, with office at New York, says: "Control of the National Railways of Mexico was secured by the Mexican government through the carrying out of the terms of the plan for the consolidation of the National Railroad of Mexico and the Mexican Central. In that plan it was distinctly stipulated that control should be lodged with the Federal Government. The government secured, has held, and so far as I know, still holds a legal majority of the oustanding stock. This control was obtained and held independently of the personal holdings of any representatives of the government."

New York Central & Hudson River.—A member of the firm of J. P. Morgan & Co., New York, is quoted as saying that the New York Central is seeking to formulate a plan for the consolidation of all its lines and subsidiaries within the state of New York in one company and under one general financial and operating management.

New York, Westchester & Boston.—Kissel, Kinnicutt & Co., and Harris, Forbes & Co., both of New York, are offering $17,200,000 first mortgage 4½ per cent. bonds of July 1, 1911-1946 of the New York, Westchester & Boston at 96¼, yielding over 4.70 per cent. on the investment. The bonds are guaranteed principal and interest unconditionally by the New York, New Haven & Hartford. They are part of an authorized issue of $60,000,000 which have been approved by the New York Public Service Commission, Second district, to bear interest at not to exceed 5 per cent. The commission gave the company permission to issue $20,000,000 of these bonds at once, of which the present offering is part, the remaining $2,800,000 being reserved for proposed additions. The investment up to May 31, 1911, made by the New York, New Haven & Hartford in the New York, Westchester & Boston amounted to $25,647,004.

The proposed four-track line runs from 138th street, New York, to Port Chester, N. Y., 22 miles, with a branch from Pelham, via Mount Vernon and Scarsdale, to White Plains, 13 miles, and a branch to Clason's Point, six miles. The road will have no grade crossings and is being laid with 90-lb. rail.

New York, New Haven & Hartford.—See New York, Westchester & Boston.

St. Louis, Iron Mountain & Southern.—See Chicago, Rock Island & Pacific.

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THE disastrous rear collision of passenger trains which occurred at Batavia, N. Y., last January, and which was reported in the *Railway Age Gazette* of January 20 and February 24 is explained by the government bulletin, reprinted in the present issue, as due probably to the engineman, 54 years old, being unconscious from epilepsy for a period of about 10 minutes; and to the neglect of the fireman to observe the rule requiring him to speak to the engineman on approaching each block signal. This case brings up a number of difficult questions. Can firemen be trained to "call" signals to the engineman with sufficient regularity and faithfulness to make the "call" rule a real safeguard? Innumerable collisions have seemed to indicate that they cannot. This fireman had worked on passenger trains 10 months; are men who have thus served for 10 years more efficient than was this one? If they are, should not every fireman of fast passenger trains be required to have gone through a long term of severe discipline on slow trains? How can a superintendent assure himself of the physical fitness of enginemen? Will a doctor's examination once in five years be sufficient? Would an examination every six months, or even every six days, have prevented this collision? A large share of collisions like this result in the death of the engineman, leaving important questions unanswered and unanswerable, but in this case he escaped, so we have the advantage of the engineman's own version; and evidently he has a conscience. In the majority of rear collisions the engineman's conscience seems to be completely paralyzed. Can consciences be trained? This is a vital question, for it affects not only the problem of getting the facts of a collision after it has happened, but also that of getting enginemen (and others) to notify their boss when, because of ill-health, they, perhaps, ought not to be entrusted with a train. From the statement in holy writ (Psalm 15), the man who sweareth to his own hurt and changeth not is a pretty high-class man, but men of that kind are needed in train service, and it is idle to blink the fact that to get them it is necessary that the selection, the training and the subsequent sifting of those selected must be done according to the most exacting standards. As a final question—not to try to exhaust the subject in a single paragraph—we may ask, What is to be done if the answers to all of the others prove unfavorable? This engineman, like the one who caused a similar collision on the Lake Shore a year or so ago, had a clear record for many years. Is the automatic stop the only safeguard that will satisfy the public?

FROM time to time during the last two years we have called attention to the steady and rapid increase in the number of railway stockholders in the United States. The *Wall Street Journal* now takes up the subject of the general increase of stockholders of corporations, amplifies the figures to a great number of corporations of all kinds, and shows the increase for a significant period, the five years 1906-11. Out of its long list of varied corporations we extract the following table for twelve dividend paying railways:

	1911.	1906.
Southern Railway	10,485	9,119
Atchison	30,000	17,430
Southern Pacific	12,941	11,918
Union Pacific	19,862	17,791
Pennsylvania	66,520	40,153
Norfolk & Western	4,612	2,955
Del., Lack. & Western	1,709	1,500
N. Y. Central	20,486	9,766
St. Paul	9,780	5,887
New Haven	18,652	12,627
Baltimore & Ohio	10,887	6,880
Delaware & Hudson	6,370	3,571
Total	212,304	139,587

In the case of the Southern Pacific and the Union Pacific the returns are for the single year 1910-11, and if available for the five year period would make the difference in the totals considerably more impressive. But, taking the table as it stands, it shows a numerical increase of stockholders in the twelve roads during the last five years of 72,717, or somewhat more than 52 per cent. And the period itself is a significant one. It includes the panic and post-panic time that began in the October following the year 1906 and reached through 1908; a period of federal and state railway baiting not yet ended; and an epoch of mutations in gross and net earnings; all which theoretically should have shadowed railway investment and undoubtedly has had somewhat of that effect abroad where governmental policy toward particular interests counts for much in the investor's mind. In the remarkable increase some allowance must undoubtedly be made for redistribution of some of the large and "timid" stock holdings, and another allowance for the five years' increase of capital stocks and some conversions of bonds—these two last being normal changes making for an increase of stockholders. But they fall far short of explaining the great absolute

reinforcement of the body of railway shareholders during a period of railway stress and adversity, and leave as ultimate causation a bedrock confidence of the small and moderate investor in the railway future joined with his conviction of cheapness of railway shares of the better type. The waxing army of railway share owners who are investors pure and simple has also its suggestion of withdrawal from "the street" of a large part of the higher class of railway shares as material for speculation and the deeper point in another direction of the elemental power of the stock-owning post at the ballot box.

THE NEW PHASE OF RAILWAY CONSOLIDATION.

THE first phase of railway consolidation in this country by which great railway systems were built up was naturally the union of competing lines. The secondary phase was the union of connecting lines so as to obtain longer and, in many cases, through routes. Often these two processes went on together, but generally speaking, with competition as the force major and antecedent, and the economy of blending connected lines as a very important but secondary influence. The forms of consolidation, using the term broadly, took many shapes, varying with the form of acquisition of the component properties. There was—and is—the lease; the holding of a mere majority, greater or less, of the stock of the subsidiary, sometimes paying dividends, sometimes not; often the actual and complete merger when the stock of the acquired road had been nearly or entirely secured and the law was consenting; and, in some cases, especially of late years, the device of a holding company. Inside of all these variants of method there have been other variants though, of course, the principle of operating control by the great parent corporation runs through them all; and the general trend of financing by the big railway systems has been the reduction of the variants so far as possible.

This policy is now taking an enlarged shape which may be called the "big" blanket mortgage typified by the $600,000,000 lien of the Great Northern and the great mortgage scheme of the New York Central System which, as a plan, has received official confirmation, but with details still to be worked out. A hint of the same general policy appears in the place of the New York, New Haven & Hartford of merging earnings and expenses of important subsidiaries in its next annual report. The latter system, by the way, has never yet placed any direct mortgage whatsoever upon its main stem. It must, of course, be obvious that the great mortgage schemes of such great railway systems are not new in form or kind. The "consolidated" mortgage, so-called, has given us a familiar adjective to express not only a method of refunding, but of securing new moneys. But what is really new is the vast scope of the proposed mortgages, their advantage and disadvantages and some of the obstacles that they must encounter before their consummation—

[illegible] especially those with "consolidated" limited mortgages already [illegible] remote is yet another obstruction. Again, in the case of some [illegible] plant. It tends strongly to do away with the "short" and

high rate railway note; and, finally, it is almost certain to be in a very large degree accepted by the holder of the matured senior security, thus doing away with extensive new financing through the underwriters. Even the long leases based on a rate paid upon stock may thus be extinguished, for it is merely a matter of inducement to be offered to the stockholder in the exchange; and the same is true of the bonds of a great railway system which have an extremely long time to run to maturity.

The ideal ultimate of the new consolidation of dependent lines, as distinguished from the old consolidations of lines originally independent, is the reduction of all securities of a great railway system to two simple forms—common stock and a single sweeping first mortgage. Each running high into its hundreds of millions. In its completeness it is an ideal pretty far away, especially when state legislation, past or future, is taken into account. There is also another very important limitation to be remembered. It is profitably feasible only for the large railway systems which are also steady dividend payers. No great blanket mortgage will appeal to investors unless the stock represents a handsome equity—in other words unless the system returns large earnings over fixed charges. Systems of lesser earning power may try the scheme, but it must be at the cost of a high and more or less speculative interest rate on the "big" mortgage, and probably with net fiscal loss. In the limits of the new fiscal consolidation looking to financial homogeneity, belong clearly such systems as the Great Northern and New York Central, not the Erie or the Wabash. But the great and steady dividend payers form so vast an aggregate as well as majority of the genuine railway investment interest that the railway groups of the minor and more speculative type may be ignored. The new theory of consolidation has a field so ample that the first ventures into it of two or three of the great railways have thus a profound significance.

WATER VS. RAIL TRANSPORTATION AGAIN.

S. A. THOMPSON, field secretary of the National Rivers and Harbors Congress, a letter from whom was printed in the *Railway Age Gazette* of June 30, page 1682, has written us another letter, this one being in reply to the editorial in our issue of June 30, entitled "The Cost of Rail and Water Transportation." In his second letter, which is given elsewhere, Mr. Thompson discusses further both the relative costs of rail and water transportation and the competition between railways and inland waterways. Before entering on a consideration of the points he seeks to make regarding these matters, it will be desirable to refer briefly to some matters in his communication that are not altogether germane to the discussion. By his general tone he seeks to convey the impression that our editorial statements were misleading. For example, he says that we made "numerous errors" in figures taken from the reports of the British Royal Commission. The only errors made were in giving the rates on the river Seine in France, and these were due to obvious typographical mistakes consisting in the omission of the decimal points from the figures. Commenting on our remark that the haul by the Great Lakes is circuitous, he compares it with the parallel haul by rail, which, he shows, is equally circuitous. As our comparison was between the haul by the Great Lakes and the haul via the Chesapeake & Ohio, his comments regarding the relative lengths of the rail and water hauls from Duluth to Buffalo are not apropos. He asserts that we garbled his statement regarding the value of the property and franchises that the public has given to the railways. He said: "The people of the United States have given outright to the railways property and franchises worth probably two and one half billions of dollars." The "garbling" consisted in the unintentional substitution of the word "about" for the word "probably." In response to our invitation to bring in a bill of particulars listing the property and franchises worth $2,500,000,000, which he asserted that the public has given the railways, Mr. Thompson decides that perhaps his statement was a valid one. His own statements show that it was merely a bald

guess founded on no basis of fact or knowledge; and yet it was no wilder or more baseless than many other assertions that the waterway enthusiasts habitually make.

In our previous editorial attention was called to the fact that Mr. Thompson did not include in his figures regarding the cost of water transportation the expenditures which the public has to make to maintain waterways and to pay interest on the investment in them. He seeks in his second letter to meet this criticism by applying an allowance for the interest on and the maintenance of all the improvements that have been made on the Great Lakes to about two-thirds of all the traffic on them. He thereby arrives at the conclusion that the cost to the taxpayers of transportation on the lakes is but .07 mills per ton per mile. To use a computation of this sort as an argument for building ship canals hundreds or thousands of miles long is quite as rational, and no more so, as it would be to say that the improvement of New York harbor has cost a certain sum of money; that the interest on this applied to all the ocean traffic that moves to and from New York amounts to only so much per ton per mile; and that, therefore, New York harbor should be extended to San Francisco. The question before the people of the United States is not whether nature shall be induced to build more great lakes and the government shall then be prevailed on to dig more short canals to connect them. The question is as to whether deep waterways shall be built from the Great Lakes to the Atlantic ocean and from the Great Lakes to the Gulf of Mexico, and whether other similar projects shall be carried out. To get any real light on what the cost per ton per mile to the people in taxes would be for transportation on such waterways, we must look to the actual cost per ton per mile now incurred in existing canals and canalized rivers. The Sault Ste. Marie canal has the densest traffic of any canal in the world. The total tons of freight that passed through it in 1910 was 62,363,218. Its length is 2.7 miles (Bureau of Census Report on Transportation by Water in 1906, page 42). Assuming that every ton of freight that entered it passed through it, the total ton mileage handled on it in 1910 was 168,380,689. Its total cost has been $13,000,000. The annual interest on this at 3½ per cent. would be $455,000. This interest applied to the ton mileage handled in the canal in 1910 amounted to *2.7 mills per ton per mile.* Owing to the heavy traffic in 1910 the interest per ton per mile was much less than in some years. For example, in 1906 and in 1908, making the computations on the same basis, the interest for each ton mile handled in the canal was *over 4 mills.* In other words, interest alone per ton per mile on the traffic handled *in the canal* amounts to from 40 to 60 times as much as Mr. Thompson estimates the combined interest and maintenance charges per ton per mile for traffic on the Great Lakes.

It is unquestionably true, as Mr. Thompson says, that "the tonnage carried on the Great Lakes made a good profit to the carriers and an enormous profit to the people." Nobody seriously questions that the public was justified in making the improvements that it has in the Great Lakes and that transportation on them is far cheaper than it is by rail. But it does not follow, because it is expedient for the public to build short ship canals to connect, and enormously increase the usefulness of, great bodies of water, such as the lakes, that it is expedient for it to spend the hundreds of millions of dollars that would be required to build a ship canal 1,657 miles long from Chicago to the Gulf of Mexico. Actual experience on the Sault Ste. Marie canal indicates that the cost in taxes to the public of building and maintaining any of the ship canals that are projected would amount to as much per ton per mile for the traffic handled on them as the average rates per ton per mile of many railways which handle mainly low grade traffic. The average rate per mile of the Chicago, Indiana & Southern, for instance, in 1909, was 4.1 mills; of the Chesapeake & Ohio, 4.1 mills; of the Bessemer & Lake Erie, 4.36 mills, and of the Chicago & Eastern Illinois, 4.76 mills. A ship canal from Chicago to the Gulf of Mexico, or from the Lakes to the Atlantic, would not cost anywhere near as much per mile as has the Sault Ste. Marie canal; but, on the other hand, it could not get anywhere near as dense a traffic over which to spread interest and maintenance charges.

Mr. Thompson disputes certain of our statements with reference to the attitude of Col. Thomas W. Symons regarding the improvement of the Erie canal, and also asserts that Col. Symons has changed his attitude since he made his report on the Erie canal in 1897. It is worth while, therefore, to quote from a paper appearing in the publications of the Buffalo Historical Society, vol. 13, pages 1 to 14, entitled, "The United States Government and the New York State Canals," in which Col. Symons traced the history of the investigations and discussions regarding the enlargement of the Erie canal down to the year 1900. In the course of this paper he said:

"With everything reduced to the same basis, it was calculated (in his first report on the Erie canal that the cost of transporting a bushel of wheat in lake freighters of 7,000 tons capacity through a suitable canal from Buffalo to New York was 2.28 cents; while the cost of transporting the same bushel in a fleet of barges each carrying 1,500 tons through a suitable barge canal from Buffalo to New York, and including the transfer charges at Buffalo, was 2.07 cents, and if the transfer charges were reduced, as they have since been reduced, was 1.66 cents."

In other words, Col. Symons estimated that the cost of transportation to the shipper in a ship canal would be 38 per cent. greater than the cost of transportation in a barge canal. Continuing, Col. Symons said:

"In making this comparison no consideration was given to the cost of the canal or the cost of operating it, the basis of comparison being the interest on the cost of carriers, deterioration thereof, insurance of carriers and cargoes, ordinary repairs, fuel, oil, and waste and wages and subsistence of the crews of the vessels. *If the first cost of the canal and the cost of maintenance and operation were taken into consideration, the showing in favor of the barge canal over the ship canal would have been still more marked.*"

"The study was convincing that for the highest economy in transportation, special types of vessels are needed for use on the ocean, on the lakes, and on the canals, and neither can replace the other in its proper waters without suffering loss of economical efficiency. Ocean vessels could not, as a general rule, engage in the business of passing through a ship canal and the lakes to the upper lake ports, and lake vessels are not fitted for use upon the ocean, and if they made use of a canal they would have to transfer their cargoes at the seaboard, ordinarily by means of lighters, floating elevators, etc., at a higher expense than such transfers would cost at the lower lake ports. For economical transportation through a canal from the Great Lakes to the sea special vessels, differing from and far less costly than ocean or lake vessels, are required.

"*The conclusion was reached by the writer that even if a ship canal were built, the greater cheapness of barge canal transportation would prevent its use by large ships, and cause it to be used almost entirely by fleets of barges, which could be almost equally as well accommodated in a smaller and cheaper canal.*

Col. Symons said not a word in this paper to indicate that he had changed the opinions previously expressed by him regarding the relative costs of transportation on barge and ship canals.

In his first letter Mr. Thompson cited development of the waterways of Europe as an example to be emulated by the United States. The *Railway Age Gazette* in reply pointed out that the average cost of transportation on most of the waterways of Europe is much greater than the average cost of transportation on the railways of the United States. In his second letter Mr. Thompson deprecates references to the results of waterway development in Europe as examples of what might be expected to follow waterway development in the United States. He points out, as the *Railway Age Gazette* has already shown (March 25, 1910, page 813), that the waterways of Europe on which a large traffic is handled have been dug to only very shallow depths. He also shows that the hauls on them are very short. Because of their short hauls he objects to comparison of their rates with those of the railways of the United States, on which the average haul is over 250 miles. And yet he sees no injustice in comparing average railway rates in the United States with the average rates on the Great Lakes, which have been almost entirely created by nature, and on which the average haul in 1910 was 840 miles. Continuing, Mr. Thompson says: "Depth and width of channel and length of haul have a profound influence on rates of freight, and because we have many rivers which are wider and deeper than those of Europe, and on which hauls may extend to thousands of miles, the assumption is justified that much lower transportation rates are possible on our rivers than on those of

Europe." In a later paragraph he says, "It has been claimed that the rivers of the United States are today in as good shape to handle a large traffic as are those of Europe, but I deny that this has been or can be shown, or that such is the fact." It would seem that Mr. Thompson's own admission that the rivers of the United States have greater width and depth than those of Europe should be sufficient to refute his contention that they are not in as good condition to handle a large traffic as are those of Europe, but if evidence on this point is needed it can be supplied from public reports. In its report on the proposed 14-ft. waterway from Chicago to the gulf of Mexico, the board of engineers of the United States Army said:

"The existing improved waterway of the Mississippi river below St. Louis fully equals, and over the greater part of its extent far excels, in both depth and duration of unobstructed use the existing river systems of Europe, where the non-tidal sections are usually given depths of only 2 to 9 ft., 9 ft. being exception and 10.5 ft. the maximum. The immense commerce of the Rhine could be carried more readily and cheaply on the Mississippi today than on the Rhine if such commerce were available for transportation by water and demanded such transportation. The decline in the commerce of the river has not arisen from its lack of navigability, but from a reduction in the amount of material available for shipment."

In the same report it was shown that the entire Mississippi river system, including the various tributary rivers, has depths greater than those on which a large commerce is handled on the rivers of Europe, the Missouri having a depth of 4½ ft. to Kansas City; the Ohio, a depth of 9 ft. to Pittsburgh; the Monongahela, a depth of 5 ft. into the Pennsylvania coal fields; the Kanawha, a depth of 6 ft. into the West Virginia coal fields, and the present waterway between Chicago and New Orleans a minimum depth of 4½ ft. Finally, it is stated in the report of the commissioner of corporations on "Transportation by Water in the United States," Part I, pages 28 and 29, that there are 225 navigable streams and 45 canals in this country, having an aggregated mileage of 28,600 miles; and of these 40 streams, with a length of 2,600 miles, have a depth of 10 ft.; and 70 streams with a length of 3,200 miles have a depth of 6 to 10 ft. Over 67 per cent. of the total water-borne commerce of Germany is carried on the Rhine and the Elbe, yet these two rivers together have only 617 miles of channel with a depth of 4½ ft. or more. That the existing waterways of the United States are unable to compete with our railways, while streams of much less depth are able to compete with the railways of Europe is due not to differences between waterways here and abroad, but to differences in railway rates here and abroad. Undoubtedly, further development of our rivers might enable them to make lower rates; it might enable them to make lower rates than those of Europe; but whether this would reduce the economic cost of transportation, which is the only thing the public is interested in is an entirely different question.

While seeking to show that our rivers are not as well developed as those of Europe, Mr. Thompson cites several rates made on them by which he seeks to support his contention that water transportation is intrinsically cheaper than rail rates. To persons who are not accustomed to dealing with such matters, his references might seem impressive, but to those who know how worthless are specific instances of low rates they do not carry conviction. It is quite easy to cite rates that have been made by rail that were very much lower than any of those by water to which he refers. As long ago as in 1877 the railways, in a rate [illegible] made a rate of 8 cents on live stock from Chicago to New York, which, for a carload of 20,000 lbs., figured out one-tenth of 1 mill per ton per mile. In the early part of 1904 the rate on wheat from Buffalo to various Atlantic ports for export fell to 2 mills per bushel. (XI I. C. C. Reports, page 14.) This [illegible] Buffalo and New York figured out [illegible] and [illegible] per mile. These rates are [illegible] the latter one is very much less—than any water rate Mr. Thompson cites. They do not, however, prove the superior cheapness of railway transportation any more than the rates he mentions establish the [illegible]

The only rates that Mr. Thompson mentions which have any [illegible] on the Ohio river, and even these prove when the conditions under which they are [illegible] to be [illegible]

the greater cheapness of water transportation of anything but the very bulkiest and cheapest commodities. The coal rates to which he refers are made by boats which tow the coal from Pittsburgh to New Orleans in enormous consignments on flimsy wooden rafts. The method used has been described as follows:

"Three species of boats loaded on the Monongahela river for the Ohio river trade are used by the shipper, namely, coal boats drawing 8 to 8½ ft. and carrying 1,000 to 1,100 tons; coal barges drawing 6 to 7 ft. and carrying 500 tons; and coal floats carrying from 200 to 300 tons. The tow boats usually bring from the mines about 3,000 tons of coal in small fleets arranged for passing the locks conveniently. At Pittsburgh the small coal fleets are moored while awaiting rises sufficient for navigation on the Ohio river. When rises of 10 ft. occur, or sufficient to carry 8 ft. coal barges, fleets of from 10,000 to 15,000 tons are made up for shipment to Cincinnati and Louisville. At Louisville two, and sometimes three, of the Pittsburgh fleets are made up into monster fleets of from 35,000 to 45,000 tons and towed to New Orleans by powerful tow boats. A fleet conveying 40,000 tons covers about 10 acres."

After delivery of the coal at destination, the rafts on which it has been towed are knocked to pieces and sold, and the tow boat returns right to its point or origin. It is perfectly obvious that such transportation may be made much cheaper than railway transportation; and it is equally obvious that it is not adapted to the handling of any commodities except cheap and bulky ones, such as coal, sand, etc. That on the rates which it has been possible to make on the Ohio river it has not been possible to develop anything but traffic in such commodities as those mentioned, is shown by the fact that the total net tons transported on the Ohio itself declined from 7,525,667 tons in 1889 to 3,142,097 tons in 1906, and that the total net tons transported on the Ohio river system declined from 15,796,968 tons in 1889 to 15,226,805 tons in 1906. Of the total traffic handled on the Ohio river system in 1906, 10,968,307 tons was coal and 1,969,732 tons were sand and stone. It may be replied that the decline in water-borne tonnage, while the tonnage by railway was increasing was due, not to the fact that the cost of railway transportation was less but that the service rendered by rail was better. This probably is true. But if a transportation line, while making lower rates than a competing line, also gives such poor service that it cannot get any business, it would seem to be about as badly off as if it could not make as low rates as the competing line. If inland waterways are to compete successfully with railways, they must make rates which are *lower in proportion to the quality of the service that they render* than those of railways.

Mr. Thompson apparently seeks to convey the impression that the real reason why the railways have been able to attract business from waterways such as the Ohio and the Mississippi, having depths of from 9 to 30 ft., is that the railways have made rates low enough to exterminate water competition, which they have raised when the competition has been destroyed. He says that just so long as the railways are permitted to do this, "just so long will it be difficult for the people of the United States to secure the full measure of the benefits which ought to occur from the development of their waterways," and he speaks approvingly of the provision of the Mann-Elkins act which prohibits a railway from advancing a rate which has been reduced to meet water competition unless there has been some change in conditions other than the elimination of the water competition.

His attitude regarding this matter is much the same as that of most advocates of waterway development. They favor the development of waterways to stimulate or create competition which will regulate railway rates; but at the same time they demand legislation to prevent the railways from reducing their rate to meet water competition. In other words, they want waterways subsidized to compete against railways, but they want railways restricted in, or even prohibited from, competing against waterways. Until the agitation for waterway development began in this country, it was assumed here that competition consisted in each of two or more business concerns trying to get business away from rival business concerns. According to the new definition of competition advanced by the waterways advocates it consists in the government, after spending the public's money, to enable one class of concerns to attract business away from a second class of concerns, compelling the second class of concerns to refrain from striking back. We have always been somewhat

puzzled to understand how the waterway advocates expect the development of waterways to regulate railway rates if the railways are to be prohibited from reducing their rates to meet water competition.

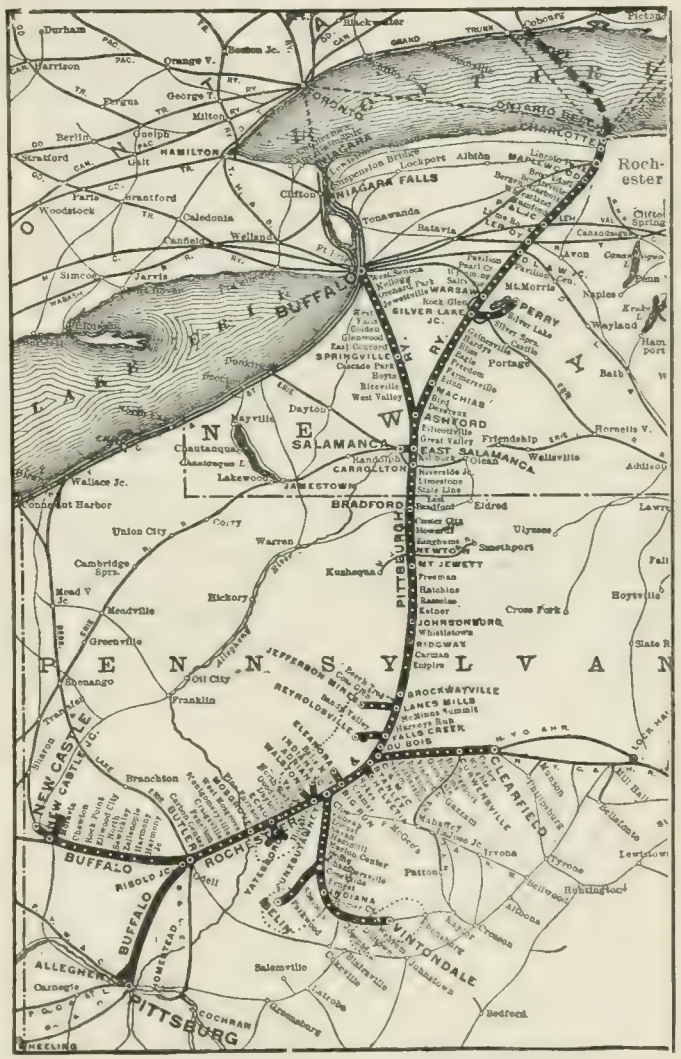
There would be, under certain conditions, entire justification for legislation to prevent railways from excessively reducing their rates where they meet water competition for the purpose of destroying the water competition. But such regulation of railways under existing conditions is not equitable. For under existing federal laws, the rates of water carriers are subjected to no regulation, except when they apply to traffic carried partly by rail and partly by water; and then, manifestly, the purpose of the regulation is to reach the railway and not the water carrier. In consequence the water carriers are left free to, and do, commit every form of discrimination which, when committed by the railways, is denounced and penalized. They make lower rates to one shipper than they make to another on the same kinds of goods hauled in the same boat. They give secret rebates to some and not to others. They constantly charge higher rates for shorter than for longer hauls when this will serve their purpose. Now, a common carrier by water is just as much engaged in a public service as is a common carrier by rail. It exercises the power of eminent domain to get land for wharves; and, unlike railways, it uses channels which, to a greater or less extent, have been provided and are maintained at public expense. Inland water carriers are, therefore, under even more moral obligation not to discriminate between shippers than the railways. For the government to tax the public to subsidize water competition against railways, and at the same time permit boat owners to commit every form of discrimination which the railways ever committed, even in the old days of chronic rate wars and cut-throat competition, but which the railways are now prohibited from committing, is as good an example of unjust discrimination by the government itself as any of which the railways have ever been guilty.

Those who advocate further development of inland waterways have never been heard to advocate also the application to water rates of the same requirements regarding publicity, 30 days notice of change, fairness and reasonableness, as are made regarding railways rates. Among the principal advocates of waterway development are the big shippers who formerly were the recipients of most of the secret rebates which the railways gave; and it seems not wholly improbable that some of them are now giving of their cash to finance the waterway campaign with the hope that they will not only thereby get the government to tax itself to pay part of their freight rates, but will also be able to get rebates from the boat lines which will compensate them for the loss of the rebates that they formerly got from the railways.

There is still wanting, in spite of the extended discussions of the subject, any evidence worthy of the name to support the contention that the further development of inland waterways, whether by the construction of canals or the canalizing of rivers for any considerable distance, either to depth suitable for barge traffic or for lake vessels, or for ocean-going steamships, would make water transportation any cheaper, even for the shipper, than rail transportation, difference in service being considered. There has not yet been adduced one scintilla of evidence that by such development of waterways the total economic cost of transportation, including both what the public would pay for the development and the maintenance of the waterways and what the shipper would pay to the boats, would be reduced, difference of service being considered. Indeed, the evidence, so far as any exists, is all the other way. It may be that by imposing all manner of restrictions on competition by the railways against the boat lines, while leaving the boat lines free to compete as they pleased against the railways, some stimulus might be given to the development of inland water traffic. But in such circumstances it could not be said that the waterways competed successfully against the railways, because there would be no real competition. It requires no hardihood to predict that if the government spent even the maximum amount on the development of inland waterways that its advocates demand, and then imposed the same restrictions on the making of rates by water as it imposes on the making of rates by rail, the railways would be able to continue to secure as large a proportion of the total traffic moved as they secure now. The more such chosen spokesmen of the waterway propagandists as Mr. Thompson press their strongest arguments, the more clear it becomes that in the court of reason they have no case.

BUFFALO, ROCHESTER & PITTSBURGH.

In general, if a railway's operating expenses in the fiscal year ended June 30, 1911 should be no higher than in the previous fiscal year, despite the increases in wages, we may assume either that the road has cut down on its appropriations for maintenance, or that it is operated more economically. This of course is assuming that the same or greater amount of business is handled by the road. Transportation expenses on the Buffalo, Rochester & Pittsburgh the first road to make its annual report for 1911, amounted to $2,930,000 last year, an increase of $380,000. This is an increase of 13 per cent. over the previous year, and is probably just about accounted for by the increased scale of wages paid employees. On the other hand, maintenance of way in 1911 cost $1,150,000, and in 1910 $1,220,000; and maintenance of equipment cost $1,770,000 in 1911, and $1,860,000 in 1910. In other words, in maintenance either there has been an increase in the efficiency per employee and a demonstration of economy



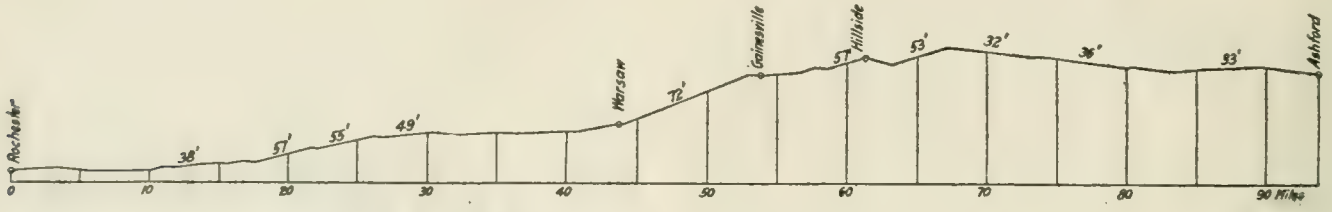
The Buffalo, Rochester & Pittsburgh.

resulting from past expenditures both for maintenance and for additions and betterments, or else there has been a scaling down of the appropriations in order to show large net earnings.

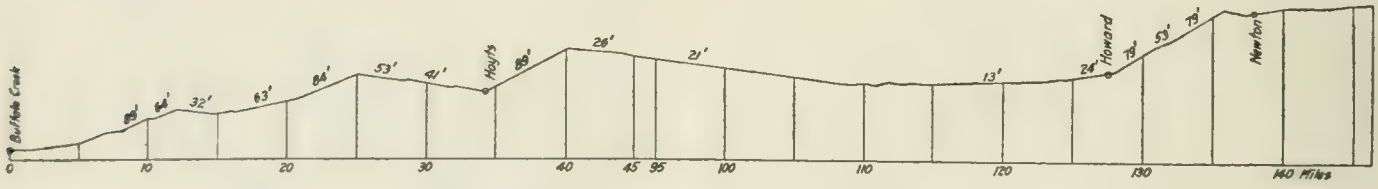
The fiscal year 1910 was a banner one for the B. R. & P. Its earnings, volume of traffic and profits were the largest in the history of the company. Its average train load of revenue freight was increased during the year from 597 tons, the 1909 figure, to 630 tons, the average for 1910. The average tonnage hauled per locomotive increased from 400 tons to 420 tons. In 1911 the Buffalo, Rochester & Pittsburgh went ahead even of 1910 in the figures for gross tonnage handled; the ton mileage in 1911 being 1,590,000,000, as compared with 1,573,000,000 in 1910.

replacement of bridges and other structures. The decrease in maintenance of equipment is due to the lower cost of maintenance of modern rolling stock."

In justifying more than *adequate* expenditures for maintenance of way and maintenance of equipment, it is customary to speak of them as if such expenditures made in a given year, or over a period of years, will put a road in such shape that eventually much less per year will have to be spent to keep the property in good repair. But what actually happens is that the standard of practice keeps so well in advance of what even the most liberally maintained road can follow, that the effect of past liberal maintenance is seldom or ever reflected in lower present maintenance cost.

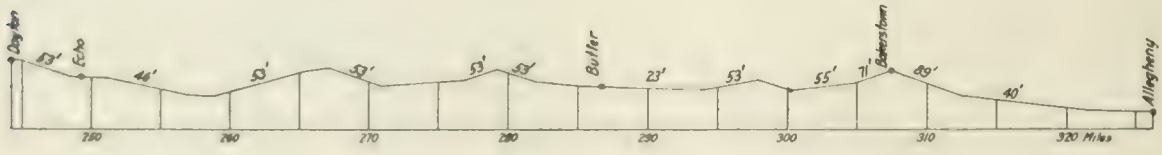


Profile Rochester, N. Y., to Ashford, N. Y.



Profile Buffalo Creek, N. Y., to J. & B. Junction, Pa.

Profile J. & B. Junction, Pa., to Dayton, Pa.



Profile Dayton, Pa., to Allegheny, Pa.; Buffalo, Rochester & Pittsburgh.

A comparison of earnings and expenses is given in the table at the end of these comments.

The detailed figures for operating expenses are not given in the annual report of the B. R. & P., so that it is more than usually difficult to form any judgment as to whether the road has suffered in any way from smaller expenditures on maintenance. We find, however, that the average train load in 1911 was 635 tons, as compared with 630 in 1910 and the average locomotive tonnage hauled per locomotive was 430 tons, an increase of 10 tons over 1910. This certainly does not look as if maintenance of the motive power department has been in any way neglected. President Bishop, in commenting on expenses says: "Maintenance of way and structures shows a decrease due to the mild winter and to the extraordinary charges made last year for the

The Buffalo, Rochester & Pittsburgh appears to be an exception to this rule. Of course without a thorough first-hand knowledge of the entire property, it would be quite impossible to say definitely whether this was the case or not, but there are many indications in the annual report that would lead one to believe that the property had actually in the past been put in such shape that it could be maintained at a high or higher standard at a lower cost per year than formerly. No new mileage to speak of has been added to the property for a number of years. In 1911 the company operated 573 miles, or six miles more than was operated in 1910, and this increase in mileage was due to the purchase of a little road running from Silver Springs, N. Y., to Perry; and before that the mileage had actually decreased slightly from 1907 to 1910 due to realinement. On this short

road the company carries a very heavy density of mostly low grade freight traffic. The road is now double-tracked from Ashford, N. Y., to Punxsutawney, Pa., 8½ miles, second track having been completed last year. During the year just closed about 500 feet of timber bridges were replaced with standard concrete structures, pipes and embankment. During the year approximately 48 track miles of 80 lb. rail were replaced with 90 lb. rail. Of this 12 miles was laid with titanium rail, 16 miles with open hearth, and the remainder with bessemer. The B. R. & P. apparently has adopted as its standard 90 lb. rail, and not 100 lb., the standard on the C. & O., for instance. Fifty per cent. of the ties renewed this year were treated at the company's timber preserving plant at Bradford, Pa., being creosoted with 10 lbs. of creosote oil per cubic foot of timber.

There seems to have been a policy, both as regards the finances of the road and the operation and maintenance of it, of concentration, or what might be called "intensive management," which has been decidedly successful. The road is lightly capitalized and in 1911 the net results of the financial operations showed a decrease of $332,000 in the bonded debt of the company outstanding on June 30, 1911. The company up to 1908 had been paying 6 per cent. dividends on the common stock, in addition to 6 per cent. on the preferred. In that year dividends were reduced to 4 per cent. and were not again raised until the last half of the 1911 fiscal year, when they were increased to a 5 per cent. annual basis on the common stock. The road earned 9.2 per cent. last year on its total common stock, after the payment of preferred dividends.

There was a decrease of 17 in the number of locomotives in service from 1910 to 1911; a decrease of 597 freight train cars, and the only change in passenger cars was the addition of 2 motor cars. But on the other hand, the average capacity of each freight car was 38.85 tons last year, as against 38.30 tons the year before, and, as we have previously mentioned, the tonnage hauled per locomotive materially increased.

There was a notable difference in the character of the traffic carried last year from that carried in 1910, which probably explains some of the changes in operating statistics that we have mentioned. In 1911 the company carried 6,950,000 tons of bituminous coal, as compared with 6,530,000 tons in 1910, while there was only 244,000 tons of iron ore carried in 1911, as compared with 559,000 tons in 1910. Presumably the greater part of the iron ore carried by the B. R. & P. moves south from the Lakes to the Pittsburgh district. The great falling off in the tonnage of this commodity, which was due to the depression in the iron and steel trades, left the company with a large amount of equipment to be moved south light. The mileage of loaded freight cars last year was 48,660,000 as against 48,900,000 in 1910; while the empty mileage was 33,464,000 in 1911 and 30,093,000 in 1910. In other words, the fact that the company was able to almost maintain the record set for train load in 1910 in spite of the loss in iron ore tonnage, which necessitated a larger empty car mileage, was due to better car loading. The accompanying profile shows the character of the road on which these results were obtained.

On an average, the loaded cars in 1911 carried a thousand pounds more freight than in 1909. The average tons of freight per loaded car in 1911 was 32.68 tons. The increase in empty car mileage, when taken in consideration with the fact that the average engine load of *revenue* freight was 20 tons heavier last than the year before, makes it all the more probable that the equipment was fully maintained in 1911. This is further borne out by the fact that on June 30, 1911, 87.08 per cent. of the locomotives that were in service were in good condition as compared with 86.82 per cent. at the end of 1910, and although there were slightly more locomotives in service requiring repairs in 1911 than in 1910, there were fewer locomotives in shops under repairs.

For a road that is always spoken of as a typical coal road, the Buffalo, Rochester & Pittsburgh does a rather large passenger business. In 1911 the passenger revenue amounted to $1,066,000, an increase of $80,000 over 1910. The company, however, figures that it loses on its passenger business. It figured its cost per passenger per mile in 1911 at 2.441 cents and its receipts per passenger per mile were 2.060 cents. It is very doubtful whether even an approximately correct estimate can be made of expenses, separating them as between freight and passengers and figuring them on a unit mileage basis. The Pennsylvania has given such figures in their annual reports for a number of years and Pennsylvania officers think that after years of experimenting and readjustment they have got a fairly accurate basis of separation, but even they would probably acknowledge that the figures are only approximately correct. One thing is worth mentioning about the Buffalo, Rochester & Pittsburgh passenger business. The average number of passenger cars to a train is only three, but notwithstanding this, the average number of passengers per train is forty.

Close control of a railway company by a banking house is sometimes used as an opportunity for running the road for other purposes than strictly public service and as an operating concern, but this charge could certainly not be brought against the Buffalo, Rochester & Pittsburgh. The control of the company is held quite closely by a firm of New York private bankers and their associates, but the policy of the management of the property has been to place authority in the hands of the officers on the road, and the results of the showing this year amply justify such a policy. Arthur Yates, who was president up to the time of his death last year, was a coal man as well as a railway man. At his death Adrian Iselin, Jr., of the banking firm of Iselin & Co., was elected president, but refused re-election last year, and William T. Noonon, who had been vice-president and general manager, was elected president.

The following table shows the results of operation in 1911 compared with 1910:

	1911.	1910.
Mileage operated	573	567
Freight revenue	$7,748,179	$7,562,259
Passenger revenue	1,065,983	986,370
Total operating revenue	9,134,402	8,936,117
Maintenance of way and structures	1,148,663	1,220,190
Maintenance of equipment	1,767,456	1,857,017
Traffic	131,403	120,169
Transportation	2,933,142	2,551,197
Total operating expenses	6,145,856	5,903,905
Taxes	212,000	188,095
Operating income	2,774,557	2,841,762
Gross corporate income	3,615,075	3,394,142
Net corporate income	1,709,277	1,527,373
Appropriations	246,500	190,000
Dividends	1,214,069	1,107,697
Surplus	495,208	419,677

NEW BOOKS.

Manual of the American Railway Engineering Association. Edition of 1911. 6 x 9 in. 477 pages. Published by the American Railway Engineering Association, Chicago. Price, paper, $2.50; cloth, $3.00; half-morocco, $3.50.

The Manual of the American Railway Engineering Association, which has just been published, stands by itself as the authority on good practice in railway engineering and maintenance of way work today, and for this reason should be found on the desk of every railway officer having to do with the maintenance of track or structures. This book represents 12 years' work of the association, and is the result of careful study and investigation on the part of committees, whose recommendations and reports are reviewed and approved by the membership at large at the annual meetings. The Manual is not a treatise or text book, but is condensed and contains simply a statement of principles and conclusions, references being given below each subject to the volume of the Proceedings, where the text of the reports and full discussion may be found.

The new Manual is nearly twice the size of the last edition (issued in 1907) and contains a large amount of additional material which has been approved by the association since that date. All material in the preceding edition has been carefully edited and revised by the various committees to be in accordance

with present practice. The book is divided into 18 chapters, corresponding to the work of the standing committees of the association, each chapter being edited under the supervision of the respective committee. The subjects covered are: Roadway; Ballast; Ties; Rail; Track; Buildings; Wooden Bridges and Trestles; Masonry; Signs, Fences and Crossings; Signals and Interlocking; Records and Accounts; Rules and Organization; Water Service; Yards and Terminals; Iron and Steel Structures; Economics of Railway Location; Wood Preservation; and Electricity. Standard forms are given for keeping records of ties, rail failures, and other maintenance of way work. Specifications are given for timber, masonry, fence material, the design and construction of steel bridges, and the treatment of timber. The organization of forces for grade reduction, track elevation and steam shovel work are given, also a discussion of turnouts and spirals with accompanying tables.

Letters to the Editor.

RAIL VS. WATER TRANSPORTATION.

Richmond, Ind., July 11, 1911.

To the Editor of the Railway Age Gazette:

In the editorial in your issue of June 30 in reply to my letter in the same issue (in which I replied to an earlier letter from H. G. Moulton) you say that in my comparison of the relative rates on coal by rail and by lake I give "no consideration to the fact that the haul by lake is very circuitous, which makes the distance the coal moves very much greater than the distance would be as the crow flies, and makes the average rate *per ton mile* very much lower in proportion than is the *absolute rate* from the point of origin to destination."

The distance by lake from Duluth to Buffalo is 989 miles. The shortest line over which a locomotive could haul a train between the two cities named is 1012 miles. By using the ferry at the Straits of Mackinac, which is not a strictly all-rail route, but does avoid the breaking of bulk, the distance is 966 miles. In the one case the distance by rail is 23 miles more, and in the other, 23 miles less than the distance by lake. How "very circuitous" the lake route is, to be sure! It is a wonder it is able to compete at all. I do not see that the distance "as the crow flies" has anything whatever to do with the case, or will have until aeroplanes and dirigibles are utilized to establish an "air line" for the transportation of coal—and I do not look for that to happen either this year or next.

There is more justification for your next criticism, for my words, as written, can be interpreted to mean that a railway on which $130,000,000 has been expended is no more artificial than are the Great Lakes, on which a similar sum has been spent. That was not the idea I intended to convey, which would be more nearly expressed as follows: "Neither a waterway nor a railway upon which $130,000,000 has been expended is entitled to be called a 'highway ready made by nature.'"

Mr. Moulton's statement was, "the Great Lakes constitute a highway ready made by nature." That statement is in the present tense, and therefore refers to the lakes as they now are, and the rates under discussion are the rates now in force. Before the work of improvement was begun lake Ontario and Superior were shut off from the other lakes by impassable barriers. Depths at harbor entrances varied from 3 ft. to 9, and between lakes Huron and Erie there was a narrow, winding channel in which navigation was impossible for vessels drawing more than 8 ft., and was difficult and dangerous, even for those of that draft. Naturally, rates were vastly higher than under present conditions.

I am not unable to see that the lakes as they are today are a highway ready made by nature, although I agree absolutely with your statement that what men "have done to make a highway of the lakes is incomparably smaller than what nature has done." But exactly the same thing is true of the Ohio, Mississippi, Missouri, Columbia and many other rivers. When the work of improvement on these streams is completed, even if the expenditures shall be double the amounts now proposed, the share of nature in the creation of the resulting highways will be incomparably greater than that of man.

You say further that I did not include a return on the $130,000,000 expended on the lakes in my figures regarding the cost of transportation thereon. That is an omission which I will proceed at once to remedy so far as it is possible to do so. There are no official figures in existence showing the total tonnage handled on the lakes; but as near as can be learned, it was about 100,000,000 tons in 1910. Neither is there anything to show the distance it was carried, nor the amount paid for its transportation, so the ton-mileage and the ton-mile rate are both unattainable.

All these facts are available, however, for the 62,363,218 tons of freight which passed through the "Soo" canals. If we take the $3,900,000, which represents the interest at 3 per cent. on $130,000,000, add to that $1,100,000 to cover operation of locks, maintenance of light-houses etc., and put the entire burden on the "Soo" tonnage, which was really less than two-thirds of the whole, it would make the total cost of transportation only .85 mills per ton-mile as compared with the .78 mills which was the price paid for transportation. The tonnage carried on the Great Lakes paid a good profit to the carriers, and an enormous profit to the people whose investment made such low rates possible.

You accuse me of dodging, but on the face of it your criticism of my estimate of the value of all the property and franchises given to railways looks like misrepresentation. For you make a garbled quotation from my letter and then invite me "to bring in a bill of particulars listing the property and franchises worth $2,500,000,000, which the railways have been given, with the value of each," when I had explicitly stated that no compilation of the figures has ever been made, and that at this late date it is impossible that it ever can be made. My statement showed plainly on its face that it was an estimate merely. Perhaps it was a wild one. Perhaps it deserves your criticism that it is sweeping; but it is no more sweeping than Professor Moulton's statement that there are waterway schemes before the people which call for an expenditure of $2,500,000,000.* His statement did not call forth any criticism from you, which leads me to conclude that it is evidently not the sweepingness of statements which annoys you so much as the direction in which they sweep.

It is undoubtedly true that the old Erie canal was unable to successfully meet railway competition. In part this was due to the fact that year by year the canal was slowly deteriorating, while the railways were constantly being increased in efficiency. Fundamentally, however, it was due, to the same cause which has produced so large a decrease in the tonnage hauled on the rivers of the United States, namely: cutthroat competition by the railways. During the season of 1895 grain was carried from Buffalo to tide water for a price about equal to the cost of lighterage at New York. In other words the railway haul was made for nothing. This was done to reduce canal traffic to a minimum, hoping thereby to discredit the canal and induce the people of New York state to vote adversely on the pending proposition to expend $9,000,000 in canal improvement. Just so long as railways, most of which come in competition with waterways over a very small portion of their total mileage, are left free to make rates low enough to exterminate water competition, raising the rates again when the competition has been destroyed, just so long will it be difficult for the people of the United States to secure the full measure of the benefits which ought to occur from the development of their waterways.

A very small beginning has been made toward remedying this

[* See *Railway Age Gazette*, July 28, for Prof. Moulton's defence of his estimate of the probable cost of proposed waterway development. The present letter from Mr. Thompson was written before Mr. Moulton's letter in our issue of July 28 was published.—Ed.]

condition. The "long and short haul clause" has been somewhat resuscitated, and one of the items of the Mann-Elkins Act prevents an increase in rail rates which have been reduced to meet water competition, except upon a showing which convinces the Interstate Commerce Commission that the proposed increase is justified by some change in conditions other than the elimination of such competition. I entirely agree with President Delano, of the Wabash Railway, that because of these enactments, pitifully inadequate as they are to fully meet the needs of the situation, it is nevertheless "quite possible that the opportunity for the development of traffic on navigable rivers is improving." I venture to predict that the people of the United States will go right ahead and create a great system of connected waterways, and will pass whatever legislation may be found necessary to enable these waterways to do the work for which they are created.

In criticizing my statement that, in my judgment, the people of New York "would have been much wiser if they had voted a sufficient sum to build a very much larger canal than the one now under construction," you refer to the fact that the people of New York decided to dig a barge canal 9 ft. deep on the strength of a report by Col. Thomas M. Symons, of the Corps of Engineers, United States Army, in which "he estimated that the *cost to the shipper* of transporting wheat in a lake freighter of 7,000 tons capacity on a ship canal would be 38 per cent. greater than with a towboat and barges on a barge canal. This took no account of the fact that the estimated cost to the public of building the ship canal would be four times as great as that of building the barge canal. Mr. Thompson's opinion on this subject does not weigh heavily in the balances against that of Colonel Symons."

The canal which the people of New York are digging is not 9 ft. deep but 12 ft., the depth recommended in Major (now Colonel) Symons' report of 1897, which report was made, not to the people of New York, but to the Chief of Engineers, United States Army. Lest there be any possible misunderstanding, let me say that I have the honor to know Colonel Symons, and have the very highest regard for him, both professionally and personally. But Colonel Symons never claimed to be infallible, and has modified his conclusions at least twice since the report of 1897 was submitted. That report recommended a canal which would pass barges carrying 1,500 tons. In 1898 he advocated a canal for 1,000 ton barges. At the present time the people of New York are spending $108,000,000 in the construction of canals which will accommodate barges carrying 2,500 tons—with the approval of Colonel Symons as a member of the advisory board of consulting engineers.

It is not true that Colonel Symons estimated the cost of transportation would be 38 per cent. greater in a 7,000 ton steamship in a ship canal than in 1,500 ton barges in a barge canal, without reference to the greater cost of the ship canal. The table on page 88 of his report gives the estimated cost of transportation from Chicago to New York as $1.29 per ton by ship canal and $1.02 by barge canal. That is a difference of 26 per cent., not 38.

But other engineers pointed out radical errors in Colonel Symons' premises, and the elimination of these errors led to radically different conclusions. For instance, Colonel Symons assumed that the 7,000 ton vessel could maintain a speed of only four miles an hour in the canal portion of the route, while it is well known that ships which can run 12.5 miles per hour in the open lake maintain a speed of 10 to 11 miles per hour in the St. Clair Flats canal, a waterway of similar dimensions to the one proposed. He also assumed that ships would be compelled to spend 11 or 12 days in port in New York on each trip, time enough to enable them to cross the Atlantic to Liverpool and unload. This assumption is not only inherently improbable, but is contradicted by the records of work regularly done by many lines of boats in New York harbor.

On November 7, 1900, Mr. George Y. Wisner (since deceased) presented a paper before the American Society of Civil Engineers on "The Economic Dimensions of a Waterway From the Great Lakes to the Atlantic." Mr. Wisner was a member of the Board of Engineers on Deep Waterways to which reference is made in the succeeding paragraph. Eliminating the errors in Colonel Symons' premises, utilizing the results of the study of the question made by that board, and taking into consideration cost of maintenance and interest on cost of construction, he estimated the rate per ton from Chicago to New York at $1.39 by barge canal and $1.09 by ship canal, a difference of $0.30, or 27½ per cent., in favor of the ship canal. It is of interest to note that the ship canal rate mentioned is .797 mills per ton mile—almost exactly equal to the average rate paid on the business through the "Soo" canal last year.

On June 30, 1900, the Board of Engineers on Deep Waterways, composed of Major Chas. W. Raymond, Corp of Engineers, United States Army, Alfred Noble and George Y. Wisner, made a report on a canal from the Great Lakes to the Atlantic. This monumental report represented the results of a more elaborate and comprehensive investigation than has ever been given to any other waterway in the United States. It is rivaled only by the reports relating to the Panama canal. This report recommended a ship canal 21 ft. deep.

Colonel Symons had an appropriation of $5,000, and a limited time in which to prepare his report of 1897. The board of engineers had an appropriation of $485,000, and all the time needed for their investigation. My judgment that the people of New York would have been wiser if they had decided to build a canal much larger than the barge canal now under construction, was based partly upon this report. Is it your opinion that the three distinguished engineers composing that board were incompetent to conduct the investigation intrusted to their care? Or do you think that the conclusion reached by them, after such thorough study of the question, is not entitled to at least equal consideration with the opinion of a single engineer, even one so able as Colonel Symons?

In his report in 1898, as a member of the Committee on Canals of New York State, Colonel Symons stated his belief that water transportation, and he included transportation on canals and rivers, as well as on lakes and ocean, is inherently cheaper than railway transportation. Would it be unparliamentary for me to suggest that "your judgment on this subject does not weigh heavily in the balances against that of Colonel Symons?"

You say that while I was on the subject of European waterways I might have given some figures about the cost of transportation thereon, because "transportation on the canals and canalized rivers of Europe is much more nearly analogous to what transportation would be on canals and canalized rivers in the United States than is transportation on our Great Lakes." You then proceed to quote a number of transportation rates taken from the reports of the British Royal Commission, making numerous errors in the figures, the most important being the rate on the River Seine, which should be 2.6 to 5.6 mills per ton-mile instead of 26 and 56. The Rhone is not a canalized river, and the high rates thereon, 7.8 mills to 15.6 mills per ton-mile, are due to the extremely rapid current.

In a previous paragraph you criticized me for comparing "the rate on coal per ton-mile on the Chesapeake & Ohio with that on the Great Lakes from Buffalo to Duluth, without giving any consideration to the fact that the haul from Buffalo to Duluth is vastly longer than the haul on the Chesapeake & Ohio." This criticism applies with even greater force to your comparison between average railway rates in the United States and the average rate on the waterways of France, Belgium and even of Germany.

The average haul on the waterways of Belgium in 1905 was only 13.3 miles; on those of France it was 92 miles; while on the railways of the United States, considered as a system, the average haul in 1908 was 253.94 miles. The combined length of the 12 principal canalized rivers of France was only 970 miles, almost

exactly the length of the Ohio. The principal canals of France are adapted to boats drawing 5.9 ft., and the most of them average only about 60 ft. in width on the surface. The only waterway in France with a greater depth than this is the Seine from Paris to the sea. Many of the French canals are carried into mountains, the Canal de Bourgogne attaining an elevation of 1,634 ft. in a distance of 150 miles. Some of them depend on pumping for the water supply on the summit level in the summer. On the Canal de la Marne au Rhin water is pumped to an elevation of 256 ft. for this purpose.

The anxiety of certain railway people regarding the building of canals in the United States is just about as touching, and just about as well-founded, as the grief of the girl who was found sobbing by the river at a picnic. When asked the cause of her trouble, she said: "I was thinking that sometime I might get married and live in a house close to this river and have a baby and the poor little thing would fall in and get drowned." Can you refer me to any proposed canals in the United States which are in any degree comparable to the French canals which I have mentioned?

There are features, of course, in which transportation on the rivers of Europe is more analogous to transportation on the rivers of this country than to transportation on the Great Lakes, but it does not by any means follow that transportation rates on improved rivers in this country will be nearer to those paid on the rivers of Europe than to those paid on the Great Lakes. Depth and width of channel and length of haul have a profound influence on rates of freight, and because we have many rivers which are wider and deeper than those of Europe, and on which hauls may extend to thousands of miles, the assumption is justified that much lower transportation rates are possible on our rivers than on those of Europe.

But we are not compelled to depend entirely on assumptions. The board of engineers which reported on the proposed improvement of the Ohio river estimated that, when a minimum depth of 9 ft. is secured, coal can be transported from Pittsburgh to New Orleans at .376 mills per ton-mile and that general transportation, both up and down stream, can be protably conducted at ½ mill per ton-mile.

Nor are these estimates based solely on theoretical considerations. Colonel Symons in his 1897 report stated that the average rate for carrying coal from Pittsburgh to New Orleans was .36 mill per ton-mile. The Board of Engineers for Rivers and Harbors says:

"It has been reported to the Board that coal has been shipped from Pittsburgh to New Orleans at a rate less than 0.4 of a mill per ton-mile, a rate the same as that charged at present on coal shipped on the 20 ft. waterway between Buffalo and Duluth where it is taken as a return cargo, the charge on iron ore from Duluth to Buffalo being at about twice that rate. The rate mentioned by the Board of cheaper rates are on ocean vessels of deep draft moving over long distances."

Sugar was carried from New Orleans to Pittsburgh in 1905-6, 2,000 miles up stream, for 1.14 mills per ton-mile, while the ocean rate for the 5,000 miles from Rio Janeiro was 1.27 mills. And [illegible] average of only 79 days in the year when fully loaded boats could [illegible]

[illegible]

[illegible] 4,000 miles. That would add .11 per ton-mile, making the total [illegible]

[illegible] of Europe," but I deny that it has been, or can be shown, or that such is the fact.

I deny that advocates of waterway development "desire to injure the railways for their own benefit," or for any other purpose. I deny that the development of waterways would injure the railways of the United States. On the contrary, I contend that the railways would be greatly benefitted by such development, and believe that there are ample facts to sustain that contention.

S. A. THOMPSON,
Field Secretary, Rivers and Harbors Congress.

STEEL MOTOR COACHES FOR THE PENNSYLVANIA.

The new suburban line between the Cortlandt street terminal of the Hudson & Manhattan and Newark, N. J., will necessitate the Pennsylvania using a smaller type of car in order to meet the clearances of the McAdoo tunnel. A design was, therefore, prepared for a car 48 ft. long over the ends and 11 ft. 8½ in. high from the top of the rail to the top of the roof. The maximum width of the car over the eaves is 8 ft. 7 13/16 in., and over the side door threshold plates 8 ft. 10½ in. The total weight

Interior of Steel Motor Coach; Pennsylvania Railroad.

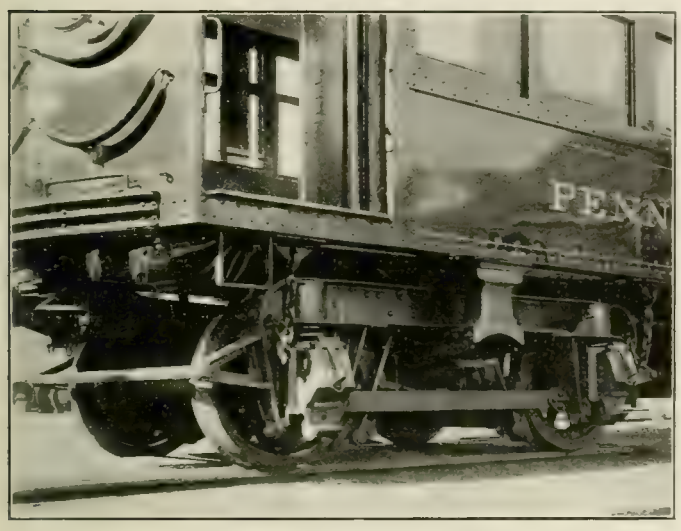
is 72,500 lbs. Three doors have been provided on each side of the car, one near each end and one in the center.

The general type of construction is the same as that used on all Pennsylvania steel passenger equipment cars. Experience with steel cars has demonstrated the necessity of providing a strong center sill construction. In freight service the minimum cross sectional area of the center sills, selected to meet all requirements, was 24 sq. in. For steel passenger cars used in fast through trains 50 sq. in. was considered necessary. For steel passenger cars for light trains in surburban service 33 1/3 sq. in. was considered a minimum. The multiple unit motor cars, each car being equipped with its own motors, can have a smaller section area of the center sills, but it should have at least as much as freight cars, for which reason an area of 25 sq. in. has been adopted. The construction of the center sills is of the box girder type, and is made up of 9-in. channels extending between the truck centers. At the truck centers the webs are spread apart and are spliced by steel angles to 5-in. channels, a bottom cover plate 7/16 in. thick by 22 in. wide and a top cover plate 5/16 in. thick by 30-in. wide.

The superstructure is carried on the two cross bearers and two end sills in such a manner that any deflection of the center construction will not induce additional strains in the superstructure. The end sill consists of a curved channel securely

riveted to a platform plate, ¼-in. thick, and to a bottom platform plate ¼-in. thick. These top and bottom plates are, in turn, securely riveted to the center construction and to the end sill diaphragms. The cross-bearers are made of bottom cover plates 5/16-in. thick by 11-in. wide, pressed diaphragms made of ¼-in. material, and two top cover plates each ⅛-in. thick by 11-in. wide. All of the strains are transferred to the center sill construction, which is amply strong to prevent the pressing down of the end of the car in a severe collision, and transfers all vertical strains directly to the center plate.

The platform plates extend from the end of the car for a distance of 5 ft. 6 in. toward the center of the car and are reinforced by U shaped diagonal braces, so that both the direct and cornering strains are definitely transferred to the center sill construction, thereby avoiding strains on the side framing which,



Truck for Pennsylvania Steel Motor Coaches.

on account of its narrowness, is not capable of resisting end strains. The main strength of the side framing is entirely below the windows and consists of a bottom side angle 5 in. x 3¼ in. x 5/16 in., a web plate 3/32-in. thick, and a belt rail 4-in. wide by ⅜-in. thick. This side girder takes care of any load that may be placed in the car.

The detail construction is the same as in the steam service and suburban type cars, but somewhat lighter because the car is shorter. The interior arrangement is of the same type as generally used for interurban motor cars, with seats running longitudinally, and with pipe stanchions convenient as grab irons for people passing along the aisle. The flooring is magnesite cement composition with a hard surface, expanded metal being riveted to the flat plates to give it an anchorage. The lower deck headlining consists of steel plates and the upper deck headlining is fiber board. The longitudinal seats have metal frames and are covered with rattan. The windows consist of two sash, the bottom one being fixed in place and the top one arranged to drop. The deck sash are made to open for ventilation. Adequate ventilation can be obtained by lowering the top sash of the side windows and opening the deck sash.

The drawbar is pivoted in a pocket which forms part of the center plate backing casting. The draft gear proper consists of a double coil spring placed inside of the hollow drawbar, and is held in place by a cap securely bolted to the drawbar casting, being similar to the draft gears ordinarily used on passenger equipment cars. The springs are double acting, thereby avoiding the use of two sets of springs usually applied to interurban cars.

In order to make these cars interchangeable with cars already in service in New York City, the Van Dorn coupler is used, the center line of which is located 2 ft. 5⅜ in. above the top of the rail. The drawbar, draft gear and coupler head parts were so designed that the strains are, as nearly as possible, along the center line of the parts. The center plate proper is bolted to the center plate backing casting, and between the two a pocket is provided for the use of centering springs, allowing a side motion of 1 in. between the center line of the car body and the center line of the truck; the function of the springs being to form a cushion against the side strains and to provide also comfort in riding.

Each truck has one motor axle and one trailer axle, and the center line of the bolster is placed 2 in. out of center; that is, closer to the trailer axle for the purpose of giving the same weight between the wheel and rail for all the wheels of the truck. The side frames consist of 8-in. H-beams with pedestal castings riveted to each end. The transom is of pressed steel, and is made of ½-in. material. The peculiar shape is due to the fact that a central opening must be provided through which the body center plate must pass. The transom is rigidly attached to the side frames by means of corner gussets, which includes the brake hanger fulcrums. The bolster is placed inside of the transom, and is supported by triple elliptic springs carried by spring carrier bars, passing through and flexibly hung over the transom and the corner castings.

The body brake arrangement consists of two cylinder levers attached to a 12-in. x 8-in. brake cylinder. The other ends of the cylinder levers are directly connected to the equalizing bar passing through the center sills immediately above the center plate, which, in turn, are flexibly attached to two brake levers on each truck. The construction is of exactly the same type as that now in use on Pennsylvania steel passenger equipment cars. The truck brake consists of four levers, two on each side connected to the brake shoes, which are hung quite low; the levers are connected in pairs by struts, the bottom of one lever being connected directly to the strut, thereby giving

Steel Motor Coach for the Pennsylvania.

more brake power on the motor wheels. No brake beams are used. The type of brake is that known as the electro-pneumatic. Each car is provided with a slack adjuster to insure a uniform clearance between the brake shoes and the wheels, and therefore provide a uniform braking power.

The motors are of the G. E. 212 type, having a nominal rating of 225 h. p. at 600 volts. The gear is carried on the extended hub of one wheel. The front side of the motor frame is provided with two lugs which are supported by the truck transom. The axle bearing caps are bolted to vertically planed tongued surfaces on the frame. The motor can be mounted on, or removed from, the truck when run out from under the car without the use of a pit. The master controller is arranged to control changes of speed throughout the train and to automatically cut out the power and set the brakes when the motorman removes his hand from the handle. It has four positions in forward and two positions in reverse direction. The operating coils of the contractors and reversers are wound for a working potential of 625 volts. The entire control will operate successfully between 300 and 750 volts. The automatic circuit breaker is provided with a magnetic blowout for disrupting the arcs, and is enclosed in an iron frame with a sheet steel cover, lined with asbestos.

The cars are lighted by well distributed incandescent lights, and are heated by electric coils placed under the seats. For emergency lighting, in case the power is cut off, small storage batteries have been provided. The cars are also equipped with electric door signals and electrically controlled pneumatic engines for opening and closing the side doors.

THE DETERMINATION OF A REASONABLE RATE.*

BY W. M. ACWORTH.

Assume that in a study of railway rates we have reached this position: the public is entitled to claim not only reasonable facilities, but rates, reasonable both in themselves and in their relation each to the other. This they are most likely to get, if the matter is left to the discretion of the manager, and the manager of a private undertaking is to be preferred in this respect to the manager of a state railway, for, while he is likely to be equally honest and competent, his position tends to secure greater impartiality. The point that the decision should, as far as possible, be left in the hands of the actual management cannot be too strongly emphasized. The sketch given in Studies in Railway Economics, of the rate-making policy of different countries under one or two different heads, sufficiently shows that rate making is not an exact science, and that there is no universal agreement as to the principles generally applicable. In other words, rate adjustments from day to day can only be satisfactorily made by a man in whom a knowledge of the general conditions of the carrying trade of the country, and especially of his own district, has become a part of his nature, the very atmosphere in which his mind moves. The features on which a right decision depend are so infinitely numerous, the importance to be attached to each of them so entirely incapable of precise and positive statement, that right decision is far

[illegible]

if the introduction of the stately poetry of Milton into the prose [illegible] to quote the language of Bagehot, used by him in reference to [illegible]

where there are some chances for many events, where there is much to be said for several courses, where nevertheless one course must be determinedly chosen and fixedly adhered to." Of course the railway man may go wrong, but at least he is less likely to do so than any outside authority called in to sit in judgment on him; for atmosphere, instinct, sub-conscious knowledge are essential qualifications that cannot be produced to order, and cannot be made use of second-hand.

For all that we have to face the fact that the discretion of the railway expert will often be questioned: his decisions will not always go unchallenged. Possibly this may be the best proof of his impartiality, for just as opposing party politicians unite in reprobating "the cross bench mind," so two sets of traders, demanding simultaneously mutually exclusive concessions, are found agreeing in denunciation of the railway manager for not granting both. They may have a grievance—either or even both of them—possibly they have none; but something of the nature of a safety valve is an essential feature of any machine that is expected to operate smoothly and continuously, and so, were it to be only a safety valve, some tribunal of appeal from the decision of the railway manager must be provided.

And indeed the establishment of such a tribunal is justified on wider considerations. Every now and then in the progressive evolution of the science of rate making, there comes a time when it is evident to the experts that wide-reaching changes have become necessary; and yet the management of the private undertaking lacks the backing of public opinion necessary to put them into operation. Let me give two instances from actual experience, illustrating the point. When some years ago the North-Eastern electrified their railways on Tyneside, they found that the extra cost of providing separate first-class accommodations much more than absorbed the extra receipts from first-class passengers. They accordingly abolished first-class accommodations. Tyneside was up in arms. The columns of the *Newcastle Chronicle* teemed with letters of denunciation. Influential merchants and shipowners were aghast at the idea of riding from their villas at Tynemouth to their offices at Newcastle cheek-by-jowl with a North Shields fishwife. A deputation, with a duke at the head of it, demanded an interview with the North-Eastern directors. And the company surrendered at discretion. And today the dukes and the merchants and the shipowners have their first-class carriage, and the third-class fares of the fishwives help to pay the expense of hauling it. On the other hand, I was discussing a few weeks back the rates question with the chairman of one of the state railway commissions of America. He said that in his state the relations between the railway companies and the commission were entirely cordial. "In fact," said he, "it has happened that the railways have come to me and said: 'We are convinced that such and such a rate situation is indefensible, but it is of long standing and many interests depend upon it. We cannot alter it, but, if you choose to investigate the matter and make an order upon us to alter it, you will not find us in opposition.'"

There must then be a tribunal of appeal. But what should be the nature of the tribunal, what functions should it possess, and on what principles should it act? For the nature of the machine must depend upon the work it is called upon to do. If the considerations advanced above be true, that reasonableness is not something precisely ascertainable by scientific methods and accurate computations, and is rather a matter of instinctive judgment by a person whose mind is saturated with a general knowledge of all the facts, it is evident that in a matter such as the *quantum* of the individual rate, the appeal tribunal should only interfere reluctantly and in the last resort. A wise man in the affairs of everyday life accepts the judgment of the experts whom he consults—legal, medical, financial, or what not, not perhaps off hand, but finally, after questions asked and answered, ninety-nine times out of every hundred. And so here. The tribunal should, as it seems to me, put the railway manager publicly on his defense, compel him to justify his position, to

*This [illegible] Railway

show that he has honestly and without bias taken into consideration all the interests and all the circumstances, and weighed them one against the other to the best of his ability. And then in almost every case, even if not satisfied, it should give a decision in some such form as this. "We cannot say that on the case as presented to us we have come to the same decision that you have reached; but you have convinced us that your action was honestly and deliberately taken in the interest primarily of the shareholders for whom you are trustee, but also with due regard for the interests of the public which we are here to protect. We further recognize that you are in closer touch with the facts than we are. It may well, therefore, be that you are right and we are wrong; at any rate, we do not feel that in this case we should be justified in interfering with your discretion in the management of the property that has been entrusted to you."

Such is my ideal of the way in which a tribunal of appeal might work, giving at once strength to the railways and protection to the public. For no manager, liable at any moment to be brought face to face with such a tribunal, would dare to make rates without mature deliberation and full consciousness of the rectitude of his action. And the tribunal itself, refraining, except in the last resort, from making orders, would when compelled to make them, speak with unique authority. For its judgments would rely for their enforcement not merely, to quote the statesmanlike words of Charles Francis Adams, "on the baton of the constable," but "on the one great social feature which distinguishes modern civilization from any other of which we have a record, the eventual supremacy of an enlightened public opinion."*

But, recognizing that from time to time, far-reaching questions must arise, on which an appeal tribunal will be compelled to form, and enforce its own opinion, we are driven to inquire by what principles it should be guided. I have already shown that on all main points, the importance of distance and the importance of size of consignment, no general agreement exists. Indeed, if there be any point on which general agreement does exist, I have so far failed to find it. Is the reasonableness of the rate to be tried by the test of what it is reasonable for the railway to receive, or what it is reasonable for the customer to pay? At the lower end of any scale of rates there will be general agreement that it cannot be reasonable to compel the railway company to carry traffic at a rate which does not cover the out-of-pocket cost of doing the business. But at the upper end, when it is a question whether the rates of a company earning substantial dividends can be reasonably reduced, there is no such agreement. One of the greatest lawyers that England produced in the 19th century, Lord Selborne, delivering the judgment of the Privy council in the case of the International Bridge Company,† said, that "the case might be imagined of the results to a company being so enormously disproportionate to the money laid out upon the undertaking as to make that of itself possibly some evidence that the charge is unreasonable, with reference to the person against whom it is charged." But he scouted the theory that charges could be regarded as unreasonabe because "the company gets a dividend which is alleged to amount at the utmost to 15 per cent." And this judgment was cited and followed by the late Lord Collins in our Railway Commission in 1895, and has remained unquestioned ever since. "The affluence or indigence of the person rendering or receiving the service is outside the question. The reasonableness of the charge must be measured by reference to the service rendered and the benefit received, which is unaffected by the prosperity or misfortune of the parties to the contract."‡ On the other hand, it is being argued at this moment all over the United States, before courts and railway commissions, in the legislatures and in the press, that rates cannot be reasonable which enable a railway company to earn more than a maximum of 6 per cent.; and this 6 per cent., calculated, not on the present value of the property, but on the actual cash invested in it from the outset of the undertaking. For instance, in a recent lecture in the Yale University, Mr. Prouty, one of the senior and ablest members of the Interstate Commerce Commission, discussing the question of the control of rates by the public authority, spoke thus: "I have said that the capitalization of a railway ought to represent the money actually invested. Ordinarily, the dividends paid on the capital stock ought not to be extravagant. Mr. Hill said in giving testimony before the commission, that 7 per cent. was enough. I think he is right. Only in extreme cases would a larger dividend be justified."¶ And the whole of the decisions of the Interstate Commerce Commission in the two recent most important cases, where th railways unsucessfully sought permission to raise whole blocks of rates, are saturated with the theory that the profits of the railway company are a main element in determining what rates are reasonable.

*"Railroads: Their Origin and Problems," p. 140.

†"Canada Southern Railway v. International Bridge Company," eight appeal cases, p. 731.

‡"Rickett Smith v. Midland Railway Company," nine railway and canal traffic cases, p. 113.

¶*Every Day Ethics*, p. 98.—Mr. Hill's railway, the Great Northern, has paid extra dividend of 7 per cent. for the last 20 years. One cannot but be reminded of the immortal Alice. "'Four inches is a very good height,' said the caterpillar, sharply. He was just four inches himself." Whether Mr. Hill reminded the commission that his 7 per cent. dividend is paid on share capital, all of it issued at par, though for many years it has commanded a very large premium in the open market, I have no means of knowing.

THE NORTH COAST RAILROAD.

Since it first became known that the North Coast Railroad was being projected through that part of Washington, heretofore the undisputed territory of the Northern Pacific and Great Northern, unusual interest has attached to the enterprise. Until the new road was consolidated with the other Harriman lines in the northwest, it was not definitely known which one of the railway interests was backing the new company. Up to the time of the consolidation of the Oregon Railroad & Navigation Company, the Oregon & Washington Railway and the North Coast Railroad and other Harriman lines as the Oregon-Washington Railroad & Navigation Company, the lines of the O. R. & N. had fairly well covered the territory of northern and eastern Oregon, and the territory along the Columbia and Snake rivers in southeastern Washington. An important branch of this road also reached Spokane and the Coeur d'Alene mining country near Wallace, Idaho, by a route that was handicapped by extremely heavy grades and curvature and excessive distance. With the exception of the short branch westward from this line to Connell in the Big Bend country of central Washington, practically no effort has been made to compete with the Northern Pacific and Great Northern in the vast productive territory extending north of the Snake river, 350 miles to the Canadian line, and west from Spokane, 200 miles to the Cascade mountains. The enormous wheat traffic originating in the Big Bend country was practically all out of the reach of the Oregon Navigation Company, as well as the traffic in products raised in the vast irrigable areas along the Columbia, Yakima and Wenatchee rivers. Since the Harrimann interests abandoned the project to enter the Puget Sound country in 1890, all of the above territory and the entire region tributory to Seattle and Tacoma had been the exclusive territory of the Hill lines.

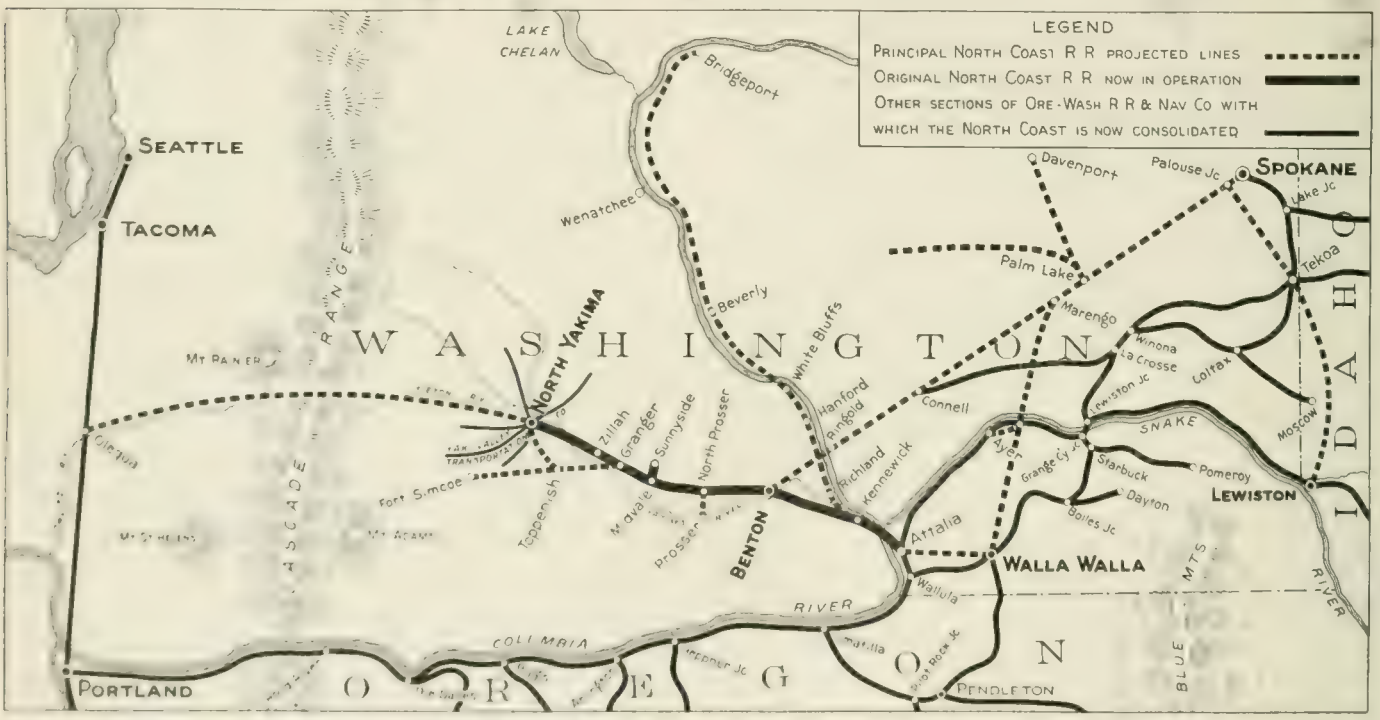
This was the condition when, in 1906, Robert E. Strahorn, who was at that time principally interested in developing public utility enterprises in cities in Idaho, Oregon and Washington, was found to be backing various disconnected railway surveys in different parts of the states named. Apparently the work had already proceeded for several months, for at the time the North Coast Railroad Company was organized, with the nominal capital of $500,000, many miles of important right-of-way had been secured, franchises in a number of cities had been applied for, and negotiations with the national government and the several

state governments had been started to obtain the important rights necessary for the building of the line.

The officers of the new company were Mr. Strahorn, president; R. J. Danson, vice-president; F. L. Pitman, chief engineer; A. G. Smith, secretary and treasurer; C. E. Woods, general right-of-way agent, and George M. Hofford, auditor. Most of these men had been associated with Mr. Strahorn before that time, and the spirit of loyalty which he was able to instill into them was accountable for the success with which the enterprise of building the road was carried through. The fact that it was necessary to preserve absolute secreacy as to the ultimate object of the new road made its building particularly difficult, and the story of how the secret was guarded is as romantic as railway history ever becomes. Mr. Strahorn has a personality which makes him most approachable by, and especially popular among newspaper men, and it is to his credit that during the years of the building the road he was always perfectly frank with representatives of the press, and gave out personally a great deal of information about his project to the papers throughout the northwest, but during the entire time no indication of the object in building the road or of the financial interests which were behind the enterprise and the great areas of densely timbered uplands along the mountain range, besides extensive coal areas on the west side.

The most important engineering feature of the completed section is the bridge across the Columbia river just below the mouth of the Snake. This bridge with approaches is 2,900 ft. long, composed mainly of Howe truss spans of 150 ft., supported on 12 concrete piers and a draw span of 240 ft. Most of these piers were built in water which at average stages was about 25 ft. deep. It was completed in less than twelve month actual working time without a casualty or loss of any kind. The completed line has a maximum grade of 0.5 per cent., and a maximum curvature of 3 deg. Several short branches have been completed, the most important of which extends into the Sunnyside orchard country.

In order to provide a direct route from Spokane to Portland, a new line between Spokane and Ayer, a station on the Snake river line of the O. R. & N., is being built. This section is 103 miles long and will reduce the distance between Portland and Spokane by 54 miles. The road runs through the Palouse canyon and presents some very difficult construction problems. The nature of the canyon can readily be seen from the accompanying



The Oregon-Washington Railroad and Navigation Lines in Washington.

photographs. It is practically a sheer precipice for 8 miles of its length, ranging in depth from 200 to 600 ft. Six tunnels will be included in this section, the longest being 1,800 ft. between portals. Several enormous rock fills bridge the deep side gorges between tunnels, notably one across Field's Gulch, which is 170 ft. high and 1,200 ft. long, requiring 800,000 cubic yds. of material. The line will pass almost directly over the Great Falls of the Palouse, where the river, which runs in a box canyon 300 ft. deep, suddenly drops a distance of 190 ft. It is estimated that the grading alone on several portions of this line will require an expenditure of at least $175,000 a mile. This section of the new road also includes a large bridge which spans the Snake river at the mouth of the canyon. This bridge will be 1,220 ft. long, and be approached by two steel viaducts, the north one 2,200 ft. long and the south one 490 ft. It will be supported by five steel towers each resting on four separated concrete piers, its centre resting above water level being 200 ft. Spanning the river will be five, deck riveted truss spans of 226 ft. each. The bridge will require about 5,000 tons of steel and will cost about $[illegible],000.

Looking Down Stream in Palouse Canyon Through Which O.-W. R. & N. is Building.

In addition to the Snake river bridge, this line will include two bridges across the Spokane river within the city limits of Spokane, the longer one being 3,400 ft. in length, and the shorter one 1,000 ft. The first bridge will be 180 ft. high and will be built of plate girders of 80 ft. span between tower span of 40 ft. There will be required 6,500,000 lbs. of steel and 3,000 cubic yds. of concrete. The other bridge is also at a high elevation above the water level, and passes 35 ft. above the great concrete bridge now being built by the city and in full view of the falls of the Spokane river. Contracts for the building of all of this section of the road have been let, and much of it is already completed. It is expected that it will be ready to put in service in about 18 months.

In addition to forming a link in the new Spokane-Portland line, this section will serve other important purposes. From Spokane to Marengo, a distance of about 60 miles, it will be used by the Chicago, Milwaukee & Puget Sound as a part of its new line via Spokane to the coast. It will also form a link in the North Coast through line to Seattle. From Marengo the line is projected through Connell to Benton on the Attalia-North Yakima section, where it will join the line to Tacoma and Seattle described above. From Palm Lake, a point about 50 miles southwest of Spokane, a branch is projected northward through the Big Bend country to Davenport, also an important spur westward from this branch. A line from Ayer to Walla Walla has been surveyed, which, in connection with the Spokane-Ayer line, will reduce the distance between Spokane and Walla Walla about 65 miles, and, on account of the low grades and improved alinement of the new road, it will be possible to run trains from Spokane to Walla Walla in about one-half the time now required and to handle freight at far less than the present cost. A line has also been surveyed from Spokane south through Tekoa to Lewiston, following Hangman creek. This line will have easy grades throughout its length, will reduce the distance

Fill of 100 Feet Between Tunnels Numbers 7 and 8 in Palouse Canyon.

between Spokane and Lewiston about 25 miles, and will enter a new country rich in timber, farming and mining resources. Lines have also been projected from Kennewick and Benton northward along the Columbia river to the mouth of the Okanogan, reaching the territory around White Bluffs, Hanford, Wenatchee and Orondo. Surveys have been perfected and a great deal of the right-of-way secured on all of these projected lines.

Among auxiliary features is the extension of electric lines in the Yakima valley by the Yakima Valley Transportation Company, an enterprise controlled by the same interests and also under the management of Mr. Strahorn. Up to date about 30 miles of high class electric branches have beenn built, radiating in different directions from the city to North Yakima, which are being extended into the most productive zones. They serve some of the finest orchard lands of the state and will prove valuable feeders to the steam railway lines with which they are affiliated.

Inseparably connected with the North Coast enterprise is the union passenger terminal at Spokane. This important enterprise, involving an expenditure of some $7,000,000, carries with it the entire separation of grades for six miles through the city, and the occupation of a central zone from east to west, solving the problem of the entrance, exit and traffic of four or five business center. It also provides the Oregon-Washington Railroad & Navigation Company large and very centrally located

Station at Benton, Wash., Typical of Those on the Yakima Division.

freight terminals, 300 to 600 ft. wide and 4,000 ft. long. The passenger tenrminal and the approaches from east to west through the city will be utilized by the Oregon-Washington Railroad & Navigation Company, the Chicago, Milwaukee & Puget Sound, the Canadian Pacific and the Idaho-Washington Northern, together with their various branches. The passenger terminal grounds are from 200 to 300 ft. wide, and three-fourths of a mile long. The entire terminal plan and approaches are designed to accommodate future railways entering the city from all directions, and as the station and track layout are closely related to the various electric and suburban lines, it presents a very complete and happy solution of the handling of a large proportion of Spokane's passenger and freight traffic.

Reconstruction of Northern Pacific Line in Marshall Canyon to Make Room for O.-W. R. & N.

Concrete Highway Undercrossing Five Miles Southwest of Spokane.

A branch line, 100 miles long, is now being built from Zaria, Nigeria, in a southeasterly direction in order to reach the Bauchi tin field. It is to be constructed at a cost of $973,300 on a 3 ft. 6 in. gage. The question of the alteration of gage has been critically discussed and the relative advantages of having a standard gage throughout the country have been emphasized, but it is considered advisable to avoid the initial expense of constructing on the wider gage, the proposal being to convert the railway to the larger width when traffic requirements show the step to be necessary.

ACCIDENT BULLETIN NO. 39.

The interstate Commerce Commission has issued accident bulletin No. 39, containing the record of railway accidents in the United States during the three months ending March 31, 1911. The number of persons killed in train accidents was 146, and of injured 3,228. Accidents of other kinds, including those sustained by employees while at work, by passengers in getting on or off cars, by travelers at highway crossings, by persons doing business at stations, etc., by trespassers, and others, bring up the total number of casualties, excluding "industrial accidents," to 18,554 (2,124 killed and 16,430 injured). The casualties are classified in table No. 1, given herewith, which includes some details from table 1B, not here shown. (The iccident statistics of electric lines are given in a separate table.) Supplementing the statement of railway accidents proper, the commission gives the following record of "Industrial Accidents"; those occurring to employees of the railway on railway premises in which the movement of the cars or engines is not involved:

Industrial Accidents to Employees.

	Killed.	Injured.
While working on tracks or bridges	36	3,732
At stations, freight houses, engine houses, coaling stations, water stations, etc.	38	4,692
In and around shops	17	8,624
On boats and wharves	4	370
At other places	18	1,240
Total	113	18,658

Adding the casualties to employees in industrial accidents to the figures given in the larger table, the total number of employees killed, including those not on duty, is 819, and injured 29,632; and this makes the total number of persons killed, all classes, 2,237, and injured 35,088.

The most striking comparison between this quarter and that of one year ago is in the number of passengers killed in train accidents, which falls from 110 to 28. In 1910 this record was swelled by a disaster due to an avalanche killing 51 passengers and a derailment killing 45. The falling off in the number of employees killed in train accidents and by other causes, when coupled with a diminution of 18 per cent. in the money loss from collisions and derailments (Table 2), is perhaps indicative of a moderate volume of freight business and an absence of severe weather in northern climates. Changes of conditions caused by the change from autumn to winter are suggested by the differences between this quarter and the last one (Bulletin 38) in the statistics of deaths and injuries of "other persons," etc., as given in Table 1.

TABLE NO. 1A.—COMPARISON OF PRINCIPAL ITEMS WITH LAST BULLETIN AND WITH ONE YEAR BACK.

	Bulletin 39.	Bulletin 38.	Bulletin 35.
1. Passengers killed in train accidents	28	30	110
2. Passengers killed, all causes	66	96	155
3. Employees (on duty) killed in train accidents	105	199	242
4. Employees (on duty) killed in coupling	55	60	57
5. Employees (on duty) killed, total	647	841	945
6. Total, passengers and employees (items 2 and 5, above)	713	937	1,100
7. Other persons killed (including trespassers, non-trespassers, and employees not on duty), all causes	1,411	1,722	....
8. Employees killed in industrial accidents	113	107	....

The total number of collisions and derailments in the quarter now under review was 2,801, of which 200 collisions and 160 derailments affected passenger trains. The damage to cars, engines and roadway by these accidents amounted to $2,124,090, as shown below:

TABLE NO. 2.—COLLISIONS AND DERAILMENTS.

	Number.	Loss.	Killed.	Injured.
Collisions, rear	270	$347,829	31	461
Collisions, butting	120	153,778	11	595
Collisions, train separating	99	40,956	1	25
Collisions, miscellaneous	898	378,160	35	658
Total	1,387	920,723	78	1,739
Derailments due to defects of roadway, etc.	306	251,292	11	435
Derailments due to defects of equipment	626	541,683	13	146
Derailments due to negligence	91	53,815	4	86
Derailments due to unforeseen obstruction	98	91,618	5	107
Derailments due to malicious obstruction	12	20,228	3	31
Derailments due to miscellaneous causes	281	244,731	14	262
Total	1,414	1,203,367	50	1,067
Total collisions and derailments	2,801	2,124,090	128	2,806
Total for same quarter of 1910	3,366	2,831,469	219	3,175
1909	3,206	2,733,830	220	3,731
1908	2,684	1,940,133	173	2,616
1907	3,964	2,962,470	197	3,813

In the larger double column table will be found the usual list of class A train accidents—all in which the damage is reported at $10,000 or over, notable cases in which passengers are killed, and those doing damage less than $10,000 and down to $2,000, wherever the circumstances or the cause may be of particular interest.

Collision No. 4, between eastbound freight train No. 6 and westbound freight train No. 7, was due to the non-delivery of an order to the westbound train. The despatcher, according to his own statement, sent this order to F, directing the train to meet the eastbound train at that station, and he says that the order was received and acknowledged by the station telegrapher. This station operator claims not to have received it. Evidence was produced to support both claims. The order was placed by the

TABLE NO. 1—CASUALTIES TO PASSENGERS, EMPLOYEES, AND OTHER PERSONS.

	Passengers.		Employees on duty		Employees not on duty.		Other persons not trespassing.		Trespassers.		Total persons.	
	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.
Collisions	19	1,090	53	704	1	11	1	19	4	5	78	1,739
Derailments	9	654	34	396	1	3	...	5	6	9	50	1,067
Accidents to trains, cars, or engines, except collisions, derailments and boiler explosions	..	34	6	142	..	...	...	3	...	...	6	184
Bursting of, or defects in locomotive boilers or boiler attachments	..	3	1	234	..	...	...	1	...	...	12	238
Total train accidents	28	1,691	105	1,476	2	14	1	33	10	14	146	3,228
Accidents to roadway or bridges not causing derailment, such as fires, floods, landslides, explosions, etc	..	10	1	31	1	2	1	3	...	...	4	46
Coupling or uncoupling cars (does not include accidents with air or steam hose)	..	...	55	738	..	...	...	....	...	...	55	738
While doing other work about trains (not in shops or engine houses) or while attending switches	..	...	30	4,232	..	...	..	...	..		30	4,232
Coming in contact, while riding on cars, with overhead bridges, tunnels, or any signal apparatus, or any fixed structure above or at the side of the track	..	4	18	314	1	4	...		3	14	22	338
Falling from cars or engines	39	46	93	1,325	4	13	...	11	83	108	191	1,503
Getting on or off cars or engines	19	599	39	1,930	9	75	6	23	108	381	181	3,018
Other accidents on or around trains not here named	1	488	6	184	..	31	5	91	5	47	15	1,041
Being struck or run over by engine or car at stations or yards	7	57	183	327	18	32	29	76	237	209	474	671
Being struck or run over by engine or car at highway grade crossings	..	....	3	6	3	3	143	495	44	31	191	535
Being struck or run over by engine or car at other places	..	1	104	95	21	8	18	37	614	297	754	428
Other causes	2	103	9	107	21	27	29	346	19	69	60	652
Total other than train accidents	38	1,478	542	9,289	57	195	228	1,084	1,113	1,356	1,978	13,202
Grand total	66	3,169	647	10,765	59	209	229	1,117	1,123	1,170	2,124	16,430

despatcher just prior to his going off duty and was duly noted by the despatcher who relieved him. A few minutes later No. 7 was ready to leave F, and the signatures of that crew to other orders was transmitted to the despatcher, who then authorized the train to proceed, overlooking the fact that signatures for the order fixing a meeting point with No. 6 had not been given him. It is the conclusion of the superintendent that the despatcher who sent this order was in error in stating that it had been acknowledged by the operator at F, confusing the acknowledgment made by the other office to which it was also sent. The despatcher and the operator concerned are reported as reliable, careful men.

Collision No. 8, between eastbound and westbound freight trains, was due to the mistake of a telegrapher of 20 years' experience; he failed to deliver an order to the westbound train. As that train approached his station he called the despatcher and announced the fact to him. The despatcher replied by instructing the operator to take a train order, and the operator began copying this order (order No. 2) with the impression in his mind that it was for the train then approaching. He already had on his desk an order (order No. 1) for this train and had his train-order signal displayed, indicating stop. When he had copied order No. 2 sufficiently far to see that it was not for the train then approaching he at once changed his outdoor signal to indicate clear, forgetting order No. 1.

Collision No. 13, in which a passenger train standing at a station was run into at the rear by a following passenger train, killing 6 passengers and injuring 46 passengers and employees, was due to disregard of signals by the engineman of the second train. This train had passed *two* automatic signals set against it, and it struck the standing train while still running at high speed. The engineman is 54 years old and had a clear record for 30 years. It is the belief of the superintendent that the engineman had been unconscious for perhaps 10 minutes immediately prior to the collision; and, from the statement made by the engineman and from other evidence, that this condition was due to a mild attack of epilepsy. The fireman had been in service on passenger trains 10 months. The train was on an ascending grade and he was attending to the fire; and he neglected to comply with the rule which requires him to communicate by word of mouth with the engineman on approaching each block signal. He is held negligent also for not having observed that

TABLE NO. 2A.—CAUSES OF 28 PROMINENT TRAIN ACCIDENTS.

[No. = Number. C. = Class. B. butting collision; M. miscellaneous collisions. D. derailment. P. passenger train. F. freight and miscellaneous trains.]

COLLISIONS.

No.	Cl.	Kind of train.	Killed.	Injured	Damage to engines, cars and road-way	Reference to record.	Cause.
1	M	F and F	6	3	$100	15	Freight cars, carelessly left standing on main track, run into at night by engine carrying passengers on front end. Six of these passengers were killed. This collision occurred on a new road a few miles long, used mainly for the transportation of freight.
2	B	P and F	1	5	4,000	31	Engineman in charge of engine without train encroached on time of regular passenger train; watch 10 minutes slow; comparison of watch with standard clock had been neglected.
3	B	F and F	1	-	4,500	8	Absence of tail lights on standing train, a car which was out of order having been put behind the caboose. Also, the men in charge of standing train had depended on the protection of a fusee; but they had been detained, by air brakes sticking, until the fusee had burnt out.
4	B	F and F	0	2	5,000	50	Failure to deliver meeting order. (See note in text.)
5	B	F and F	2	0	6,700	46	Disregard of two automatic block signals by engineman and front-end brakeman, both of whom were killed. It is believed they were asleep.
6	B	P and F	2	32	7,308	9	Freight encroached on time of passenger train at meeting point. Conductor and engineman are said to have "assumed" that the passenger would be late.
7	B	P and P	0	66	7,700	47	Operator failed to deliver order.
8	B	F and F	2	2	9,338	14	Operator, 20 years in service, failed to deliver order. (See note in text.)
9	B	F and F	0	3	9,910	10	Operator, 21 years old, 3 years in service, accepted order after train had passed.
10	B	P and P	2	20	12,802	1	Train standing at station, 5:36 a. m., in fog, not protected.
11	M	P and F	0	0	13,568	30	Switch thrown under rear car of moving passenger train. Car ran partially on siding and collided with a locomotive. One passenger car destroyed by fire, started by ignition of gas. The superintendent was unable to fix the responsibility for the throwing of the switch.
12	B	F and F	0	3	15,700	45	Freight standing at station not protected by flag.
13	B	P and P	6	46	17,000	3	Disregard of automatic block signals. (See note in text.)
14	B	P and F	2	15	20,000	5	Freight encroached on time of passenger train. (See note in text.)
15	B	P and P	5	48	25,600	3	Faulty time-interval regulations and failure to protect train by fusees. (See note in text.)
		Total	29	245	162,105		

DERAILMENTS

16	D	P	1	0	600	15	Disregard of speed at branching switch, engineman asleep (6:15 a. m.)
17	D	P	1	1	1,000	7	Rail fell at place from bend 300 ft. above. Road had been watched for many years, and in unsettled weather it was patrolled, but at the time of the accident the ground was very dry and the patrolman had been taken off.
18	D	P	1	17	3,000	39	Broken rail. The road at the point has automatic signals, but the break in the rail was not affected the track-circuit for the reason that it was close to the rail at the joint between the rail of the bond wire.
19	D	F	0	0	3,000	6	Locomotive driving-box hot due to heavy train and ran off track at switch 30 miles an hour.
20	D	F	0	0	6,000	11	Derailment caused by broken driving-box. Wreck occurred in tunnel, blocking both tracks. Conductor and brakeman held blameless due to not having displayed signals, owing to the darkness.
21	D	P	0	4	11,000	33	Derailment due to broken rail which had been caused by some cause undiscovered.
22	D	P	1	19	12,000	4	Misplaced switch.
23	D	P	1	13	13,000	41	Rear truck of engine struck the frog and ran over it, the train following on the ties. Cause not decided.
24	D	P	1	7	16,000	44	Engineman asleep on descending grade.
25	D	P	1	4	17,000	13	Broken rail.
26	D	P	1	4	17,000	17	Broken axle, which had been in use [illegible] a wooden bridge. The axle broke at the end of the normal test to the [illegible] The diameter of the [illegible] was [illegible] inches, which is [illegible] the diameter above it was new.
		Total collisions and	29	245	162,105		

the speed of the train was excessive, in view of the fact that it was approaching a large station.

Collision No. 14 was a case of a passenger train running into the rear of a freight which was entering a side track, having been delayed in this movement because of the pulling out of a drawbar. As the freight approached the switch, where it was to enter the siding, the rear brakeman threw off three fusees, but the train was delayed because of the failure of the drawbar, and before it could move two of the fusees had burned out. The third, burning yellow, was at a point about 1,000 ft. in the rear of the freight. The men in charge of the freight are held responsible for the collision, in not having given the passenger train effective stop signals; yet the engineman of the passenger train (who was killed) could have seen the tail lights of the freight 1,650 ft. before reaching them; while the evidence shows that he did not apply the brakes until he was within 200 to 350 ft. of the freight.

Collision No. 15, in which two passengers were killed, was a case where a regular passenger train ran into the rear of a preceding passenger train which was just about to enter a sidetrack to clear the main track for the other train. Both trains were of the same same class, but the leading train was behind time and fell back on the time of the one that was following, while the schedule of the following train was faster than that of the other. At T, about 10 miles back of the point of collision, the second train was 10 minutes behind the first. On approaching C, where it was to enter the sidetrack, the leading train was slackened to allow one of the trainmen to go ahead and set the switch for the sidetrack. To provide against a collision the rear brakeman dropped a lighted fusee at a point one mile short of the switch, but the fusee did not burn. He immediately dropped another, and that also failed. He then went into the car to get a third fusee, but by that time the train had come to a stop, and before he was able to get back with a flag the collision had occurred. The brakeman says it was not over one minute after his train stopped before the following train appeared. On account of a dense fog he could see back not more than 150 to 250 ft. It was found that one of the fusees which had been thrown off had been burned about 1 in. The testimony of the brakeman regarding the weather is contradicted by other witnesses, who say that, although the atmosphere was a little hazy, objects could be seen for a half mile. The collision occurred at 7:25 a. m.

Derailment No. 1 occurred at 7 p. m. during a severe wind and snow storm. The engine and nearly the whole of the cars in a passenger train were thrown off the track at a derailing switch, and the engine and mail car were overturned. In consequence of the blinding snow, the engineman had passed through a cut about a half mile back without observing the location, and then when his engine struck a snowdrift a short distance from the point where he was derailed, he thought he was then passing through the cut; and he had not shut off steam at the time when the engine went off the track. The towerman in charge of the derail saw the train coming and endeavored to close the derail, so as to avoid ditching the train, but he was unable to close it, as the points were clogged with snow. The section foreman had just come on duty, to clear the switches of snow for evening trains, but had not yet reached this particular derail. The derailed cars were of steel and were only slightly damaged.

Derailment No. 2 occurred to a freight train moving along a passing track. The train was not kept under complete control, and went off the track at the derailing switch at the outgoing end of the passing track. The accident occurred at 7 p. m. The engineman said that the electric headlight of the engine caused the purple light (indicating "stop") at the derailing switch to look white (which would indicate "all clear"). The light was dim, however, and the engineman has been censured for not bringing his train to a stop when he had ground for suspicion that the track was not in proper shape for the passage of his train. After the accident, a test was made with an electric headlight, shining on a purple light, and it was found that the purple light appeared to be white until the observers had reached a point within about 200 ft. of it, thus confirming the engineman's statement.

Electric railways reporting to the commission had 61 persons killed during the quarter and 696 injured; and there were 30 collisions and 52 derailments. Train accidents are charged with only one fatality—one employee killed in a collision. The total number of passengers killed from all causes was 9, and of employees 5 (none in industrial accidents). The number of trespassers struck or run over by cars was 41; 20 killed and 21 injured.

DUCTILITY IN RAIL STEEL.*

BY P. H. DUDLEY.

The phrase "ductility in rail steel" does not, as often supposed, express equal physical properties in metal for rails of different chemical composition or different methods of fabrication, and for different conditions of service. Bessemer-steel rail sections of high phosphorus, even with low carbon content, are more fragile in the distribution of rapid large bending moments than the low-phosphorus medium-carbon steel of basic open-hearth rails. There is also a marked difference in the freedom from fractures under similar service between brands of steel made under the same specifications. Rails which are satisfactory in warm climates fracture more frequently in colder climates.

Iron forms the economic basic element of steel, its ductility being utilized with the metal manganese and the metalloids carbon and silicon to produce an alloy of double the elastic limit and ultimate strength of the best wrought-iron rails. The iron rails were adequate for the installation of the railways, but were so rapidly impaired by the equipment of 1860 and 1870 that they were replaced by Bessemer-steel rails, which have since rendered possible the present extensive railway systems of the world.

Owing to the exhaustion of the available low-phosphorus ores, Bessemer rail steel is now of necessity a high-phosphorus and low-carbon alloy, the mean carbon being about 0.50 manganese about 1.00, and silicon 0.10 to 0.20 per cent.† The impurity of phosphorus is limited to 0.10, while that of sulphur was limited formerly to 0.075 or 0.08 per cent. The manufacturers this year charged for this limitation of sulphur five cents extra per hundred pounds and it has been omitted from most specifications, though it is generally required that its content be reported.

Plain basic open-hearth rail steel is usually a low-phosphorus and medium-unsaturated-carbon alloy, as most of the phosphorus has been reduced by this process from its content in the ores and iron to 0.04 per cent. or under. This permits, in this class of steel rails, carbon of 0.63 to 0.75 per cent. in combination with the same percentage of manganese and a silicon content of 0.10 to 0.20 per cent.

The metalloid carbon (under 10 per cent.) when alloyed with iron increases its tensile strength, but, as would be expected, lessens at the same time its ductility by increasing its viscosity to strains, yet does not increase its brittleness rapidly so long as the mineral aggregates elongate after passing the elastic limit and have a decided reduction of area at the necking or point of fracture. Steel which is rendered granular from any condition of chemical composition or fabrication partakes more of the nature of brittle solids than of ductile tough alloys.

Manganese also increases the tensile strength of the metal, although to a less extent than carbon when its amount is under 1.25 per cent. It is not an impurity, as frequently stated, but is a necessary element in oxidation processes to reduce the percentage of oxides in the completion of refining the steel.

* A paper read before the American Society for Testing Materials, Atlantic City, N. J., June 27-July 1.

† The chemical compositions refer to all cases to which it is

Silicon is also a requisite element to increase the solidity of the metal, and in the small percentages which obtain in Bessemer or basic open-hearth steel, it adds little if any to the tensile strength of the alloy.

Phosphorus is an embrittler, especially with high carbon. It increases the viscosity of the steel and reduces its capacity to distribute rapid strains or those of large magnitude before fracture occurs, particularly in low temperatures. Therefore, when as much as 0.1 per cent. of this impurity is present the percentage of carbon must be limited for Bessemer rail steel practically to 0.5 per cent., with the necessary manganese. Phosphorus, it is said, may exist in rail steel in two or more compounds, one not being considered harmful to the steel. Several investigations have indicated the same result, but have not disclosed any direct method of fabrication to control the harmfulness of a part of or the entire phosphorus content. It is therefore considered best to reduce the total phosphorus in the ores in this country by the basic open-hearth process, and to replace the embrittling properties of a large content of phosphorus by a higher percentage of carbon. This enables the metal to withstand greater tensile and impact strains and distribute them in the rail section as a girder in a shorter time without fracture than is possible for the Bessemer metal with the higher phosphorus content.

Sulphur is an impurity and renders the metal hot short in rolling, producing checks and cracks, while the greater portion of the sulphur unites with the manganese forming manganese sulphide, which is occluded by the metal as a foreign substance, preventing its welding, and breaking up the continuity of its structure. Silicates which should have escaped from the bath of molten metal are also often occluded in the steel. These defects often become the incipient points of detailed fractures due to the gradual deformation of the section by the repetitions of passing wheel loads.

Tests butts from Bessemer rail steel, carbon 0.50, manganese 0.90 to 1.10,, phosphorus about, but under 0.10, silicon 0.13 to 0.15, show under the drop-testing machine a range of ductility from 6 to 18 per cent., although the majority of the tests give from 10 to 18 per cent.‡ There are some heats or groups of heats in which the ductility drops to 5 or 6 per cent. and in which the butt breaks under a second blow. The tests of the butts, unless otherwise indicated, refer to the crop from the top of the "A" rail.

Test butts from basic open-hearth rails, carbon 0.63 to 0.75, with about a similar content of manganese, phosphorus 0.04 or under, silicon 0.15 to 0.20, usually show under the drop-testing machine a range of ductility from 6 to 18 per cent., while an occasional melt gives 20 to 25 per cent. Twenty thousand tons of special basic open-hearth supersaturated steel rails, carbon 0.80 to 0.90, phosphorus under 0.03, with a small percentage of titanium added in the ladle, which have been rolled recently, show a ductility of 6 to 18 per cent. and are now in service. The rails seem tough as a girder, and abrasion tests indicate that they will show great resistance to flange abrasion on curves.

Melts of open-hearth rails for the New York Central Lines [illegible] from 10 to 24 ingots and make from 60 to 180 rails. Three butts are tested from different ingots of each melt; one is from the second heat tapped, one from the middle of the melt, and a third from the ingot before the last one poured. To pass [illegible] each butt must show a ductility of at least 5 per cent. in two consecutive inches upon the base or of 6 per cent. in one inch, while in one butt the ductility of the steel is totally exhausted. The butts for this record are selected in rotation from the different ingots and the range for the melts is thus ascertained. The tests as a rule indicate that the ductility is quite uniform for each melt. The exceptions can usually be [illegible]

[illegible]

traced to colder rolling, differences in heating, and sometimes to brittleness of the metal itself.

The size and weight of the ingots for open-hearth steel vary at different mills. The smallest ingot for a three-rail length of 100-lb. section weighs 3,934 lbs. The ingots for six-rail lengths of 100-lb. section at another mill weigh 8,200 lbs. The ingots at a third mill weigh 12,500 lbs. each and after more than a 20 per cent. discard are bloomed for eight 100-lb. rails, cut in two-rail lengths and reheated before rolling. These large ingots, with nearly sixty reductions in size to that of the section of the rail, receive so much mechanical work upon the metal that the effects of the carbon are intensified and the ductility is reduced 2 or 3 per cent. below that of rails of similar composition from smaller ingots. The slightly reduced ductility will give greater resistance for curve abrasion and still be sufficient for the section as a girder.

The ductility of ferro-titanium Bessemer rails, with 0.1 per cent. of metallic titanium added to the bath, carbon 0.60 to 0.70, manganese 0.40 to 0.70, though usually confined under 0.60, silicon 0.10 to 0.18, ranges from 6 to 15 per cent., showing a decided softening of the effect of the phosphorus content by the titanium and lower manganese. These rails are now to be submitted to extensive service tests to see whether or not the expected benefits will be secured in pratcice.

The value of 8 to 12 per cent. ductility in rail steel may be modified considerably in the fabrication of the rails by the checking of the columnar structure in blooming, producing large percentages of second quality rails. These checks do not roll out completely, and while many rails are rejected, some checks under the scale are invisible in the base of the rail and weaken it transversely, thus losing in effect the ample ductility intended by the chemical composition. It has been found that under high-speed trains of heavy wheel loads the half-moon or crescent breaks which occur in the base of the rail start from these incipient checks in the metal near the center of the base and in low temperatures generally develop as detailed fractures. When the "seconds" run from 5 to 15 per cent. of the output, this type of break occurs in rails in which the checks were so minute as to be invisible, and therefore escape detection in the rails at the mills.

Some years since, when the output of the mills was large and the steel not well deoxidized before teeming the ingots, the half-moon fractures were confined mostly to the "A" rails; but they are now more common in the lower rails of the ingots, at least of some brands. The metal in the present blooming trains does not crack or check as much in the upper part of the better deoxidized open-hearth or Bessemer ingots as it does under the first heavier drafts for the lower and larger part of the ingots. The checks have not occurred to as marked an extent in the open-hearth ingots, making only 1 or 2 per cent. of seconds, as formerly in the Bessemer ingots, for the reason that the purer open-hearth metal is not as hot-short as the less deoxidized plain Bessemer metal. It is noticed, however, that in open-hearth rails the greatest number of seconds from some of the mills, even of the 1 or 2 per cent., are from the last rail in the ingot. While the mills are designed to produce rails, the differences in many of the details of furnace and mill practice have some influence upon the ductility which may be secured and utilized from a given composition of metal.

The New York Central and Hudson River, and the Boston and Albany Railroad Companies, have had a large experience concerning the requisite ductility of rails as girders to carry and distribute the wheel loads and also to resist flange abrasion upon curves under heavy traffic. Of the many thousand tons of Bessemer rails of 0.06 per cent. phosphorus and 0.60 to 0.65 per cent. carbon which I commenced to roll in 1891 and continued until the exhaustion of the low-phosphorus ores in 1902, 90 per cent. were required to exceed a minimum ductility of 5 per cent. per inch as shown under the drop test, which in fabrication by the manufacturer was raised to 95 per cent. The maximum

ductility was about 18 per cent., and the average was over 12 per cent. The minimum ductility was 4 per cent. per inch for acceptance of 10 per cent. of the rails, though confined by good mill practice to 5 per cent. of the output. The rails proved to be tough and but few fractures have occurred in service, while many are still in the tracks.

Six-inch, 100-lb. rails made in 1894, after sixteen years of service carrying 250,000,000 tons of traffic with a loss of less than 0.125 in. on the head, were tested early this year under the drop, base down on the supports. One butt gave 6 per cent. elongation before it sheared through the bolt holes and a butt from another heat gave 8 per cent. The metal in the head of either rail, like thousands of others in the track, did not flow to the sides but wore uniformly, owing to the efficient support of the metal of high elastic limit underneath the bearing surface. The resistance to flange abrasion was excellent, rails lasting six to ten years upon three-and four-degree curves under heavy traffic. Rails of the same sections containing 0.10 per cent. phosphorus and 0.50 per cent. carbon used to replace them, cut out upon the same curves in two or three years, although there has been some increase in the traffic.

The minimum difficulty of the metal has been raised from 4 to over 5 per cent. per inch to insure malleability as well as ductility for the increased service under the present wheel loads and higher speeds. This is for the purpose of meeting the present decreased time factor in distributing the larger and more rapid alternating positive and negative bending moments in the rail as a girder under the moving wheel contacts of the heavier loads and higher speeds, particularly in freezing temperatures.

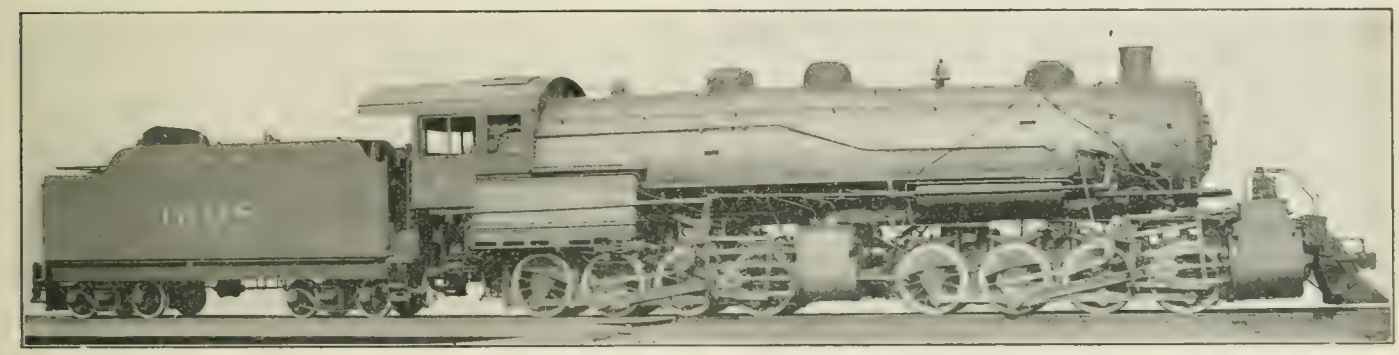
It has been instructive to note that new rail butts at 60 deg. F. would withstand 2,000 lbs. falling 16 ft. Similar butts at 0 deg. F. would fail when an 8-ft. drop was exceeded, yet under the 16-ft. drop they showed by their curvature that a permanent set and about one-half of the elongation had occurred in the metal as found for a 16-ft. drop before fracture. The cold had increased the viscosity of the metal; therefore its resistance to flow, combined with the reduced time factor for the distribution of the greater energy and speed of impact of the higher drop, started the rupture of the extreme fibers in the base of the rail before the stress could be distributed through the entire section, and fracture consequently took place. Similar conditions occur in the rails in the track which are deflected from the trackman's unloaded surface to the "general depression" under the total loads of the wheel bases of the locomotives or cars, with specific deflections in the rails under the passing wheel contacts.

The heavy wheel loads of slow freight trains with a large time factor to distribute the stresses through the sections as girders, do not check or fracture as many rails as similar wheel loads un at higher speeds with greater generated wheel effects and with less time for their distribution through the rails to the cross-ties, ballast, and roadbed. Oxidized flaws are often found in fractured rails, showing that a minute check had been caused by the maximum intensity of the wheel effect, but was so quickly relieved by the passing of the wheel that the rail was not completely fractured at the first occurrence. Broken rails have been found having in the base two distinct oxidized checks which had occurred several months apart and not until a third excessive wheel load at some subsequent date was the rail completely fractured. There are also many fractures which show that the impact of the passing wheel was so quick and great as to render ductile metal fragile without exercising its ductility in the least. This has led to a general investigation of the relations of the passing equipment to the rails and roadbed, as it is their combination which forms the means of transport.

MALLET SUPERHEATER LOCOMOTIVES; DELAWARE & HUDSON.

In June, 1910, the Delaware & Hudson received six Mallet locomotives from the American Locomotive Company, which at the time of their construction were the most powerful locomotives in the world. They were put in pusher service on the 18 mile grade of the Pennsylvania division between Carbondale, Pa., and Arrarat station, where they have been in operation ever since. From W. C. Tower, Carbondale, to Forest City, a distance of 5½ miles, the grade is 1.36 per cent., and from the latter point to Summit, it averages about .8 per cent. with a number of 6 deg. and 7 deg. curves.

Recently four more articulated locomotives were received from the same builders, which are nearly duplicates in design



Mallet Superheater Locomotive; Delaware & Hudson.

of the first lot except that they are equipped with the Schmidt loop type fire tube superheater, which provides a superheating surface of 1,106 sq. ft. One of these later engines is shown in the accompanying illustration. Except for modifications in the construction of the boiler but very little change from the original design, shown in the *Railway Age Gazette* of May 27, 1910, was necessitated by the application of the superheater. In the non-superheater design the high pressure steam pipes are connected to the branch pipes in the smoke box and extend back underneath the running boards to the high pressure cylinder; consequently, no change was necessary on account of the application of the superheater. Extended piston rods are applied to all pistons and the rods of the high pressure valves are also extended in the superheater design. There is also a difference in the valve setting between the two classes of engines. The valve in both cases has a travel of 6-in. In the superheater engine the high pressure valve has a 1-in. steam lap, a 3/16-in. lead and a 5/16-in. exhaust clearance. The low pressure valve has the same lap and lead and a ⅜-in. exhaust clearance. In the case of the non-superheater engines the high pressure valve has a 1 1/16-in. lap, a 3/16-in. lead and a 5/16-in. exhaust clearance, while the low pressure valve has a 1-in. steam lap, a 5/16-in. lead and a 7/16-in. exhaust clearance. The boiler of the engines, here illustrated, is fitted with 270 tubes, 2¼-in. in diameter and 24-ft. long, and 42 flues 5½ in. in diameter.

Shortly after the first lot of engines went into service tests were made to determine their fuel and water consumption as

compared with the class E. 5 consolidation locomotives whose place they took in pusher service. The consolidation locomotives have a total weight of 253,000 lbs., 223,000 lbs. on driving wheels and a tractive effort of 49,700 lbs. Observations were taken of several runs made by the same two class E. 5 locomotives working together as pushers, and also of locomotives of 1,600 and 1,605 of the articulated type, working separately. In order to obtain the fairest basis for comparison only the results of those runs in which conditions were most nearly alike were tabulated—four in each case. The general average showed that the articulated locomotive hauled within 2.7 tons as much as 2 consolidation locomotives together at approximately the same speed, and burned 44 per cent. less coal. From records of the fuel consumption of the articulated locomotives covering the time since they have been in service, J. H. Manning, superintendent of motive power, states that they have maintained the averages shown by the tests. Similar tests will be made of the superheater locomotives, which will permit of interesting comparisons with the locomotives using saturated steam.

An analysis of these figures, and a consideration of the causes which produce the economy shown, bring out some interesting points as to the saving affected by the use of a single unit of great power instead of two or more units of less power in handling a given amount of tonnage. For instance, the total weight in working order of the articulated locomotive and tender is approximately 97 tons less than the aggregate of the two consolidation locomotives with their tenders. The length of the division is 18.7 miles, which gives in round numbers, 1,800 ton-miles less for the articulated locomotive per trip as compared with the 2 consolidation locomotives. The consolidation locomotives burned 68 lbs. of coal per ton-mile on the average, consequently the above saving in ton-miles means a resulting reduction of 1,225 lbs. of coal per trip, or 6.4 per cent. of the average total amount of coal burned (19,074 lbs.). On the other hand, both classes of locomotives have approximately 100 sq. ft. of grate area; consequently, with the single unit there is 100 sq. ft. less grate area to consume coal when the train is standing on a siding. It will be readily appreciated that considerable economy of fuel results from this cause. The tests showed that the consolidation locomotives burned an average of 55.8 lbs. of coal per sq. ft. of grate area per hour. Assuming that the rate of combustion is half of this amount, or 28 lbs., when standing on a siding, and that in the 18 miles there is an average lost time of 20 minutes, which is a very conservative figure, the saving in coal would be 933 lbs., or 4.89 per cent. of the total coal burned.

An excellent system of operating and handling the Mallett locomotives has been adopted. In engine house work the Mallet engines are segregated from the general work. A building was erected at the end of the engine house and a number of tools were installed. Night and day mechanics were selected to work on the Mallet locomotives. Their whole time is not put in on the Mallets, but the understanding and [illegible] is such that when there is such work to do they [illegible]

[illegible] necessary the articulated locomotive [illegible] to the shop, which is about 100 yards from the engine house. At the shop a drop table has been installed that permits of dropping 4 pairs of drivers at one time. With this table all the wheels of the articulated locomotive can be removed in 30 minutes after they are ready to be taken down.

[illegible] the company has established a maximum speed limit of [illegible] miles per hour for the articulated locomotives. All the [illegible] are equipped with speed recorders and the rule in regard to speed limit is rigidly enforced. An engineer exceeding the speed limit is disciplined, and as a result the rule is universally observed. The locomotives are run forward up the hill for 30 days and then turned and run backward for an equal length of time, thus equalizing the flange wear on the tires of the front and back systems. There can be no doubt that this careful system of operation contributes largely to the successful service which these locomotives are giving.

The general dimensions of these locomotives are as follows:

General Data.

Type	0-8-8-0
Service	Freight
Fuel	Bit. coal
Tractive effort (compound)	105,500 lbs.
Tractive effort (simple)	126,600 lbs.
Weight in working order	457,000 lbs.
Weight on drivers	457,000 lbs.
Weight of engine and tender in working order	625,800 lbs.
Wheel base, driving	40 ft. 2 in.
Wheel base, rigid	14 ft. 9 in.
Wheel base, total	40 ft. 2 in.
Wheel base, engine and tender	75 ft. 7¼ in.

Ratios.

Total weight ÷ tractive effort	4.33
Tractive effort × diam. drivers ÷ heating surface	963
*Tractive effort × diam. drivers ÷ equiv. heat. surf.	741
Total heating surface ÷ grate area	55.98
*Total equiv. heating surface ÷ grate area	72.57
Firebox heating surface ÷ total heat. surface, per cent.	6.3
*Firebox heating surface ÷ total equivalent heating surface, per cent.	4.86
Total weight ÷ total heating surface	81.7
*Total weight ÷ total equivalent heating surface	63
Volume equivalent simple cylinders, cu. ft.	26.1
Total heating surface ÷ vol. cylinders	214
*Total equiv. heating surface ÷ vol. cylinders	278
Grate area ÷ vol. cylinders	3.83

Cylinders.

Diameter	26 in. & 41 in.
Stroke	28 in.

Wheels.

Driving, diameter	51 in.
Driving, journals, main	10 in. × 12 in.

Boiler.

Style	Conical connection
Working pressure	220 lbs.
Outside diameter of first ring	90 in.
Firebox, width and length	114 in. × 126 in.
Tubes, number and diameter	270, 2¼ in.; 42, 5½ in.
Tubes, length	24 ft.
Heating surface, tubes	5,245 sq. ft.
Heating surface, firebox	353 sq. ft.
Heating surface, total	5,598 sq. ft.
Heating surface, superheater	1,106 sq. ft.
*Heating surface, total equivalent	7,257 sq. ft.
Grate area	100 sq. ft.

Tender.

Tank, style	Water bottom
Frame	Steel channels
Wheels, diameter	33 in.
Water capacity	9,000 gals.
Coal capacity	14 tons

*Total equivalent heating surface equal total heating surface (5,598) plus 1½ times superheating surface.

LIGHTNING PROTECTION.

The problem of adequate lightning protection is a most serious one with the Canadian Pacific on the portion of the line between Lake Superior and the Rocky Mountains on account of the excessive severity of the lightning in this district. I might say that we are "between the devil and the deep blue sea." If we use sufficient arresters to take care of the frightful discharges, we most likely will kill the telephone circuit by having so many "traps for bugs." We have been using in the station where the fone line is looped, four Argus arresters, without fuses, on the four ends of the wires, and two Argus arresters with fuses on the bridge wires to the tones and selector.

At stations where the circuit is only legged in we have two Argus arresters with fuses. At the despatcher's office, besides the Argus arresters we equipped the first three poles from the office with O'Connell pole arresters. In some sections this protection seems to be adequate, the circuit being worked right through storms, but in the district above mentioned it does not appear to be sufficient, my reports showing that at times the telephone has to be abandoned for an hour or more on account of lightning. There have been some interruptions on account of the pole arresters, and this year we are trying out the Branch office and pole arresters to the same extent as the former equipment.—*H. J. Camp* (C. P. R.)

General News Section.

The division superintendents of the Intercolonial Railway have had their salaries increased to $2,700 a year each; the salaries heretofore having been at different rates, averaging about $2,400.

The International Railway Fuel Association has published the proceedings of its third annual convention, held at Chattanooga, Tenn., May 15 to 18 inclusive. The volume is handsomely bound in red leather, contains 235 pages, and is well illustrated.

A pension system has been adopted on the Oregon Short Line, the plan being the same as that which has been in effect for several years on the Southern Pacific and other lines in the Harriman system. Throughout the system the number of persons now on the pension rolls is 420.

Governor Dix of New York has vetoed a bill to permit the Union Railroad Company, New York City, to consolidate with any other street surface railway in Westchester county. The Governor disapproves the bill because it allows the consolidation without the consent of the Public Service Commission.

Suit has been begun at San Bernardino, Cal., against the Atchison, Topeka & Santa Fe for violation of the California full crew law, the offense charged being the running of a passenger train of four cars with only one brakeman. The road claims that, one of the four cars being a baggage car, the requirement of the law does not apply.

The Bureau of Navigation monthly shipbuilding return says that five wooden sailing vessels, with a gross tonnage of 1,566 tons, were built in the United States during July. During this period 133 wooden steam vessels, with a gross tonnage of 3,912 tons, and five steel steam vessels, with a gross tonnage of 9,958 tons, were also built.

Suit has been filed by the state of Kentucky against the Southern Pacific Company for $125,000 additional franchise taxes, the petition alleging that while the company's books show gross earnings of $145,000,000 and net earnings of $57,000,000, it reported gross earnings at $45,000,000 and net earnings at $36,000,000 to the state auditor.

The Interstate Commerce Commission, acting on a complaint that regulations for the transportation of explosives and other dangerous articles are unreasonable, is to investigate the general subject, both as regards the regulations of the express companies and those of the railway companies; the first hearing to be held in Washington, October 11.

The Baltimore & Ohio has ordered of the United States Electric Company, of New York, Gill selector telephone train despatching outfits complete for 40 stations, to be used on the telephone despatching circuit from Clarksburg to Salem, W. Va. A message circuit will parallel the train wire. This installation will complete the train despatching circuit from Grafton to Salem.

The Maine Central has opened war on tramps. Conductors, both passenger and freight, telegraph ahead to stations where there are policemen, calling for officers to be ready to make arrests; and the tramps are taken into court and sent to jail for 30 to 90 days for evading fares. Magistrates in New York and other states who are reluctant to impose a sentence even of 30 days might do well to send for the records of some of those 90-day cases.

The Chicago Great Western has adopted an accurate coal weighing system by which a record will be kept of every pound of coal used throughout the system, and it is expected that the present cost of fuel—$1,500,000 annually—can be reduced 10 per cent. New scales will be put in at each of the company's twenty-three coaling stations, and reports will be made showing the average consumption of coal per locomotive mile and per ton mile.

The Missouri Pacific announces that beginning next Monday the general claim department, which has its office at St. Louis, will become a part of the office of the vice-president and general solicitor and will no longer be a separate department. District claim agents will be appointed who will report to the heads of the legal departments of their respective districts, thus introducing division management into this department. All minor claims will be settled without the delay incident to sending the papers to the general headquarters.

The attorney general of the United States has begun suit in the federal court at Columbus, Ohio, to dissolve the alleged illegal combination in restraint of trade which has been established by the amalgamation of the Hocking Valley Railroad, the Toledo & Ohio Central and other roads, and three coal mining concerns. Among the defendants are the Lake Shore & Michigan Southern and the Chesapeake & Ohio, which two years ago acquired control of these Ohio roads, the Lake Shore taking the T. & O. C., and the Chesapeake & Ohio the Hocking Valley.

Governor Dix of New York has vetoed a bill which was passed by the legislature, recently adjourned, providing that a railway telegrapher must be 21 years old and must have had a year's experience as an apprentice. Governor Dix believes that the present law, making the minimum age 18, is a sufficient protection for the public; but adds that if a change ought to be made the Public Service Commission is the body that ought to make it. The Governor has also vetoed a bill which would require every engine running without a train to be manned by an engineman, a fireman and a flagman. He says that the regulation of a matter of this kind belongs to the Public Service Commission.

Ninety-two thousand seven hundred forty-seven dollars and sixty-five cents is the amount of a check issued by the Southern Pacific Company, at San Francisco, July 24, in payment of damages to W. R. Zibbel, who in a railway accident lost both arms and one leg. This we learn from the *San Francisco Bulletin*, which prints a facsimile of the check This remarkably large verdict has been sustained by the Supreme Court of California. It is said to be the largest sum ever paid under such circumstances, which one may well believe. According to the *Bulletin* the company's first offer to the injured man was $500. He sued in the court at Fresno and on the first trial was granted $100,000. Fearing that this would be held excessive on appeal Mr. Zibbel agreed to accept $70,000. The road, however, took the case to the highest court and put forth its best efforts to secure a reduction; but Mr. Zibbel now gets his $70,000 with interest from December 31, 1906. The gross sum includes also the costs.

Committees representing the railways and commercial concerns interested in the proposed changes in the regulations affecting the size of trunks to be accepted by the roads as baggage, met in Chicago on August 7 with a view to reaching an agreement in the matter. Although nothing was decided at the conference, it was decided at a subsequent meeting of the railways' committee to postpone the date when the 40-inch limit will become effective to July 1, 1914, and to adopt a rule imposing a 45-inch limit, but not to put it into effect until July 1, 1912. While the commercial organizations and trunk manufacturers decided at a meeting on July 10 to ask that trunks the greatest dimension of which is as much as 50 in. be accepted free as baggage, and that the rule imposing this limit be not made effective until January 1, 1913 it is believed that they will agree to the concessions offered by the roads as outlined above. The extension of time will give interested shippers and trunk makers an opportunity to adjust themselves to the new rules.

Oil Burners in Alaska.

All the engines in use on the Copper River & Northwestern Railway in Alaska are being changed from coal to oil burners, owing to the impossibility of securing Alaska coal and to the fact that California oil can be secured more cheaply than American or Canadian coal. A contract has been entered into between the railway and the Standard Oil Company to furnish the fuel. The mining plants located in the Copper River region are also changing all of their furnaces to oil burners. The Alaska

Northern has solved the fuel problem in part by purchasing two gasoline motor cars which are run for passengers, light freight and express, making the run from Seward to the end of the line and back on the arrival of each steamer. The gasoline is bought in Seattle.

Dissatisfied Shopmen.

Shop men of the Southern Pacific are asking for shorter hours and higher pay throughout the lines of the system, and it is said that the brotherhoods who control these shop men are making or soon will be making similar demands on all of the roads west of the Missouri river. The Northern Pacific and the Great Northern have reduced the working hours in most or all of their shops. The International & Great Northern has closed its shops at Palestine. The Texas & Pacific has laid off considerable numbers of shop men in Texas and in Louisiana. On the other hand, the Missouri, Kansas & Texas has increased the working hours at its shops in Sedalia, and the Louisiana Railway & Navigation Company has ordered increases in the shop forces at all points on the road.

Railway officers in Chicago say that the roads throughout the West will present a united front in combating the demand of the shop men for increased pay. The present is a favorable time for them to meet a widespread strike. The presentation of the demands of the men has disclosed the formation of a new labor alliance, the "Federated Shop Trades." It is said that the shop men at Los Angeles on the Rock Island have completed plans to strike. A request has been received by the Illinois Central for a conference with a committee representing the so-called Federated Shop Trades; but it is said that the road will insist on treating with the unions individually instead of in a combined organization. A similar request addressed to the Rock Island is said to have been granted.

An Absent-Minded Engineman.

In investigating a collision which occurred at Salford on the Lancashire & Yorkshire, last June, Col. Druitt, of the British Board of Trade, found that the engineman of a special passenger train, not a regular runner on that part of the road, yet well acquainted with it, "for some reason or other got the impression that he was on the passenger track (of a four-track line) when he was really on the freight track"; and he ran past a stop signal and into a freight train. Only four persons were injured and none very seriously. Errors of this kind on the part of engineman have been reported on four-track lines in this country; but the curious feature of the Salford collision is that it occurred in broad daylight (about 6 p. m.); and, moreover, the line appears to have been straight, or nearly so. The signals were on bridges and each was fixed exactly over the line to which it applied. The signal which was wrongly taken was 21 ft. to the right of the one which in fact governed the track on which the train was traveling. The engineman had been on duty twelve hours, but with an interval of rest of about four hours.

The Pennsylvania and the New York Subways.

[illegible] having studied the New York situation—which has been confused [illegible] except that [illegible] to the probability that the [illegible] support of lines which for some years will have only a light traffic. He is disappointed that "the city is being committed to an extravagant subway system, which will serve the entire city [illegible] which will have to be paid by the taxpayers." Continuing, Mr. [illegible]

[illegible] keep the city's interest therein paramount to all others, and this can be effected without the undesirable features of the extravagant plan now proposed. There are six important questions:

1. Has the city the basis for such a tremendous expenditure—$160,000,000 to probably $200,000,000—and yet meet its other needs without imposing an unusual tax burden? The mayor and the comptroller should publish the facts.

2. Is there any real present necessity for all the subway lines proposed, and can the same be profitably operated? The estimates already made of the revenues and expenses of the new subway system have shown what a long term of years must elapse before the proposed system will be free from operating losses, but they have not so clearly indicated when, in addition to these losses, the accumulated interest charges on the capital invested will be met; nor have they definitely shown the accumulated burden which the taxpayers must pay for at least a period of thirty or more years. The bankers and investors, who will be asked to provide for the city and the operating company about $225,000,000 under the conditions proposed, will also do well to consider these estimates, and endeavor to save the city against the unfortunate results.

3. Can the city's credit be used and should it be used to guarantee either the Interborough or the Brooklyn Rapid Transit Company, or any other operator, against subway losses, or make a preferential payment to them out of subway operations at the expense of the citizens?

4. Can the citizens under present rapid transit conditions wait for at least five years without any relief? Should they be asked to do it? The present crowded rapid transit conditions are almost unbearable.

5. Can it be regarded as a final settlement of the situation to offer the proposed operator the cream of the short distance Broadway-Fifty-ninth street travel and not insist that in fairness it assume the operation of the much-needed West Side Seventh avenue subway?

6. Can the Pennsylvania and Long Island Railroads, the largest taxpayers of the city, be satisfied when the urgent necessities for the Seventh avenue subway, which would serve the Bronx, Brooklyn and Queens, are absolutely ignored and no provision made in this vast outlay for anything to relieve the situation? In addition to being the largest taxpayers they also carry 30,000,000 of citizens in and out of New York City yearly, and by other traffic do as much as any other corporation to maintain the commercial supremacy of New York City. Yet all of this has not been deemed sufficient to commend the building of a subway to their station for the public benefit as a part of the comprehensive subway system.

Citizens, taxpayers and investors in city securities need to give the situation urgent attention and try to save the city from any such wholesale expenditure of its capital as is now proposed, and confine the present subway program to providing imperative necessities.

Safety Committees on the Frisco.

Safety committees have been organized on the St. Louis & San Francisco for the purpose of reducing the number of deaths and injuries to passengers and employees. A central safety committee will have general supervision over this work, while committees have also been appointed for each division. The duties of the different committees will be to investigate defective conditions and careless practices and take necessary steps to remedy or improve them. If of general application the measures adopted by the division committees are reported to the central safety committee, and all recommendations approved by the central committee are submitted to the management. Each division committee will make periodical trips over its division on a special train, and each member of the committee while on the trip will be detailed to investigate some department of the service with which he is not familiar, he being more likely to notice dangerous conditions in a other than his own department. An account of the proceedings of the central safety committee will be furnished to the different committees, and bulletins will be distributed among the employees. The results will also be published in the employees' magazine. At the end of each year a prize will be awarded by the company to the division showing the greatest improvement and the fewest injuries in proportion to the work done.

Telegraphic Reports of Accidents.

The order of the Interstate Commerce Commission, requiring railways to report all fatal accidents by telegraph, appears to have been modified, the chief of the accident division having given assurance that fatal accidents to passengers or employees on or about trains will be the only class to which the telegraphic requirement will apply. Reports of trespassers killed on the road, of persons killed at highway grade crossings, of track men killed by trains, etc., may be reported by letter instead of telegram. Industrial accidents need be reported only in totals at the end of the month, as heretofore. The safety appliance inspectors who are assigned to the investigation of accidents are not authorized to summon witnesses or take testimony, but are to send in reports which will be in the nature of preliminary reports to enable the commission to decide whether or not it will hold a more formal investigation. Some roads have decided not to comply with the order of the commission calling for telegraphic reports until the legality of the order shall have been tested in the courts.

Railroad Chemists and Engineers of Tests.

A number of railway chemists and engineers of tests met at the Hotel Stratford, Chicago, on August 3 to effect an organization. For the present, the meetings will be informal in character, and the attendance will be confined to representatives of railway test departments and laboratories. H. F. Force, chemist of the Delaware, Lackawanna & Western, with office at Scranton, Pa., was elected chairman. W. A. Derby, acting engineer of tests of the Chicago, Burlington & Quincy, with office at Aurora, Ill., was elected secretary.

The main objects of the association are: (1) Co-operation in making effort to increase the quality of material and the service obtained from such material; (2) exchange of results obtained in various tests; (3) broadening the field of research work and investigation; and (4) assistance of all in working out any special or intricate problem. Several subjects were thoroughly gone into, among which were: Steel and iron wheels; steel; and paints and vehicles. Matters on which attention is desired will be taken up with the secretary, who will request all members to bring to the following meeting such data as is possible. It is understood that there will be no work undertaken which will conflict with the American Society for Testing Materials, but rather that full benefit will be received from the transactions of that society. Problems more pertinent to the railway man and requiring immediate action will be followed up as quickly as possible, and results will be made known at once to others interested. Meetings will be held as often as is found necessary. The next meeting will take place at the Hotel Stratford, September 7.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

Air Brake Association.—F. M. Nellis, 53 State St., Boston, Mass.

American Association of Demurrage Officers.—A. G. Thomason, Scranton, Pa.

American Association of General Passenger and Ticket Agents.—C. M. Burt, Boston, Mass.; next meeting, St. Paul, Minn., Sept. 19, 1911.

American Association of Freight Agents.—R. O. Wells, East St. Louis, Ill.

American Association of Railroad Superintendents.—O. G. Fetter, Carew building, Cincinnati, Ohio; 3d Friday of March and September.

American Electric Railway Association.—H. C. Donecker, 29 W. 39th St., New York; October 9-13, Atlantic City, N. J.

American Railway Association.—W. F. Allen, 75 Church St., New York; November 15, Chicago.

American Railway Bridge and Building Association.—C. A. Lichty, C. & N. W., Chicago; Oct. 17-19, 1911, St. Louis, Mo.

American Railway Engineering Association.—E. H. Fritch, Monadnock Block, Chicago; annual convention, March 19-21, 1912, Chicago.

American Railway Master Mechanics' Association.—J. W. Taylor, Old Colony building, Chicago.

American Railway Tool Foremen's Association.—O. T. Harroun, Bloomington, Ill.

American Society for Testing Materials.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.

American Society of Civil Engineers.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

American Society of Engineering Contractors.—D. J. Haner, 13 Park Row, New York; 3d Tuesday of each month, New York.

American Society of Mechanical Engineers.—Calvin W. Rice, 29 W. 39th St., New York.

Association of American Railway Accounting Officers.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.

Association of Railway Claim Agents.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 22, 1912, Los Angeles, Cal.

Association of Railway Electrical Engineers.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago; annual, November 6-10, Chicago.

Association of Railway Telegraph Superintendents.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.

Association of Transportation and Car Accounting Officers.—G. P. Conard, 75 Church St., New York; December 12-13, Louisville, Ky.

Canadian Railway Club.—James Powell, Grand Trunk Ry., Montreal, Que.; 1st Tuesday in month, except June, July and Aug., Montreal.

Canadian Society of Civil Engineers.—Clement H. McLead, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

Car Foremen's Association of Chicago.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

Civil Engineers' Society of St. Paul.—D. F. Jurgensen, 116 Winter St., St. Paul, Minn.; 2d Monday, except June, July and Aug., St. Paul.

Engineers' Society of Pennsylvania.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

Engineers' Society of Western Pennsylvania.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

Freight Claim Association.—Warren P. Taylor, Richmond, Va.; annual, Buffalo, N. Y.

General Superintendents' Association of Chicago.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

International Railway Congress.—Executive Committee, rue de Louvain, 11 Brussels; 1915, Berlin.

International Railway Fuel Association.—D. B. Sebastian, La Salle St. Station, Chicago.

International Railway General Foremen's Association.—L. H. Bryan, D. & I. R. Ry., Two Harbors, Minn.

International Railroad Master Blacksmiths' Association.—A. L. Woodworth, Lima, Ohio; annual, Aug. 15, Toledo, Ohio.

Iowa Railway Club.—W. B. Harrison, Union Station, Des Moines, Ia.; 2d Friday in month, except July and August, Des Moines.

Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York.

Master Car Builders' Association.—J. W. Taylor, Old Colony building, Chicago.

Master Car and Locomotive Painters' Association, of United States and Canada.—A. P. Dane, B. & M., Reading, Mass.; Sept. 12-15, 1911, Atlantic City, N. J.

New England Railroad Club.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

New York Railroad Club.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

Northern Railway Club.—C. L. Kennedy, C., M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.

Omaha Railway Club.—H. H. Maulick, Barker Block, Omaha, Neb.; second Wednesday.

Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

Railway Club of Pittsburgh.—C. W. Alleman, P. & L. E., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

Railway Industrial Association.—G. L. Stewart, St. L. S. W. Ry., St. Louis, Mo.; annual, May 12, 1912, Kansas City, Mo.

Railway Signal Association.—C. C. Rosenberg, Bethlehem, Pa.; annual, Oct. 10, Colorado Springs, Colo.

Railway Storekeepers' Association.—J. P. Murphy, Box C, Collinwood, Ohio.

Richmond Railroad Club.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

Roadmasters' and Maintenance of Way Association.—Walter E. Emery, P. & P. U. Ry., Peoria, Ill.; September 12-15, St. Louis, Mo.

St. Louis Railway Club.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

Society of Railway Financial Officers.—C. Nyquist, La Salle St. Station, Chicago; Sept. 12-14, St. Paul, Minn.

Southern Association of Car Service Officers.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.; annual, October 20, Atlanta, Ga.

Southern & Southwestern Railway Club.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

Toledo Transportation Club.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

Traffic Club of Chicago.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.

Traffic Club of New York.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

Traffic Club of Pittsburgh.—T. J. Walters, Oliver building, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

Train Despatchers' Association of America.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.

Transportation Club of Buffalo.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

Transportation Club of Detroit.—W. R. Hurley, L. S. & M. S., Detroit. Mich.; meetings monthly.

Traveling Engineers' Association.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.; annual, August 29-September 1, Chicago.

Western Canada Railway Club.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

Western Railway Club.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Wednesday in month except July and August, Chicago.

Wood Preservers' Association.—F. J. Angier, First National Bank bldg., Chicago; annual, January 16-18, Chicago.

Traffic News.

The demands of English cotton merchants for better guarantees of the genuineness of bills of lading for cotton having been in part unsuccessful, a number of those merchants have established agencies in the southern states for the purpose of buying cotton and shipping it on their own account.

The Southern Railway has found such marked satisfaction in the service of its cotton department that four additional agents are to be employed, the purpose being to extend this work eastward into Alabama, Georgia and Florida. R. E. Grabel, one of the new agents, has his office at Macon. The duty of these cotton agents is to warn farmers how to be on the lookout against the boll weevil and how to raise cotton in spite of the pest in case it should spread to their fields.

In July, 1911, there passed through the canals at Sault Ste. Marie 2,874 vessels, of which 1,845 vessels moved through the United States canal and 1,029 through the Canadian canal. The eastbound traffic amounted to a total of 5,675,619 short tons, the principal commodity in that direction being iron ore, of which 5,161,823 short tons were hauled; in the same direction a total of 6,182,597 bushels of wheat were moved. The total westbound traffic reached 2,870,200 short tons, 2,210,309 tons of soft coal forming the principal part of the traffic in that direction. Eastbound 3,940,525 short tons passed through the Canadian canal and 1,735,094 tons through the United States canal. Westbound there passed through the United States canal 2,094,543 short tons and through the Canadian canal 775,657 tons.

The Pennsylvania Railroad has announced the discontinuance, August 31, of the tariffs which prescribe the fares to be charged on the "shuttle trains" that run between the Pennsylvania station in Manhattan, New York City and Flatbush avenue, Brooklyn; which seems to indicate that those trains are to be taken off. These trains were put on at the time of the opening of the new station in New York, to take the place of the Brooklyn ferry boats which formerly took passengers direct from Fulton street, Brooklyn, by water, to the Jersey City terminus of the Pennsylvania. Those boats connected with all of the principal trains to and from Jersey City; but the schedules of the shuttle trains are not advertised in connection with the leaving time of trains for Philadelphia and the West and it is said that they have lacked patronage because of this failure to assure passengers that in starting from Brooklyn at a given time they could be certain of the connection at the New York station.

Crop Conditions.

The government report, giving the conditions of the various crops on August 1, is as follows, stated in per cents.:

The condition of corn was 69.6.

This compares with 80.1 last month, 79.3 last year, 84.4 August 1, 1909, 82.5 August 1, 1908, and 82.8 August 1, 1907.

The condition of oats was 65.7.

This compares with 68.8 last month, 81.5 last year, 85.5 August 1, 1909, 76.8 August 1, 1908, and 75.6 August 1, 1907.

The condition of spring wheat was 59.8.

This compares with 73.8 last month, 61 last year, 91.6 August 1, 1909, 80.7 August 1, 1908, and 79.4 August 1, 1907.

The condition of barley was 66.2, against 72.1 last month, 70 last year, 85.4 August 1, 1909, and 83.1 August 1, 1908.

The yield of winter wheat per acre, preliminary report, was 14.1.

This compares with 14.6 last month, 15.8 last year, 15.5 August 1, 1909, and 15.8 the final of 1910.

The condition average for rye is 81.2.

The estimated winter wheat crop was 455,149,000 bushels.

This compares with 458,294,000 last year, 432,920,000 August 1, 1909, and 468,011,000 the final of 1910.

The condition of winter wheat on August 1 was 64.

This compares with 64.2 last year, 76.3 August 1, 1909, 70.6 August 1, 1908, and 66.6 August 1, 1907.

The average quality of winter wheat was 92.0.

This compares with 92.6 August 1, 1910, 90.3 August 1, 1909, 90.1 August 1, 1908, and 90.1 August 1, 1907.

The yield of corn per acre was 22.6 bushels.

This compares with 25.5 last month, 25.4 last year, 27.1 August, 1909, and 27.4 the final of 1910.

The yield of rye per acre is given at 15.6.

The estimated yield of spring wheat per acre was 10.1 bushels.

This compares with 11.8 last month, 10.1 last year, 14.7 August, 1909, and 11.7 the final of 1910.

The indicated yield of oats per acre was 23.2 bushels.

This compares with 23.2 last month, 28.5 last year, and 31.9 the final of 1910.

The indicated corn crop was 2,621,000,000 bushels.

This compares with 2,956,455,000 last month, 2,897,708,000 last year, 2,954,063,000 August, 1909, and 3,125,713,000 the final of 1910.

The indicated spring wheat crop was 209,646,000 bushels.

This compares with 244,933,000 bushels last month, 199,394,000 last year, 270,348,000 August, 1909, and 233,399,000 the final of 1910.

The estimated oats crop was 817,800,000 bushels.

This compares with 817,800,000 last month, 979,830,000 last year and 1,126,765,000 the final of 1910.

Indicated yield per acre of winter and spring wheat combined was 12.8 bushels.

The indicated total wheat crop, spring and winter, was 664,795,000 bushels.

This compares with 702,891,000 last month, 657,688,000 last year, 703,268,000 August, 1909, and 695,443,000 the final of 1910.

Indicated barley crop was 140,056,000 bushels.

Indicated rye crop, 31,216,000 bushels.

Indicated yield of barley per acre, 19.8 bushels.

The condition of hay was 68.6, against a ten-year average of 87.1.

Eggs of Alligators?

The local freight traffic officers of the Southern Pacific had to buckle down and solve a problem that was as hazy as some of the reputed answers of the Oracle at Delphi, when William E. Voekel & Sons announced that they had twenty-one crates of live alligators, two boxes of alligator eggs and one box of Louisiana bullfrogs to ship to the California alligator farm at Los Angeles, Cal.

The problem arose when a careful searching of the tariff sheet revealed the fact that there was no specific rate on either reptiles, saurians or batrachians. The shipment was charged the rate of live animals not otherwise specified.

The rate on tigers and lions, elephants and hippopotami, not to mention bears and wolves, is $3 per 100 lbs., so the alligators had to pay $9 per 100 lbs., or walk and swim the distance to the 'gator farm. The frogs had to content themselves with the same classing.

The alligator eggs were easy in the billing, but whether they will reach their destination in the same category is doubtful. The eggs went in the classification covering the general egg family, but, as the question presented itself in the Southern Pacific freight office, should they hatch en route that classification could not apply.

Should this contingency arise it might be a cause celebre for the Interstate Commerce Commission to figure out.—(New Orleans) *Daily Picayune*

The Beam in the Shipper's Eye.

It is noteworthy that very few shippers appeared before the commission in person. This has aroused the suspicion of a fear that while claiming the railroads are reaping undue returns they might have been cross-examined as to the amount of their own profits. In these days of great industrial and commercial corporations the line of distinction between public or quasi-public and private enterprise would seem to be different from that of the long past generations when industry and commerce were conducted by the individual artisan and the individual merchant for whose benefit highways had to be provided and of necessity at the public expense. That the people should be fed and clothed and provided with shelter is certainly a public necessity. Now that these necessities are largely provided by great corporations it is not an exaggeration to say that they are performing a public service, that their functions are of a public nature, and therefore that they should be regulated if the railroads are to be regulated

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF JUNE, 1911. (SEE ALSO ISSUE OF AUGUST 4.)

Name of road.	Mileage operated at end of period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or dec.) comp. with last year.
		Freight.	Passenger.	Total, inc. misc.	Maintenance: Way and structures.	Maintenance: Of equipment.	Traffic.	Transportation.	General.	Total.					
Alabama & Vicksburg	142	$70,971	$40,352	$120,960	$18,859	$34,345	$3,241	$42,824	$4,774	$104,043	$16,917	$138	$4,685	$12,370	$25,049
Arizona Eastern	354[1]	103,028	33,392	144,958	14,467	13,237	2,239	40,179	5,074	75,196	69,762	102	4,174	65,690	66,045
Atchison, Topeka & Santa Fe	7,549[2]	4,532,789	1,946,861	6,991,455	1,117,642	817,036	208,706	2,090,039	186,986	4,420,409	2,571,046	.....	203,156	2,367,890	205,460
Atlantic Coast Line	4,498	1,556,244	568,135	2,332,123	270,265	364,393	43,055	922,723	77,860	1,678,296	658,827	.....	171,247	482,580	—84,249
Baltimore & Ohio	4,434[1]	5,720,123	1,289,891	7,461,709	1,057,732	1,310,971	156,362	2,516,972	157,742	5,199,979	2,261,730	26,109	210,752	2,024,869	271,542
Baltimore & Ohio Chicago Terminal	77	.....	2,837	117,210	29,565	17,785	585	49,151	3,460	100,546	16,664	764	18,206	778	.....
Bangor & Aroostook	627[1]	2,090,038	52,449	277,046	29,400	29,115	4,496	72,024	11,571	146,606	130,440	.....	20,117	110,323	37,130
Charleston & Western Carolina	340	101,425	26,782	136,080	CR.602	21,380	2,819	35,669	4,493	63,760	72,320	.....	10,864	61,456	34,619
Chicago Great Western	1,495	702,269	255,829	1,037,937	176,954	159,628	50,059	371,665	33,183	791,489	246,448	—540	17,866	228,042	53,261
Chicago, Indiana & Southern	329	263,843	21,369	292,522	47,106	55,876	7,534	105,886	8,357	224,762	67,760	—489	13,900	53,371	33,503
Chicago, Milwaukee & Puget Sound	2,020[5]	978,019	238,650	1,263,851	40,254	93,398	35,899	476,370	18,441	664,362	599,489	11,689	50,307	560,871	53,609
Chicago, Milwaukee & St. Paul	7,511	3,371,584	1,280,695	5,182,262	518,472	543,391	104,123	1,999,965	100,711	3,266,662	1,915,600	26,940	226,616	1,715,924	179,139
Chicago, Rock Island & Gulf	470	198,292	48,886	262,027	27,443	22,363	10,259	72,627	8,787	141,479	120,548	74	9,501	110,973	21,491
Chicago, Rock Island & Pacific	7,551[6]	3,121,832	1,679,557	5,878,372	707,900	691,719	154,156	1,891,056	140,243	3,585,074	2,293,298	—9,331	206,962	2,077,005	167,358
Cleveland, Cincinnati, Chicago & St. Louis	1,978	1,521,824	703,712	2,449,289	271,163	410,509	59,102	967,451	62,255	1,770,480	678,809	—3,749	80,000	595,060	211,355
Colorado & Southern	1,196[7]	431,034	132,482	597,410	58,133	106,981	11,094	179,149	22,678	378,035	219,375	—2,792	20,545	196,037	31,955
Delaware, Lackawanna & Western	930	2,330,887	671,270	3,210,003	474,426	503,003	85,041	869,214	62,128	1,993,812	1,216,191	35,726	143,500	1,108,417	—167,564
Denver & Rio Grande	2,566	1,373,089	444,867	1,897,633	203,273	322,656	55,635	616,025	51,872	1,249,461	648,172	2,698	71,421	579,449	—121,968
Denver, Northern & Pacific	214	53,410	34,539	92,153	14,824	16,796	4,839	26,785	2,732	65,976	26,177	.....	3,184	22,993	3,854
Detroit & Mackinac	360	60,652	26,215	92,632	20,726	16,777	2,135	30,013	2,744	72,395	20,237	—1,857	8,100	10,280	—10,148
Detroit, Toledo & Ironton	441	92,243	11,430	114,137	64,709	16,947	2,547	60,745	5,733	150,681	36,544	—45	16,502	53,091	—64,954
Duluth, South Shore & Atlantic	611	185,366	93,745	295,698	63,412	35,794	9,066	100,735	7,003	216,010	79,688	1,422	19,308	61,802	—19,723
El Paso & Southwestern Co	901	446,556	87,305	561,348	68,889	79,519	12,420	153,112	24,229	338,169	223,179	—4,575	21,076	197,528	.....
Florida East Coast	583	160,241	82,146	286,270	41,820	53,294	5,093	99,225	18,685	218,117	68,153	—9	15,500	52,644	—15,769
Galveston, Harrisburg & San Antonio	1,338	544,602	258,150	849,087	109,923	100,895	31,713	302,829	41,684	587,044	262,043	—6,143	38,633	217,267	—51,145
Georgia	307	125,382	69,343	209,951	8,360	40,639	11,150	101,461	7,126	168,736	41,215	.....	2,100	39,115	115,678
Great Northern	7,344[8]	3,894,422	1,296,206	5,537,324	1,126,445	536,995	97,051	1,432,814	102,888	3,296,193	2,241,131	35,345	274,265	2,002,210	588,099
Gulf, Colorado & Santa Fe	1,537[9]	527,925	254,049	833,578	95,375	96,495	23,968	402,888	39,674	658,400	175,178	.....	42,059	133,119	—26,442
Houston & Texas Central	789	264,467	154,214	453,049	79,897	38,922	18,730	190,522	22,426	350,497	102,552	—1,357	17,816	83,379	29,744
Houston East & West Texas	190	56,316	31,107	93,696	14,619	8,702	1,875	27,768	3,687	56,651	37,045	.....	3,320	33,725	5,046
Indiana Harbor Belt	108	.....	.....	205,642	28,399	22,877	2,871	90,979	5,911	151,037	54,605	3,158	5,500	52,263	50,967
Iowa Central	558	217,253	45,993	276,341	36,146	52,505	10,644	114,039	8,033	221,367	54,974	.....	9,619	45,355	—6,999
Kanawha & Michigan	175	240,519	28,681	275,417	52,108	44,014	2,108	75,996	5,242	179,468	95,949	—17	10,961	84,971	—4,121
Lake Erie & Western	886	309,962	73,674	406,620	76,587	88,703	11,920	166,808	11,958	355,976	50,644	.....	19,868	30,776	—40,223
Lake Shore & Michigan Southern	1,662	2,458,332	1,003,768	3,951,967	721,228	588,221	46,734	1,256,017	84,612	2,696,812	1,255,155	1,412	135,000	1,121,567	75,053
Louisiana & Arkansas	255	74,777	19,001	98,318	18,217	19,655	2,526	27,370	4,455	72,123	26,195	.....	3,150	23,045	—18,259
Louisiana Railway & Navigation Co.	350[10]	108,112	22,105	139,754	9,026	5,942	6,040	60,295	5,719	87,022	52,032	.....	3,547	49,185	5,744
Louisiana Western	207	94,817	53,858	157,196	78,065	25,131	7,339	48,486	8,384	167,405	—10,209	740	6,124	—15,593	—67,202
Louisville, Henderson & St. Louis	199	56,317	33,289	95,655	19,855	11,974	4,301	35,319	2,698	74,147	21,508	379	8,684	13,244	1,390
Maine Central	931	500,400	278,107	834,666	122,319	106,521	6,613	280,131	22,697	538,281	296,385	4,687	60,086	240,986	183,618
Michigan Central	1,804[11]	1,475,293	665,194	2,394,785	241,976	318,425	23,663	923,844	47,013	1,554,921	839,864	311	110,000	730,175	.....
Minneapolis & St. Louis	1,027	249,740	115,121	392,888	CR.3,309	63,930	6,250	154,440	12,902	234,213	158,675	45	18,977	139,743	25,701
Missouri, Kansas & Texas of Texas	1,348	334,149	310,065	703,781	100,592	92,058	23,144	374,473	27,765	618,032	85,749	—3,170	22,500	60,079	—5,824
Mobile & Ohio	1,114	668,480	106,263	931,077	92,522	144,114	31,857	327,575	35,205	631,273	299,804	339	24,565	275,578	10,822
Morgan's Louis. & Tex R. R. & S. S. Co.	404[12]	220,544	99,139	339,153	83,276	35,289	13,349	141,211	14,776	287,901	51,252	—3,476	18,410	29,366	49,864
New Orleans & Northeastern	195	188,931	49,542	257,786	29,038	52,048	9,936	98,698	8,434	198,151	59,635	456	9,840	50,251	24,652
New York Central & Hudson River	3,591	4,911,952	2,891,135	8,748,955	1,233,428	1,552,306	125,085	3,068,755	247,294	6,226,868	2,522,087	23,597	414,651	2,131,033	298,038
New York, Ontario & Western	545	632,071	132,571	798,236	89,782	135,950	5,831	272,039	18,895	522,497	275,739	497	19,990	256,246	7,514
Oregon Short Line	1,646[13]	1,099,783	425,740	1,619,292	203,091	131,756	34,649	351,217	37,542	758,255	861,037	1,591	81,405	778,041	3,885
Oregon Washington R. R. & Nav. Co.	1,856	849,345	461,955	1,399,204	119,619	116,494	51,177	492,805	42,874	822,969	576,235	5,191	39,516	531,528	.....
Peoria & Eastern	351	166,939	55,478	242,211	49,136	42,325	4,877	103,914	6,320	206,572	35,639	.....	9,500	26,139	23,998
Pecos & Northern Texas	296[14]	96,162	36,985	140,382	23,222	14,126	2,679	40,273	4,761	84,061	56,321	.....	2,547	53,774	5,491
Pittsburgh & Lake Erie	215[15]	1,159,934	122,284	1,322,451	155,235	151,217	18,861	309,024	23,176	637,513	664,938	279	30,000	634,659	272,904
Pittsburgh, Cincinnati, Chicago & St. Louis	1,467	2,054,123	696,303	3,100,001	342,594	579,613	67,593	1,079,253	64,437	2,133,490	966,511	—834	128,898	836,779	370,103
St. Joseph & Grand Island	319	80,791	38,135	129,507	26,017	18,808	6,273	52,775	7,304	111,177	18,330	.....	5,711	12,619	27,140
St. Louis, San Francisco & Texas	243	58,511	25,167	95,283	31,281	9,672	3,180	41,606	3,913	89,652	5,631	.....	1,360	4,271	18,848
St. Louis, Brownsville & Mexico	509[16]	102,772	48,347	168,097	56,254	9,944	2,764	55,315	7,384	131,661	36,436	.....	5,691	30,745	9,790
St. Louis Southwestern	796[17]	375,934	106,586	508,928	39,216	72,071	24,916	142,166	22,177	300,546	208,382	683	22,058	185,641	3,579
Santa Fe, Prescott & Phoenix	364[18]	100,455	33,976	141,726	23,223	8,123	2,879	43,209	5,475	82,909	58,817	.....	26,000	32,817	—23,767
Southern Kansas of Texas	125	78,557	13,419	96,078	9,014	11,065	2,601	35,914	4,406	63,000	33,078	.....	1,973	31,105	19,776
Sunset	56	82,031	17,824	103,643	7,328	1,319	26	23,587	173	32,443	71,210	.....	2,044	69,166	8,509
Syracuse, Binghamton & N. Y.	80	51,636	30,273	93,602	12,401	5,978	3,494	27,933	1,924	51,730	41,872	.....	6,220	35,652	1,568
Tennessee Central	293	86,978	31,651	125,475	17,067	10,228	5,022	50,666	7,351	90,334	35,141	.....	5,431	29,710	—21,227
Texas & New Orleans	451	207,493	88,392	313,829	59,204	52,962	8,064	126,236	9,707	256,176	57,653	—166	12,147	45,340	—24,138
Texas & Pacific	1,884	670,548	336,772	1,072,711	158,669	231,877	22,874	501,504	47,821	962,745	109,966	218	38,261	71,923	—55,529
Toledo & Ohio Central	444	340,261	54,956	425,684	88,092	59,673	7,632	139,210	8,169	302,776	122,908	—1,063	21,508	100,337	75,967
Trinity & Brazos Valley	462	62,247	35,175	103,818	31,290	14,364	8,982	64,749	10,288	129,673	—25,855	.....	3,500	—29,355	34,997
Union Pacific	3,472[19]	2,643,643	963,364	3,951,488	604,602	323,973	126,167	993,448	97,882	2,146,072	1,805,416	2,298	154,937	1,652,777	—327,155
Union (of Balto.)	9	105,095	19,992	127,210	13,613	.....	988	5,479	2,538	22,618	104,592	.....	5,125	99,467	2,655
Union (of Penna.)	31	.....	.....	398,875	23,851	91,582	111	109,703	3,473	228,720	165,155	1,963	3,250	163,868	.....
Virginia	827	502,752	198,471	796,285	133,611	140,418	26,242	301,327	18,415	620,013	176,272	.....	27,401	148,871	—27,804
Wabash, Shreveport & Pacific	171	53,389	37,230	99,579	24,178	27,710	2,767	33,439	3,813	91,907	7,672	—194	6,454	1,024	—20,852
Wabash	2,514	1,555,913	643,437	2,502,646	348,852	414,323	75,652	1,049,594	73,473	1,961,894	540,752	—2,788	79,891	458,073	—85,492
Virginia & Southwestern	240	115,902	12,125	131,830	15,494	25,109	1,837	32,583	4,243	79,266	52,564	.....	4,328	48,236	31,076
Wheeling & Lake Erie	457	507,248	50,470	590,295	60,633	98,449	7,861	184,859	13,961	365,763	224,532	1,130	20,903	204,759	—31,164

REVENUES AND EXPENSES OF RAILWAYS.

YEAR ENDED JUNE 30, 1911.

Name of road.	Mileage operated at close of year.	Operating revenues: Freight.	Passenger.	Total, incl. misc.	Operating expenses: Maintenance: Way and structures.	Of equipment.	Traffic.	Transportation.	General.	Total.	Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or dec.) comp. with last year.

If the rates of the one are to be limited, why not the prices of the other? If the rates of the one are to be limited, in order that profits may be but moderate, why should not the prices of the other be limited in order that their profits may likewise be moderate? If the era of paternalism in which we have taken a long step is to endure there should not be distinction between Peter and Paul.—*L. E. Johnson,* before the Southern Shoe Wholesalers' Association.

INTERSTATE COMMERCE COMMISSION.

The commission has decided to make a general investigation of allowances made to short line railways serving iron industries, particularly in Ohio.

The commission has announced that, beginning at Oklahoma City, September 11, a general investigation will be made into freight rates on live stock and fresh meat from the Southwest to Chicago. Over 150 roads have been notified to appear. Hearings will be held in other places.

The commission has suspended until November 25 the new tariff supplement of the San Pedro, Los Angeles & Salt Lake, in which about 500 other companies participate, which prescribes the rules under which fruit will be taken for pre-cooling. Among other things the new tariff provides that when shippers instruct that commodities loaded in cars, tanks of which contain ice, are not pre-iced in transit, the full refrigeration charges published shall apply. The privilege heretofore which the shippers had of pre-icing carload shipments of citrus fruits is withdrawn, and the railways exercise the exclusive right of furnishing and billing all icing and refrigeration of citrus fruits in all cases where the shipper does not specifically direct that the shipment shall move under ventilation solely.

The Commission has suspended until December 30 proposed advances in class freight rates between the Mississippi and Missouri rivers, which were to have become effective on October 28, 1911. The suspension affects also the proportions of through rates from the Atlantic Seaboard. The increases proposed average about 9 cents per 100 lbs. (first class). The rates in question are substantially the same as those complained of in the Burnham-Hanna-Munger case in 1908. The commission issued an order in that proceeding reducing the rates on first-class freight from 60 to 51 cents, and making proportionate reductions on freight of other classes. The roads contested the order, which was effective for two years from November 10, 1908. In October, 1910, the United States Supreme Court sustained the commission's order and the lower rates were made effective immediately. They continued in effect only fourteen days, when, on the expiration of the two years' life of the order, the roads again advanced them. The advances were suspended and the case will be heard probably early in the approaching autumn.

STATE COMMISSIONS.

The Nebraska state railway commission has issued a call to the commissioners of 13 other states to attend a conference to be held in Lincoln, August 28, when methods of obtaining physical valuation of railway properties will be discussed.

The Oklahoma Corporation Commission has issued, tentatively, a tariff fixing freight rates on brick, stone and other building materials and will hold a hearing August 12. This action of the commission is taken to establish rates in place of those recently enjoined and set aside by the Federal court.

COURT NEWS.

In the Federal court at Portland, Ore., July 31, Judge Wolverton declared that section 27 of the new Oregon railway law was invalid as containing unconstitutional requirements affecting interstate traffic. This section requires adequate interchange facilities and has a clause to regulate charges for switching.

A Michigan court has granted a temporary injunction against the enforcement of the law of that state limiting passenger rates in the Upper Peninsula to 2 cents a mile. The application was made by the Duluth, South Shore & Atlantic. The law was to have gone into effect August 2. Argument for a permanent injunction will be heard September 26, and until then the present rate of 3 cents a mile will continue in force.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

R. S. Marshall has been appointed assistant to the vice-president and general manager of the Minneapolis & St. Louis and the Iowa Central, with office at Minneapolis, Minn.

A. H. Mansfield has been appointed assistant general claim agent of the Missouri Pacific, with headquarters at St. Louis, Mo., to succeed C. Hoeppner, who has been appointed assistant attorney, with office at St. Louis.

W. W. Cumberworth, chief clerk in the auditing department of the Lake Erie & Western at Indianapolis, Ind., has been appointed auditor of freight accounts, with headquarters at Indianapolis, to succeed A. W. Wilmington, resigned.

Operating Officers.

A. A. Gist has been appointed trainmaster of the Atchison, Topeka & Santa Fe, with headquarters at Arkansas City, Kan.

H. H. Ober, trainmaster of the Chicago, Milwaukee & St. Paul at Wausau, Wis., has been appointed superintendent of the Wisconsin Valley division, with headquarters at Wausau.

H. C. Owen has been appointed trainmaster of the Northern Railway Company (Costa Rica), with office at Limon, Costa Rica, succeeding A. Curotte, resigned to go to another company.

J. B. Austin, Jr., engineer maintenance of way of the Long Island Railroad, at Jamaica, N. Y., has been appointed superintendent, with office at Long Island City, succeeding F. Hartenstein, resigned.

F. R. Bolles has been appointed assistant general manager of the Copper Range, with headquarters at Houghton, Mich. A. E. Ehlers, trainmaster at Houghton, has been appointed assistant superintendent, and G. T. Hartman, assistant trainmaster, has been appointed assistant superintendent, both with headquarters at Houghton.

N. J. Groves, assistant superintendent of the Missouri & North Arkansas at Leslie, Ark., has been appointed superintendent, in charge of transportation, with headquarters at Leslie. The positions of assistant superintendent at Searcy, Ark., in charge of maintenance, and assistant superintendent at Leslie in charge of transportation, have been abolished.

J. M. Chandler, car accountant of the St. Louis, San Francisco & Texas and the Fort Worth & Rio Grande at Fort Worth, Tex., has been appointed trainmaster, with office at Fort Worth, succeeding F. B. Parker, resigned to engage in other business. G. A. Chandler, chief clerk in the office of the vice-president, succeeds J. M. Chandler as car accountant.

F. E. Williamson, assistant superintendent of the Mohawk division of the New York Central & Hudson River, at Albany, N. Y., has been appointed acting superintendent of the St. Lawrence division, with office at Watertown, succeeding to the duties of Cornelius Christie, granted leave of absence on account of ill health. D. B. Fleming, assistant superintendent at New York, has been appointed acting assistant superintendent of the Mohawk division, with office at Albany, succeeding Mr. Williamson. T. W. Crowley, trainmaster at Dover Plains, N. Y., has been appointed acting assistant superintendent, at New York, succeeding Mr. Fleming. O. O'Connor, train despatcher on the Harlem division, has been appointed acting trainmaster, succeeding Mr. Crowley.

George W. Berry, superintendent of the Wisconsin division of the Illinois Central at Freeport, Ill., has been appointed terminal superintendent, with office at Chicago, with jurisdiction between South Water street and Matteson and between Twelfth street and Parkway. The jurisdiction of the superintendent of freight terminals and that of the superintendent of passenger terminals at Chicago has been extended to cover the same territory and they will report to the terminal superintendent. John F. Dignan, trainmaster at Freeport, succeeds Mr. Berry. Abner Bernard has been appointed trainmaster, with jurisdiction over passenger and freight service between Sixty-third street, Chicago,

and Matteson; and Fred Ehertsman has been appointed trainmaster at Chicago, with jurisdiction over passenger and freight service between South Water street and Sixty-third street and between Twelfth street and Parkway, including the St. Charles Air Line. W. E. Briggs, special agent on the St. Louis division, has been transferred to the Wisconsin division. George McCowan suceeds Mr. Briggs.

Traffic Officers.

F. A. Pontius has been chosen assistant manager of the Chicago Demurrage Bureau.

H. S. Humphreys has been appointed a commercial agent of the Rock Island Lines, with office at Enid, Okla.

D. E. Gilbert has been appointed contracting freight agent of the Wabash Railroad, with office at Pittsburg, Pa.

H. A. Noble has been appointed general pasenger agent of the Great Northern, with headquarters at St. Paul, Minn., succeeding S. J. Ellison, resigned.

C. H. Jenson has been appointed traveling freight agent of the Chicago Great Western, with headquarters at Red Wing, Minn., succeeding A. D. Beals, resigned.

W. E. Davidson has been appointed general agent of the St. Louis, Iron Mountain & Southern, with office at Monroe, La., to succeed R. T. Varner, resigned.

L. P. Harris, chief clerk in the advertising department of the S. Louis & San Francisco, has been appointed city passenger agent, with office at Cincinnati, O., in place of E. Z. Giblon, resigned.

E. B. Rock, Jr., traveling freight agent of the Seaboard Air Line, at Cordele, Ga., has been transferred to Atlanta, succeeding P. S. Burney, Jr., resigned. C. E. Felton succeeds Mr. Rock, with office at Cordele.

O. C. Stein has been appointed contracting freight agent of the Illinois Central, with office at New Orleans, La., succeeding J. M. Counsins, resigned to become commercial agent of the Missouri & North Arkansas.

Edward J. Platt has been appointed traveling freight agent of the St. Louis & San Francisco, with headquarters at San Antonio, Tex., succeeding J. T. Brooks. T. J. Bryan has been appointed soliciting freight agent at San Antonio.

G. L. Edwards has been appointed a commercial agent of the Missouri & North Arkansas, and A. L. Dewey has been appointed a traveling freight agent, both with offices at Memphis, Tenn. The traffic office at Memphis is a new one.

F. R. Bolles, general freight and passenger agent of the Copper Range, has been appointed traffic manager, with office at Houghton, Mich., and C. W. Marquardt, contracting agent at Houghton, has been appointed assistant general freight and passenger agent, with headquarters at Houghton. George Williams, [illegible] and passenger agent, with office at Calumet, Mich., has been appointed general agent, with headquarters at Calumet.

George B. Haynes, whose appointment as assistant general passenger agent of the Chicago, Milwaukee & St. Paul, was announced in the issue of July 21, was born at Ainswort, Iowa, on August 22, 1871. He graduated from the Omaha (Neb.) high school in 1890, and entered railway service in March, 1891, with the Union Pacific. On December 28, 1892, [illegible] Chicago, Milwaukee & St. Paul, [illegible] in the office of the general passenger agent at Omaha, Neb., and was promoted to ticket agent at Omaha June 1, 1893, and made [illegible] agent in 1897. He was appointed traveling passenger agent, with headquarters at Chicago, June 1, 1903, and, [illegible] October 1, 1906, when he was made general passenger agent, which office he held until his recent appointment as [illegible] general passenger agent, with office at Omaha.

Engineering and Rolling Stock Officers.

[illegible] has been appointed [illegible] of the Northern division of the Northern Railway Company (Costa Rica), with office at [illegible], succeeding C. Cartens, resigned.

F. G. Colwell has been appointed master mechanic of the Buffalo division of the Delaware, Lackawanna & Western, with office at East Buffalo, N. Y., succeeding B. H. Hawkins, resigned.

D. W. Cross has been appointed acting master mechanic of the Toledo, St. Louis & Western, with headquarters at Frankfort, Ind., to succeed M. Marea, resigned to accept service with another company.

The title of W. B. Redgrave, division engineer of the Staten Island Rapid Transit Railway and the Staten Island Railway Co., at St. George, Staten Island, N. Y., has been changed to engineer of maintenance of way.

J. L. McDonald, general foreman of bridges and buildings of the Missouri, Kansas & Texas at Denison, Tex., has been appointed superintendent of bridges and buildings of the Texas Lines, succeeding F. W. Baily, resigned.

H. E. Hale, principal assistant engineer of the Missouri Pacific, with headquarters at St. Louis, Mo., has been appointed engineer of maintenance of way of the Southern district, with office at Little Rock, Ark., succeeding E. J. Correll, resigned.

E. M. Weaver, signal engineer of the Long Island Railroad, at Jamaica, N. Y., has been appointed engineer maintenance of way, succeeding J. B. Austin, Jr., who has been transferred to the operating department. The office of signal engineer has been abolished.

F. J. Allen, resident engineer of the Missouri & North Arkansas at Eureka Springs, Ark., has been appointed engineer of maintenance of way, in charge of tracks, bridges, buildings, right of way and water service, with headquarters at Eureka Springs, and his former position has been abolished.

H. Marsh, for seven years general car foreman of the Baltimore & Ohio Southwestern at Washington, Ind., has been appointed general car foreman of the Iowa Central, with headquarters at Marshalltown, Ia., succeeding W. E. Looney, resigned. W. W. Calder succeeds Mr. Marsh, with office at Washington.

F. C. Moeller has been appointed night roundhouse foreman of the Rock Island Lines at Silvis, Ill., in place of J. Fitzgerald, who has been appointed machine foreman at the Forty-seventh street shops, Chicago, succeeding George Stone, promoted. W. O. Morton has been appointed night roundhouse foreman at Burr Oak, Ill., succeeding William Glenn, promoted.

W. O. Thompson, master car builder of the New York Central & Hudson River, at East Buffalo, N. Y., has had his authority extended and is now in charge of the territory west of Syracuse, including the St. Lawrence, Ontario and Pennsylvania divisions, and G. E. Carson, master car builder, at West Albany, has had his authority extended and is now in charge of the territory east of Syracuse, including the Hudson, Harlem and Putnam divisions.

P. H. Reeves, motive power inspector of the Baltimore & Ohio Southwestern at Cincinnati, Ohio, has been appointed master mechanic, with office at Chillicothe, Ohio, succeeding George F. Hess, resigned to become superintendent of machinery of the Kansas City Southern. N. S. Brooks has been appointed general foreman of the Baltimore & Ohio Southwestern, with headquarters at Storrs, Cincinnati, succeeding W. F. Hayes, resigned on account of ill health.

W. V. Betts, supervisor of Division No. 1 of the Philadelphia, Baltimore & Washington, at Clayton, Del., has been appointed supervisor of Subdivision No. 15, Buffalo & Allegheny Valley division of the Pennsylvania Railroad, with office at Reynoldsville, Pa., succeeding M. C. Phalen, assigned to other duties. H. D. Stowe succeeds Mr. Betts. W. E. Dunbar, assistant supervisor of the Northern Central, at York, Pa., has been appointed assistant supervisor of Division No. 3, of the Philadelphia division of the Pennsylvania Railroad, with office at Lancaster, succeeding Porter Allen, promoted, and C. M. Hursh, assistant supervisor of the Northern Central, at South Port, N. Y., has been appointed assistant supervisor of Division No. 2, of the Altoona division, with office at Osceola Mills, succeeding R. P. Koons, promoted. H. M. Grimm has been appointed assistant supervisor of the Northern Central, at York, Pa., succeeding Mr.

Dunbar, and C. W. Barwis has been appointed assistant supervisor at South Port, N. Y., succeeding Mr. Hursh.

George F. Hess, whose appointment as superintendent of machinery of the Kansas City Southern and Arkansas Western was announced in our issue of last week, was born at Ft. Wayne, Ind., January 1, 1872, and was educated in the public schools. He entered railway service in March, 1886, as office boy in the master mechanic's office of the Pennsylvania Company at Ft. Wayne. After serving as machinist apprentice from March, 1887, to March, 1891, he worked as machinist for various roads until July, 1897, when he was made roundhouse foreman of the Wabash at Montpelier, Ind., being transferred to Delray, Mich., in a similar position, in May, 1898, where he remained a year. He was subsequently general foreman of the Grand Trunk at Detroit, Mich., and in March, 1901, went to the Chicago, Rock Island & Pacific as roundhouse foreman at Pratt, Kan. In July, 1901, he was transferred to Caldwell, Kan., as roundhouse foreman, and one year later was made machine shop foreman at Chicago. He was appointed general foreman of the Baltimore & Ohio at South Chicago, Ill., in April, 1903, and was promoted to master mechanic at Lorain, Ohio, in June of that year, being transferred to Chillicothe, Ohio, as master mechanic in November, 1910. He held the latter position until his appointment as above mentioned. The headquarters of Mr. Hess will be at Pittsburg, Kan., instead of Kansas City, Mo., as stated in our issue of August 4.

Purchasing Officers.

D. B. Allan has been appointed assistant general storekeeper, in charge of the Omaha store, of the Union Pacific, with headquarters at Omaha, Neb. Mr. Allan's title has been assistant to general storekeeper.

OBITUARY.

John C. Cornell, formerly engaged on the construction of the Colorado & Wyoming, now part of the Chicago, Burlington & Quincy, died at his home in Denver, Colo., on August 4, at the age of 69 years.

Frank B. Williams, who was the first telegrapher employed by the Associated Press when that organization began operating its system of leased wires in 1886, died Tuesday night at his home in Louisville, Ky., after an illness of eight months. In Pittsburgh he handled the first message over the leased wire. Since 1886 he served the Associated Press at New Orleans and Louisville, latterly there as chief operator.

J. H. Conlen, during 1903 vice-president, chief engineer and general superintendent of the Chicago, Rock Island & Mexico, now part of the Rock Island System, was found dead in a room in the Roberts Banner building at El Paso, Tex., on August 4. He had been shot and the despatches indicate that he had been killed by his own hand. Mr. Conlen was superintendent of the Rock Island terminal elevation work in Chicago during 1908.

Nathaniel M. Osborne, resident assistant to the president of the Norfolk & Western, at Norfolk, Va., died at his home in Norfolk on July 31. Mr. Osborne was born February 6, 1842, at Petersburg. He began railway work on January 1, 1868, and has been in the service of the Norfolk & Western or its constituent companies ever since. In May, 1881 he was appointed secretary to the general manager of the Norfolk & Western Subsequently he was made superintendent of the Eastern division, and later was general agent at Norfolk.

Edward J. Swords, general eastern agent of the Chicago, Burlington & Quincy, with office in New York, died at his home in that city August 3. Mr. Swords was born in New York in 1842, and during the civil war he served as an engineer in the volunteer service of the United States army. He began railway work in July, 1870. He was appointed agent of the Chicago, Burlington & Quincy at New York, in October, 1876, and was later general western agent of the same road at Denver, Colo. From July, 1883 to September, 1887 he was general freight agent of the Kansas City, St. Joseph & Council Bluffs, and from May, 1884 to September, 1887 was also general freight agent of the Hannibal & St. Joseph, both Burlington properties. He had been general eastern agent since September, 1887

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Reid Newfoundland is building 8 locomotives at the company's shops at St. John's.

The Czarnikow-Rionda, New York, has ordered two switching locomotives from the American Locomotive Company. The dimensions of the cylinders will be 8 in. x 14 in.; diameter of the driving wheel will be 26 in. and the total weight in working order will be 25,000 lbs.

The American Railways of Porto Rico have ordered four compound consolidation locomotives from the American Locomotive Company. The dimensions of the cylinders will be 14 in. and 20 in. x 20 in.; daimeter of the driving wheel will be 37 in. and the total weight in working order will be 82,000 lbs.

CAR BUILDING.

The Reid Newfoundland is building 50 box cars, 3 sleeping cars, 3 coaches and 1 dining car at the company's shops at St. John's.

The Atlantic Coast Line has ordered 900 box and 100 flat cars from the Standard Steel Car Company. This road is now in the market for 17 baggage and 18 postal cars.

Swift & Co., Chicago, mentioned in the *Railway Age Gazette* of July 21 as being in the market for tank cars has ordered 50 such cars from the Pressed Steel Car Company.

The Missouri Pacific, mentioned in the *Railway Age Gazette* of July 7 as being in the market for 50 passenger cars, has ordered 15 baggage cars and 14 mail cars from the American Car & Foundry Company; and 11 chair cars, 8 coaches and 2 combination cars from the Pullman Company.

IRON AND STEEL.

The Central Railway of Havana has ordered 4,500 tons of rails from the Maryland Steel Co.

The Southern Pacific has ordered 200 tons of structural material for its new station at Oakland, Cal.

The New Orleans & Mobile has ordered 5,500 tons of rails from the Tennessee Coal Iron & Railroad Company.

The Southern Railway has ordered 21,000 tons of open-hearth rails from the Tennessee Coal, Iron & Railroad Company.

The Portland Railway, Light & Power Co., Portland, Ore., has ordered 600 tons of structural material for towers from Millikin Bros., Inc.

The Copper River & Northwestern has ordered 104 tons of structural material for tank construction at Katella, Alaska, from the Llewellyn Iron Works.

General Conditions in Steel.—The Steel Corporation has increased its operations to 77 per cent. of its capacity, but a slight falling off is looked for within a week. The monthly report of the corporation for July is expected to show an increase in both unfilled tonnage and in net earnings over June.

It is expected that by direction of the ministry of finance at Vienna, Austria, the provincial government will lay before the Diet in the autumn session a bill providing for a loan of some $20,000,000. The money will probably be used for various purposes—educational grants, provision for public works, including a diet house, a general post office, and law courts at Sarajevo, new barracks, etc., and perhaps $5,070,000 for railways. The lines to be then taken in hand will probably be those from Banjaluka to Jajce, the northernmost section of the proposed Banjaluka-Klek railway, from Brcka to Tuzla, part of the proposed Brcka-Sarajevo line, and from Novi to Bihac, all in the north of the Province.

Supply Trade News.

The Isthmian Canal Commission will receive bids until September 6 on miscellaneous supplies, including track bolts and screw spikes.

The American Steel Tie Company, Salt Lake City, Utah, has been incorporated with $1,000,000 capital stock to make steel ties with rail fixtures for use without bolts or spikes of any kind. Joseph R. Murdock is president, John T. Clark, vice president, and J. W. Musser, secretary and treasurer.

The Western Electric Company, Chicago, has recently put on the market for use in railway work a new dry battery. This new cell differs from the standard cell in that the cardboard carton has been treated with a special impregnating compound which prevents moisture from reaching the cell proper. This will give sufficient protection so that the life of the batteries used in outdoor work will be as great as that of the batteries used in any other magneto service under ordinary conditions.

Hildreth & Company, New York, and the Morgan T. Jones Company, Chicago, inspecting and supervising engineers, have formed a combination under the title of the Hildreth-Jones Company. Morgan T. Jones will be in full charge of the western district, with headquarters in Chicago. Mr. Hildreth has been in business as a consulting and inspecting engineer in New York since 1888. Morgan T. Jones was for upwards of ten years connected with R. W. Hunt & Company, Chicago, and later for nearly seven years was president of the American Bureau of Inspection & Tests, Chicago.

J. W. Motherwell, assistant to the vice-president of the Ashton Valve Company, Boston, Mass., has been made vice-president of that company and manager of the railway department. Mr. Motherwell was born in Lancaster, Ohio. After completing a public school course he entered as machinist and tool maker apprentice the Motherwell Iron & Steel Works, Lancaster, which was owned by his father and uncles. There he became foreman of the shops. Later he was connected with Fairbanks, Morse & Company for 12 years as a mechanical expert and railway representative. He left that firm seven years ago and since that time has been assistant to the late Vice-President Fred A. Casey, of the Ashton Company, whose recent death was mentioned in these columns. Mr. Motherwell had charge as chairman of the executive committee of the Railway Supply Men for the International Railway General Foremen's convention which met at the Hotel Sherman, Chicago, last month.

J. W. Motherwell.

The General Electric Company, Schenectady, N. Y., has received an order from the Delaware & Hudson for one 7500 k. w. turbine, one 100 k. w. turbo-exciter and four 2500 kva. transformers. This apparatus will give an increased power supply to the company's electric traction interests in Albany, N. Y., Troy and Schenectady, and will also furnish power for the company's new line to Watervliet. This company has also delivered one of the six gas-electric motor cars recently ordered by the Frisco Lines, to Brownsville, Tex., where it will be run between Brownsville and Mission. A second machine will run out of Dallas, Tex., and the Orange & Northwestern division of the Frisco Lines. The other four, as soon as completed, will be assigned to various points on the system where gasoline motor cars are in service.

An Illinois Central box car equipped with the Williams all-service car door made by the Williams All-Service Car Door Company, Clinton, Ill., was unloaded at the Keith elevator, Twenty-second and Halsted streets, Chicago, on Wednesday, August 2, in the presence of a number of railway and elevator representatives. Within 50 seconds of the time the car was stopped the wheat was pouring into the boot. The size of the opening in the door, however, was so large that the sink was soon overflowed and it was necessary to hold the doors partly shut to allow the hoisting apparatus to carry away the grain. It was about 10 minutes from the time the doors were open until the steam shovels were thrown in to push the unloading, but during that time the elevating machinery was working at full capacity to care for the grain delivered by gravity. The car had carried 51 tons of wheat for a long haul and had undergone considerable switching before it reached the elevator, but the doors were found to be in excellent condition.

Edwin M. Herr, whose selection to the presidency of the Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., has been mentioned in these columns, was born in Lancaster, Pa., May 3, 1860. In 1873 he moved to Denver, Colo. Upon completion of a common school course, he was given the position of telegraph operator on the Kansas Pacific, with which company he remained for two years. He was promoted from construction train service to the position of station agent. In 1881 he entered the Sheffield scientific school of Yale and graduated with the class of 1884. During this time he spent his two summer vacations working as an apprentice in the shops of the Pennsylvania at Altoona, Pa. From 1884 to 1885 he was apprentice at the West Milwaukee shops of the Chicago, Milwaukee & St. Paul. He then went to the Chicago, Burlington & Quincy as a draftsman in the mechanical engineer's office, and afterwards became assistant engineer of tests, and then engineer of tests at Aurora, Ill. From 1887 to 1889 he was superintendent of telegraphy, and from 1889 to 1890 was division superintendent of this road. From 1890 to 1892 he was division master mechanic of the Chicago, Milwaukee & St. Paul at West Milwaukee, Wis. From 1892 to 1894 he was superintendent of the Grant Locomotive Works, Chicago. From 1895 to 1896 he was superintendent of motive power and machinery of the Chicago & North Western, and from 1896 to 1898, held the same position with the Northern Pacific. On September 10, 1898, he became assistant general manager of the Westinghouse Air Brake Company, Pittsburgh, Pa., with office at Wilmerding, Pa. He was promoted to the position of general manager on November 1, 1899, which position he held until June 1, 1905, when he was elected first vice-president of the Westinghouse Electric & Manufacturing Company.

E. M. Herr.

The Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., has received an order from the St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo., for a partial equipment of 307 interpole railway motors. The Denver & Interurban Railway Company has placed an order with this company for a partial equipment of 300 B interpole railway motors with type K-35 control. The Hutchinson Interurban Railway Company of Kansas has ordered a double equipment of 92-A railway motors with type K 10-A control. The Birmingham Railway Light & Power Company has ordered a 1000 k. w. 60-cycle, self-starting rotary converter with the usual accompaniment of transformers, switchboard, gloves, etc. The Capitol Traction Company, Washington, D. C., has placed with the

Westinghouse company an order for two complete sub-station equipments—one covering a 1500 k. w., 25-cycle, self-starting, rotary converter with the necessary transformers and switchboards; and the other, a 1000 k. w., 25-cycle, self-starting, rotary converter with switchboards and transformers. The Chicago Railways Company has placed an order with this company for equipment for the extension of its La Salle street sub-station, including two 3000 k. w., 25-cycle, self-starting, rotary converters, with the necessary transformers, and a 10-panel switchboard. The Georgia Railway & Electric Company, Atlanta, Ga., has placed an order for a 1000 k. w., 60-cycle, self-starting, rotary converter with transformers and switching apparatus. The Interurban Railway Company, Des Moines, Ia., has placed an order for a 300 k. w., railway rotary converter. The Metropolitan Street Railway, Kansas City, Mo., has ordered a 3000 k. w., 25-cycle, self-starting, rotary converter with three 11,000 kva. air blast transformers and the necessary switching and glower apparatus.

TRADE PUBLICATIONS.

Northern Pacific.—This company has issued a small booklet called What Minnesota Wants to Tell You. The many industries, resources and attractions of this state are described in such a way as to tempt a prospective home seeker.

Denver & Rio Grande.—The passenger department of the Denver & Rio Grande has issued a pamphlet entitled Panoramic Views showing nine Rocky Mountain views in colors with descriptions of some of the most prominent places.

Tools.—The Pratt & Whitney Co., Hartford, Conn., has published catalog No. 6 of its small tools, including taps, dies, die stock sets, milling cutters, reamers, punches, twist drills, lathe tools, etc. The catalog contains about 250 pages, is well illustrated, and includes many tables and considerable useful data.

Locomotives.—The Vulcan Iron Works, Wilkes-Barre, Pa., has recently published a well-illustrated, 144-page, catalog of its locomotives of from 7 to 70 tons weight on drivers. This company, besides building for light road service aims to meet the varying needs of the contractor and of mining, steel and industrial plants. Illustrations are given of their different types with an accompanying table which gives the capacities of different sizes of that type. Suggestions are given as to the ordering of locomotives and the drawing up of their specifications. The last 36 pages contain valuable information in the shape of formulae and tables.

Valve Gear.—The Baldwin Locomotive Works, Philadelphia, Pa., recently issued record No. 70, describing the application and the method of setting Walscheart valve gear. Two illustrations show the arrangement of the gear for both outside and inside admission valves, and eight illustrations show its applications to different types of locomotives. The method of setting valves with this gear is described in detail. Both the outside and the inside admission piston valves and the outside admission slide valves are considered, with notes on the travel irregularities and the corrections to be made when the valve gear is found to be out of square. Under corrections, two hypothetical cases are considered for both the inside and outside admission valves. The discussion on valve setting is supplemented by many line drawings which make the subject matter clear. A few paragraphs at the end of the pamphlet are devoted to the handling of the Walscheart gear in the event of a break-down.

At a meeting of the Korean Railway Association held in Seoul, Mr. Oya, chief engineering expert in Korea, gave some important particulars as to the construction of railways in the peninsula. He said that the new line between Seoul and Gensan would be open to traffic from 1914, and the road from Mokpo to Tajon would be opened one year sooner, namely, 1913. The system of five lines—from Seoul to Gensan, from Mokpo to Tajon, from Seoul to Fusan, from Seoul to Wiju, and from Seoul to Chemulpo—would measure in all 985 miles. Finally the bridge across the Yalu would be open to traffic in the spring of next year. Mr. Oya alluded to the fact that this system of railways had not been planned with primary reference to local needs. He practically admitted that such was the case, and that the intention of the program had been rather to meet the demands of the world's traffic. He was convinced that events would establish the wisdom of this selection.

Railway Construction.

New Incorporations, Surveys, Etc.

Algoma Central & Hudson Bay.—A contract has been given to the Superior Construction Co., Ltd., Espanola, Ont., for building from Hobon, on the Canadian Pacific, to a point on the National Transcontinental, about 101 miles. Sub-contractors desiring to secure sections of this work should communicate immediately with the contractors at Espanola. (July 28, p. 198).

Atlantic Coast Line.—According to press reports, this company will build an extension from Monticello, Fla., to Perry, 30 miles.

Ballard & Thompson.—An officer writes that contracts are to be let at once to build from Thompson Springs, Utah, to Ballard. The line is to be built to carry coal. B. F. Bauer, Salt Lake City, may be addressed. (See Utah Roads, July 28, p. 199).

Baltimore & Ohio.—An officer writes that surveys have been made for improvements from Portsmouth, Ohio to Hamden, on the Southwestern division, but it has not been definitely decided what improvements are to be made.

Batesville Southwestern.—An officer writes that work is now under way by J. B. Lewis, Batesville, Miss., building from Batesville, on the Illinois Central, southwest. Track has been laid on about three miles. There will be one steel bridge. The line is being built to carry lumber, merchandise and farm products. C. H. Markham, president, and M. H. Baldwin, chief engineer, Chicago. R. J. Darnell, lessee, Memphis, Tenn.

Bellingham, Mt. Baker & Spokane Interurban.—An officer writes that the prospects of building this line are good. The company was organized in the state of Washington to build from Bellingham, Wash., southeast via Deming to Glacier, thence to the headwaters of the north fork of the Nooksack river. The line is eventually to be extended along the Skagit river and Slate creek to near Barron and down the Methow valley and river to Twisp, thence east via Silver, Methow and Pateros. The line will carry coal, cement and lime rock, timber and wheat. Joseph Morrison, president, and C. E. Wright, chief engineer, Bellingham.

Buffalo, Rochester & Pittsburgh.—See report of this company elsewhere in this issue.

Canadian Pacific.—An officer writes that contracts have been let to Palmer Brothers & Henning, Vancouver, B. C., to build the Cowichan Lake branch of the Esquimalt & Nanaimo, from Duncans, to Cowichan lake, 18 miles. The work will all be light earth work. Maximum grades will be 1.5 per cent. and maximum curvature 10 degrees. The line is being built to carry lumber. (July 21, p. 157).

An officer writes that a contract has been let to W. P. Tierney, Nelson, B. C., to build a spur from Three Forks to Lucky Jim Mine.

Location plans have been approved by the board of railway commissioners of Canada for a branch from Hamiota, Man., northwest to Birtle, 32.67 miles. A branch is to be built from Boissevain, Man., northwest to Lauder, about 40 miles, and location work is now under way for a branch from the present end of track, north of Virden northwest to McAuley, about 30 miles.

Track laying is under way from Imperial, Sask., southerly and it is expected to have the work finished to Craven, about 60 miles, early in September.

Grading work is now under way on a branch from Bassano, Alb. to the company's irrigation lands.

Cheat Haven & Brewster.—Incorporated with $75,000 capital to build from Cheat Haven, Pa., southeast to Albright, Preston county, W. Va., about 25 miles. The headquarters of the company are at Lee Ferry, W. Va.

Chicago, Milwaukee & Puget Sound.—A contract is said to have been given to the Bates & Rogers Co., at about $250,000, for building a double-track line at Spokane, Wash.

Chicago, Weatherford & Brazos Valley.—Financial arrangements have been made, it is said, for the completion of this line, now under construction from Weatherford, Tex., north to

Bridgeport, 30 miles. Rails have been bought and it is announced that as soon as the line is finished to Bridgeport work will be started on an extension from Weatherford, southwest to Lipan, 25 miles. F. B. Truax, chief engineer, Weatherford. (February 3, p. 257.)

Denver, Northwestern & Pacific.—According to press reports, work is to be resumed at once on the extension from Steamboat Springs, Colo., west towards Salt Lake City, Utah.

Eastern Maine.—This company has been incorporated in Maine for the purpose of utilizing the charter granted by the last Maine legislature for a standard gage steam or electric line, from tidewater at Brewer, Me., to Houlton, about 95 miles. The capital stock is $500,000. The route from Brewer is easterly about 12 miles, thence northeasterly towards Bancroft, thence north to Houlton. The line will open up timber lands. George W. Maxfield, president; F. O. Beal, treasurer, both of Bangor, and H. M. Heath, clerk, Augusta. The directors include: William H. Taylor, New York; H. P. Sargent, South Brewer, Me., and A. G. Chambers, Haynesville. (April 14, p. 907.)

El Paso & Southwestern.—The contract for building an extension of this road from Fairbanks, Ariz., to Tucson, 67 miles, has been let to the MacArthur Brothers Company, New York, and it is understood that construction work will be started as soon as the necessary equipment can be placed on the ground. The cost of the work will be about $3,000,000. (July 21, p. 158.)

Esquimalt & Nanaimo.—See Canadian Pacific.

Grand Trunk Pacific.—Train service on the Prairie division is now in operation from Edson, Alb., west to Hinton, 55.6 miles, and the Mountain division has been opened for business from Prince Rupert, B. C., northeast to Vanarsdol, 100.9 miles.

Idaho Northern Railway.—An officer writes that work is now under way by the Utah Construction Co., Ogden, Utah, on an extension from Emmett, Idaho, north along the Payette river to Smiths Ferry, 56.2 miles. The work is difficult and expensive. There will be four steel bridges and two important trestles. The line is being built to carry lumber, grain, hay, sheep and cattle. (June 2, p. 1296.)

Illinois Central.—An officer writes that the new work to be carried out near McComb, Miss., consists of grade reduction on 3.31 miles of double-track, for which contracts have been let. This work involves handling 79,000 cu. yds. of earth. (Apr. 21, p. 970).

Missouri, Oklahoma & Gulf.—An officer writes that a general contract has been let to the Hoffman Construction Co. to build an extension from a point near Henryetta, Okla., west probably via Okemah and Shawnee to Oklahoma City, about 102 miles. It is expected to begin the work, which will be heavy, in about two months. Maximum grades will be 0.6 per cent., and maximum curvature 4 degrees. Two locating parties are now working west from Henryetta and expect to finish the work by October 1. (June 23, p. 1674).

New York Subways.—The New York Public Service Commission, First district, has awarded the contract to the Oscar Deniels Company for work on contract No. 12 of the new subway, at a bid of $2,825,740, which was the lowest bid for this section. The contract covers the section from 106th street, Manhattan, under Lexington avenue to 118th street. Two stations are included, one at 110th street and one at 116th street. The award will be sent to the City Board of Estimate for approval. Work will be commenced at once on the section, also on the four sections already let to the Bradley Construction Company, the one section let to the Parsons-Peck Company, and one to the Metropolitan Contracting Company, of Boston. (July 7, p. 65.)

[illegible] & Western Iowa Electric.—An officer writes that the reconnoissance surveys for a 100-mile line have been made, the route being from Omaha, Neb., via Council Bluffs, Iowa, [illegible] the east side of the Missouri valley to Sioux City. It is estimated that the total cost of construction and equipment will be $3,000,000, including terminals. Preliminary work is now in progress, but no track has been laid as yet. The road will carry passengers, express and freight. Frank W. Bacon, president and treasurer; E. T. Hathaway, vice-president; Daniel G. Cary, secretary, and K. B. Ward, chief engineer, all with offices at Omaha, Neb. (November 4, p. 887.)

Pennsylvania Railroad.—The Pennsylvania, Monongahela & Southern has built an extension from a point north of the former Rice's Landing (Pa.) passenger station, to a point south of the new station, 0.33 miles, and this extension is now operated as a part of the Monongahela division.

Pennsylvania Roads (Electric).—Plans are being made by H. C. Allen of the Buffalo & Lake Erie Traction Co., it is said, to build an electric line from Erie, Pa., southeast to Corry, thence southwest to Cambridge Springs, 42 miles.

L. M. Smith, Pittsburgh, Pa., is said to be back of a project to build an electric line from Erie, Pa., via Corry, Cambridge Springs, Townville and the Sugar Creek valley to Franklin.

Richmond & Northern Neck.—An officer writes that preliminary surveys are expected to be finished during August for a line from Doswell, Va., easterly via Tappahannock, thence southeasterly crossing the Rappahannock river to a point on Chesapeake bay at or near Wicomico, about 70 miles. C. M. Ward, chief engineer, Tappahannock.

Rock Island, Texico, Farwell & Southern.—See Texas, New Mexico & Pacific.

Salt River Valley (Electric).—Incorporated in Arizona to build lines as follows: From Phoenix, Ariz. to Peoria, 15 miles; to Mesa, 18 miles; to Scottsdale, 11 miles. The estimated cost of the work is $600,000. F. M. Winter, J. K. Leck and W. S. Furman, are incorporators.

San Joaquin Valley Electric.—An offcer writes that work is now under way from Stockton, Cal., via French Camp, Manteca, Ripon and Salida to Modesto. A contract for some of the work has already been let. There is to be a 200 ft. reinforced concrete bridge, and a 1,500 ft. trestle. N. H. Colwell, Stockton, is the supervising engineer. (November 18, p. 986.)

Springfield & Northwestern Interurban.—This company recently completed its organization and has surveys made to build from Springfield, Ill., northwest to Petersburg, about 20 miles. Some of the right-of-way has been secured. The directors include: H. J. Tice, Greenview; R. Y. Kincaid, Athens; E. D. Keys, R. N. Baker, W. F. Workman, F. Reisch, Jr., and S. E. Prather, Springfield.

Texas, New Mexico & Pacific.—Incorporation will be asked for in Texas or New Mexico by this company, as successor to the Rock Island, Texico, Farwell & Southern. The company wants to hear from contractors and construction companies, to build from Tucumcari, N. Mex., southeast to Farwell, Tex., then south to Knowles, N. Mex., thence southeast via Midland, Tex., to Kerrville. Grading has been finished on 33 miles. The work will be light, maximum grades will not be over 1 per cent. The line is being built to carry coal and general products. M. J. Healy, president, Amarillo, Tex. (See Rock Island, Farwell & Gulf, June 30, p. 1714).

Tidewater & Southern (Electric).—This company, in addition to building a line from Stockton, Cal., south to Turlock, will build an extension, it is said, to Fresno. J. H. Wallace, president, Stockton. (May 5, p. 1085.)

Tombigbee Valley.—This road has been extended from Silas, Ala., to Souwilpa, four miles.

Union Pacific.—A new branch has been opened for business on the Colorado division, from Dent, Colo., northwest to Fort Collins, 68 miles.

Vera Cruz, Tabasco & Campeche.—Financial arrangements have been made with English capitalists for building this line from Santa Lucrecia, Mex., on the Vera Cruz & Isthmus, east to Campeche, on the United Railways of Yucatan, 470 miles. Grading work has been started at Santa Lucrecia and it is expected that when the rainy season is over work will be commenced also from Campeche. The entire route through the states of Oaxaca, Chiapas, Tabasco and Campeche will traverse a rich section of Mexico at present without railway facilities. Connection is to be made at the western end with the National Railways of Mexico. A concession to build this line was granted to Prim Wood, Mexico City, in May, 1910. David Coe, chief engineer, Mexico City. (April 7, p. 878.)

Western & Atlantic.—A proposition looking toward the extension of this road to tidewater was included in a report made

recently by the executive committee appointed to investigate that property. The plan suggested was to move the Chattanooga and Atlanta terminals of the road, rent the valuable land they now occupy and use the money thus realized to extend the road to the Atlantic coast. The road is now in operation from Chattanooga, Tenn., to Atlanta, Ga., 137 miles.

Wichita Falls & Northwestern.—See Wichita Falls Route.

Wichita Falls Route.—According to press reports, a contract has been given to W. H. Dennison, Lubbock, Tex., for work on a nine-mile section of the extension of the Wichita Falls & Northwestern, from Hammon, Okla., north towards Woodward. This work is north of the South Canadian river. A contract was recently let for work from Hammon to the river, and a third contract has been let to J. L. McSpadden, for some of the work between the river and Woodward. (July 28, p. 199.)

Yosemite Valley Railroad.—An officer writes that this company now has under construction spurs and sidings at Merced Falls, Cal., a Y at El Portal, and a passing track will be built during the fall at Pleasant Valley. These improvements are made necessary principally to handle the expected business from the Yosemite Lumber Co. An officer of the latter company writes that a grading contract has been given to L. J. Scooffy, San Francisco, for work on a logging line. The route is up an incline to the top of the mountain on the south side of the Merced river at an altitude of 3,100 ft., the length of the slope being about 8,000 ft. and maximum grade 80 per cent. From this point there will be a four-mile logging line built this year, to which extensions will be made as may be necessary for logging purposes. 40,000-lb. capacity standard gage flat cars, when loaded, will be lowered down the incline, one at a time, on a 1½-in. cable, while an empty car is being raised, and at the foot of the incline they will be delivered to the Yosemite Valley Railroad, and carried 54 miles over that road to Merced Falls, at which place the lumber company is now building a new sawmill to have a capacity of 150,000 ft. The work will be difficult owing to the steep grade of the incline, part of which will be through solid rock. Maximum grades on the logging road will be 4 per cent. compensated and 12 per cent. on spurs not compensated. G. H. Nickerson, chief engineer, El Portal.

RAILWAY STRUCTURES.

Barstow, Cal.—Plans are being made by the Atchison, Topeka & Santa Fe Coast Lines, it is said, for building a 44-stall concrete roundhouse at Barstow. The estimated cost of the work is $75,000.

Bellingham, Wash.—Plans have been approved by the board of public works for new freight sheds for the Northern Pacific at Bellingham.

Bloomington, Ind.—According to press reports, a contract has been given by the Chicago, Indianapolis & Louisville to the Chicago Construction Co., at $22,000, for putting up a new passenger station at Bloomington. A new freight house to cost $7,000 is to be built by the company's men.

Brandon, Man.—A contract has been given to the Brandon Construction Co. for putting up a new station for the Canadian Pacific at Brandon, the work is to be finished by February, 1912.

Chickasha, Okla.—A contract has been given to the Lisle-Dumind Construction Co., Oklahoma City, it is said, to build a steel and concrete station for the Oklahoma Central in Chickasha. The building will cost about $30,000. The foundation work is already under way.

Cordova, Alaska.—Plans have been made by the Copper River & Northwestern for a new station at Cordova.

Duluth, Minn.—According to press reports, contracts have been given by the Canadian Northern to John A. Johnson and Hugh Fawcett, Duluth, for putting up the 10-stall roundhouse and shop buildings at Duluth. Plans are now being made for a new passenger station at Virginia, which is to be a stone structure, two stories high, to cost between $20,000 and $25,000. (July 21, p. 159.)

Emmett, Idaho.—See Idaho Northern Railway under Railway Construction.

Fort Smith, Ark.—According to press reports, the Kansas City Southern has given a contract to T. T. Reddick, Fort Smith, for putting up the passenger station at Fort Smith, at his bid of $95,877. (August 4, p. 269.)

Gresham, Ore.—The Mount Hood Railway & Power Co. will build new car shops at Gresham, it is said, for which plans have been completed.

Jamaica, N. Y.—The New York Public Service Commission, First district, has granted the petition of the Long Island Railroad for a change in the location of the new station which is to be built on a site 1,790 ft. west of the present location. This is part of the general Jamaica improvement work being carried out by the Long Island Railroad, including shortening the main line and the elimination of curves and grade crossings. (Dec. 23, p. 1194).

Joliet, Ill.—The contract for building a union passenger station at Washington and Scott streets, Joliet, to cost about $250,000 has been let to Adam Groth & Co. of that city. The new station will be used by the Chicago, Rock Island & Pacific, The Atchison, Topeka & Santa Fe, the Chicago & Alton, and the Michigan Central. The grade separation work and the building of subways, described in the *Railway Age Gazette* of March 16, 1910, page 627, has been practically completed.

Kansas City, Mo.—The Kansas City Terminal Co. has awarded the contract, amounting to between $4,000,000 and $5,000,000, for building the Kansas City Union Station, to the George A. Fuller Construction Co., Chicago.

Los Angeles, Cal.—Plans are being made for putting up a 10-story office and terminal building at 12th and Main streets in Los Angeles, for the Los Angeles Railway and connected interests. Myron Hunt is the architect, Los Angeles.

Moncton, N. B.—Work is now under way building an extension to the general office building of the Intercolonial Railway at Moncton. The Rhodes-Curry Co., Amherst, are the contractors. The improvements will cost about $100,000.

Mumford, N. Y.—The Buffalo, Rochester & Pittsburgh has given a contract to the Hyde-Murphy Co., Ridgway, Pa., for putting up a combined freight and passenger station at Mumford. A contract has been given to the same contractors for building a passenger station at Orchard Park. The buildings are to be of brick and stone construction, with tiled roofing.

New Castle Junction, Pa.—The Baltimore & Ohio is putting up a building at New Castle Junction which is to be used as the headquarters of the division forces. Upon completion of the work the offices at New Castle will be located at New Castle Junction.

Oelwein, Ia.—The Chicago, Great Western improvements at Oelwein, amounting to $100,000, mentioned in the *Railway Age Gazette* of July 28, will consist of a modern brick passenger station, a transfer table 72 ft. long, a power house, a 170,000-gallon steel tank, an oilhouse, a blacksmith shop and a new coaling station.

Orchard Park, N. Y.—See Mumford, N. Y. (July 21, p. 159).

Stockton, Cal.—See San Joaquin Valley under Railway Construction.

The Dalles, Ore.—The Great Southern station at The Dalles has been destroyed by fire.

Tucson, Ariz.—The Southern Pacific is making plans, it is said, to put up new shops at Tucson.

Virginia, Minn.—See Duluth, Minn.

West Toronto, Ont.—A contract for the construction of the concrete abutments for the Canadian Pacific subway at Jane street, West Toronto, has been let, it is said, to Wells & Gray, Ltd., Toronto.

Wilmington, N. C.—The Seaboard Air Line has awarded the contract for building a warehouse 90 ft. x 421 ft. with necessary docks, fire walls, etc., to cost about $40,000 and dredging 90,000 cubic yards adjacent to the building amounting to about $30,000.

Railway Financial News.

Algoma Eastern.—The Bank of Montreal recently offered in London £513,600 ($2,568,000) 5 per cent. first mortgage bonds of 1911-1961, guaranteed principal and interest by the Lake Superior Corporation. The company now has in operation 22 miles of railway, and it is planned to build in all 86 miles from Sudbury, Ont., to Little Current. This company was known heretofore as the Manitoulin & North Shore.

Atchison, Topeka & Santa Fe.—Stockholders are to be asked at the next annual meeting, October 26, 1911, to approve an issue of $100,289,000 convertible bonds. The bonds may be issued by the directors from time to time under such terms and conditions as they deem expedient.

In a letter to stockholders accompanying the notice of meeting President Ripley says:

"It seems desirable to take steps at this time to provide for an additional increase of $100,000,000 in the authorized common capital stock of the company and to provide for the issue of convertible bonds for that amount or any part thereof and also for $289,000 of common stock already authorized but not used or reserved for other purposes.

"Ample provision of this character seems wise, although at this date it is not anticipated that there will be immediate resort to this method of financing."

Among matters to come before this meeting is a proposal to purchase from the Southern Pacific 242 miles of line between The Needles, Cal., and Mojave, which the Atchison has long operated under lease from the owner. This line is a part of the Atchison's through main line to the coast. The purchase price is not stated in the notice to stockholders, but will probably lie between $5,000,000 and $10,000,000. The company asks the authority of the stockholders to issue general mortgage bonds for this purpose, under a clause of the mortgage which still authorizes the further issuance of about $6,700,000 bonds.

Stockholders will be asked to approve and confirm the leases to the Atchison of the Kings River Railway, the Laton & Western, and the Garden City, Gulf & Northern, and the purchase of the capital stock and bonds of the last named road.

Boonville, St. Louis & Southern.—Spitzer, Rorick & Co., Toledo, Ohio, are offering $500,000 first mortgage 5 per cent. bonds of 1911-1951 at 101¼, yielding 4.90 per cent. on the investment. These bonds are guaranteed principal and interest by the Missouri Pacific. They are a first closed mortgage at the rate of about $11,000 per mile. This property was recently bought by the Missouri Pacific.

Boston Elevated.—The directors of the West End Street Railway have voted to accept the terms on which the Massachusetts legislature has authorized the consolidation of this company with the Boston Elevated. Favorable action is required of the Boston Elevated also to make the legislation effective, but it is understood that acceptance by this company is assured. The Boston Transit Commission, after the filing of the necessary plans, is to make an agreement with the Boston Elevated for the exclusive use of new tunnels, and contracts for the following [illegible] are to be let:

From Park street station in Boston via South Boston to Dorchester.

From Commonwealth avenue and Beacon street under Boylston street to the Park street station of the Tremont street subway.

From the terminus of the East Boston tunnel to Court street under Court street to the surface tracks in Cambridge street.

To meet the cost of construction, the city is to sell 4½ per cent. bonds bearing interest to run to exceed 4 per cent.

[illegible] Electric & Power Co. the annual report and [illegible] dividend on another part of the issue.

[illegible] Railway. The company has sold to the Mercantile Trust Co. of Chicago and White, Weld & Co. of New York an additional $500,000 first mortgage 5 per cent. bonds, making the present outstanding $2,000,000.

[illegible] & Quincy. The directors on August 3 declared the regular semi-annual dividend of 3 per cent. on the preferred stock, payable on the 30th inst. This action was postponed from a number of meetings and it was thought that the directors had decided to pass the dividend. The dividend on the preferred stock had previously been passed.

Columbus, Delaware & Marion.—The court at Marion, Ohio, has ordered the sale of this property under foreclosure of the mortgage for $1,000,000 to the Western Reserve Trust Company of Cleveland, of the two mortgages of $300,000 each to the Standard Trust Company of New York, and another of $2,500,000 to the Merchants Trust Company of New York. This last named mortgage covers the other three mortgages.

Eustis Railroad.—This 15-mile 2-ft. gage road, running from Eustis Junction, on the Sandy River & Rangeley Lakes, to Berlin Mills lumber camps, has been ordered sold on August 24 under foreclosure of the mortgage securing bonds. The control of this company is held by the Maine Central. The upset price is $40,000.

Illinois Tunnel Co. (Chicago).—The receivers have been authorized to issue $1,000,000 6 per cent. one-year certificates dated July 1, 1911, to provide for the extension of the automatic telephone system.

Maine Central.—The mortgage securing the recently authorized $25,000,000 consolidated refunding bonds provides that the bonds shall bear interest not to exceed 5 per cent. and shall be dated July 1, 1911. The mortgage covers all of the present railway and equipment of the Maine Central and all additions acquired with the proceeds of the bonds, but does not cover leasehold interests, except the 999-year lease of the Androscoggin Railroad, nor does it cover property within the limits of the proposed Portland terminal. Of the bonds, $5,543,000 are reserved to retire outstanding securities and $2,000,000 are reserved to pay off the Maine Central five-year notes dated 1909. The remaining $17,457,000 are issuable for any lawful purpose. See also Eustis Railroad.

Manitoulin & North Shore.—See Algoma Eastern.

Underground Electric of London.—This company has drawn for redemption on January 15, 1912, £868,700 ($4,343,500) of its 4½ per cent. bonds due 1933 but redeemable at par. In addition, £220,000 ($1,100,000) additional bonds of this issue have been bought in the open market below par and will be redeemed on January 15. The total outstanding issue, including the bonds bought and the bonds drawn for redemption, amount to £2,818,700 ($14,093,500). The bonds are dated 1908.

FOREIGN RAILWAY NOTES.

The Chilean government has granted concessions for private railways in this country covering 5,628 miles, of which about one-third is in operation. During 1910 concessions were granted covering 210 miles of railway, the greater portion of which are now under construction.

The provincial council of Bosnia-Herzegovina has presented a memorandum to the minister of finance at Vienna, Austria, dealing with the necessity of extending the railways of the province. The council proposes the construction of the following lines: (1) Banjaluka to Klek (or to Porto Tolero) on the Adriatic, estimated cost $12,166,000; (2) Bugojno to Arzano on the Dalmatian frontier; (3) junction line between Sarajevo and some point on the Banjaluka-Klek (or Porto Tolero) line; (4) Bihac to Novi, on the Croatian frontier and the Banjaluka line; (5) Bosnian Gradiska, on the Croatian frontier to Banaluka; (6) Breka on the Slavonian frontier to Sarajevo, estimated cost $6,691,000; (7) Bjelina, in the Northeast Bosnia to Tuzla, on the Breka-Sarajevo line, estimated cost, $1,421,000; (8) Samac, on the Croatian frontier, to Breka, estimated cost $808,000. Though laying stress on the importance of the proposed main line from Banjaluka to Klek, the council deals in greater detail with the Breka-Sarajevo line as the one to build and the one that would open up the richest districts. The council points out that the new line, costing $6,691,000 would virtually take the place of the present line from Brod to Sarajevo, the conversion of which to the normal gage is estimated to cost $15,816,000 more, in fact, than it were entirely rebuilt.

ANNUAL REPORT

BUFFALO ROCHESTER & PITTSBURGH—TWENTY SIXTH ANNUAL REPORT.

The Directors of the Buffalo, Rochester and Pittsburgh Railway Company submit to the Stockholders the following report for the year ending June 30, 1911:

ROAD OPERATED.

	1911. Miles.	1910. Miles.	Increase. Miles.
Owned	352.10	346.39	5.71
Leased	93.83	93.83	....
Trackage rights	126.74	126.66	.08
Total length of road operated	572.67	566.88	5.79
Second track (owned)	111.13	102.57	8.56
Second track (trackage rights)	81.63	81.63	....
Sidings (owned and leased)	309.76	298.28	11.48
Total miles of all tracks, all steel rail	1,075.19	1,049.36	25.83

The increase in mileage of road operated is due to the purchase of the Silver Lake Railway, extending from Silver Springs, N. Y., to Perry, N. Y., a distance of 6.49 miles, and .08 miles of additional trackage rights at Lincoln Park, N. Y., taken into the accounts of the company during the year; less an adjustment of .78 miles at various points in the State of Pennsylvania caused by remeasurements.

The second track was increased by the construction of 8.49 miles between Newton, Pa., and Mt. Jewett, Pa., and .07 miles at Elk Run Junction, Pa.

Sidings were increased 11.48 miles.

INCOME.

	1911.	1910.	Increase or Decrease.
Rail Operations:			
Operating revenues	$9,134,402.03	$8,936,116.96	$198,285.07
Operating expenses	6,145,855.52	5,903,904.93	241,950.59
Net operating revenue	$2,988,546.51	$3,032,212.03	—$43,665.52
Outside Operations:			
Revenues	$18,868.52	$17,064.21	$1,804.31
Expenses	20,857.57	19,418.64	1,438.93
Net deficit	$1,989.05	$2,354.43	$365.38
Total net revenue	$2,986,557.46	$3,029,857.60	—$43,300.14
Taxes Accrued	212,000.00	188,095.17	23,904.83
Operating income	$2,774,557.46	$2,841,762.43	—$67,204.97
Other Income	840,517.59	552,380.19	288,137.40
Gross corporate income	$3,615,075.05	$3,394,142.62	$220,932.43
Deductions for Interest and Rentals	1,905,798.00	1,866,769.16	39,028.84
Net corporate income	$1,709,277.05	$1,527,373.46	$181,903.50
Appropriations:			
Pension fund	$10,069.42	$12,696.54	—$2,627.12
Special appropriations	371,500.00	315,000.00	56,500.00
Total Appropriations	$381,569.42	$327,696.54	$53,872.88
Surplus available for dividends	$1,327,707.63	$1,199,676.92	$128,030.71

Taxes increased 12.71% to $212,000, as a result of higher assessments on Real Estate, and of higher taxes imposed on Capital Stock and Loans.

Other Income was increased $288,137.40; of this amount $259,424.18 was of Hire and Equipment, and the balance in Rents and Interest Accounts.

The increase in "Deductions for Interest and Rentals" is principally due to the fact that the account this year has been charged with the full annual interest on the 4½% Consolidated Mortgage bonds issued during the latter half of the preceding year.

A special appropriation of $371,500 was made from the Net Corporate Income. Of this amount, $125,000 was paid into the Sinking Funds under Equipment Agreements Series A, B and C, for the purchase of new rolling stock; $44,000 was used to retire a like amount of Equipment Bonds Series G, and $202,500 represents one-half of the principal of Equipment Bonds Series D, E and F paid during the year, the other half being refunded by 4½% bonds, issued under the terms of the Consolidated Mortgage, and held in the Treasury of the Company.

DIVIDENDS.

Dividends in cash were paid on:		1911		1910	Increase.
Preferred stock	$6,000,000	6%	$360,000	6% $360,000	
Common stock	10,500,000	4%	472,500	4% 420,000	$52,500
Total	$16,500,000		$832,500	$780,000	$52,500

Since the close of the fiscal year, your Board of Directors has declared a semi-annual dividend of three per cent. on the preferred stock and two and one-half per cent. on the common stock, both payable August 15, 1911.

CAPITAL STOCK.

There has been no change during the year in this account. The total outstanding Capital Stock of the Company amounts to $16,500,000, and consists of $6,000,000 preferred stock and of $10,500,000 common stock.

FUNDED DEBT.

Under the terms of the Sinking Funds for the redemption of Equipment Bonds, $449,000 bonds were retired as follows: $114,000 of Series D; $115,000 of Series E; $176,000 of Series F, and $44,000 of Series G.

Your Company purchased the entire capital stock of the Silver Lake Railway Company, and on October 1, 1910, took possession of this railway extending from Silver Springs, N. Y., to Perry, N. Y., a distance of 6.49 miles. Articles of merger were filed with the Secretary of State of New York on September 29, 1910.

To pay for this property, $117,000 Consolidated Mortgage 4½% bonds were issued. There were also issued $60,000 of these bonds to pay off the last mortgage outstanding on real estate belonging to the Company.

In accordance with the provisions of the Consolidated Mortgage of 1907, the Trustee delivered to the Company $203,000 Consolidated Mortgage 4½% Bonds, representing 60% of the Equipment Bonds, Series D, E and F retired during the year. These bonds, added to those in the Treasury of the Company, make a total of $561,000 held in treasury.

The net result is a decrease of $332,000 in the bonded debt of the Company outstanding on June 30, 1911.

CONSTRUCTION.

The purchase of the Silver Lake Railway for $150,000 was paid for by the issue of $117,000 Consolidated Mortgage Bonds, as mentioned above.

In addition, Capital Account has been charged during the year with $1,117,281.58 for additions and betterments to your property, as follows:

Improving bridges and culverts	$38,666.52
Station improvements, Rochester, N. Y.	21,455.75
New station, Scottsville, N. Y.	4,063.76
New station, Springville, N. Y.	18,653.48
New office building, Du Bois, Pa.	27,384.67
Reservoir and pipe line, Ketner, Pa.	69,005.83
Reservoir and pipe line, Falls Creek, Pa.	82,904.46
Mechanical coal and cash handler, Lincoln Park, N. Y.	17,528.74
Mechanical coal and ash handler, Du Bois, Pa.	41,988.65
Creosoting plant, Bradford, Pa.	7,426.65
Increased weight of rail and fastenings	33,424.28
Sidings and yard extensions	21,000.88
Second track, Newton, Pa., to Mt. Jewett, Pa.	479,972.01
Jacksonville mine line	85,551.35
Lucerne mine line	17,760.46
Frances mine line	26,132.93
Automatic block signals	12,036.14
Coal trestles and docks, Genesee Dock, N. Y.	101,181.14
Other items	8,143.88
Total	$1,117,281.58

The new double track between Newton, Pa., and Mt. Jewett, Pa., 8.49 miles in length, was completed and turned over to the Operating Department on December 29, 1910. The main line is now double-tracked from Ashford, N. Y., to Punxsutawney, Pa., a distance of 131.89 miles.

The following work referred to in last year's report, was completed:

Division office building at Du Bois, Pa.

Mechanical coal and ash handlers at Du Bois, Pa., and Lincoln Park, N. Y.

Creosoting plant at Bradford, Pa.

Station improvements at Rochester, N. Y.

A new brick and stone station was constructed at Springville, N. Y.; two mine lines were opened to new coal operations, and important improvements made at Genesee Dock, N. Y.

The following work, now in progress, will be completed during the coming year:

Reservoirs and pipe lines at Ketner, Pa., and Falls Creek, Pa.

Double-track automatic block signals between Clarion Junction, Pa., and Falls Creek, Pa., a distance of 35 miles.

New station at Scottsville, N. Y.

Replacing various timber bridges, trestles and culverts in permanent form.

Jacksonville and Lucerne mine lines.

The unexpended balance, amounting to $428,053.72, derived from the sale of 4½% Consolidated Mortgage Bonds, issued last year, was applied to meet expenditures for additions and betterments this year.

EQUIPMENT.

Expenditures were made for new rolling stock as follows:

Two passenger motor cars		$17,658.70
One saddle tank locomotive		3,388.77
Sundry betterments, including re-classification or transfer of seventy-six freight train cars and work equipment cars		63,108.45
		$114,155.92

There was credited for Equipment sold, transferred or destroyed, the following book values, charged in part to Operating Expenses, and the balance, representing the depreciation since June 30, 1907, charged to "Reserve for Accrued Depreciation":

Seventeen locomotives	$100,358.97	
Six hundred and seven freight train cars	220,692.06	
Fourteen work equipment cars	5,838.95	
		326,889.98
Making a net decrease of		$212,734.06

All cars in freight service are now provided with automatic couplers and 98.86 per cent. of the cars are equipped with air brakes.

The total carrying capacity of cars in freight service now amounts to 607,519 tons, a decrease of 14,218 tons from last year. The average carrying capacity or efficiency of each freight car increased .55 tons, being 38.85 tons as against 38.30 tons last year.

The book value of rolling stock sold, transferred or destroyed, is credited to "Additions and Betterments—Equipment," and Operating Expenses is debited (less the salvage carried to material account, and less the amount previously written off for depreciation, charged against the "Reserve for Accrued Depreciation").

When rolling stock is purchased or rebuilt, the cost is charged direct to "Additions and Betterments—Equipment" account.

The reserve for accrued depreciation of equipment on June 30, 1911, amounted to $1,229,797.92.

PASSENGER REVENUES.

The average rate received per passenger per mile decreased .003 cents, being 2.060 cents as compared with 2.063 cents a year ago.

The average distance each passenger was carried decreased 1.64 miles, being 28.48 miles, against 30.12 miles last year.

Passengers carried in 1911	1,817,038	
Passengers carried in 1910	1,586,838	
An increase of 14.51 per cent., or		280,200
Passengers carried one mile in 1911	51,751,214	
Passengers carried one mile in 1910	47,802,085	
An increase of 8.26 per cent., or		3,949,129

The result is a gain of $79,613.69 in gross passenger revenues.

FREIGHT REVENUES.

The average rate received per ton per mile increased .06 mills, being 4.87 mills, as compared with 4.81 mills last year.

The average distance each ton was hauled increased .09 miles, being 154.67 miles, against 154.65 miles a year ago.

In spite of the [illegible] in the iron and steel trade, the tonnage moved was the largest in the history of the company.

	1911.	1910.	Increase.	Decrease.
[illegible]	6,950,767	6,526,087	424,680	
[illegible]	627,206	578,380	48,826	
[illegible]	243,610	[illegible]		314,940
[illegible]	188,830	209,032		20,202
[illegible]	2,271,838	[illegible]		26,596
Total	10,282,251	10,170,483		

An increase of 1.10 per cent., or		111,768
Tons moved one mile in 1911	1,590,341,454	
Tons moved one mile in 1910	1,572,897,173	
An increase of 1.11 per cent., or		17,444,281

The result for the year is a gain of $185,919.23 in gross freight revenue.

EXPENSES.

Operating Expenses increased $241,950.59, or 4.10 per cent. Maintenance of Way and Structures shows a decrease due to the mild winter and to the extraordinary charges made last year for the replacement of bridges and other structures; the decrease in Maintenance of Equipment is due to the lower cost of maintenance of modern rolling stock.

The other operating expense accounts show increases. The most important is in Transportation, caused principally by the advances made in the wages of employees and higher cost of supplies.

The operating ratio increased 1.21 per cent., being 67.28 per cent., against 66.07 per cent. last year.

The percentage of each group of operating expenses to gross earnings for the past four years, is as follows:

	1911.	1910.	1909.	1908.
Maintenance of way	12.57	13.65	10.72	12.71
Maintenance of equipment	19.35	20.78	21.45	23.01
Traffic	1.44	1.35	1.41	1.28
Transportation	32.11	28.55	29.22	32.39
General	1.81	1.74	2.25	2.10
Total	67.28	66.07	65.05	71.49

The Company's roadbed, tracks and equipment have been greatly improved, and are now in better condition than ever before.

The average cost per ton per mile is 3.07 mills, being .07 mills more than last year.

The average number of revenue tons carried one mile per revenue freight train mile, excluding the mileage of helping engines, decreased 2.87 tons, being 634.69 tons, against 637.56 tons a year ago.

The average number of revenue tons carried one mile per revenue freight engine mile, including the mileage of helping engines, increased 10 tons, being 430, against 420 a year ago.

The averages for the past ten years are as follows:

Year.	Train Load.	Engine Load.
1902	424	353
1903	441	364
1904	439	357
1905	507	374
1906	525	418
1907	543	435
*1908	530	371
*1909	597	400
*1910	638	420
*1911	635	430

*The figures from 1908 to date are based on the Interstate Commerce Commission's classification of locomotive and train mileage.

The average number of revenue passengers carried one mile per revenue passenger train mile is 40, the same as in the preceding year.

The non-revenue traffic, not included in any of the other figures of this report, is as follows:

	1911.	1910.
Number of passengers	262,445	244,563
Number of passengers carried one mile	10,285,321	9,640,295
Number of tons	911,360	966,968
Number of tons carried one mile	73,811,354	75,856,798

FIRE INSURANCE FUND.

The assets in this fund were increased $23,425.73 during the year, and now amount to $216,200.85 in interest-bearing securities.

PENSION FUND.

The assets in this fund, created July 1, 1903, were increased $19,284.16 during the year, and now amount to $165,233.86 in interest-bearing securities and cash.

[illegible] upon the roll on June 30, 1911, a net increase of thirteen during the year.

GENERAL REMARKS.

The Ontario Car Ferry Company, Limited, paid a dividend of 5 per cent. for the year ending December 31, 1910. The sum of $12,485 received on the $249,700 of this company's stock was credited to "other income" account.

A corporation was organized, with a capital of $50,000, to acquire and hold real estate. The sum of $49,600 paid for the stock subscribed to by your company has been charged to "investment account." In addition, temporary advances of $240,000 were made to this new corporation to fur[illegible]

Mr. Adrian Iselin, Jr., president, having declined re-election at the last organization meeting of the directors, Mr. William T. Noonan, vice-president, was elected president, and Mr. Adrian Iselin, Jr., vice-president.

The board records the death, on December 22, 1910, of Mr. A. Lanfear N[illegible] November, 1909.

The acknowledgments of the board are renewed to the officers and employees for their faithful and efficient services.

[illegible] for the year are

William T. Noonan,
President.

INCOME ACCOUNT.

[illegible] Increase. Decrease.

[illegible] $5,015,847.56 $4,651,660.27 $364,187.29

[illegible] $179,409.07

Total [illegible]

[illegible] $ 97.81

[illegible] 88.68

[illegible]

[illegible] 46.92

[illegible]

[illegible] 11.05

[illegible] 126.00

Total Operating Revenues	$9,134,402.03	$8,936,116.96	$198,285.07	
OPERATING EXPENSES.				
Maintenance of way and structures	$1,148,663.46	$1,220,190.46	.....	$71,527.00
Maintenance of equipment	1,767,456.36	1,857,016.59	.....	89,560.23
Traffic expenses	131,403.06	120,168.82	$11,234.24	
Transportation expenses	2,933,141.80	2,551,197.46	381,944.34	
General expenses	165,190.84	155,331.60	9,859.24	
Total Operating Expenses	$6,145,855.72	$5,903,904.93	$241,950.59	
Net Operating Revenue	$2,988,546.51	$3,032,212.03	.....	$43,665.52
Outside Operations—				
Revenues	18,868.52	17,064.21	$1,804.31	
Expenses	20,857.57	19,418.64	1,438.93	
Net deficit	$1,989.05	$2,354.43	$365.38	
Total Net Revenue	$2,986,557.46	$3,029,857.60	.....	$43,300.14
Taxes Accrued	212,000.00	188,095.17	$23,904.83	
Operating Income	$2,774,557.46	$2,841,762.43	.....	$67,204.97
	1911.	1910.	Increase.	Decrease.
Other Income—				
Rents—Hire of Equipment	570,635.14	311,210.96	$259,424.18	
Rent—Joint Facilities	142,182.25	129,269.27	12,912.98	
Dividends on stocks owned	12,485.00	12,485.00		
Interest on securities, loans and accounts	102,735.91	86,204.60	16,531.31	
Miscellaneous	12,479.29	13,210.36	.....	731.07
Total Other Income	$840,517.59	$552,380.19	$288,137.40	.....
Gross Corporate Income	$3,615,075.05	$3,394,142.62	$220,932.43	.....

DEDUCTIONS FROM GROSS CORPORATE INCOME.

Rents Accrued for Lease of Other Roads—				
Allegheny & Western Railway	$272,000.00	$272,000.00		
Clearfield & Mahoning Railway	86,500.00	81,921.67	$4,578.33	
Mahoning Valley Railroad	15,000.00	15,000.00		
Total	$373,500.00	$368,921.67	$4,578.33	
Rents—Joint Facilities	284,176.45	289,852.07	.....	$5,675.62
" Miscellaneous	16,510.15	18,306.67	.....	1,796.52
Total	$300,686.60	$308,158.74	.....	$7,472.14
Interest Accrued on Funded Debt				
First Mort. Bonds— Roch. & Pitts. Rd.	$78,000.00	$78,000.00		
Inc. Mort. Bonds— Roch. & Pitts. Rd.	.....	303.33	.....	$303.33
Con. Mort. Bonds— Roch. & Pitts. Rd	235,200.00	235,086.50	$113.50	
Gen. Mort. Bonds— B., R. & P. Ry.	221,350.00	221,350.00		
Con. Mort. Bonds— B., R. & P. Ry.	276,581.24	226,040.75	50,540.49	
First Mort. Bonds— L., P. & C. Rd.	17,500.00	17,500.00		
Equipment Agreements	380,632.51	385,190.17	.....	4,557.66
Construction & Improvement Notes	.....	1,350.00	.....	1,350.00
Real Estate Mort.	550.00	3,300.00	.....	2,750.00
Total	$1,209,813.75	$1,168,120.75	$41,693.00	.....
Interest on Bills Payable	21,797.65	21,568.00	229.65	.....
Total Deductions.	$1,905,798.00	$1,866,769.16	$39,028.84	.....
Net Corporate Income	$1,709,277.05	$1,527,373.46	$181,903.59	.....
	1911.	1910.	Increase.	Decrease.

DISPOSITION OF NET CORPORATE INCOME.

Appropriated for—				
Pension Fund	$10,069.44	$12,696.54	.....	$2,627.12
New Equipment	125,000.00	125,000.00		
Retirement of Equipment fund	246,500.00	190,000.00	$56,500.00	
Dividends Declared—				
Preferred Stock—				
(No. 34) 2½ on $7,000,000, payable Aug. 15, 1910	180,000.00	180,000.00		
(No. [illegible]) 2½ on $7,000,000, payable Feb. 15, 1911	180,000.00	180,000.00		
Common Stock—				
(No. [illegible]) 3½ on $10,500,000, payable Aug. 1, 1910	210,000.00	210,000.00		
(No. [illegible]) on $10,500,000, payable Feb. 1, 1911	[illegible]	210,000.00	[illegible]	
Total charges	$1,211,069.44	$1,107,696.54	$106,627.88	
Balance transferred to Profit and Loss Account	$497,207.61	$419,676.92	$75,530.71	

Railway Age Gazette

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THE Massachusetts railway commssion, for forty years the classic example of the mild commission, empowered only to recommend, and depending for its usefulness on the logic and reasonableness of its opinions, has at last become a "strong" commission, the legislature having empowered it to order changes in rates and improvements in service, the orders to remain in force until set aside by a court. Coincident with the passage of this law the governor has appointed a new and unknown man, a politician, to the chairmanship of the commission. But, though the legislature is thus radical, the public sentiment of the state, not always reflected with accuracy by the legislature, retains a good deal of conservatism, and it remains to be seen what use will be made of the new powers. Mandatory powers have been granted to the commission occasionally for several years past, in relation to certain details of railway operation, but they have been exercised with conservatism. The legislature has now taken radical action also in passing a law providing for the payment of compensation to employees injured while at their work, and, taking advantage of a constitutional provision designed for such cases, it asked the opinion of the Supreme Court of the state before passing the law, and received a reply approving it as constitutional. It does not go into effect until July 1, 1912. This court approval, with the fact that a high grade administrative board is provided for, will make the Massachusetts experiment peculiarly interesting.

THE Massachusetts legislature also showed its radicalism by authorizing the construction of a railway from Salem to Boston, 17 miles, where there are already three or four lines, after the railway commission, an expert board, established by law to deal with such questions, had decided that the proposed new road was not necessary. Again, the legislature showed unwarranted disrespect for the commission in passing a law requiring conductors and enginemen to have had a certain amount of experience. As originally drawn, this law had no qualifying clause, and in case of a strike would have tied the hands of the railways completely, but as finally passed, each section—one referring to enginemen, and one to conductors—allows the employment of anyone who shall have been employed as a locomotive engineer (or conductor) prior to the passage of the act. Thus, if a strike were to occur today the employer could engage "strike breakers" who had had experience on other roads, even if that experience had been very brief and very far in the past. Ten years hence, however, this provision will not be of much value. Section 4 of the law excepts hostlers moving engines "in or around engine houses." Sooner or later the meaning of this phrase "in or around" will probably have to be defined by the courts, as a hostler moving an engine on the main track may be "around" an engine house; and some notable accidents have been caused by entrusting main line movements of this kind to hostlers not fully competent for the duty. Section 4 also provides for running a train to a terminal when the conductor or engineman is unexpectedly disabled. Governor Dix of New York had the sense and courage to veto a number of bills in which the legislature attempted to perform the functions of the Public Service Commission.

THE New York State Public Service Commission, Second district, two years ago did a notable public service in its adverse decision on the application of the men who proposed and promised to build an unnecessary railway from Buffalo to Troy—a 300 mile line to parallel a six-track railway and the Erie canal; and now that commission, slightly changed in its membership, has repeated its refusal. The present decision, reported in another column, is unanswerable. Chairman Stevens is a master at investigation and analysis, and he completely demolishes the claims of these promoters. Moreover, some of his strongest points elicit no word of reply from them, and their case is shown to have the characteristics of a "strike"—a scheme

to get rights of way merely to sell out. Their financial backing shows up so poorly that the commission treats the statements concerning it as absurd—strong language, surely.

IT is a great pity that five public service commissioners, burdened with important duties in the promotion of the welfare of the people of the state, should have thus to spend many weary days in exposing pretensions which never deserved a hearing. The state of New York now has adequate administrative and judicial machinery to require reasonable service and fair rates from its existing railways, and the old policy of accomplishing this end by encouraging the construction of parallel lines, almost always a wasteful expedient, is out of date. Moreover, the New York Central has been increasing its facilities vigorously for years, and evidently with the rational purpose of making an efficient railway, regardless of competition. Such being the situation, and it is similar in other states, it would without doubt be to the interest of the public if we could have in all the states commissioners with the knowledge, statesmanship and courage to deal out something like "Dutch justice" to the shadowy schemes of unknown promoters. A three days' hearing ought to have settled a case like that of the B. R. & E.; one day would suffice if promoters did not so easily get the aid of people who ought to know better. Many citizens fail to appreciate their responsibilities in regard to such public institutions as railways. Except for the petition of unreflecting but respectable citizens of the interior cities and the amiable assistance of the newspapers in printing whole columns about the scheme, these promoters would not have attained the respectable standing that got them the attention of the commission. Laws establishing commissions usually aim to obviate the tedium and expense of court procedure by authorizing summary action without unnecessary formalities. This provision ought to be more generally availed of.

THE TRAFFIC MAN AND THE LAWYER.

THE most striking element in Commissioner Lane's supplemental report in the Reno and Phoenix cases is the constant suggestion of the pains and thought exerted by the transcontinental railways, for over 30 years, to neutralize and minimize the effect of water competition, whether via Magellan's Straits, Panama or Tehuantepec. The best brains of railway managers were put into the task, and in the main they accomplished wonders, at least from the point of view of putting up the most effective fight against water competition and at the same time retaining to themselves the maximum possible receipts from all other business.

This was an obvious problem. The enemy was in the field, and his equipment and mobility were known. But Commissioner Lane's recital suggests the inquiry whether railway managers are today meeting a more complicated attack on their earnings with pains and skill equal to the abilities they showed in [illegible]

We refer to the results flowing from orders of the Interstate Commerce Commission. Two cents per hundred reduction on a single commodity, or even on a class rate, does not look very big when considered in its relation to the carrier's other business. Moreover, the [illegible] may have brought some traffic men to a feeling of impotence or indifference. But it should be borne in mind that every reduction is probably but a step in a process. The tendency is toward the eventual reduction of *all* rates, and assuredly the prevention of such a result as that is well worth the best traffic man's best powers.

On many railways, a litigated rate is treated like other litigated matters, and is passed over to the law department. [illegible] too theoretical a plane, and, moreover, he too often has much work in fields other than rates.

But the result of the downward tendency of commission-made rates is precisely the same as the result of real water competition, or of any effective competition. Rates are lowered and revenues, especially net revenues, shrink. Thus the Interstate Commerce Commission, is constantly doing to railway earnings the very thing that forceful competition does. Wherefore, the traffic man's most important ally today is his rate lawyer. The traffic man should guide the lawyer's defense and attack precisely as he conducted his naval battles. The law department must become the traffic department as to all rate matters, and no traffic man should ever be heard to excuse himself by saying that such-and-such a rate matter was handled by the law department.

There is so much to be said on the railway's side that a vigorous defense will sometimes win and oftener will accomplish a lesser rate of reduction. The contest is governed by parliamentary rules, and the weapons of defense are delicate and fragile, but a concerted stand of the best wits among the traffic men will save millions of gross receipts.

DISCIPLINE OF ENGINEMEN.

THE record of prominent train accidents in July, printed in this issue, includes the derailment at Bridgeport on the New York, New Haven & Hartford, which caused widespread discussion. The lessons of this accident are the same as those noted last week in connection with the Batavia collision, except that in this case the engineman and fireman both were killed and evidence concerning their physical and mental condition is conjectural or lacking. As we said of Batavia, the problems are difficult; but there is no warrant for saying that they are impossible of solution, for there has been no thorough, persistent and intelligent attempt at their solution. This is the fact, so far as the public knows. If individual superintendents here and there have trained their runners to better vigilance nothing has been said about the methods used and those methods have not been much imitated. Some roads are better than others, to be sure; but the thing that disheartens the public is that the New Haven road's practice is, or ought to be, among the best.

The opinion of the coroner that the thing to do to prevent such a disaster is to make crossovers long enough to be traversed at high speed deserves a word, for it has been endorsed in respectable quarters. The trouble with this remedy is that it attacks the problem at the wrong end. The shortness of the crossover can hardly be called even a secondary cause. The primary cause, the failure of the engineman to heed the distant signal, is the true point of attack. Lengthening the crossover would logically need to be followed by the straightening of all curves. That No. 8 crossover at Bridgeport could have been converted to a No. 20 at an expense of a few hundred dollars; but only a mile farther east the train would have hit a curve where all trains have to limit their speed to about 30 miles an hour. To make the road safe for unlimited speed through Bridgeport would cost several millions. Moreover, the limit of speed at the longest practicable crossovers is 40 miles an hour, or 50 at the outside; but the regular speed of many trains is 60, and some run at 65 and 70. A set of No. 20 crossovers on a four-track road requires a straight stretch a quarter-mile long, and often the crossovers are needed at a place where such a tangent is not available. And what will the crossover doctors do with the six or eight other places between Harlem River and New Haven where speed must be reduced? And on what principle are they basing their opinions when they propose to make a railway safe for trains that are run by enginemen who pass stop signals without heeding them?

As to the engineman, for all practical purposes it may be assumed that he was asleep. He was acquainted with the road, the switches and signals, and, though an extra runner, was familiar with the train. Sometimes a runner goes through a crossover too fast simply by an error of judgment, due to an excess of zeal in making time, but that could hardly be the case

where the speed, as in this case, was *four times* that allowed by rule. Being asleep or otherwise incapacitated, what could the superintendent have done about it? An extreme course would be to provide a regular daily medical examination of men going on duty, and an inquisition to see if they were rested. No one has proposed seriously to go that far, and it seems quite certain that no such provision would surely detect deceivers. It would irritate many men and the superintendent would have a troublesome task in allaying that irritation. If it were a part of the routine it would be a reminder to men who, though well disposed, were careless; but it is very doubtful whether the money thus used could not be spent to better advantage in other ways.

Men are often tempted to work when not in good mental or physical health because of the compelling motive of earning as much money as possible. Could they be prevented from yielding to such temptation by paying them by the month, and giving liberal allowances of time off? Possibly, to some extent; but there can be little doubt that cheating would be greatly promoted. To maintain a business-like arrangement would be next to impossible.

No; it does not seem likely that either of these methods would invariably keep sick or weary men from going into engine cabs. A more hopeful idea would be to try to induce them to stay off voluntarily. A man with good judgment, a good conscience and a large bump of caution would do so without any action on the part of his superior; and these qualities can be cultivated. Conscience is supposed to be cultivated in the school or the church, not the railway office; but, both in school and church, the disposition to do right is inculcated partly by showing the certainty that to do wrong will bring a severe penalty; and *that* is an instrumentality which the railway can use. Sometimes the best available means of preventing stealing by conductors is to exercise rigorous compulsion in the correction of lesser faults; likewise, enginemen can be influenced powerfully to avoid going to sleep in the cab by maintaining such strict discipline that they will see that there is trouble in store for them when they are awake, except as they maintain the highest vigilance every moment.

We do not sufficiently heed the lesson of the derailer. A derailing switch is a powerful "moral safeguard," because enginemen know that disregard of its warning is sure to be found out. A derailing switch at the approach to every crossover, every block signal and every danger point would tend powerfully to make enginemen vigilant, and such a mechanical calling-to-account, if interposed along a railway frequently enough, would cure the fault that we are talking about. But it would be irrational to adopt such radical measures without first exhausting simpler remedies. A derailing switch is of doubtful value, or is an added danger, at many places on four-track lines, and at best it is a costly complication on any line. An automatic train-stop is also a "moral safeguard," but it is subject to many disadvantages on the ordinary railway and cannot be justified except as a last resort in a desperate case. But the *lesson* of these devices is that enginemen can be kept vigilant by convincing them that neglect cannot be concealed. On most roads this can be done far better than it now is, and this without either derails or automatic stops. The best discipline is very rare. If it were well known that the requirements were severe, and that they were never relaxed, a half sick man or one needing sleep would *think in season*, and not try to take out his run.

A superintendent who has any suspicion that a Bridgeport case may occur on his division ought to prepare to answer the following questions from his general manager's office:

How many of your enginemen have run past stop signals within the past six months?
How many of these men were discharged?
How many of the discharged appealed? How did the appeal result?
In how many cases were unreasonable claims made in appeals?
Do you ever reinstate a discharged engineman because you lack the grit to convince the general superintendent that you are right?
Have you enough inspectors so that you feel confident that serious misconduct does not escape your attention?
Do you have inspectors [illegible] energy and skill necessary to lead enginemen (and other employees) to report infractions of rules voluntarily?
If you have not enough inspectors, secret or non-secret, why do you not have more? Who is at fault for the lack?
Do you get good results from winking at [illegible] offenses as disregard of signals?
Are you cold and judicial enough to apply severe discipline to good runners? To those who try to wheedle you? To those who are most powerful in their lodge?
What proportion of discharged or suspended enginemen do you convince of the justice of your action?

Discipline of the kind suggested by these questions, administered without fear or favor, would cause a marked awakening on many roads; and an awakening would improve the service; for there can be no doubt that a great majority of the mistakes of enginemen are the result of habitual loose thinking, which will never be corrected by circulars or diminished by horizontal increases of pay, or by being pleasant to grievance committees.

The Bridgeport case, like Batavia, N. Y., Grindstone, Me., and many others, brings up the question of the fireman and his value as a monitor. If an engineman drops dead or falls in a faint, the fireman's presence as a lookout is of vital importance. The Bridgeport fireman was experienced; but that does not amount to much if the requirement that firemen shall see signals is not enforced. This rule is in all the rule books in the country, but on nearly or quite all of the roads it is enforced poorly or not at all. On the New Haven the rule says frankly that the fireman is to observe signals *when not otherwise engaged*. On other roads this is an unwritten proviso. But with that proviso what is the rule good for? Superintendents who have made this rule a real safeguard should stand up and be counted. The rule should be enforced or else abolished. Except perhaps on the heaviest freights its complete observance is possible. Is it not worth while to make its observance actual? If firemen neglect it and enginemen acquiesce in the neglect, the result is that at many of the most critical times there is on the engine only one lookout man. This being admitted, as the facts compel us to admit, the way is open for Congress to require a third man on the engine, or to order the general introduction of automatic stops; for the presence of the existing rule in the rule book is presumptive evidence that a single lookout is not regarded by the railways as sufficient.

The most hopeful means immediately available for preventing these unexplainable derailments and collisions is to secure, at any expense, from every engineman, the best service of which he is capable. The great majority of enginemen have ample mental and moral capacity for their duties under rigid discipline. The inefficient must be weeded out.

NEW BOOKS.

Investigations on the Briquetting of Lignite. By Charles L. Wright. Issued by the Bureau of Mines, Washington, D. C., as Bulletin No. 14.

The tests, conducted by the author, indicate that some American lignites equal German lignites in fuel value, and can probably be made into briquets on a commercial scale without the use of binding materials. Cohesion and weathering tests demonstrated that good briquets endure handling and resist weathering much better than the lignite from which they are made. Of four samples of raw lignite, three contained about 40 per cent. moisture and had a full value of 6,079 to 6,241 B. T. U., while a Texas lignite, with a moisture content of 33 per cent. had a fuel value of 6,840 B. T. U. The percentage of moisture removed in the process of briquetting ranged from 24 to 32 per cent., and the heat value of the briquet was 36.5 to 54 per cent. higher than that of the raw lignites. In the case of one of the North Dakota lignites the removal of 32 per cent. of moisture during briquetting permits a decided lessening of the cost of supplying a consumer with a given number of heat units. The advantage of the briquets in this respect is of especial importance when transportation to a distant market is involved. If the briquets possess no other advantage over raw lignite than their higher heat value, they would be worth 50 per cent. more than raw fuel. This bulletin can be obtained from the Bureau of Mines, Washington, D.C.

Letters to the Editor.

WIDE FIREBOXES.

PHILADELPHIA, Pa., July 28, 1911.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

I read my friend Bell's letter on the history of wide fireboxes for locomotives in the issue of July 21, page 110, with much pleasure. In his letter I do not agree with one thing, and that is the date given for the first *wide firebox*, i. e., one extending over the driving wheels. I wish to call his attention to locomotives used in France as shown in Colburn's History of the Locomotive Engine, published in 1871. A wide firebox engine is shown on pages 89 and 90—Figs. 105, 106, 107 and 108—which was used in 1863.

HENRY F. COLVIN.

ENGINE NUMBERS READABLE AT NIGHT.

SACRAMENTO, Cal., August 1, 1911.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

Standard rules provide for the insertion of engine numbers in train orders for the purpose of identification. Many passenger engines are equipped with electric generators to furnish current for headlights and engine indicators, and electric lights are provided for the benefit of the engineman in oiling instead of using a torch. Why not place two 16 c. p. electric lights under the iron step that is attached to the side of the tender above the [illegible] on Vanderbilt tanks, directly over the engine [illegible] is placed on the side of the tender? This is the only [illegible] the numbers that it is possible to see from moving trains at night. Incidentally, it may not be out of place to mention that many of the disastrous collisions occur at night. Trains always have to decrease speed materially at night to check engine [illegible] on the side of the tender by the insufficient light of a torch or lantern, and then there is sometimes a doubt if the reading is correct. By placing the electric lights on the side of the tender the rays of light will be thrown directly on the number and the doubt removed. By placing them under the iron [illegible] numbers would be removed and the numbers would be as plainly discernable as the train numbers in engine indicators. This idea, [illegible] would be particularly [illegible] that are equipped [illegible]

[illegible] everybody can agree with our correspondent. But it is highly [illegible] to scrutinize the front of the engine, in the expectation of finding the number on the tender, and then the tender should fail him, he might be worse off than before. In this connection it is to be borne in mind that to require conductors, enginemen and others on moving trains to read engine numbers at night, at the risk of causing a collision if a mistake is made, cannot be dignified by any better name than a necessary evil. Use the block system, and render such a clumsy expedient unnecessary.—EDITOR.]

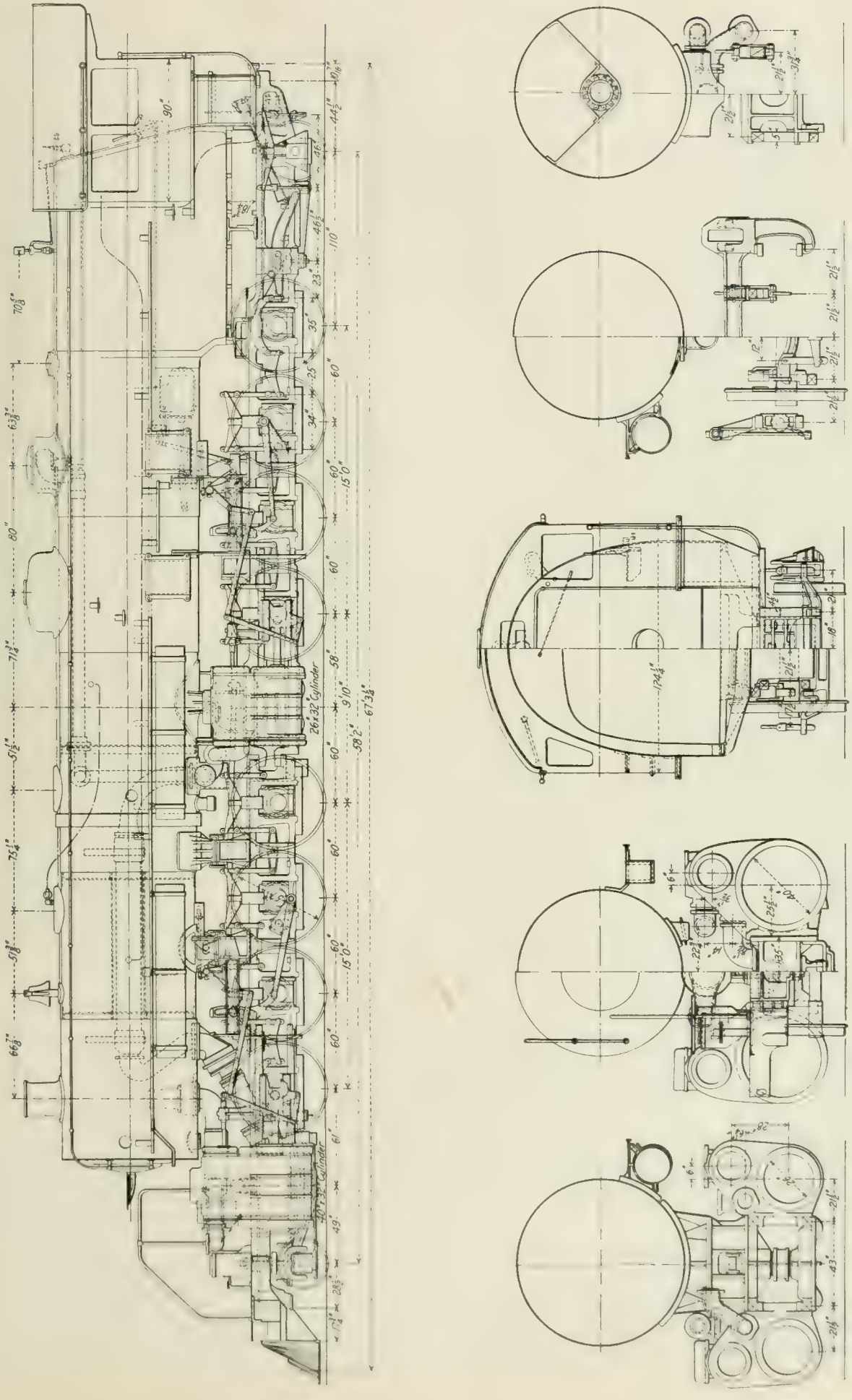
MALLET LOCOMOTIVES; DULUTH, MISSABE & NORTHERN.

The Duluth, Missabe & Northern has recently placed in service eight Mallet locomotives having the 2-8-8-2 wheel arrangement. These engines were built by the Baldwin Locomotive Works, Philadelphia, Pa., and are operating under specially difficult conditions. Their duty is to either pull or push trains of empty steel ore cars from the docks at Duluth, Minn., to the yard at Proctor, a distance of seven miles. For six miles there is an ascending grade of 2.2 per cent., combined with numerous compensated curves of 6 to 10 deg. The engines were built under guarantee to handle, on this grade, a train of 55 empty steel ore cars, each weighing 32,300 lbs., with a caboose weighing 20,000 lbs., at a speed of 12 m. p. h. This represents a load, exclusive of engine and tender, of approximately 900 tons. The locomotives have proved their ability to handle 950 tons under the specified conditions. The calculated tractive effort, working compound, is 91,000 lbs. The engines

Heavy Mallet Locomotive; Duluth, Missabe & Northern.

are capable of traversing curves of 18 deg., and are arranged for operating in either direction. They have a pilot and headlight at each end, and the arrangement of the truck wheels is said to be of special value in work of this character.

The boiler has a straight top, and is of the separable type, with a feed water heater in the front section. The water enters the heater through right and left hand check valves, and is discharged through an outlet placed in the manhole cover on the top center line. The main check valves are placed [illegible] and left, near the front end of the boiler proper, and approximately on the water line. The feed, after passing through the check enters, an internal horizontal pipe, 20 in. in length. This pipe is closed at the end and has holes drilled on its upper side so that the water enters the boiler in a number of small [illegible] The design is the invention of C. W. Seddon, superintendent motive power Duluth, Missabe & Northern, and has given good satisfaction. The [illegible] has an exceptional amount of heating surface and volume, and approximates the Wootten type in shape. The grate is arranged to rock in four sections, and is provided with transverse drop plates, located between the front and rear group of rocking bars. The ash-pan has a [illegible] hopper and damper front and back, and draft openings under the mud ring at the sides. It is piped so that the ashes can be blown out the sides into the hopper, and thence out through the [illegible] damper. The [illegible] has a short exten-



Mallet Articulated Locomotive; Duluth, Missabe & Northern.

sion and contains a high single nozzle, in front of which it placed the adjustable diaphragm. The stack is twenty inches in diameter, and it has an adjustable petticoat pipe beneath it.

As far as details of construction are concerned the boiler follows the regular practice of the builder for locomotives of this type and capacity. The separable joint surrounds an intermediate combustion chamber, located between the water heater and the evaporating section. The longitudinal seams are butt-jointed and welded at the ends. The dome is formed of a single piece of pressed steel, flanged to fit the radius of the boiler shell. The arrangement of the steam and exhaust piping used presents several interesting features. The throttle valve is connected to an internal dry pipe, and this, in turn, communicates with right and left hand steam pipes located in the combustion chamber. These pipes are seated on a saddle shaped casting, which is bolted to the underside of the boiler shell, and has cored in it suitable passages for the high pressure steam and exhaust. Short pipes connect these passages with the high pressure steam chests. Here the distribution is controlled by inside admission piston valves, 15 in. in diameter. The high pressure exhaust, after passing through the saddle, enters a cast iron elbow pipe and is conveyed to the reheater. This device is located in a 21-in. flue which traverses the center of the water-heater. It consists of two cast steel headers connected by 31 2-in. tubes and provides a reheating surface of 160 sq. ft. At the front end the reheater connects with a second elbow pipe. This pipe is located in the smoke-box and communicates with the flexible receiver pipe, which is arranged in accordance with the usual practice of the builders. The exhaust pipe connecting the low pressure steam chest with the smoke-box calls for no special comment. The low pressure distribution is controlled by outside admission piston valves, of the same dimensions as those used with the high pressure cylinders.

The valve motions are of the Walschaert type, and are controlled by the Baldwin power reverse mechanism. The links for both the front and rear engines are supported by longitudinal bearers, outside the leading driving wheels. Both the high and low pressure valves are given ¼-in. lead. The cylinder by-pass valves have flat plates over the relief ports, this being the type ordinarily used by the builders on piston valve engines. The low pressure cylinders are lubricated by force feed oil pumps driven from the front valve motion. The frames are of cast steel and measure 5 in. in width. The articulated connection and the frame construction at the low pressure cylinders are in accordance with the usual practice of the builders. The forward equalization system is broken between the second and third pairs of drivers, while the rear system is continuous on each side of the locomotive. The front truck is center bearing, and the back end of the forward equalizer rests on a transverse leaf [illegible] which is supported from yokes placed over the leading driving boxes. The front frames are strongly braced transversely by the two cast steel waist bearers on which the engine is supported. The rear frame braces include a substantial steel casting, which serves as a support for the front end of the mud ring. The latter is carried at the rear on a vertical expansion [illegible] The tender frame is composed of 13-in. channels with front and back bumpers of cast steel. The trucks are of the arch-bar type with steel bolsters. The tank has a water-bottom and carries 9,000 gal. of water and 16 tons of coal.

[illegible] under such conditions heavy compound locomotives operate to [illegible] engines steam freely and preliminary tests indicate that they [illegible] are given in the accompanying table.

Type	2-8-8-2
Service	Freight
Fuel	Soft coal
Tractive effort	91,000 lbs.
Weight in working order	448,000 lbs.
Weight on drivers	406,600 lbs.
Weight of engine and tender in working order	620,000 lbs.
Wheel base, driving	30 ft. 10 in.
Wheel base, total	58 ft. 2 in.
Wheel base, engine and tender	87 ft. 6 in.

Ratios.

Total weight ÷ tractive effort	4.92
Weight on drivers ÷ tractive effort	4.47
Tractive effort × diameter drivers ÷ heating surface	.755
Total heating surface ÷ grate area	82
Firebox heating surface ÷ total heat. surface, per cent.	3.71
Weight on drivers ÷ total heating surface	59.2
Total weight ÷ total heating surface	65.1
Volume equivalent simple cylinders, cu. ft.	27.75
Total heating surface ÷ vol. cylinders	248
Grate area ÷ vol. cylinders	3.03

Cylinders.

Kind	Compound
Diameter	26 in. & 40 in.
Stroke	32 in.

Valves.

Kind	Pist. Piston

Wheels.

Driving, diameter over tire	57 in.
Driving, thickness of tire	3½ in.
Driving, journals, main	11 in. x 12 in.
Driving, journals, others	10½ in. x 12 in.
Engine truck, diameter	30½ in.
Engine truck journals	6 in. x 11 in.
Trailing truck, diameter	36 in.
Trailing truck journals	6 in. x 10 in.

Boiler.

Style	Straight
Working pressure	200 lbs.
Outside diameter of first ring	84 in.
Firebox, width and length	96 in. x 126½ in.
Firebox plates, thickness	⅜ in.
Firebox, water space	6 in. & 5 in.
Tubes, number and diameter	301 2¼ in.
Tubes, length	21 ft.
Heating surface, tubes	4,934 sq. ft.
Heating surface, firebox	255 sq. ft.
Heating surface, feed-water heater	1,694 sq. ft.
Heating surface, total	6,883 sq. ft.
Grate area	84 sq. ft.

Tender.

Wheels, diameter	33 in.
Journals	6 in. x 11 in.
Water capacity	9,000 gal.
Coal capacity	16 tons

GOVERNMENT REGULATIONS FOR THE TRANSPORTATION OF DANGEROUS ARTICLES.

Beginning on the first of October next, the regulations prescribed by the American Railway Association for the transportation of dangerous articles, other than explosives, will be superseded by a code which has been issued by the Interstate Commerce Commission, and the new regulations, prefaced by a brief code of rules prepared by the American Railway Association and serving as an introduction and index to the government rules, is being sent out by the general secretary of the association. All railways are urged to re-issue their regulations in accordance with the new code as soon as possible, so as to give employees ample opportunity to study them before October 1. The Interstate Commerce Commission rules were drawn up originally by the railways' bureau of explosives. The rules have the force of law, and they require railways to furnish copies of them to shippers of dangerous articles on application

An important and new feature of the government regulations is the inclusion of detailed specifications for shipping containers for dangerous articles. These fill eight pages of the pamphlet. There are six sets of specifications, covering the manufacture and test of glass carboys for corrosive and inflammable liquids; metal cans and boxes for inflammable liquids; seamless steel cylinders for gases under high pressure; lap welded steel cylinders for anhydrous ammonia; iron or steel barrels or drums for inflammable liquids, and wooden, wire-bound or fibre board boxes for matches. The adoption of these specifications, to be followed later by specifications for other containers, emphasizes the fact that the regulating authority exercised by the Interstate Commerce Commission to secure safe transportation, applies to

the shippers as well as to the carriers. The standards fixed by these specifications are higher than those heretofore in general use, increasing the cost of packing.

An important change in the body of the regulations is the use of a single list of well-known dangerous articles to replace the three lists of "Inflammable Articles," "Doubtful Articles," and "Excepted Articles," in the A. R. A. regulations. This simplification has been made possible by the education of shippers and railway employees, accomplished by the bureau of explosives during the past three years. Under the old regulations station agents were required to act somewhat in the capacity of a policeman in enforcing the rules. In doubtful cases they had to inform themselves in regard to the knowledge possessed by the shipper, not only of the requirements of the regulations, but of the characteristics of the material offered by him for shipment. These requirements are now the law of the land, applicable to the shipper as well as to the carrier; not simply railway rules that an obstinate shipper may decide to disregard. After October 1 the shipper of a dangerous article of any kind must certify on his shipping order that he has complied with the regulations of the Interstate Commerce Commission.

In preparing for the commission the new set of regulations, the bureau of explosives has been successful in securing the co-operation of interstate shippers. Practically all of the container specifications mentioned were drawn by committees of manufacturing shippers, a very practical evidence of their willingness to co-operate in promoting public safety.

The certificate to be signed by shippers will have to be in a form different from that now required, so that if old blanks are continued in use rubber stamps will be necessary to insert the new wording.

The new rules include specifications for iron or steel barrels or drums to be used in transporting inflammable liquids. These require that a drum with a capacity of 50 to 55 gals. shall weigh 70 lbs., and be of No. 16 gage metal, United States standard; a drum to carry less than 30 gals., No. 18 gage; one to carry 100 to 110 gals. to weigh 130 lbs., and to be made of No. 14 gage; every drum to stand a compressed air test of 15 lbs. per sq. in., and be designed to stand a hydrostatic test of 40 lbs. per sq. in.; and every drum must be able when filled with water to stand being dropped 4 ft. to a solid concrete floor without leakage.

No change has been made in the labels specified for packages or in the placards prescribed for cars. The shippers must furnish and apply the labels to their packages, and the carriers must supply the placards.

It was recommended by the bureau of explosives that the use of metal barrels or drums meeting these specifications be made compulsory for inflammable liquids having a flash-point below 20 deg. F. The commission did not approve this recommendation and adopted a rule permitting the use of good wooden barrels for these liquids, expressing the expectation that the use of wooden barrels would be gradually discontinued.

It will thus be seen that while the commission permits the use of wooden barrels, it has by the adoption of the metal barrel specifications prohibited the use of many of the grades of cheap metal barrels heretofore used for this service, and it has given at least a moral support to the contention of the bureau of explosives. It is believed to be only a question of time when the permission to use wooden barrels for such inflammable liquids as gasoline, will be withdrawn.

Another new and important feature of the rules relates to the transportation of inflammable liquids in tank cars. It is now specified that in order to be transported in a tank car, an inflammable liquid must not show a vapor pressure of more than 10 lbs. per sq. in. at a temperature of 100 deg. F. Not many of the shippers using tank cars have known heretofore anything about the vapor pressure of liquids shipped by them, and the serious accident at St. Louis in April last, was due to the transportation in a tank car of unblended liquefied petroleum gas (casing head gasoline). Samples of this liquid have shown vapor pressures at 100 deg. F. exceeding 30 lbs. per sq. in.

This accident has also emphasized the necessity for some action on the part of the railways to insure that tank cars used for this dangerous service are selected from the best cars available. Not infrequently in the past, any tank car available has been considered satisfactory and no distinction has been made between the dangers involved in transporting in such a car highly volatile and inflammable liquids on the one hand, and lubricating oil, or cottonseed oil on the other. The tank car committee of the Master Car Builders' Association has been re-established, and this important question will be given serious consideration in the near future.

Colonel Dunn, chief of the bureau of explosives, has been conducting a vigorous campaign of education among the manufacturers of liquefied petroleum gas, a new and important industry, and has got many of them to supply themselves with the vapor tension measuring apparatus developed by the bureau of explosives working with a committee of manufacturers. The construction of this apparatus is described and directions for using it are given in a circular which has been issued by the bureau.

TRAIN ACCIDENTS IN JULY.[1]

Following is a list of the most notable train accidents that occurred on the railways of the United States in the month of July, 1911. This record is based on accounts published in local daily newspapers, except in the case of accidents of such magnitude that it seems proper to write to the railway manager for details or for confirmation.

Collisions.

Date.	Road.	Place.	Kind of Accident.	Kind of Train.	Kil'd.	Inj'd.
†3.	W. Jersey & S.....	Lucaston.	xc.	P. & P.	2	17
5.	M., St. P. & S. S. M..	Superior.	bc.	F. & F.	3	3
5.	L. S. & M. S..... N. Y. C. & St. L..	Ashtabula.	xc.	F. & F.	5	2
*6.	Wabash	Litchfield.	xc.	F. & F.	1	2
13.	Southern	Granite Quarry.	xc.	F. & P.	0	6
15.	Erie	Portage.	xc.	P. & F.	1	8
17.	Penn.	Newark.	xc.	F. & F.	1	0
19.	Ann Arbor	Ann Arbor.	xc.	P. & F.	0	2
27.	Seaboard A. L....	Hamlet, N. C.	bc.	P. & F.	8	65
29.	Southern Pac.	Tracy.	xc.	P. & F.	0	2
28.	Bangor & A.....	Gradstone.	bc.	P. & P.	9	24
*30.	Ches. & Ohio.....	Fire Brick.	xc.	F. & F.	1	1

Derailments.

Date.	Road.	Place.	Cause of derailmt.	Kind of Train.	Kil'd.	Inj'd.
7.	Mo., Kan. & T.....	Bartlett.	unx.	P.	0	4
10.	N. Y., N. H. & H...	Westerly.	ms.	F.	1	3
†10.	Oregon Trunk	The Dalles.	d. track.	P.	2	20
11.	N. Y., N. H. & H...	Bridgeport.	exc. speed.	P.	15	50
12.	Balt. & O. S. W.....	Dillsboro.	unx.	P,	0	20
13.	Illinois Cent.	Duquoin.	malice.	P.	0	6
16.	Mo., Kan. & Tex....	Bonham Jc.	ms.	P.	0	3
16.	Buff., R. & P.....	Farmersville.	unx.	P.	0	6
16.	Chi. & N. W.....	Tilford.	cow.	P.	0	0
16.	St. Louis & S. F.....	Joplin.	cow.	P.	1	0
16.	La., R. & N. Co.....	Edenborn.	unx.	P.	0	0
18.	Penn.	Anoka	derail.	P.	0	5
19.	Balt. & O.....	Bryant.	....	F.	4	2
19.	Denver & Rio Grande.	De Beque.	d. bridge	F.	0	0
19.	Colo. & Southern....	Trinidad.	d. track.	P.	2	0
24.	Phila. & Reading	Centreville.	malice.	P.	1	12
28.	Lehigh Valley	Bowdette	b. rail.	P.	0	40

Other Accidents.

Date.	Road.	Place.	Cause of Accident.	Kind of Train.	Kil'd.	Inj'd.
3.	S. P. L. A. & S. L.	Garfield.	boiler.	F.	2	0

[1] Abbreviations and marks used in Accident List: xc, Rear collision——bc, Butting collision——xc, Other collisions——b, Broken——d, Defective——unf, Unforeseen obstruction——unx, Unexplained——derail, Open derailing switch——ms, Misplaced switch——acc. obst., Accidental obstruction——malice, Malicious obstruction of track, etc. ——boiler, Explosion of locomotive or tender——fire, Cars burned while running——P. or Pass., Passenger train——F. or Ft., Freight train (including empty engines, work trains, etc.)——Asterisk, Wreck wholly or partly destroyed by fire——Dagger, One or more passengers killed.

The derailment at Bridgeport, Conn., on the 11th, due to disregard of signals and high speed through a crossover, was the most notable accident in July, the train being one which is frequently used by the President of the United States, and the location being easily accessible to a multitude of New York reporters; but the collisions in Maine and North Carolina two weeks later were of about equal gravity. The fifteenth death from the Bridgeport disaster occurred August 10. No important facts have been brought out in addition to those given in our account printed July 14, page 90. The rear brakeman who went back testifies that the distant signal was found by him properly set to stop the train. The frog was a No. 8 (slip switch), not No. 10. The distant signals for the two eastbound tracks are on a bracket post about 2,200 ft. in the rear of the home signals, and the home signals are on a like post near the cabin. The distant and the home signal for track No. 2 were both in the horizontal position and a dwarf signal, on the ground, at the entrance to the crossover indicated "clear." A railway officer, not of the New Haven road, who knew the engineman (Curtis) says that he was above the average engineman in intelligence and general ability. Curtis had been sick with measles, returning to work about three weeks previous to this date, and it is conjectured that his health was not fully restored; but no evidence has been produced either on this point, or as to whether he had a normal amount of sleep in the period—said to be six hours—in which he was in bed, before going on duty. The afternoon and night were extremely hot. The fireman had had several years' experience.

The collision at Hamlet, N. C., on the 27th, was between an excursion train carrying 912 passengers (negroes), and a freight train. Six of the 11 coaches were wrecked. Eight passengers were killed, and 62 passengers and 3 trainmen were injured. Most of the victims were in the third and fourth cars of the passenger train. The collision was due to an error of the despatcher, who notified the freight that all overdue trains had arrived at Hamlet, when such was not the fact.

The collision at Grindstone, Me., on the night of the 28th, in which five passengers and four trainmen were killed, and 22 passengers and two trainmen were injured, was between a southbound regular and a northbound excursion train. Both trains were moving at moderate speed, but yet fast enough so that the engine of the excursion train was pushed back through the car next to it, which was the smoking car; and nearly all of the passengers killed or injured were in this smoking car. Both engines were badly wrecked, and both firemen and one engine man were among the killed. The trains were to meet at Grindstone. The excursion train was the second section of a regular train and was inferior, by direction, to the southbound. It had overreached on the time of the other train one or two minutes. The enginemen and the fireman of the excursion train were both killed.

The collision at Lucaston, N. J., on the third was due to the mistake of a brakeman who threw a crossover switch instead of a switch leading to a side track. His train, a westbound local passenger train, was to be backed into the side track to clear the main line for a following express train. In consequence of the mistake in setting the switch the local train was backed across to the eastbound main track just as an eastbound passenger train came along at high speed, and two passenger cars of the local were struck in the side and overturned. Two passengers were killed and 17 injured, all of them in the two coaches of the local train. The brakeman who threw the wrong switch is a man of experience. He was arrested and sent to jail on a charge of manslaughter. The two switches are only about a rail length apart. The report indicates that the engineman of the local train was one not regularly assigned to that train, and that he stopped the train a little too soon, so that its rear car was just past the crossover switch but was not past the next switch. It is said that he backed the train before the brakeman had given a signal authorizing him to do so.

Electric Accidents.—Of the 14 accidents to electric cars reported in the newspapers as occurring in the United States in the month of July (and in nearly every one of which a considerable number of persons were injured), three are charged with fatal results. A butting collision at Fairhaven, Mich., killed one and injured 27. Another similar accident at Dearborn, Mich., killed one and injured 25, and one at Ridgewood, N. J., on the 21st, killed three and injured 12. In the last mentioned case one of the cars was an extra, and it was being run by the superintendent of the road; and he was killed. The collision was due to disregard of an automatic block signal. This signal had been struck by lightning and made inoperative, and the men in charge of the regular train (car), not having been informed that an extra car was coming from the opposite direction, proceeded on their timetable rights. This action of the conductor and the motorman was therefore in defiance of the lesson of a dozen years' experience with automatic block signals on single track lines, namely, that when such a signal indicates stop, whatever the cause, the only safe course, unless the line can be seen for a long distance, is to send a flagman ahead. Timetable rights and block signal rights cannot be thus easily interchanged.

LETTERS FROM AN OLD RAILWAY OFFICIAL TO HIS SON, A GENERAL MANAGER.*

XII.

Omaha, Neb., June 24, 1911.

My Dear Boy: You tell me that you are conducting labor negotiations these days. As I understand it, all the old grievances have been merged; after eliminating all demands introduced for trading purposes it is simply a question of more money. This simplifies the proposition. The union gets all that it can and the general manager gives up only what he must. Simple but barbaric. Such innocent bystanders as the public and the stockholders may get hurt in the process, but that is part of the penalty for being innocent bystanders. We are in a transition period. All the hot air fests that you are now holding are probably necessary to blow the chaff away from the wheat. Sooner or later the irrevocable law of supply and demand must operate to place the whole matter of the compensation of labor upon a more scientific basis. At present it is rather the strength of the particular union than the relative justice of its demands.

Our predecessors of two generations ago did many fine things, but they overlooked some basic propositions. Suppose that fifty or sixty years ago when a brakeman expected to be promoted to a conductor they had said: "Fine, my boy. You have the ear-marks of a conductor. You understand, of course, that we have no conductors who cannot run an engine. We will arrange, without money loss to you, for you to fire two or three years. When you assure us of your ability to run an engine we will begin to commence to talk about making you a conductor." Later on a man with this splendid all-around training could have specialized along the line of his greatest aptitude. We would not see freight tied up in terminals waiting for firemen, with a board full of extra brakemen. There would be an elasticity of assignment that would work out for the good of all concerned. We would not have the fireman straining his back to shovel fifteen or twenty tons of coal while a different breed of cat, a brakeman, rides on the fireman's seat and forgets to ring the bell when the train starts.

We blame the unions for expensive lack of interchangeability of function. The fault lies at the door of the official class. The master mechanic said: "This is *my man.*" The superintendent, and later the trainmaster, said "This is *my man.*" This pleasing tenacity for so-called individuality left the company out of the reckoning. The company got it where the chicken got the axe, sweet Marie. It did not take the men long to respect the plane of cleavage which the officials had

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projected. So we have a number of unions with conflicting demands rather than the more enlightened self-interest of a larger body. I know that it has been fashionable to play one union against another, but the day of this is nearly passed. Just how it will all work out I do not know; perhaps it is too late to expect amalgamation. Perhaps it will come of itself when the firemen and enginemen absorb or replace the Brotherhood of Locomotive Engineers, and when the trainmen outlive the Order of Railway Conductors. Whatever the cause and whatever the existing conditions the result is plain. We have a number of forces operating to restrict the output of capable men. The economic machinery of society at large is therefore out of balance. You cannot blame the artisan, skilled or unskilled, for guarding the entrance to his craft. It is human nature, and it is right. The debatable ground, however, is as to where the entrance of the public at large should be to prevent the matter being overdone. No one labor organization can expect, in the long run, to be given preferred consideration over another; neither can the labor unions, comprising only a small percentage of the country's population, expect indefinitely to dominate society at large.

It is useless to expect to accomplish much in the way of increased elasticity of labor as long as railway officials, through so-called departments, insist upon narrowing and specialized rigidity. Such reforms to be effective must begin at the top. It will all come out in the wash, but in the meantime the laundry bills are disproportionate and may place cleanliness far beyond godliness.

General Sherman, one of the versatile geniuses developed by our great Civil War, once said that most men consider the immediate at the expense of the remote; that a few like himself were handicapped by considering the remote rather than the immediate; that really great men, like Grant, derived their title to greatness from an ability to balance the immediate and the remote. All men are more or less a product of conditions and environment. The railway official of today lives from hand to mouth—the hand of expediency to the mouth of rapid-fire results. When more roads are like the Pennsylvania in having the stability which admits of intelligent, far-seeing, actual control by directors and executive officers, it will be easier. The banker, from his condition and environment, dreads a war or a strike more than the famine and the pestilence. The former two seem to him to be avoidable, while the latter may be visitations of Providence. A strike, like a war, is a terrible thing to contemplate. A surrender to principle and violation of the broad laws of true altruism can be even more terrible. Last year when the Pennsylvania, backed by its directors, called the bluff of the trainmen, there was hope in many a breast that a lesson would be learned; that the rights of the community at large would be vindicated as against the unreasonable demands of the powerful few. How quickly did the trainmen find an excuse to back down. Their friend and advisor, the late Edward A. Moseley, shrewd and scheming, once told them that their best weapon is a threat of a strike and not the strike itself. By and by the bankers will learn these lessons and bargaining will be scientific and altruistic as well as collective and coercive.

Perhaps you are thinking that, like the minister who lectures the members present for the non-churchgoing of the absentees, I am taking too much of this out of you. We all know, as do the labor leaders, that no general manager ever went through a long strike, successful or unsuccessful, without ultimately losing his job. The directors start out with the best intentions of supporting him. As the struggle grows fiercer, the temporarily reduced earnings have a refrigerating effect on their feet. This cold storage is reflected by a message to the brain that the poor Mr. General Manager is so unfortunate; that he lacks tact. He is so rash. He jumps right in. We told him he might go out to swim and hang his clothes on a hickory limb. We cautioned him, as all prudent mothers should, not to go near the water. Everything in this world costs something, and nothing is more expensive than an unjust peace, a peace which leaves out of the reckoning the rights of the body politic.

One of the hopeful signs of the times is the opposition the labor unions have offered to the exponents of so-called scientific management. Already our critics are giving indications of becoming our allies as against the hard-headed, selfish opposition of labor unions to progress. This will serve to help show the public our problems in their true light. All that we need ask is a fair hearing and ultimately the calm judgment of the American people will decide aright.

I have no quarrel with the labor union, as such. Were I in the ranks I would belong to a union and give it my loyal support. Monopoly and combination of capital beget as a corollary a labor trust. You and I are powerless to eliminate the effect of such natural, economic forces. We can, however, help control the effect of these forces, preferably by reason. There are so many of the primal instincts and passions still extant in human nature that at times diplomacy exhausts itself and falls back upon the protection of forces offensive and defensive, active and passive.

You see that it is merely a phase of a general problem that a disproportionate amount of your time is taken up by affording an opportunity for delegates to make their lodges believe they are earning their per diem and expenses. What matters it to the locomotive engineers if their importunities cause scant attention to the unspoken rights of your clerks and trackmen? Why not figure out just what proportion of your time the different organizations are entitled to, shut off senatorial courtesy and limit debate accordingly?

Whatever you do, have your division superintendents present at your negotiations. Do not flatter yourself that your own wonderful ability will enable you to take a sound position on every question that may arise. Such deliberations are staff work and, unlike line administration, are not a one-man function. The final decision should rest with you, but in the meantime get all the light you can. Under the unit system the superintendent can be thus spared from his division to help save the company money because there is always a competent man to perform his duties, and a provision all along the line for automatic successions to meet just such incidents of service. It should be as easy for a chief assistant superintendent, familiar with the routine, to assume the superintendent's regular duties any day as for the second despatcher to work the first trick. When your mechanical assistant conducts his shop negotiations, by all means insist that he direct the superintendents to send in each mechanical assistant superintendent to assist in the conferences.

One reason that the labor situation has gotten away from us is because the matter has been handled on too large a scale. The tendency has been to consider the abstract possibilities rather than the concrete effort. A superintendent of a 140-mile division once recommended approval of an application for increase in wages of his milk train crew, because the men on the next division were getting as much for running only 105 miles. Investigation showed that his men were on duty less than six hours, of which the total time consumed in handling milk cans was a trifle over one hour. Each general manager is inclined to believe that his men will get the worst of it as compared with other roads. He has been inclined to yield when he should have been firm. The further away from the concrete local conditions the negotiations can be conducted the more vulnerable are the officials. The labor leaders know this, and the more divisions or the more roads they can bunch in a single negotiation or arbitration the more unwieldy becomes the proposition and the greater the gain for labor. This condition of things was partly inevitable, is now partly avoidable. Uniformity may be deadly. Standardization can be run in the ground, as was shown when a West Virginia agent of the Chesapeake & Ohio painted his wooden-leg orange color with maroon trimmings.—

Affectionately your own

P. M. P.

BUFFALO, ROCHESTER & EASTERN APPLICATION DENIED.

For the second time the New York State Public Service Commission, Second District, has denied the application of the Buffalo, Rochester & Eastern for a certificate of public convenience and a necessity, and for permission to construct a railway across the state between Buffalo and Troy. The decision was unanimous. The commission passed adversely on a previous application on March 15, 1909, and the following year an application for a rehearing was made and granted. The grounds of denial on the rehearing are as follows:

1. That a reasonable and fair estimate of the cost of the railway proposed to be constructed by the applicant is not less than $100,000,000.

2. That the principal use of the proposed road would be for through freight. That a part of the purpose is the serving of the localities through which the road would pass, but that it is not estimated or claimed by the applicant that the receipts therefrom would amount to more than one-tenth of the total receipts.

3. That the existing facilities for the carriage of through freight and passengers across the state are now adequate for existing business, and the service and facilities which can be furnished by existing railways will be adequate for a reasonable future preiod.

4. That the facilities afforded by the existing roads for the accommodation of local business are adequate. That the construction of the proposed road would be a greater convenience to these communities which are nearer to its proposed line than to the lines of existing roads, but that such greater convenience is not enough to make the proposed road as a whole a public necessity.

5. That the business which could be obtained by the proposed road would not be sufficient to pay operating expenses and a reasonable return upon the capital invested; and that the road would necessarily be bankrupt from the outset.

6. That the applicant has failed to show financial ability, resources, and connections sufficient to justify the belief that it could construct its proposed road.

7. That upon all of the facts shown by the evidence taken, the commission is unable to find that the said proposed road is a public convenience and a necessity.

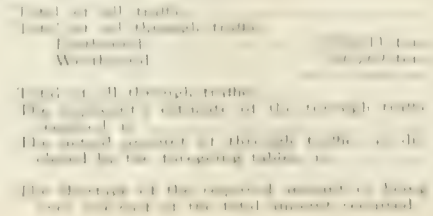
The opinion of the commission was prepared by Chairman Stevens. The new evidence adduced upon the rehearing is exhaustively considered. The applicant admits that in order to be a successful road it must earn gross the sum of $12,142,850 annually, and that of this sum $10,792,650 must be earned by the carriage of through freight. An analysis of the situation at Buffalo is given, showing in great detail that the proposed road does not connect with the Grand Trunk at the International Bridge; that there is no place for a local freight station nearer the International Bridge than at Ontario street, beyond the point where the tracks of the Lackawanna cross the tracks of the [illegible], for it to obtain a pound of freight from either lake boats or existing elevators without using the facilities of other roads which it is claimed are inadequate for handling the existing business. Passenger traffic could not be brought within 5½ miles of the center of the city upon the line of the road itself, and no [illegible] could be brought nearer the business portion of the city than Black Rock, without resorting to existing facilities which the proposed road should avoid. This situation was brought to the attention of the applicant upon the [illegible] but no attempt was made to show how these [illegible] could be overcome, although months elapsed after its attention was called to the matter before the hearings were closed.

The commission says that the applicant has not shown that at any time since the former decision either the New York Central or [illegible] Buffalo has refused to accept freight from western connections, or failed to transport the same, when accepted, without delay to the point of consignment. It has not shown any delays in handling any eastbound through freight coming from the West, either by rail or water, and delivered to existing rail lines at Buffalo, since 1907.

With one trifling exception it has not shown any congestion in the elevators at Buffalo since the former hearing. The case is practically barren of evidence showing delays in the handling of through freight. Daily reports to the commission as to cars supplied and car shipments at the elevators in Buffalo for a period of nearly a year show no failure in such car supply at any time. The conclusion is that there is no lack of facilities for the handling of the traffic which the proposed road is chiefly designed to serve, and that no claim of any failures or inadequacy of service has been made by the applicant in regard to this traffic.. Facilities for handling that class of business from which the applicant proposes to obtain nine-tenths of its revenues are adequate, and that business is being handled satisfactorily. An enormous mass of evidence was taken on the handling of local traffic by the New York Central since 1907, the applicant calling some seventy-four witnesses who gave evidence regarding undue and unreasonable delays in the transportation of freight, and some thirty-five witnesses who testified regarding delays in furnishing cars when required for carload shipments. This evidence has been thoroughly analyzed and classified, and then the evidence of the Central in response thereto is analyzed with equal care. Numerous cases of alleged delays are cited, the answer of the Central is given thereto, and analysis is made of the actual service of the Central with reference to a large number of cars ordered and when the same were furnished with reference to the point of time for which they were ordered. The number of freight trains run by the Central, their scheduled and actual running time for a period of one month is given, the handling of large numbers of cars with reference to promptness and efficiency of service is reviewed, and as a conclusion the opinion says: "After the most careful and comprehensive study which the commission has been able to give to this enormous mass of evidence, treating the matter in its broadest aspect and making all allowances in every direction which good judgment would seem to require, it must hold, as it held upon the former decision, that the existing facilities are adequate for existing business, and it must hold, in addition thereto, that the service which has been given during the past three years, and is being given now, is of such a character as not to warrant the construction of another road for the purpose of affording additional facilities and relief from delays and inadequate service."

Complaints received from shippers during the year 1910 and 1911 do not indicate any chronic delays or congsetion at any point. Attention is also called to the fact that no complaint whatever was made upon the hearing regarding the passenger service given by the New York Central; and also that, with but one break between Little Falls and Fonda, there is a first-class, high-speed trolley service the whole length of the state from Troy to Buffalo.

The cost of the road, if it is to pay a 5 per cent. return, would require a gross operating revenue of $14,285,741, which would necessitate a gross operating revenue per mile of $48,100. Complete tables have been prepared showing all of the freight handled by the New York Central during the year 1909, which the proposed road might have handled had it been in existence; the sources from which it was derived, and the place or places to which it was consigned are also given. The analysis of the mass of evidence relating to these freight shipments given by the commission is as follows:



Translating the situation into dollars and cents, the account would stand as follows:

Gross earnings required, according to applicant, upon through freight	$10,792,850
Actual earnings	1,606,775
Shortage of required amount	$9,186,075

In reaching this astonishing result it is assumed that the B., R. & E. would secure every pound of freight except that which it is certain the Central had already taken into its possession and would be required to surrender to get upon the tracks of the B., R. & E. Whether this is a violent assumption, requires no discussion.

The substantial accuracy of these figures is not questioned by the applicant, either by evidence or in its brief.

The commission also discusses the approaching completion of the Barge or Erie Canal. The evidence shows that it will be completed ready for traffic from Buffalo to Watervliet by the year 1915, and that its probable capacity will be about 15,000,000 of tons of freight annually. It is obvious that the capacity to handle 15,000,000 tons easily through this canal will have a most tremendous effect upon the freight situation. It is a factor which must be reckoned with in considering the financial success of the proposed road. Its existence is absolutely assured. It will compete for the identical freight from which the proposed road expects to derive nine-tenths of its revenues. It will be able to transport such freight at a lower rate than the applicant. The applicant upon the application for a rehearing intimated that it would produce satisfactory evidence as to its financial ability, and this was of great potency in inducing the granting of the application for a rehearing. But no new evidence of any kind having any legitimate weight was given upon the rehearing. All of the evidence that was offered is quoted at length and is characterized as ludicrous and absurd.

BAD PRACTICES MADE PUBLIC.*

GROUP V.

A. & B. R. R.—The practice on this road is for station agents to hire telegraph operators.

So far as could be ascertained, the road has no system of examining operators on standard rules, nor examination of operators for color blindness or fitness for the position of telegrapher. Many of the men claim that they never saw a book of rules, and many train-order offices are not supplied with one. Operators are not required to have standard watches. Many of them have no watches. Practically none of the offices are equipped with emergency hand signals.

C. & D. R. R.—At R operators were found completing orders before getting conductor's signature. This has been the practice at this station. At another station the third-trick operator was found working in excess of hours prescribed by law. First-trick operator gone fishing. Third-trick operator working first trick and using first-trick operator's signature.

This road has no regular examination of telegraph operators, and a majority of them have never been examined on operating rules.

E. & F. R. R.—On this road the operators in general or good, although a number of them have never been examined on the rules. In one important office the operators were found to be located in the same room with the station agent, ticket agent, and yard force, making it unsafe as concerns the blocking and train movements. The operators at this point are burdened with the clerical work for the agent, in addition to heavy telegraphing, as it is a heavy train-order point. The operator has the small telegraph table covered with expense bills and other clerical work, covering up block and train-order sheet, an element of danger. On some portions of this road it is common practice to indicate that a train has passed into a siding by a whistle signal, instead of the conductor reporting to the operator that the main track is clear, as required by the rules. It is the practice also for a train despatcher to give operator a 31 order for a passenger train running late. When the passenger train has consumed what time is given on the order the despatcher tells the operator to file the order. The order should be annulled in accordance with the rules. Many offices were not supplied with signals as required by rules, such as red lamps and flags, torpedoes and fusees. At one station a farmer's lantern was being used in the semaphore as a signal lamp. Operator had to climb post to ascertain whether or not the lamp was burning.

At C operators handling train orders are in office used by yardmaster and clerks and public. Operators are continually harassed and interrupted in their work. At the time of inspector's visit there were 12 persons in the office beside the regular employees. It was also observed that when operators relieved each other they made no transfer. When the first-trick operator went off duty he had nine train orders on the table. He went out—said nothing to the second-trick man as to what orders or messages he had for trains.

G. & H. R. R.—On this road (and elsewhere) a signal failure is not reported as such unless it has caused a train detention, or is likely to be reported by some one other than the person in charge.

Of the interlocking plants on this road there are few that are provided with circuit plans, and in no case were these plans found to be correct. Absence of emergency hand signals, especially red lanterns properly filled, trimmed, and lighted, and placed ready for use in signal stations was frequently noted.

A signal repair foreman complained that he had very hard work to keep 5 men in his gang, his book showing that in the past year he has had 150 men on his roll. He could not keep them on account of low wages ($1.35 a day). A recent increase of rate to $1.50 a day has given him reason to hope that he can obtain a better grade of men and keep them longer than had heretofore been possible.

At one interlocking plant found to be in poor condition the red roundel and the lens in the lamp of a dwarf signal on an important connection were missing, and had been missing for so long that trainmen passing at night had formed the habit of going ahead and looking at the switch and derail by the light of their lanterns to learn their position before making the move. . . . One train was observed to pass a home signal with the blade only about 5 deg. below the horizontal. Investigation showed that the signal lever could be operated while yet the signal arm would not operate on account of fouling and improper adjustment of pull and back wires.

At another interlocking plant the combined manipulation chart and track diagram was found to be incorrect. Two electric locks were out of service, and jumpers placed around the contacts in both screw hand releases.

L. & M. R. R.—None of the operators employed during the past four years had been examined on the working rules. Many boys with little experience are employed. Chief despatcher informed inspector that it was almost impossible to keep competent telegraphers; he knew that some employed by the company were incompetent, and he had trouble with them, because of sleeping on duty and other minor offenses. Few offices were found equipped with emergency signals and very few had train-order transfer books. Rules of company require trains to be spaced 15 minutes apart. Operators are not living up to this rule.

GROUP VI.

A. & B. R. R.—One of the features particularly noted in an inspection of this road was that while automatic signals are provided on double track the protection on the stretches of single track intervening was much less complete. On a considerable portion of it a controlled manual block system had been in use

*From third annual report of the Block Signal Board of the Interstate Commerce Commission; conclusion of article published May 19.

for some time, but had been abandoned. In an automatic-signal installation, provided in certain suburban territory on this road, at one station a dead space of approximately 1,000 ft. on both northbound and southbound main tracks is left without track circuit.

One automatic signal was noted during inspection which was out of service on account of a defective insulated track joint. The signal had been out of service at that time for five days. Another automatic signal was reported as having been out of service for eleven days. It was alleged that the signals remained out of service for this length of time on account of the failure of track department to co-operate with the signal department in making repairs.

Surprise checking of enginemen, in their observance of signal indications, though but infrequently made during the past two years, had been revived and at the time of this inspection was being frequently made, and was found to be producing a good effect.

In one important office 12 changes in operators had been made in fourteen months. Operators in second and third tricks in this office at time of inspection were found not familiar with railway work; the manager informed the inspector that they were continually making mistakes, but they were retained because they were sober and industrious. A number of operators on this road had never been examined on book of rules; one operator when directed by the despatcher to cut in on another wire in switchboard, was unable to do so, never having had any instructions on the manipulation of the switchboard.

C. & D. R. R.—On this road, as on a number of others in this group, distant signals at various interlocking plants were found to be out of service. Another plant was found to be out of service on account of a derailment, due to misunderstanding by a freight conductor of hand signals given from signal tower by the signalman. The use of the caution card, instead of a hand signal, on this occasion, would doubtless have prevented this derailment, which caused heavy damage to the plant.

The inspector comments favorably on the very complete use of seals at a power-interlocking plant on this road to detect improper interference with the interlocking machine or the release. The use of these seals has led to a great improvement in the matter of "picking" or "plugging" indications on the interlocking machine.

Examination of the block records at a considerable number of block stations on this road shows that the records are not properly kept, some columns of the report not being filled out at some stations, while they are so filled out at others. These reports are required to be forwarded to the chief despatcher each day, and from the fact that they are continually sent in in an incomplete form, it would appear that they were inadequately checked in the chief despatcher's office.

E. & E. R. R.—On this road the inspector found an incom-

being lived up to.

one as incompetent, and one as a careless and indifferent boy.

At one 24 hour telephone block office two of the operators had been taken from farms; the third had been a section laborer for a few months. These men were given only a few days' training before they were put into regular positions. The general yardmaster informed the inspector that these men were incompetent and were continually making mistakes. During a period of eight months, the third trick in another office was held by 16 operators.

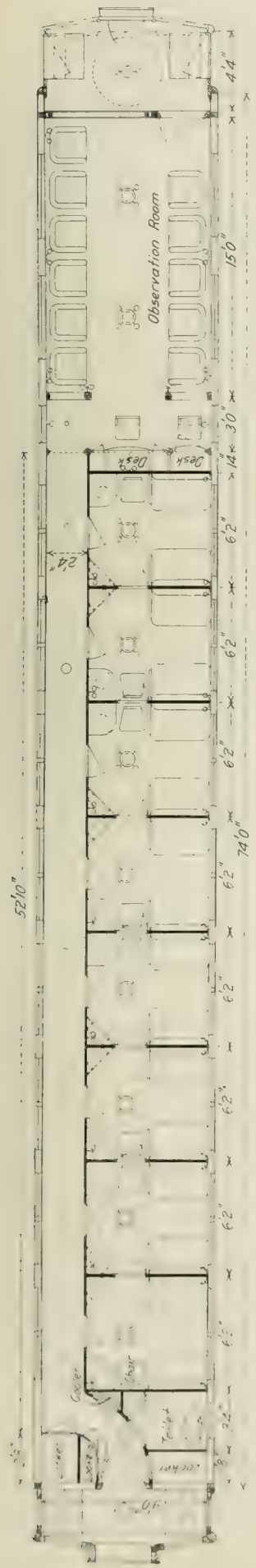
PULLMAN EQUIPMENT FOR THE CHICAGO GREAT WESTERN.

The Chicago Great Western has recently received several Pullman cars containing a number of improved and original features. The principal novelty is the ladies' observation parlor which forms a part of the new steel compartment sleeping car,

Ladies' Observation Room.

and is intended for the exclusive use of women passengers. It is 18 ft. long, and is furnished with luxurious chairs upholstered in frizette of goat's hair, and furnished in a delicate shade of green. A stenographer's cabinet, book cases and a magazine

Lounging Room in Men's Club Car; Chicago Great Western.


Observation Room
Desk
Desk
Cooler
Chair
Table
Locker
52'10"
44"
150"
30"
14"
24"
6'2"
6'2"
6'2

RAILWAY LEGISLATION IN MASSACHUSETTS.

The legislature of Massachusetts, recently adjourned, passed a law enlarging the powers of the state railroad commission, an employers' liability law, and other important acts. The committee on railways was in session from early in the year nearly to the day of prorogation.

The session of 1911 has established a precedent in railway legislation in granting a certificate of exigency to the Boston & Eastern Electric Interurban Railroad Company, after the railway commissioners who had given numerous hearings on the petition, had refused, by a vote of two to one, to grant the certificate. This company proposes building a high speed electric road from Salem to Post Office Square in Boston, with a tunnel under Boston harbor, and with branches leading into Beverly and Peabody. There are now four roads serving this territory, in part, at least; the Boston & Maine (two lines), the Boston & Northern street railway company, and the Boston, Revere Beach & Lynn. Despite the vigorous opposition on the part of these roads, together with the opposition of the New York, New Haven & Hartford and the Boston & Albany, the legislature, by a decisive vote enacted the bill into law. The company has already filed its bond as required, and claims that within four years the road will be in operation.

Railway men say that this territory cannot support an additional road, and that the granting of this charter amounts to confiscatory legislation. The Boston, Revere Beach & Lynn, which would suffer the most, is being sought by the New Haven road.

An act passed early in the session and which has been adopted by many other states requires railways to furnish individual drinking cups on all passenger trains running thirty miles or more, with a sufficient quantity of pure drinking water, cups and water to be free. This bill was vigorously opposed by the roads, and the contention was made in open hearing that the people behind the bill are interested in the manufacture of these individual drinking cups and are using this means to force the railways to accept their product. But the legislature did not take the contention seriously and the bill went through and was signed by the governor in short order.

The bill setting forth the qualifications of locomotive enginemen and conductors was the subject of protracted debates. In the form approved by the governor, it provides that no person shall act as a locomotive engineer unless he shall have been employed two years as a locomotive fireman or as an engineer's helper. No person shall act as a conductor on a railway train unless he shall have been employed as a brakeman for two years. A fine of $500 is imposed for violation of the provisions of this act. The law does not affect men who have acted as conductor (or engineman) previous to June 10, 1911.

Another bill which is without precedent authorizes the town of North Attleboro to subscribe $20,000 towards the building of the Boston & Providence Interurban Electric Railroad Company for the purpose of securing a location in a specified section of the town. [illegible] to be adopted by the road has only very recently been approved by the railway commissioners.

The powers of the state board of railway commissioners have been greatly increased by Chapter 755. Whenever the board, after hearing, holds a rate unreasonable or unjustly discriminatory or insufficient to yield compensation, it may, with due regard to a reasonable return upon the value of the carrier's property, determine just and reasonable rates, etc.; and similar power is given to regulate practices, equipment, appliances and service; but rates and facilities which have been fixed by statute shall not be meddled with. The board may employ experts to examine [illegible] and [illegible] subjects of railway [illegible] and may spend $7,000 a year for the salary and expenses of an accountant. The attorney general (or one of his assistants) is to be the counsel of the board and also must appear [illegible] any matter on which the board deem such action necessary in the public interest. Every order of the board shall continue in force unless set aside by the board or by a court.

The railway commission was empowered to relax the restrictions imposed by law on the running of street cars across the tracks of standard steam railways. A law was passed providing for the consolidation of the Boston Elevated and the West End Street Railways; the vote of the stockholders of the companies to be taken by or before September 15. Another law changes the basis for the taxation of legacies of non-residents. Where owners of railway, telegraph or telephone stocks, living in other states, leave such property, Massachusetts will assess a tax on a part of the legacy, in proportion to the part of the company's line lying within that state.

A bill that became law despite the absence of the governor's approval provides that railways issuing season tickets shall, at the request and on the presentation of a season ticket by the holder, place the same on deposit for not less than one week and reissue the ticket at the request of the owner; in other words, the passenger may take a vacation (but not more than once in three months) and not have to continue paying fare while he is away. The railways are required to reimburse the holder of a season ticket who pays fare because of having forgotten to bring with him his season ticket.

The state board of railway commissioners is required to make an investigation and a report concerning charges for commutation tickets.

The "Workingmen's Compensation act" is of vital importance to railways. This act was signed by the governor July 28, and in an opinion given by the justices of the supreme judicial court to the Senate, July 24, approving the bill as being constitutional, it is described by the court as "a radical departure in the manner of dealing with actions or claims for damages for personal injuries received by employees in the course of their employment."

The principal provisions of this act are as follows:

First: Except as to domestic servants and farm laborers, the following defences of employers are repealed by the statute—

(1) That the employee was negligent.

(2) That the injury was caused by the negligence of a fellow employee.

(3) That the employee had assumed the risk of the injury.

Second: The employer may take his chances with his employee, with the above defences repealed, or he may protect himself against their claims, and those of their representatives and dependents in case they are killed, either by becoming a subscriber to the Massachusetts Employees' Insurance Association, a mutual liability insurance company created under Part IV of the act, or by insuring the liability to pay the compensation provided for in the act, in any company—stock or mutual—authorized to do liability business in Massachusetts.

Third: The amount of compensation an injured employee or his representative and dependents may recover, is roughly as follows:

(a) For the first two weeks after the injury no compensation except reasonable medical and hospital services.

(b) In case of death, payments are to be made to dependents equal to one-half the workman's average weekly pay for the preceding 300 weeks—maximum amount $3,000—partial dependents to receive compensation in a lesser amount. If there are no dependents, expenses of burial and last sickness up to $200 are to be paid.

(c) In case of total incapacity, payment is to be made him equal to one half his average weekly pay for the preceding 500 weeks—maximum amount $3,000.

(d) In case of partial incapacity, payments are to made him equal to one half the difference between his average weekly pay before and after the accident, but the payments in no case shall extend over more than 300 weeks or exceed a maximum of $3,000.

(e) In case certain specified serious injuries are received,

there shall be paid, in addition to the above amounts, sums ranging from $120 to $1,000.

Fourth: Compensation as provided in this act will not be paid if an employee is injured by reason of his own "serious and willful misconduct," but if the injury of the employee is due to the "serious and willful misconduct of his employer," or "of any person regularly entrusted with and exercising the power of superintendence," the sums enumerated are to be doubled.

Fifth: Every employer must keep a record of injuries received by his employees in the course of their employment, and report the same in detail within 48 hours of the occurrence, under penalty of a fine of $50 for each failure.

Sixth: The act provides in considerable detail for the establishment of an "industrial accident board" which is given general supervision over all parties affected by the act, and which is clothed with quasi judicial powers.

Seventh: The act establishes a mutual liability insurance company to which employers are entitled to subscribe, as before noted.

Eighth: The act takes effect July 1, 1912, except such portion thereof as authorizes the creation of the Massachusetts Employees' Insurance Association, which portion takes effect January 1, 1912.

HEATING CARS CONTAINING PERISHABLE FREIGHT.*

BY E. F. M'PIKE,
Refrigerator Service Agent, Illinois Central.

The heating of cars loaded with perishable freight may be divided into, first, heating at terminals or reconsigning points; second, heating in transit. In both cases a considerable amount of this work is done by the shippers themselves at their own risk and expense. Shippers of potatoes, from Wisconsin and Minnesota, for example, send their own messengers along in charge of lighted fires in coal stoves; and when such messengers abandon the cars, the fire is supposed to be extinguished, as the carriers feel that they have done their part in affording free transportation for the messenger to go with the car to the Ohio river, and for his return when he has accompanied two or more cars in one train.

There are serious objections to allowing such cars with lighted fires to move without the supervision and constant care of shippers' messengers. The carriers could not undertake to replenish the coal in the stove, nor to look after it in transit. The larger shippers of potatoes have their own representatives on the track to look after the heating of cars held at Chicago, or other large terminals for disposition or reconsignment. Shippers having a large number of cars to handle are in a position to do this work economically.

The beer shippers, also, during cold weather often forward a portable heater with their cars.

This paper relates more particularly to heating service performed by the carriers when necessary, and we may consider first, the heating of cars standing on team tracks at terminals where they are held for unloading or reconsignment. It is, of course, desirable that consignees be urged to unload promptly or make early disposition of the cars. In any event it is desirable that some definite instructions in writing be obtained from the consignees as to the protection or non-protection to be given cars so held; that is, whether by placing one portable heater in the ice tank at each end or otherwise. There are, of course, certain commodities the nature of which renders it impracticable to protect them by the use of artificial heat. The whole question of heating cars on team tracks, or at terminals, or to avoid round-housing, with consequent delay, involves, first, the selection of a suitable, reliable and economical apparatus for heating, and second, the securing of definite instructions from the owner of the goods, whenever possible to do so.

When we approach the question of heating in transit, we find a somewhat larger and more difficult problem, because, it is not so easy to give the heating apparatus in cars in transit frequent inspection or constant supervision as to give such inspection and supervision to the heating apparatus in cars on team tracks. The practice of heating in transit has not become generally recognized, or firmly established on a uniform basis. It is a special service, additional to the transportation service, and if it is furnished by the carriers they are, of course, entitled to reasonable compensation for it, which feature of the matter is being investigated on its merits.

Methods of heating in transit may be divided into two classes, first, by the use of permanently equipped cars; second, by the use of portable heaters. The permanently equipped car for heating, has at first sight, certain advantages, particularly if the cars can be kept in assigned runs, and if there is perishable freight requiring heated service in both directions. But the use of an assigned car for heat, whether it is equipped with steam pipes or any other apparatus is very apt to produce a large amount of empty back haul of equipment in order to have the cars to protect assigned runs. If such cars are loaded back to the original station with dead merchandise or other freight not requiring heating, there may be delay in unloading them, when they must be made available for re-loading to protect assigned runs. Further, some of the permanently equipped cars might get into bad order and thus deplete the number of cars available to protect such assigned runs, which might mean default on the schedule and consequent complaints and trouble.

Some more or less extensive experiments have been made by certain carriers with steam heating apparatus in refrigerator cars, but so far they have not been entirely satisfactory. It is not always easy to heat passenger coaches, and the difficulty certainly would be no less in the steam heating of refrigerator cars in transit. It would be a question of equipping engines, also principal freight terminals; and then a steam heated car loaded with perishable freight might get into bad order and have to be set out somewhere in transit where steam facilities were not available, or might arrive Saturday night or Sunday morning, and have to be held over until Monday morning at a destination where steam heating facilities did not exist. It is possible that on certain long haul traffic, a plan might be worked out satisfactorily for the steam heating of refrigerator cars, if a reliable, constant and durable steam apparatus could be furnished.

Some of the New England roads handling a large quantity of potatoes from Maine, etc., have been using permanently equipped cars containing heaters which burn kerosene without a wick. Having had neither personal experience with such apparatus, nor complete information about it, I cannot state positively the results, but it has been said that this service was not in all respects absolutely satisfactory and that some fire risk is involved and other trouble encountered, owing to the care and attention required by such heaters. Experiments are also being made with a heater to burn denatured alcohol, and it is now stated that a number of cars so equipped will be in service next winter. The stove burning denatured alcohol is said to have certain parts which require some care and attention for proper adjustment or operation, and it will be very interesting, indeed, to learn the final result, in view of past experience with all other apparatus using oil as a fuel. There is also a question as to the relative cost of denatured alcohol as compared with other available fuel.

Suitable false floors should be furnished when possible in heated refrigerator cars, so as to permit a circulation of warm air under the load, such floors to be of proper design to facilitate trucking while freight is being loaded.

At the present time, as recently stated by the Service Committee of the Railroad Refrigerator Service Association, in its circular No. 22, it seems absolutely necessary for the carriers, generally speaking, to rely upon a portable heater, which can be placed in any car, at any time, at any point, as needed. This

*A paper read at the meeting of the Peoria Division, American Association of Railroad Superintendents, at Peoria, Ill., June 20, 1911.

brings us to the question of the relative merits and reliability of the different portable heaters. The beer shippers and certain railways have been using different types of oil stoves, burning kerosene, but trouble has been experienced with the wick going down, extinguishing the fire or creeping up, and causing smoke and soot, resulting in either case in unsatisfactory service, complaint, and more or less damage to the contents of cars. There have been some explosions of kerosene oil stoves, with consequent fires. Efforts have been made to design such stoves so that the wicks can be securely fastened in place, but at the best an oil stove is not automatic and requires intelligent and close supervision from time to time. They are not generally speaking, durable and is considerable overhauling or replacement is necessary so that they are not economical or satisfactory, but have been used in the absence of any suitable portable heater. They can be taken out of the car at destination and sent back by express or baggage, thus releasing the equipment for other service and preventing empty back hauls of cars.

Under this condition of affairs, the Illinois Central about January, 1910, made in its own shops after the design of one of its own men, a heater to burn charcoal. The experiments with it were so encouraging that five more charcoal heaters were built in the shops during the spring of 1910. The tests as a whole gave so much promise of better service than that previously obtained with oil stoves, that the Illinois Central, early the following winter purchased sixty charcoal heaters of improved design, having still five of the original heaters in service, making a total of sixty-five charcoal heaters, which were in constant use during at least the months of January and February, 1911, and with very satisfactory results. These heaters were of a large design to place in the body of cars containing L C L shipments. Some of these cars were permanently equipped with heaters to protect assigned runs and short hauls locally between stations where heated car service was needed in both directions. On several schedules from Chicago, outbound, however, to stations in Iowa, the heaters were taken out at ultimate destinations and sent back by baggage cars as far as Freeport, Ill., for transfer at Freeport into the regular Chicago in freight house merchandise cars. By this plan, the heaters were always returned promptly to Chicago and made available for re-use on the assigned schedules. One of these schedules from Chicago was to Sioux Falls, S. D., which is a haul of 548 miles. These cars, initially supplied with charcoal at Chicago, were waybilled for inspection at Waterloo, Ia., where the heater was always found burning satisfactorily, and where it was re-supplied with charcoal. The cars on arrival at Sioux Falls had, practically every trip, more charcoal remaining than the quantity put in at Waterloo, showing that the initial supply of charcoal at Chicago would have been sufficient to carry the car through and keep the heaters burning until arrival at Sioux Falls, but the inspection at Waterloo and the replenishing there with charcoal were a safe-guard on this long haul. The reports from the agents at Sioux Falls and other points were invariably favorable and indicated reliable and satisfactory service. The charcoal heaters are automatic, having a magazine which feeds the charcoal by gravity, and require no supervision in transit.

The [illegible] charcoal [illegible] the Illinois Central has [illegible] charcoal heaters, and has declared that [illegible] and he [illegible] Arrangements were made [illegible] good quality sent [illegible] Danville, Ill., where under supervision, it was crushed into uniform pieces about the size of a [illegible] was furnished our Burnside shops of the exact amount of crushed charcoal which would be needed by all our forwarding agents each week, according to the number of scheduled cars. By establishing this system and having the forwarding agents telegraph in ample time, before their supply of charcoal was exhautesd, no difficulty was experienced in maintaining the necessary amount of charcoal at each point, and it was found possible, at the larger stations, to store a large quantity of charcoal to provide for emergencies. It would have been possible to send a bag of charcoal along in each car with the heater, but this was not found necessary. The whole success of the charcoal heaters depends on the use of dry charcoal of good quality, crushed into pieces small enough to feed easily by gravity. The charcoal heater has no dampers or drafts, no parts requiring adjustment in transit, and therefore, is very simple and automatic. The charcoal heater seems to be of very durable design, requiring practically no replacement, except perhaps a fire pot lining once a year, costing about 40 cents. All these facts tell their own story, and it is gratifying to have found a reliable and portable apparatus for heating refrigerator cars. A new design of the charcoal heater of smaller dimensions has since been made to go in the ice bunkers of carload shipments, so as not to disturb the lading. One of these bunker heaters at each end of the car is expected to furnish ample heat to protect the contents of cars during extreme cold weather, and there seems to be reason to anticipate a widespread use of this bunker heater next winter. One thing is certain: the use of kerosene oil stoves is drawing to a close.

Successful tests of the charcoal heater have also been made by the Chicago & North Western and certain other railways.

It is understood that some of the trolley lines are using electric radiators, for which they have the necessary power, and are advertising frequent heated car service to country crossings There is a constantly increasing demand each winter for heated car service.

Railways are entitled to reasonable compensation for heated car service when they supply it, and in due course will no doubt publish proper charges for such service, which is being extended from year to year. The New England roads have for some time had tariffs in effect publishing minimum charges for heated car service in carloads, ranging from $10 to $24 per car per trip, according to the style of the car and the length of the haul. In some cases an extra charge of 10 per cent. or 15 per cent. above the regular freight rate is made for less-than-carload-heated service.

FOREIGN RAILWAY NOTES.

The construction of the Wagga to Tumbarumba railway, Australia, has been strongly recommended by the public works committee. Agitation for this line has extended over 25 years. The district is adapted for mixed farming, and is capable of [illegible] supporting dense population.

Substantial progress has been made during the last twelve months with the construction and equipment of the Benguella Railway, Portuguese West Africa, and traffic is now running up to the railhead, 200 miles from the sea. This railway runs from the port of Lobito, on the west coast of Africa, eastward through Portuguese Angola toward the Belgian Kongo, and it is proposed ultimately to extend it to join the Rhodesia railways and the Cape to Cairo line. The portion from 123 miles to 200 miles was completed in October last. A contract has been arranged for the construction and equipment of a further section extending up to 223 miles, and the surveys for the line up to Katota, 359 miles from Lobito, are to be completed by the end of June. The total distance from Lobito to the Kongo frontier is estimated at about 807 miles. The port of Lobito possesses one of the finest natural harbors in Africa, with a substantial timber jetty that is capable of accommodating the largest [illegible] running to South Africa.

Maintenance of Way Section.

THE twenty-ninth annual convention of the Roadmasters' and Maintenance of Way Association, will be held in the parlors of the Southern Hotel, St. Louis, Mo., September 12 to 15. Reports will be presented by the various committees and discussed at the convention. The Track Supply Association will have a display of appliances in the lobby of the hotel.

THE necessity for proper drainage of roadbed and the direct relation between this and the cost of track maintenance are fully realized. Drainage problems are met with so frequently and have been worked out in so many ways that the number of contributions to our contest on this subject should be large. All papers should be sent in promptly and must reach this office not later than September 1. All methods of handling track drainage problems may be treated of in the contest, and special attention will be given by the judges to those methods capable of the widest application. The papers should describe clearly the local conditions before the drainage work was begun, as well as the method adopted. Prizes of $25 and $15 will be awarded for the best two contributions, while all other papers accepted for publication will be paid for at regular space rates. All contributions should be sent to the civil engineering editor of the *Railway Age Gazette*, 417 South Dearborn street, Chicago.

TWELVE contributions were received in the Bridge Kink contest, which closed August 1. The judges—C. F. Loweth, chief engineer of the Chicago, Milwaukee & St. Paul; W. H. Finley, assistant chief engineer of the Chicago & North Western, and L. J. Hotchkiss, assistant bridge engineer of the Chicago, Burlington & Quincy—awarded the first prize to S. C. Tanner, master carpenter of the Baltimore & Ohio at Baltimore, Md., for his description of the gallows frames for placing girders; and the second prize to J. T. Frame, engineer maintenance of way of the Chicago Great Western at Clarion, Iowa, for the description of a method of shifting a trestle deck. Other papers which have been accepted were sent in by: M. Riney, foreman bridges and buildings, Chicago & North Western, Baraboo, Wis.; L. C. Lawton, division engineer, Atchison, Topeka & Santa Fe, Newton, Kan.; F. Burrell, general foreman bridges and buildings, Chicago & North Western, Fremont, Neb.; G. LeBoutillier, division engineer, Pennsylvania Lines, Cincinnati, Ohio; H. C. Arter, bridge foreman, Chicago, Burlington & Quincy, Jacksonville, Ill.; and E. R. Lewis, division engineer, Michigan Central, Bay City, Mich. These papers are published in this issue. The contest brought out a number of practical bridge kinks, but a much larger number are to be found in the field. For this reason we expect to announce a contest along similar lines in a few months.

ALMOST the entire attention of railway men in charge of tie supply today has been directed towards preparing ties for great resistance to decay, to the neglect of the proper handling of the tie to render the treatment most effective. It is inconsistent for roads to spend a large amount of money for the treatment of ties and then allow the use of picks when placing the ties in the track. The preservative extends but a short distance into the wood and a pick penetrates this coating whenever it is driven into the tie. In placing the tie in the track several such holes are made, all of which are pockets for the collection of water. At such points decay begins just as if the tie had never been treated. Some roads provide tie tongs for handling ties, while others still provide only picks. One roadmaster, who evidently realizes the injury resulting from the use of picks more than do his superior officers, who have repeatedly refused to furnish him tie tongs, requires his men to stick the pick only in the center third of the tie, as this part is ordinarily the last to fail. The pick is used even more frequently in handling a treated tie than an untreated one, because of the action of the preservatives on the skin. The use of tie tongs when handling treated ties is certainly proving economical, for, in addition to eliminating injury to the tie, they are more convenient to use and the tie can be more easily placed. They are inexpensive in first cost and can either be purchased in the market or readily made in company shops.

IN the past, for some reason, less attention has been given to economy in track work than to the standard of maintenance. Today, while not slighting this standard in any way, the cost must also be considered. To meet this demand the track man must be impressed with the value of both labor and material. If he knows that a ton of freight must be hauled 90 miles to pay for one track shovel he will not be so quick to throw it in the scrap heap. When he knows how much his tie renewals are costing him he will try to devise some way to reduce his unit cost. If he also knows what his neighbor's work is costing the spirit of rivalry spurs him to do his work cheaper than the others. The supervising officer (superintendent, roadmaster, master carpenter or supervisor) should not only know the amount of work each foreman is doing, but also what it is costing. In most cases, he knows only the first item. When he has the unit costs of the work of all his gangs before him he can readily locate the weaker foremen and help them remedy the difficulty. Many times he will be surprised to find that the man whom he considers one of his best is at the same time one of the most expensive. Cost data should be kept as the work progresses, so that weak points can be strengthened at once. Figures furnished months after work is completed are of little value compared with those prepared for the use of the men doing the work at the time they are doing it; but it is in only a few instances that such figures are kept. Believing that a more general use of cost data will result in savings in the maintenance of way department, the *Railway Age Gazette* is conducting a contest on Methods of Keeping Cost Data in Maintenance of Way Work. All methods of keeping such data and getting it before the men who are doing the work may be described in this competition. The plan should be given in detail, as well as the results secured, and the amount and cost of the clerical labor involved. Prizes of $25 and $15 will be awarded for the best two papers, while our regular space rates will be paid for all other contributions accepted. All papers must be in the hands of the civil engineering editor of the *Railway Age Gazette*, 417 South Dearborn street, Chicago, not later than October 1.

THE method of renewing ties to face advocated by Mr. Trabue in an article in this issue will be considered by most railway men as very radical. When viewed from the standpoint of past and present practice, it is so. It is a question, however, whether these objections that will be raised to it will not arise more from adherence to long-established practice and general opinion than from a definite knowledge of the actual costs involved. The greatest objection is that of waste of ties, and, while it is true that the maximum life is not secured from all the ties, the figures presented show that this waste, in the case considered, is more than offset by the saving in labor resulting. No one will deny the effect the yearly disturbance of the track during tie renewals has on the amount of labor necessary to maintain that track in proper condition. The entire question resolves itself into a study of whether this saving in track labor is sufficient to more than offset the increased outlay for ties. Attention in general has been fixed on securing the maximum life from the ties, and but little thought has been given to the question of the labor involved. Some may attribute economy in this instance to the fact that work in this case was done by a part

of the country, where ties are worth but 40 cents apiece as compared with 50 and 60 cents in the northern states, but it must also be remembered that labor is secured in the South for about $1.10 per day as compared with $1.50 in general. Thus, the ratio remains about the same. If Mr. Trabue's figures for the entire life of the ties work out as he anticipates, the experiment will become a powerful argument for the treatment of ties. If it is economical to renew to face ties having an average life of six years, it is of far greater advantage to thus renew ties having a life of 8, 10 or 12 years. It is to be regretted that more roads have not kept figures of the actual cost of the various items of track work involved here. A recent attempt to gather such data from several of the large roads revealed the fact that practically no such figures had ever been collected. In this regard, Mr. Trabue has an advantage in that he has kept actual cost data on all his investigations. It is to be hoped that this study will lead other men to investigate the question more fully and gather statistics of cost under their own operating conditions. We shall be very glad to receive further data on this subject which other men may have collected.

RAILWAY FORESTRY OPERATIONS.

THE record of the Pennsylvania Railroad's success in forestry operations, described in another column, is particularly important since conservative logging has scarcely been tried by railway foresters. The necessity for the conservation of timber resources in this country has become a popular cry in recent years, and railway managers have not been slow in recognizing it. Most of the large roads now have an officer in charge of some phase of the work of producing, preserving or utilizing timber, and much progress has been made in this line. Attempts by the roads to increase the production of timber have been directed principally to planting trees on waste lands, and in several instances this work has advanced beyond the experimental stage. It is urged in favor of such planting that, in addition to raising timber, the plantations serve as a protection against soil erosion, and in some cases against drifting snow, and that they are valuable as object lessons in conservation to farmers along this line. But the total amount of land now available for such planting, or which could be secured at a reasonable price, is entirely inadequate to produce the timber needed for railway consumption, and it would be impossible to plant trees fast enough to insure an adequate tie supply, even if money and land were available. Another objection to extensive work of this kind is that the expenditure necessary for the work cannot produce returns for many years, 30 or 40 years being about the average period in which standard ties of common species can be grown.

Foresters are practically agreed that if a supply of timber is to be assured for the future it must be done in the main by managing existing timber land and not by planting. It is not generally realized how much waste there is in the present methods of logging and milling. This waste is especially great in the production of hewed ties. It is customary to select only the younger and straighter trees for ties, making only one tie from each tree. A tree 10 to 14 in. in diameter is still growing very rapidly and a much greater timber production per acre could be secured by allowing these trees to mature before cutting. In present practice many trees of tie size are left, because for some reason they are difficult to log, and it is estimated by the government forestry bureau that by taking all trees of the tie size on the area now cut over, the yield per acre could be increased from 60 to 125 ties. If the trees now taken were allowed to mature this yield could be increased by 170 ties per acre. There is also a great waste in cutting the stump high and not making use of the butt log. It is to make use of the greatest amount of timber. It is estimated that the saving possible by the application of proper methods in logging is 25 per cent. On the basis of these estimated savings, the area which is cut over each year for railway purposes could be greatly reduced, and at the same time the net return for each acre would be considerably increased.

Forestry bureau statistics show that the annual consumption of lumber in the United States is about 60 billion board feet, of which the railways consume approximately 15 per cent., or 9 billion feet. The annual growth of timber per acre in a properly managed forest is about 400 board feet, although much higher yields than this are obtained in European forests, and, no doubt, could be obtained in this country if proper methods were adopted. It is, of course, impossible to utilize this entire growth in the finished product, but it can be assumed that under proper conditions at least 75 per cent. of the growth can be so utilized, and on this assumption 300 board feet could be secured from each acre each year. On this basis 30,000,000 acres of forest land, properly managed, would supply all the railways in the country with lumber at the present rate of consumption for an indefinite period. The annual consumption for all purposes, nine billion feet, is being constantly reduced, however, and, on this account, the above figure is considered a conservative estimate. When it is remembered that a very small number of railways now hold over 10,000,000 acres of timber land, it is evident that no very extensive purchases of private property by railway corporations would have to be made to enable the companies to produce all their own timber.

Some railway managers object that forestry operations provide for the future at the expense of the present. The best answer to this argument is the immediate saving in the cost of lumber made by the Pennsylvania Railroad by managing but a small tract of timber land. A considerable profit was shown in the first cutting on a very badly mutilated second growth forest, the entire expense of preparing the tract for producing a maximum growth in future cuttings being counted in the cost of production. Future cuttings on this same tract will show much greater profits. If it is true that a railway management can net $12,000 in three years on a small tract of only fair timber in addition to providing itself a supply of lumber for the future, it is time the policy of managing timber lands now owned and of securing other timber lands which can be managed be generally adopted.

ENGINEERING ARTICLES SINCE JULY 21.

THE following articles of special interest to engineers and maintenance of way men, and to which readers of the engineering and maintenance of way section may wish to refer, have appeared in the issues of the *Railway Age Gazette* since July 21:

The Procedure of Technical Associations.—E. L. Corthell, in a letter to the editor, comments on proper procedure at technical association conventions, as exemplified in a recent European congress. July 28, page 164.

Coal and Ore Docks of the Baltimore & Ohio at Lorain, Ohio.—The Baltimore & Ohio's ore and coal handling plant at Lorain is one of the best examples of a modern plant for the mechanical handling of these commodities. The engineering features of the building of this plant and details of the unloading machinery and power supply are included in an illustrated article on page 178 of the issue of July 28.

College Men in Railway Work.—A continuation of the series of comments on this subject, signed by "Yale, 1894," appears in the issue of August 4, page 204.

Substructure of the Kentucky & Indiana Bridge.—One of the large bridge projects now under way is the replacing of the old Kentucky & Indiana bridge over the Ohio river at Louisville, Ky. A detailed description of the substructure work, with a number of illustrations, appears on page 208 of the issue of August 4.

The new manual of the American Railway Engineering Association, which has recently been completely revised and carefully edited, is reviewed on page 258 of the issue of August 11.

The North Coast Railroad.—The building of the North Coast Railroad has attracted wide attention and is one of the important steps in the development of the far Northwest. The connections which the new line will make with existing lines, the unusual features in its construction, and a number of photographs of work along the line are included in an article in the issue of August 11, page 283.

Ductility in Rail Steel.—P. H. Dudley, consulting engineer of the New York Central Lines, presented a paper before the recent convention of the American Society for Testing Materials which included a complete discussion of ductility in rail steel. This paper is reprinted on page 289 of the issue of August 11.

Letters to the Editor.

THE FUNCTION OF THE EXTRA GANG.

Huntington, Ind., July 29, 1911.

To the Editor of the Railway Age Gazette:

The editorial on the function of the extra gang, on page 124 of the issue of July 21, appealed to me, as an extra gang can much abuse a piece of work if it is not properly organized.

I had occasion a short time ago to visit an extra gang which was trimming a stretch of stone ballast. A foreman was in charge who had spent about $200 per mile more for stone ballast work a couple of years ago than other foremen who were doing exactly the same class of work under practically the same conditions. He was starting to trim the stone in a manner which was costly and very slow. He laid a fence board on the berm where the slope of the ballast would catch it, after which he had a few men dig out large sized rocks and lay them down in a neat line. This might be all right for a road which has plenty of money, but for efficiency in track work it is hardly necessary, for the operation of trains over this track would destroy this neat ballast line with less than six months. He also had the entire gang of men engaged in trimming ballast in a very short space.

I promptly reorganized his gang in three parts. Two men were detailed to work ahead of the gang, one on each side of the track, throwing loose stone on the berm up on the ballast shoulder and also keeping the ballast out of the way of the boards which were used to make the ballast line. Thirteen men were started in at a certain point. Four of them were placed on each side of the track to form the shoulder and trim the line of the ballast, while four men worked in the center of the track shoveling the ballast out of the center on to the shoulder. Two and one-half by 6 by 16-ft. fence boards were placed on the berm at the points indicated by the ballast templet which was handled by one man a short distance in advance of the rest of the gang.

Thirteen more men were then started in at another point approximately as far in advance of point A as the day's work would carry a gang of 13 men. This gang of 13 men was also supplied with four trimming boards and one templet. The foreman took charge of one gang, while the other gang was placed in charge of the assistant foreman. Six foreigners in charge of a native laborer trucked ballast to points where a full shoulder had not been made. There was also one man carrying water, making a total of 37 men and the foreman. After working a few hours in this manner the foreman voluntarily said that the work was going much faster than formerly and his reports since that time have been surprising to me, while at the same time, his work is done very well. By splitting up the gang as outlined we had three bunches of men always trying to catch up with each other, which naturally incited some rivalry between the bunches as well as serving to keep them apart. It did not give them a chance to do as much talking as a crowd of foreigners will do if too many are working together under the supervision of one man.

This instance illustrates the results that can be accomplished not only by supervisors, but also by many division engineers, some of whom depend too much upon their supervisors, and do not get closely enough in contact with the work themselves. In another instance my attention was called to the poor daily rail reports which were received from a rail gang, and I was able to increase the amount of work done by this gang from 50 ft. per man per day to 100 ft. per man per day by going on the ground personally and remedying the difficulty.

A. Swartz,
Division Engineer, Erie Railroad.

FORESTRY OPERATIONS ON THE PENNSYLVANIA RAILROAD.

An important work which has not been emphasized in commenting on the forestry work of the Pennsylvania Railroad is the conservative management of its timbered lands. The logging operations which have been conducted by the company's foresters during the last three years over a total area of about 1,200 acres form only one of the means which are being used by the Pennsylvania Railroad in an effort to solve the problem of procuring ties and other timbers. It has used during these three years 2,600,000 board feet of lumber and 15,000 ties produced from woodlands which are being managed by its foresters. The tracts on which they are applying the principles of silviculture include small areas along the right-of-way which have no value to the company except from the timber which is growing on them, and the more extensive areas of land which are the catchment basins for the mountain reservoirs which supply water for locomotive and shop use.

Logging operations as carried on by the foresters have in view the best utilization of the standing timber and the conservation of the supply for future operations. Although the aim is to leave each tract logged in more productive condition than before, each case presents its own peculiar conditions, and must be considered as a separate problem. On many unmanaged timber tracts frequent fires have added to the injury caused by partial cuttings. In extreme cases the result of such fires and cuttings is that there are no young trees which are worth leaving and the mature trees are badly damaged. Under such extreme conditions the area as a rule would be cut clean and a complete planting made. The other extreme condition exists when the area has been free from fires and cuttings and the growth is so well graded in age that it is possible to cut out matured trees and still leave sufficient young growth to stock the area. The most prevalent condition, however, lies between these two extremes, and the methods adopted under such conditions are well illustrated by the work done on the Brush Mountain tract near Altoona, Pa. This tract includes about 700 acres in the drainage basin of the reservoirs which store the water for use in case of fire at the Altoona shops. Forest growth conserves and purifies the ground water supply, and in order properly to care for the timberlands in drainage areas the officers responsible for the water supply were glad to avail themselves of the services of the company's foresters. The tract under management lies in a basin-shaped valley known locally as the "Kettle." The slopes are steep, with a range of about 400 ft. in elevation. The forest on most of the area was second growth in blocks of even age from six to eighty years old, resulting from fires and partial cuttings. There were also some virgin trees which had been left

Planting Acorns at Morrisville Nursery.

because they were not merchantable. Three types of timber are distinguishable. The bottom land bears hemlock, white pine, black birch, red maple, white ash, cucumber tree, tulip, basswood and black ash. As this low ground is continually moist, fires have never been able to run over it, and on that account the reproduction is good. The slopes, which include most of the area, have white oak, red oak, scarlet oak, black oak, chestnut oak, chestnut, beech, black birch, white pine, pitch pine, black gum and pignut hickory. Fires have repeatedly run over these

Red Oak Plantation Three Years After Planting.

areas, with the result that there is very little ground cover and reproduction is mostly of sprout origin. The ridges are dry and the scattered timber was stunted and of poor quality. The principal species are chestnut oak, black oak and pitch pine. The reproduction is so poor as to be hardly worth considering. Many trees on the tract had been seriously damaged by fire and [illegible] dead or dying, so that much of the lumber was fast decreasing in value.

On account of the mutilated condition of this forest a very heavy improvement cutting was necessary. The intention was to remove everything that could possibly be removed without interfering with the water conserving value of the property or reducing the productive capacity of the land, and ultimately to secure a stand which would produce timber usable by the railway. To these ends there were removed in the cutting all mature, damaged and dead trees of all species; all trees of merchantable size, except where needed for reproduction; and every tree of the following species: gum, scarlet oak, birch, sassafras, ironwood, dogwood and witch hazel. The foresters of the company personally marked all trees for removal. In this marking a short-handled axe is used to blaze the trunk breast high and just below stump height. To identify the mark, a sharp blow is struck in the bare spot with the keystone brand of the head of the axe. In the process of marking, many barren spots were found which had been so badly burned that there could be little [illegible] contractor agreeing to deliver the manufactured timber on cars at Altoona. This contract also covered taking tanbark and the [illegible] usable as tanbark, and the trees which were cut for their bark [illegible]

made from logs of a given species and size, but as the contractor had had considerable experience in this work and was intelligently interested in this conservative logging, the matter was left largely to his judgment with frequent checks by the foresters. The contractor was so well satisfied with the results of the marking that he has since sought to employ the company's foresters to mark trees on his own land. In general, ties were made from white oak and chestnut oak trees of a diameter which would just make one tie, as it was more profitable to saw logs large enough to make two ties into bridge timbers, crossing planks or smaller sticks. The contractor was required to avoid injury to young trees throughout the work by so felling trees as not to strike any trees not intended for removal, by not cutting saplings of desirable species for use in logging operations, and by not locating roads through young growth. All stumps were cut low, the rule being that the stump of a sound tree should not exceed in height half the diameter of the tree at stump height. The surface of the stumps was left smooth and in good condition so that desirable sprouts would be more readily produced. Branch wood and refuse was cut so as to lie close to the ground and thus rot more rapidly. Since cordwood was not readily saleable in the vicinity, it was necessary to make charcoal from the unmerchantable timber.

Both the contractor for the logging and the one for making the charcoal agreed to exercise every possible care in preventing fires and in fighting them when once started. This is the most important provision that can be made in managing timber land. During dry weather a man was kept patrolling the tract continually, and in case of an alarm of fire the contractor was required to set every man in his force to fighting the fire.

Up to the present time about 1,200,000 board feet of lumber, 5,000 cords of charcoal woods, 90 cords of paper wood, 130 cords of tanbark and 189,000 lath have been made from this tract. Of

Locust Grove Planted in 1902.

this amount the following was taken by the Pennsylvania Railroad:

[illegible]

the department at about five cents for each thousand board feet. Since the net profit on the 1,200 acres logged has averaged about $23 per acre (stumpage not charged), and this is typical second growth land which has been considered of little value, it is evident that if the example of conservative logging set by the railway were followed by other land owners in the state the amount and value of forest products, both present and future, would be greatly increased.

The company's purchasing agent always gives the forestry department a chance to fill a requisition for lumber before an attempt is made to buy it elsewhere. If any of the material needed can be supplied from the company's tracts the order for it is placed with the forester. In order to provide seedlings for planting the company conducts a nursery at Morrisville, Pa., where commercial trees are grown and ornamental stock is carried for use on the system. The total area under cultivation is 38½ acres and the annual capacity is about one million trees. Comparing the cost of producing the trees at this nursery with the market price, the net saving to the company for the year 1910 was about $6,000. The planting of trees on unused land has been carried on since 1902. During the nine years up to and including 1910, there were set out 4,099,524 trees. This planting has been done on tracts of various sizes and under various conditions. Whenever a tract is turned over for forestry purposes a careful

Locust Plantation Near Vineyard, Pa.

examination is made to determine how it can best be used. If it is already wooded the timber is inspected, and if the stand is sufficiently valuable the tract is carefully logged and conservatively managed. If it must be cut clean, or if it is already a clear area, the advisability of planting it is considered. If it is to be planted, the species which will grow best in that soil must also be decided on. The planting may be done either in the spring or fall, preferably in the spring. This work is done by squads of men who are employed locally. They work over the ground in two rows, the men in front cutting the sod and digging holes with mattocks, and the men behind, who carry the seedlings in buckets partly filled with water, planting them in the holes. The trees are set in rows, the location of each tree being determined by the planters by sighting stakes or by following stretched lines. Under favorable circumstances a squad should plant 400 trees per man per day. To grow tall and straight trees desirable for timber it is necessary that the seedlings be planted close together, the approved spacing in most cases being six feet in both directions. After several years this growth may require thinning if the stand is good, although the natural suppression of a considerable number of the seedlings must be expected. Along all such plantations which adjoin the right of way a furrow is kept plowed to guard against the spread of fire from locomotive sparks. Most of the older plantations are of black locust, and it is to be regretted that this species is being attacked by borers with considerable damage to the young trees. The borers attack both good and bad trees, and, although they do not kill the trees, the holes they make cause many of the trees to break and to a marked degree weaken the timber which can be made from the tree. The locust leaf miner is also attacking these plantations, with the result that the growth of the trees is retarded through lack of nourishment, since the leaves cannot perform their functions after they are attacked by the miner. Although the locust grows well in Pennsylvania and makes desirable trees, posts, etc., it does not seem practicable to continue its planting for these purposes until some method can be devised to prevent the damage by these insects.

Various lines of experimental planting are attempted from time to time. As an example of this class of work, two double rows of evergreen trees were planted near Glen Loch, Pa., in 1910, to serve as a snow fence. The wooden snow fences commonly used require considerable maintenance, and it is thought desirable to substitute growing evergreen trees where conditions are favorable. Their use, however, requires a wide space between the track and right of way line. In the planting made, the first row of trees is Scotch pine planted 100 ft. from the track, while the outer row, of Norway spruce, is planted along the property line. To save expense, small trees were used in this planting, but it is thought they will be large enough in a few years to drop the snow behind them successfully.

In addition to the other activities of the foresters, the two wood preserving plants operated by the company are also under their technical direction.

The forestry department is in charge of E. A. Sterling, forester, who has several trained men under his direction. William Springer, Jr., is in charge of the logging operations and the management of the woodlots, and W. C. Shepard has charge of the nursery and planting work. John Foley, first assistant forester, who is now acting as chief lumber inspector, was active in the examination of timber land and the inauguration of the conservative lumbering operations. In addition to the regular staff several students in university forestry courses are employed during the summer to handle minor details of the work requiring some technical training. We are indebted to Messrs. Sterling and Springer for the above information.

EXPERIMENTS WITH RED BEECH RAILWAY TIES.

Since 1896 experiments with red beech for railway ties have been made in the neighborhood of Eberswalde by the Prussian Ministry of Agriculture and Forestry, in connection with the Ministry of Public Works. The carrying out of these experiments was entrusted to the main station of the experimental section of the Forestry Department, in connection with the railway authorities of the Stettin line; and later with the central railway office in Berlin.

As regards the results of these experiments, and the lessons to be learned therefrom, Professor Dr. Schwappach has published a report, a concise *résumé* of which is here given.

(1) Sound soft-hearted beech wood, impregnated with tar oil containing creosote, is a very desirable material for railway ties; and on main lines should last at least 25 years.

(2) Sound red-hearted beech wood may be used for ties without any apprehension, if the area of the red heart does not amount to more than 25 per cent for the entire cross-section of the tie, and the heart of the log does not come near the outside of the tie. Ties with gray-dyed heart are to be rejected.

(3) In selecting the wood by the forestry officials, care is to be taken that only sound wood is chosen for ties; rotten places, and especially at large branches, are to be avoided.

(4) Especial attention must be given to thorough drying of the wood before impregnation.

(5) In order to prevent splitting of the wood, the proper precautions must be taken at once after felling the tree. Letting the felled logs lie long in the sun in the early spring, which is often very dry, is especially to be avoided.

BRIDGE KINK COMPETITION

FIRST PRIZE: GALLOWS FRAMES FOR PLACING GIRDERS.

BY S. C. TANNER.

Master Carpenter, Baltimore & Ohio, Baltimore, Md.

It became necessary last year to replace an old wooden truss bridge with deck plate girders 86 ft. long and weighing approximately 102,000 lbs. The length of the bridge and trestle approaches over all was 731 ft. 5 in., while the height from the base of rail to low water at the location of the girder span was 75 ft. 3 in. The construction of the old trusses was such that it would have been both difficult and expensive to build a gallows frame on the bridge to handle the girders, while the amount of traffic over this branch line did not permit the use of steam

Gallows Frames Partially Dismantled.

wrecking cranes. It would also have been dangerous to snub the girders down into place on each side of the track from a flat car. For these reasons it was decided to build two gallows frames on flat cars, with another flat car, or idler, between. On this idler two transfer bridge winches were installed for hoisting the girders, while four boat cleats were securely fastened to the floor of each of the cars equipped with gallows frames. The girders were unloaded on cribbing on the ground at one end of the bridge on opposite sides of the track the day before they were installed. The following day the three cars were placed between the girders, which were picked up by means of two sets of 1¼ in. block and tackle at each end of each girder. The rope was made fast to the boat cleats and the three cars were then pulled out over the location of the girders on the bridge. After cutting the engine loose and blocking the cars, the girders were lowered into place with little difficulty, notwithstanding

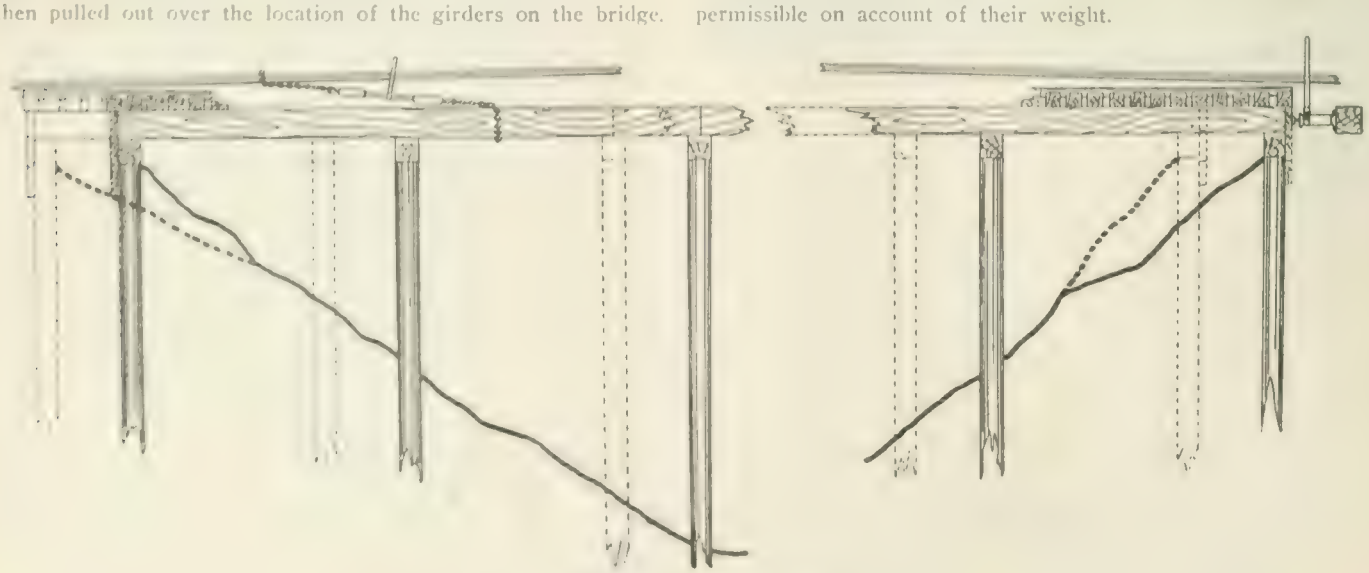
Carrying Girders Out on the Bridge.

the fact that it rained the entire day and all the ropes were wet and hard to handle.

This method will work out safely and economically on any

Girders Lowered into Place.

single track railway where steam cranes are not advisable or permissible on account of their weight.



Shifting a Trestle Deck.

SECOND PRIZE: SHIFTING A TRESTLE DECK.

BY J. T. FRAME,

Engineer Maintenance of Way, Chicago Great Western, Clarion, Iowa.

It frequently happens that the deck of a timber trestle outlines the piles and by redriving the bridge with new bents complete, several years' service is obtained from the old deck. The standard span length of the old and new trestles being the same, the new bents are driven a few feet distant from the old, and are capped and braced. The process of changing the deck from the old to the new location, if dismantled and moved in sections, is tedious and expensive. Considerable time and expense as well as delays to trains is saved by jacking up the rails, leaving the stringers, ties and guard rails intact, pulling the cap drift bolts and moving the deck forward. A jack block is set in the embankment at the end from which the deck is to be moved, and a heavy ratchet jack is set against the end of each chord of stringers with this block as a base. A steamboat pulling jack is anchored to each rail and to the other end of each of the chords. A man on each of the four jacks will move the entire deck of a trestle of several spans in length to its new location in a few minutes. The attached sketch [see preceding page] shows the manner in which the work is performed.

DERRICK CAR FOR HANDLING BRIDGE TIMBERS.

BY L. C. LAWTON,

Division Engineer, A., T. & S. F., Newton, Kan.

A number of divisions on the Santa Fe use a derrick car quite similar to the one described in the *Railway Age Gazette* of July 21. So much work is done with them that one division at least has two of these cars. As their uses multiplied it was found that piles or rail could not be unloaded from a gondola car on account of the boom striking the end of the car while coupled with the derrick. The original seat of the boom was placed at the bottom of the mast, and this is still used for heavy lifting from flat cars. To make it possible to lift from the center of coal cars a second seat for the boom was placed 3 ft. above the first on the mast. This is used almost entirely in unloading bridge material, making it possible to pick up any standard stick without lengthening the boom.

RAILS AS BRIDGE STRINGERS.

BY E. R. LEWIS,

Division Engineer, Michigan Central, Bay City, Mich.

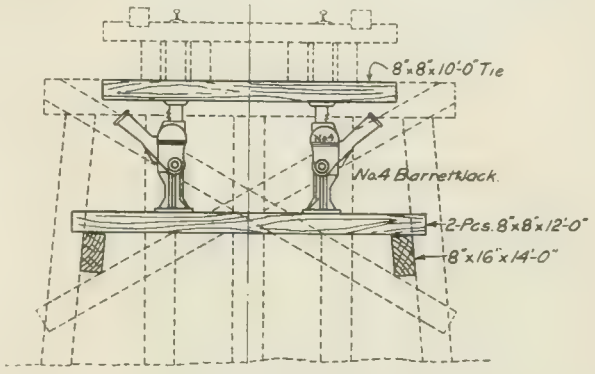
It was necessary several years ago to lay track over seven waterways for which wooden trestle bridges with spans 16 ft. long were designed. The materials for these trestles came to hand promptly excepting the 7 in. x 16 in. x 32 ft. Douglas fir stringers, which were ordered from the Northwest and had been delayed in transit because of a wreck. To allow the track laying to proceed continuous girders were designed and made from 65 lb. rails and used in place of the stringers. The spans were reduced from 16 ft. to 8 ft. and piling driven accordingly. The elevation of the cut-off was raised 11½ in. to provide for the difference in depth of stringers. The girders were made of nine rails each, balled together, five rails standing upright side by side with four on top of them upside down. Steel strap clamps held the rails in position while holes were drilled through the webs and 1 in. stringer bolts securely bolted through all the rails. The drilling and assembling were done at the bridge sites by the blacksmith and helpers. These girders were laid on the wooden caps and fastened to them with drift bolts and clamps to prevent creeping. While the construction was intended to be temporary, the girders have been in place to this time and have given satisfaction.

METHOD OF RAISING TRESTLES.

BY M. RINEY,

Foreman of Bridges and Buildings, Chicago & North Western, Baraboo, Wis.

It has recently been necessary to raise several pile bridges from 8 to 28 in. on a branch of the Chicago & North Western, where there were four passenger and six freight trains daily between 7 a. m. and 6 p. m. Second-hand 8 in. x 16 in. timbers were placed longitudinally on the pile, bracing the entire length of the bridge, as shown in the sketch. Eight inch x 8 in. x 12 ft. ties were placed on these stringers, and jacks placed on them, while 8 in. x 8 in. x 10 ft. ties were placed on the head of the



Raising Trestle with Jacks.

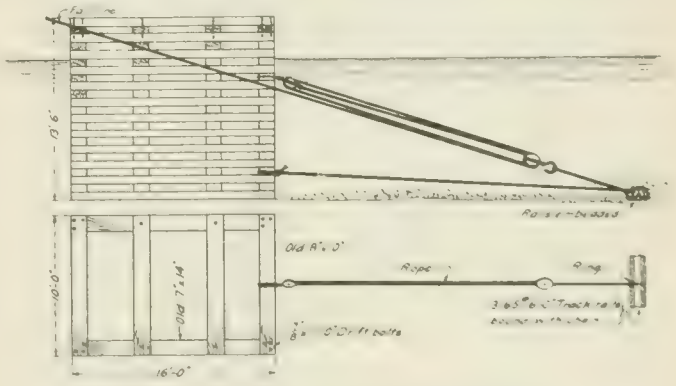
jacks under the track stringers, of which there were three under each rail. The longest bridge raised was a 19-span structure 243 ft. long with an average height of 16 ft. This entire bridge was raised with six No. 4 Barrett jacks and two screw jacks and a safe run-off made in ten hours. Dowels and lining bolts were put in place and all material picked up within this time. It required one day to place the 8 in. x 16 in. timbers the entire length of the bridge, costing $15.25, while it cost $13 to raise the bridge. The cost per lineal foot of this work for the 8 in. raise was 11¾ cents, which is as cheap as any way to handle this class of work.

ANCHORING CRIBS IN WASH-OUTS.

BY F. BURRELL,

General Bridge Foreman, Chicago & North Western, Fremont, Neb.

The following scheme was used successfully in filling a wash-out a few years ago at a point where the river had overflowed and washed out a long stretch of track. The stream was moving



Crib and Anchor for Filling Washouts.

with a velocity as high as 12 miles per hour and left a hole from 20 to 30 ft. deep with from 10 to 22 ft. of water. The pile driver was busy at a wreck some miles away, and, in order to reduce the amount of pile driving, it was determined to build cribs out as far as possible.

Cribs of the dimensions shown in the attached drawing were built and an attempt was made to put them into place, but it was found impossible to hold them without anchors. To make these anchors three pieces of 65 lb. rail. 6 ft. long were bound together by chains to which a ring was fastened. The crib was fastened to the anchor by ropes and tackle, as shown. The anchors were worked out to a favorable position and dumped, the velocity of the water, together with the weight of the rail, causing them to become quickly buried in the sand. The cribs were then filled with riprap and sunk into place. In this way the work was carried on until the bridge was shortened to 160 ft. before the pile driver arrived. This method is especially applicable in streams carrying a large amount of sand or silt where the anchor and crib are quickly buried.

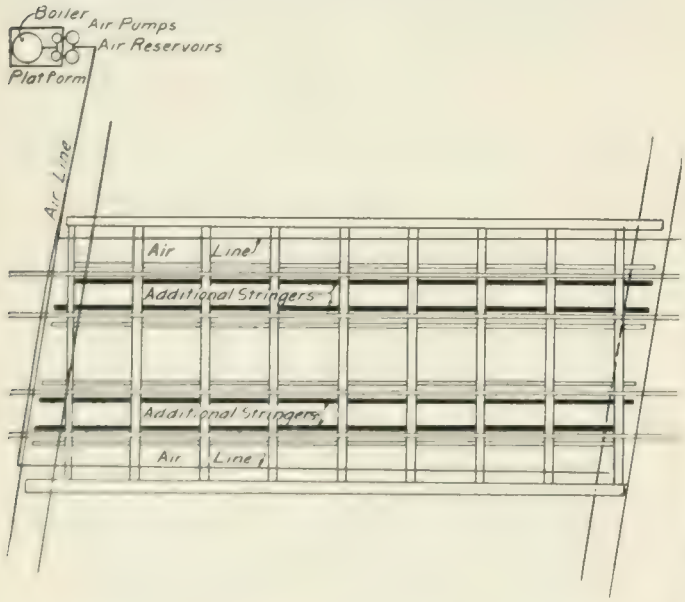
COMPRESSED AIR PLANT.

BY G. LE BOUTILLIER,

Division Engineer, Pennsylvania Lines West, Cincinnati, Ohio.

A home-made field drilling, reaming and riveting plant has been extensively used in the erection and reconstruction of steel bridges with company forces on the Cincinnati division of the Pennsylvania. This plant was built some six years ago, when 18 light bridges were replaced with heavier structures. These bridges ranged in length from 20 to 90 ft., and consisted of deck I-beams, deck plate girders, deck troughs, half through plate girders with trough floors and through plate girders. Considerable field reaming and riveting were necessary on some of these bridges.

Since that time it has been used a large number of times,



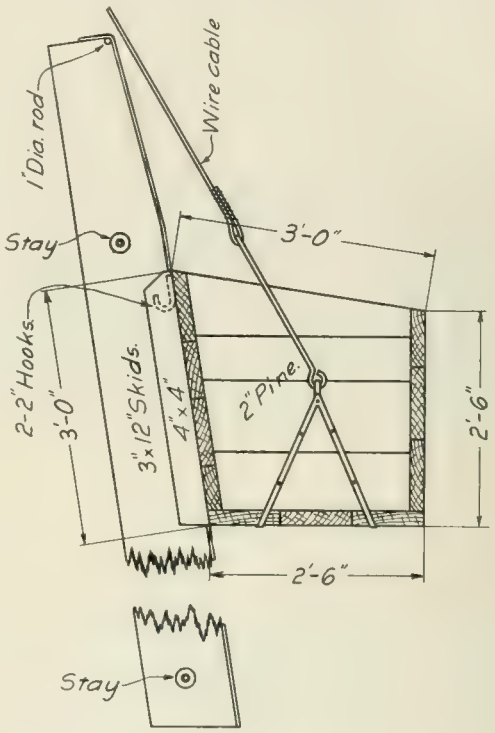
Layout of Compressed Air Plant.

A CHEAP CONCRETE HOISTING ELEVATOR.

BY H. C. ARTER,

Concrete Foreman, Chicago, Burlington & Quincy, Jacksonville, Ill.

In building concrete piers near Jacksonville, Ill., an apparatus to hoist concrete into the piers was devised to do away with the



Skid and Bucket of Concrete Hoisting Elevator.

common use of false work. A ladder or skid was made out of two pieces of 3 in. x 12 in. timber placed 2 ft. 0 in. apart and long enough to reach from the ground to the top of the piers. A 1 in. rod was placed across the skid at the upper end, as

Concrete Hoisting Bucket.

shown in the sketch. A concrete box of 2 cu. yd. capacity was made of 2 in. pine with 1 in. x 4 in. guides extending down outside the ladder to prevent the box from dipping off the

skids. Two hooks were placed on the under side of the box at the upper egde. A cable was fastened to a hoop on the box and passed through a block to the drum of a hoisting engine. As the box is raised to the top of the skids the hooks engage the

Dumping the Bucket.

1 in. bolt and dump the box. With this arrangement it is easily possible to handle a ½ yd. batch every 1½ minutes. The cost of this device was about $10, as compared with a probable cost of $100 for false work.

RENEWING TIES TO FACE.

BY R. P. TRABUE,
Roadmaster, N. C. & St. L., Nashville, Tenn.

After an experience of almost twenty years, first as engineer of construction and then as roadmaster, I became convinced that the prevailing methods of track maintenance left much to be desired in point of economy. Increasing tonnage makes it more and more difficult to maintain a high standard of track under the old method without a very great expense. After a careful consideration of all the phases of labor and material that are employed in the maintenance of track, I came to the conclusion that we could get better track, at much less cost, by renewing ties to face; and, while this method is revolutionary in its nature, the facts, borne out by an experience of two and a half years, have proven that the practice is all and more than I had expected.

Below are comparative figures of actual cost of maintenance of track by putting in ties to face and by the old method of patching in ties. The effective life of a cross-tie in main track, as borne oue by our past experience, is six years. The cost of the initial preparation of a mile of track, with ties renewed to face, for which special account was kept, was as follows:

3,000 cross-ties, at 40 cents	$1,200.00
1,263 cu. yds. ballast, at 50 cents	631.50
Labor putting in ties, ballasting and dressing up	844.00
	$2,675.50
Average cost per year, based on six-year life of ties.	$446.00
Cost of labor required to keep this mile of track in first-class condition, based on our experience of the past two years and a half, including three winters, has been, for the first three years, $27.50 per year, and for the ensuing three years will be, say $75.00 per year, or an average cost per year for six years of	$51.25
Initial cost—average per year	446.00
Total average cost per mile, per year, for renewal of ties and ballast, and labor of keeping track in first-class condition	$497.25

If the ties are renewed one at a time at different places, always leaving sound ties on each side of those advanced in decay, as is the common practice of other roads, it might be possible to get a life in main line of seven years. By this plan it would be necessary to work over the entire mile every year renewing ties, and 429 ties would be required each year which at 40 cents would cost $171.60. The labor of putting in these ties, tamping up, etc., would cost $77.22. To keep this track in good condition would require that a slight raise be made and some new ballast added every two years. On stone ballast it is impossible to tamp on a raise of less than an inch and a half, which would take 475 yds. of ballast at 50 cents, amounting to $237.50, or $118.75 per year. The cost of labor for such surfacing is $500 per mile, or $250 per year. To this must be added the cost of further maintenance which is required on account of the continual disturbance of the roadbed and which, according to our experience, will amount to $100 per mile.

Summarizing, we have the following cost per mile per year:

Ties	$171.60
Labor, patching in ties	77.22
Ballast, 1½ in. every two years	118.75
Labor, surfacing and applying ballast	250.00
Labor, maintaining surface and line	100.00
Total average cost per mile per year	$717.57
Average cost per mile, renewing ties to face	497.25
Difference in favor of renewing ties to face	$220.32

In both of the above cases it is assumed that a clean bed of ballast exists under the ties. With the first method, at the end of the six-year period the 4 in. of ballast would be in a much better condition than the 4½ in. which has been put in at two-year intervals by the second method. It would not be necessary at the end of the six-year period to use as much as 4 in. of ballast again and a raise of 2½ to 3 in. would be all that would be needed for another six years. The annual cost for the second six-year period would be considerably less than for the first.

Under the old method, floating gangs are necessary to help out the section men in maintaining track. Every year less and less of this labor is necessary, as our track is put up by the new method. This is a great saving, for floating gang labor is expensive as well as unsatisfactory. The adoption of the first method requires a greater initial outlay for a few years and the economy of the plan cannot be fully realized until a large amount of track has been so treated. It may appear that the life of a white oak cross-tie as given above is shorter than past experience would warrant; nevertheless, the figures are correct, and are arrived at from careful observation.

The following objections have been brought against renewing ties to face:

First, that it is wasteful. The figures given disprove this The value of the ties taken out before this is absolutely necessary is not the only thing to be considered, the cost of labor being the principal item.

Second, that it causes disturbance of roadbed. As 429 ties, or one-seventh of the entire number, have to be renewed every year by the patching method, and the entire mile gone over, raising low places and joints where ties are almost rotted and doing necessary repair work to keep the track in first-class condition, it is very evident that the entire roadbed is very much disturbed *every* year. Under the other method only one-sixth of your track is renewed each year, and the small amount of repair work done on the part of the roadbed that is not renewed will not appreciably disturb it.

Third, that track becomes weakened just before the time of renewal. This objection is met by the fact that, on renewing ties at the end of a six-year period, ties are taken out which would last one, two, and, a few, three years. These ties are used in sidings, but, in the estimates given, no credit for this has been taken.

Fourth, that the life of the ties to be put in sidings is reduced by rehandling. Doubtless the life of the tie is somewhat lessened by rehandling, but as no account is taken of these ties for sidings in the estimates of cost any use got from them is clear gain.

DETROIT RIVER TUNNEL YARDS.

In planning for the operation of the tunnel under the Detroit river connecting Detroit, Mich., and Windsor, Ont., it was necessary for the Michigan Central to provide electrified yards on both sides of the river. It was also desirable to include in the new improvements a classification yard. The single line of the Michigan Central from Buffalo branches at this point into the three lines to Chicago, Toledo and Bay City, making Detroit a natural distributing point. Although a great deal of classification could advantageously have been handled here, it was difficult to do such work before the building of the tunnel, as the existing yards were inadequate and it was necessary to ferry all freight across the river. A little rough classification work was done in loading and unloading the ferries. The old yards on the Detroit side extended east of the tunnel portal so that it was not feasible to attempt to utilize this old yard in planning for a new classification yard. The right of way from the Detroit portal of the tunnel to Bay City Junction, where the line to Bay City diverges, is through the manufacturing district of Detroit, and on this account it was thought best to locate the yard on the Windsor side, where the adjacent property was undeveloped and ample room could be secured for building a yard which would satisfy present needs and allow ample room for future expansion. The complete yard system includes east and westbound hump classification yards, and on the Windsor side east and westbound electrified receiving and departure yards on both the Windsor and Detroit sides.

The electrified section on the Detroit side consists of a westbound receiving yard of three tracks about 2,350 ft. long, a similar eastbound departure yard, a custom house track, an inspection track, one passenger track, and a number of short switching tracks to facilitate handling of the electric locomotives. The layout of these tracks was influenced by the plans now about complete for building a new passenger station between Fifteenth and Seventeenth streets, as shown in the accompanying drawing. The freight yard was located so as not to interfere with the work on this station and to allow ample room for additional passenger tracks through the new train shed. Westbound trains are pulled through the tunnel by electric locomotives which enter the westbound electrified yard by a direct lead from the westbound tunnel track. The trains are dropped in this yard and picked up again by road engines which pull through to the west end and reach the main line by a single track lead. Eastbound tunnel freight is separated from local freight at West Detroit and is pulled into the eastbound electric yard by road engines. It is picked up here by electric locomotives and handled through the tunnel to the electric receiving yard on the Windsor side. Two electric locomotives are used on all freight trains, their capacity being such that two of them can handle the same tonnage as one road engine. There is an additional object in using two, since by placing one on the front and one on the rear end of every train the possibility of a train breaking in two in the tunnel is eliminated.

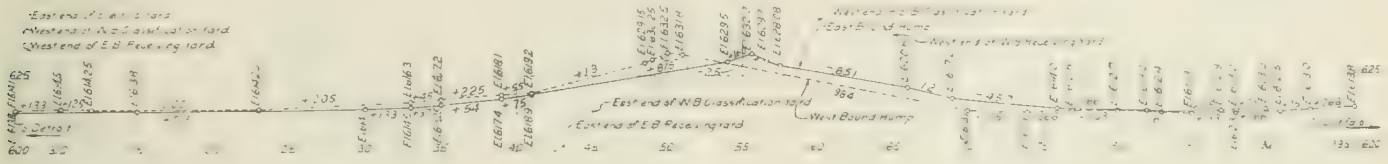
The custom house track is entered from the westbound receiving yard and a house is provided for the American customs officials. The electric locomotives are housed and repaired in a repair shed on the repair track, having a capacity for three [illegible] at one time. Movements into and out of the yards are controlled by two all-electric interlocking plants, one of which also controls eastbound movements into the tunnel.

On the Windsor side it was necessary to build a new passenger station, as the old one was located on the river front. The town of Windsor lies along the river and in locating the new station it was desirable to bring it as near the river as possible. The approach to the tunnel portal [illegible] necessary to build [illegible] the station had to be [illegible] portal on the Detroit [illegible]. A [illegible] station building has been provided with facilities for handling the passenger business for a considerable time to come.

Michigan Central Yard on Detroit Side of River.

The electric yard begins a short distance east of the station and is entered by a double track lead from the main tracks. It also has connections with inspection and switching tracks alongside the main line. A small inspection shed is provided at this point for minor repairs to the electric locomotives, which must be made on the Windsor side. The electric yard has eight tracks, each about 3,000 ft. long, the leads being arranged so that four of the tracks are operated as eastbound and four westbound. The track centers are 15 ft. between adjacent tracks in each set of four, and 19 ft. 6 in. between the two sections, allowing room for a row of electric arc light poles down the center of the yard. The yard is laid with 80-lb. relaid rail on creosoted ties. Manganese frogs are used throughout. This yard serves the same purpose and is operated in the same manner as the one already described on the Detroit side, except that the steam locomotives operating into and out of these yards are the shifting engines from the hump classification yards. An all-electric interlocking plant governs the entrance of the yard at the west end and a mechanical plant governs the connection between the electric and the steam yards.

The eastbound steam receiving yard connects directly with the eastbound electric yard and has six tracks about 3,100 ft. long. A Canadian customs house is provided in connection with this yard for an inspection of cars by the Canadian government.



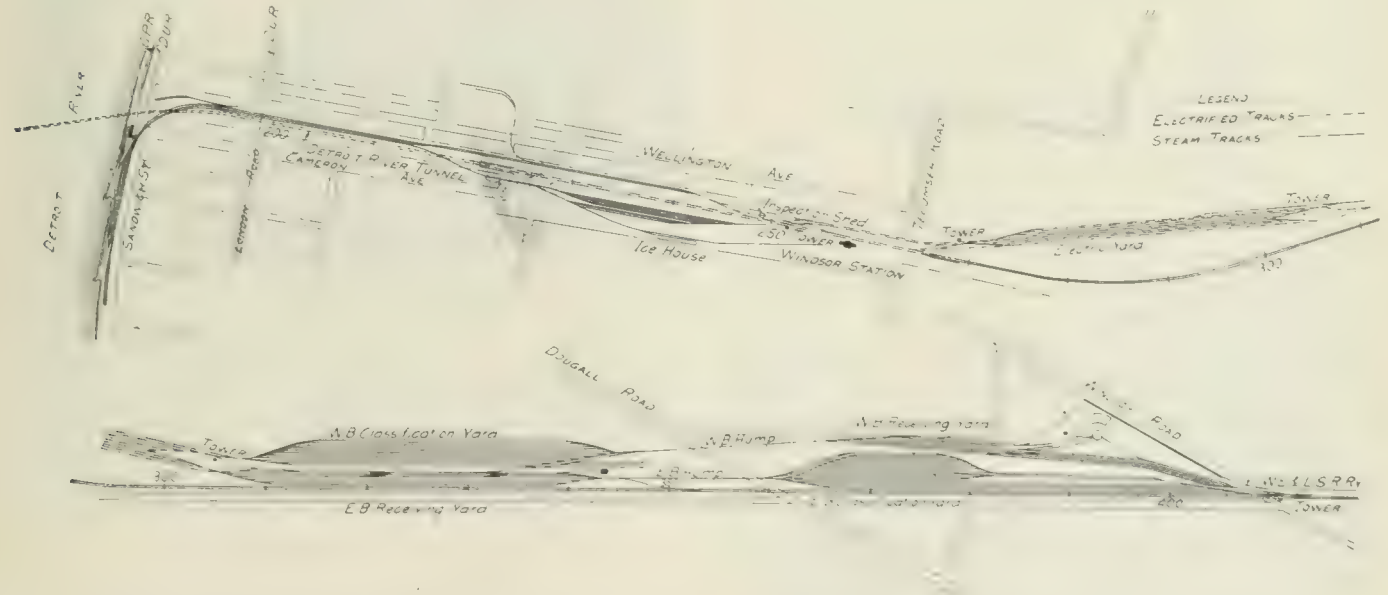
Profile of Humps; Windsor Yard.

to two tracks about 1,600 ft. long) and five tracks about 4,000 ft. long. All of these seven tracks converge to a single lead to the main track.

The entrance to the westbound receiving yard is at the same point as the junction of the eastbound classification yard with the main. A single lead to this receiving yard diverges at once to five tracks about 3,600 ft. long. A 20-stall brick and frame engine house, a hemispherical bottom steel water tank, a concrete cinder pit, an oil house and other accessory buildings are provided at this point, reached by engine leads from this receiving yard. As there were no accommodations for train men within convenient reach of this point the company has provided a house where the men can secure rooms and meals.

The crossings of the two humps and the main line over the highway are carried on plate girder structures raised on concrete abutments. It was necessary to revise the main line grade to provide the necessary clearance over this road. The highway which crossed the side near the east end of the eastbound classification yard was closed and in return for this concession the company built and maintains a highway parallel to its tracks on the north side of the westbound receiving yard to a junction with Dougall road, which crosses under the humps.

The westbound classification yard consists of 12 tracks averaging about 3,100 ft. long, entered from a single ladder off the



Classification and Electric Yards on Windsor Side of River.

A connection is provided from the east end of this yard to the main tracks to allow any trains which do not have to be classified to take the main line again without going over the hump. A long lead over the hump was required on account of the location of a public highway which could not be closed and which had to be crossed at an elevation which would provide ample clearance. The grades over both humps are shown in the accompanying profile.

Two ladders lead off of the hump to 13 tracks, averaging about 1,800 ft. long (which converge through a double ladder hump. In order to provide somewhat longer tracks in this classification yard double turnouts from the ladder at the west end were installed.

The capacities of these yards are about as follows:

Westbound receiving	450 cars
Westbound classification	230 "
Eastbound receiving	165 "
Eastbound classification	1,185 "
Eastbound electric	85 "
Westbound electric	80 "
Total	2,200 "

Under normal operating conditions this yard is handling about 1,150 cars a day, including both east and westbound. The cost for classification, exclusive of engine charges, is about 10 cents per car.

The site of the yard before work was begun was a low, flat area, and exclusive of the humps, the building of the yard did not require a fill more than two or three feet high on the average. The construction up to subgrade was handled by contract, the filling material being partly tunnel mud and excavation from the approach cut on the Windsor side and partly gravel, hauled from a point about 32 miles east. In the latter case the gravel was hauled in trains of standard flat cars, and the raising of the yard was accomplished by spreading from alternate tracks. Under the most favorable conditions the cost of placing this gravel under the track did not exceed 20 cents a yard.

The engineering features of the tunnel were described in the *Railway Age Gazette* of April 29, 1910. The tunnel has now been in satisfactory operation for several months and its maintenance has proved to be simple. A gang of a foreman and four men are able to take care of all necessary maintenance work in the tunnel and the approaches on both sides. A track walker covers the entire length of both bores four times in each twenty-four hours. The maintenance of the new yard is also very easy on account of the high class of its construction. A foreman with twelve men cares for the entire mileage of steam and electric yards on the Windsor side.

The improvement work around Detroit was handled under the direction of G. H. Webb, chief engineer; R. D. Starbuck, assistant chief engineer; and F. B. Marble, division engineer of the Michigan Central, to whom we are indebted for the above information.

SECTION FOREMEN MEETING ON THE ST. PAUL.

A society named the Section Foremen's Debating Society has been maintained on the C. & C. B. division in Illinois of the Chicago, Milwaukee & St. Paul for the past 15 years. This organization has a president, vice-president, secretary and treasurer, and is conducted the same as any other society. There is very little expense connected with it, except the hall rent and a small salary for the secretary, which are met by a membership fee of one dollar. All section foremen on the division are eligible for membership. The meetings are usually held on Sunday at the roadmaster's headquarters, so that they do not in any way affect the supervision of the track. At first, meetings were held every month, but after a few years they were reduced to one every two months, and now they are held four times a year—in March, June, September and December. It has been found that all the topics can be discussed sufficiently in these four meetings. In March the spring track work is the subject; in June, the general cleaning up work; in September, the fall work, and in December, the care of the track during the winter. A regular list of topics, usually about 10, is prepared by a committee of three or four foremen and sent to other foremen for answers. The questions are brought up at the meeting one at a time, and are followed by free discussion. If a majority of the members approve them, the questions and answers stand. If not approved, new answers and amendments are attached, all of which are recorded for future reference.

These meetings have been found to be especially beneficial to the young foremen just starting in the work, as they have the opportunity to pick up a great many points from the discussions of the many problems in the daily work that they are at much value to all. It has been found that they give much greater satisfaction in the work. The advantages derived are such that even if the meetings were held no more than once a year it is considered that they would more than offset the time lost. The meetings provide a good opportunity for the roadmaster to bring to several subjects before them at once in a body and explain to them the details. The foremen met before the last spring meeting at which became necessary to reduce forces. At this meeting the roadmaster explained the situation to the men and talked the matter over with them in a short time, which he could only have done otherwise by visiting each one personally on the track and spending two or three days. Such matters can be handled much more quickly and far more satisfactorily than is possible by letter. The meetings have been held so long that the men think they cannot get along without them. They were started under the direction of Edward Laas, at that time roadmaster, and have been continued under the supervision of W. H. Kofmehl, who succeeded Mr. Laas, and to whom we are indebted for this information.

DITCHING WITH THE BOWMAN DITCHER.

BY T. AHERN,
Superintendent, Coast Division, Southern Pacific.

The coast line of the Southern Pacific traverses territory between Surf, Cal., and Santa Barbara in which there are a large number of deep cuts through material that erodes very easily when subject to wash. As a result of the heavy rains of the winter season bring down large quantities of material

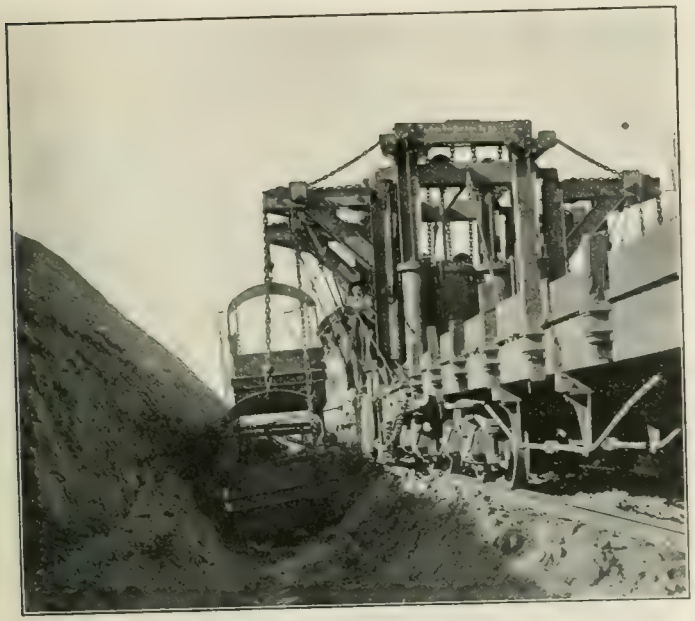
Bowman Ditcher Plowing Ditch.

which entirely fills the ditches and runs over the track, frequently causing delays to traffic.

It being a frequent occurrence for an entire summer's work of cleaning out and reshaping the ditches and cuts to be entirely swept away by one storm, the problem of taking care of the ditching work on this portion of the line was too great to be handled by the use of the ordinary maintenance equipment, and it was necessary to put in service a type of ditching machine that would cope with the situation. A machine consisting essentially of a steel frame flat car surmounted by the various appurtenances constituting a complete ditching apparatus was constructed in the Sacramento shops of the Southern Pacific from plans furnished by the designer, Ben Bowman, of Springfield, Mo. This machine has been in operation in the above mentioned territory of the Coast division for the past eighteen months.

At one end are located four No. 5 New York air pumps, operated by steam supplied by the work train locomotive, and two large drums for the storage of compressed air. Midway of the car are situated two sets of steel standards from which swing four steel booms. Mounted in between the standards are four hoisting cylinders 24 in. inside by 5 ft. long and four clamp cylinders 12 in. inside and 5 ft. long

Threaded through a block attached to the plunger of each cylinder is a chain, which passes out and swings from the end of each boom to which is attached, at various times, the buckets and other devices used in the process of operation.



Loading Material into Buckets.

Just forward of the pumps and drums is the stand of the operator who by means of 18 valves controls every movement of the machine by the application or releasing of air pressure. The machine complete with all the attachments weighs 58 tons.

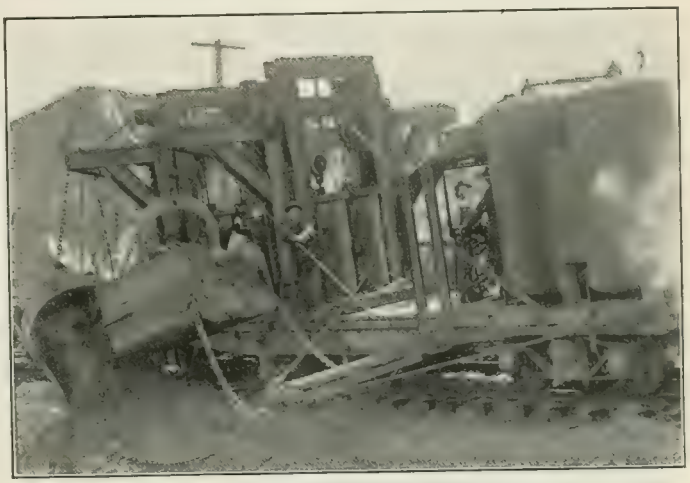
The first step in ditching with the "Bowman" consists of the plowing and breaking up of the material removed. The

Hauling Material Out of Cut.

plow is attached to the telescoping iron poles, as shown in Fig. 1, set at the angle and depth required and pulled through the entire length of the cut a sufficient number of times to thoroughly break the soil. The operator has absolute control of the plow, and can at will, raise, lower, tilt, or move it laterally. After each side has been thoroughly broken up, the plow is removed and the buckets attached, as shown in Fig. 2, using two or four buckets as desired. The buckets are of four yards' capacity each, are similar in construction to an ordinary [illegible], and are filled by dragging. If four buckets are used, the two lead buckets are lowered and filled first, and after being raised to clear, the rear buckets are lowered and filled. When all four buckets are filled they are raised to clear, and then the run is made to the dumping ground. Photographs 3 and 4 shows the ditcher running to unload and the details of unloading.

Fig. 5 illustrates the sloper in operation trimming the cut to a uniform slope. Following this the buckets are again attached and run through to gather up the dirt trimmed off. Fig. 6 illustrates the spreader attachment in the act of leveling off the fill. Fig. 7 shows the ditcher after a day's work ready to tie up for the night, while Fig. 8 is a view of a completed ditch after being touched up by section men and the burlap protecting the ballast removed. Experiments with a burlap blanket spread over the ballast have proved quite successful. It keeps the same clean and consequently reduces the cost of forking ballast.

The limit of reach of the "Bowman" is 15 ft. from the



Dumping the Buckets.

center of the track. The ditching illustrated in the accompanying photographs resulted in a 26 ft. roadbed. The machine is capable of handling any class of material; dry earth, mud or any rock that can be shattered by powder. Not only can it be used for ditching but also the excavation for line changes of a small magnitude can easily and cheaply be accomplished by gradualy shifting the track over.

It has been found a difficult matter to establish a reliable

Plowing Down the Slopes.

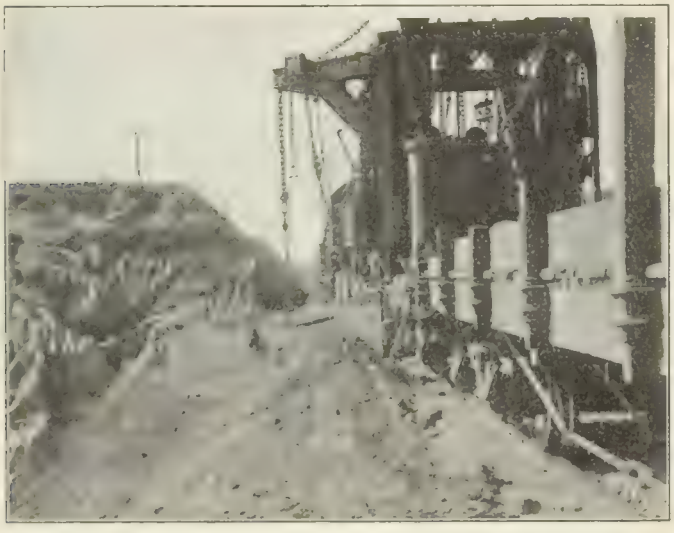
cost unit on account of the wide variations in the class of work performed and the ever changing conditions met. The following statement gives the average costs per month for eighteen months ending April 1, 1911. During this period it is believed that every climatic and physical condition, in

cluding the maximum and minimum hauls and the most widely varying yardage per lineal foot of ditch.

Average Costs Per Month for 18 Months.	
Wages of ditcher crew, 1 engineer at $125.00 per month, 4 backsetmen at $2.25 per day	$371.88
Wages of work train crew, 1 engine crew, conductor and 2 brakemen	564.33
Ditcher supplies, including minor repairs, bolts, cables, lubricating oil, waste, etc.	80.82
Work train supplies, including fuel oil used by locomotive for its own steam and operating of ditcher, waste, lubricating oil, etc.	293.97
Miscellaneous work, including heaping ballast ahead of ditcher, forking ballast, trimming ditch and cut, leveling fills, and restoring shoulder	463.75
Total average	$1,774.80
Average yards moved	8,719.5
Average cost per yard exclusive of miscellaneous work.	$0.15
Average cost per yard inclusive of miscellaneous work.	0.2035
Average ditch, .6 yard per lineal foot	0.1221

All minor repairs included in this item were made while the machine was in the clear for the passing of trains or while the locomotive ran for water.

A comparative statement showing the cost month by month of operating the ditcher and work train indicates fair uniformity, while the yardage moved and lineal feet of ditching accomplished varies considerably owing to the different classes of material handled and to the time involved in getting it into movable shape, the distance hauled, the time lost



Spreading Material Down the Bank.

Bowman Ditcher Packed Up Ready for Travel.

line between what is justly chargeable to ditching and what is chargeable to track maintenance. Before the ditcher starts its operation the ballast on the fill where the ditcher is to dump must be cast to the center of the track. After the machine has completed its work, the cut and fill are gone over by an extra gang, which forks and dresses the ballast to standard, trims the cut and restores the shoulder to both cut and fill, produces the ditch from the mouth of the cut down the slope to carry the water away from the fill, restores the cattle-guards which it may have been necessary to remove, and this leaves the section worked in standard condition.

Section of Completed Ditch and Track.

This work may not be done during the same month as the ditching, and, therefore, the cost per yard of material moved is less than in the months when the extra gang charges are included. The cost per yard during the period of eighteen months ranges from 0.08 to 0.45, and the yardage moved ranged from 22,000 to 4,400. The number of trips ranged from 25 to 75 per day.

PROTECTING PILES FROM ROTTING.

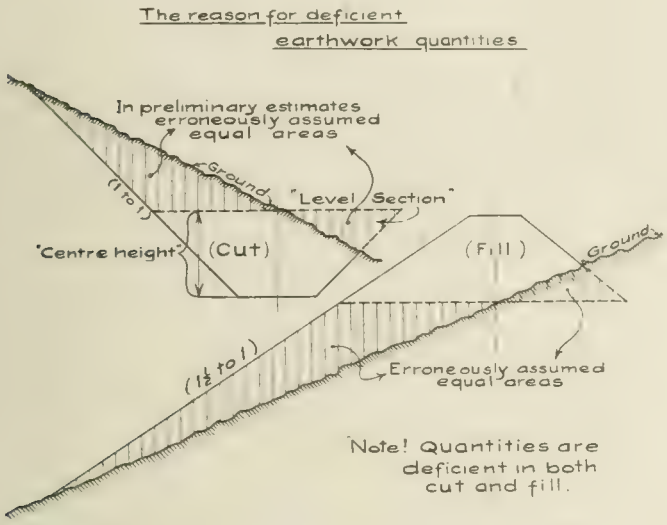
It is well known that wooden piling is especially liable to rot in such places as are subject to the alternate action of moisture and dryness; for instance, just where they are driven into the earth. Knapen, who bases his suggestion on repeated experiments and researches in connection with the decomposition of wood, proposes a method of avoiding this alternate action of the temperature by preventing the deposit of moisture at the place where it is most hurtful. His system consists essentially in the use of a protecting mantle surrounding the pile, and reaching about 20 in. underground and 10 above. The diameter of this mantle, which is made of wire gauze and cement, is about 0.2 m. greater than that of the pile in question. The space between mantle and pile is filled with mineral wool. A ring of pressed metal closes the mantle above and another does the same below, so that the sand cannot enter the space between mantle and pile.

It is usually well to use a layer of Norway tar or its equivalent between the ring and the wood, to make the joint perfectly water tight. There is then bored in the pile a simple channel about an inch or a little more in diameter, above the mantle, clear to the center of the pile. This is enlarged by a red-hot iron to effect carbonization of the walls of the bore, and keep the porosity of the wood constant. This hole has for its object the equalizing of the conditions between the interior and the exterior watery vapor.

EFFICIENT EARTHWORK ESTIMATES.

BY J. G. VAN ZANDT,
Instructor in Civil Engineering, University of Illinois.

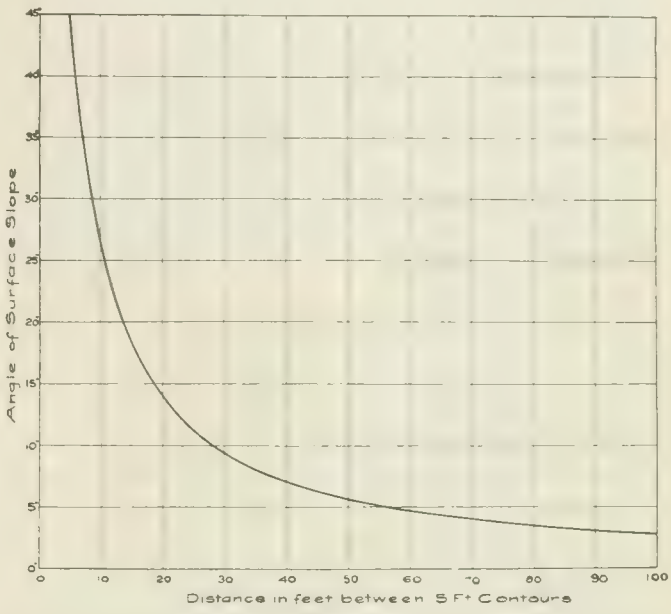
Preliminary estimates of earthwork quantities have always been a subject of discussion, because of the fact that they do not require any great exactitude, and hence engineers may reasonably differ on the degree of precision that should be attained. It is probably true that one reason why engineers' estimates are frequently spoken of so disparagingly is that in assuming approximate quantities some of the essential items have been disregarded and the results have been accordingly inaccurate.



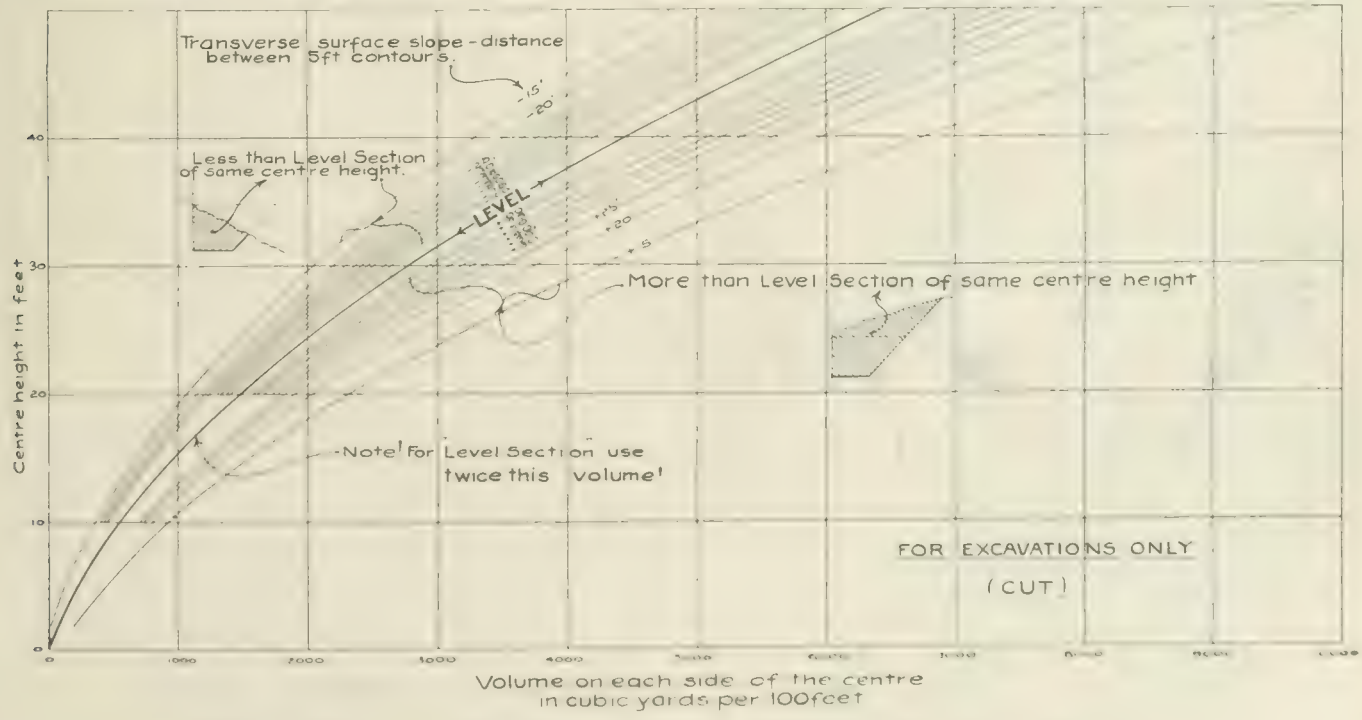
Effect of Changes of Surface Slope on Area of Cross-Section.

Among the items which must not be omitted, Wellington says, in his Economic Theory of Railway Location; that the surface slope is "one source of error that must be allowed for," and suggests that "this may be done by either using a coefficient to multiply the quantities when obtained or by working from a diagram." It is certain that in estimating merely from profile center-heights without taking this important matter into full consideration there may be sufficient lack of precision in a single cut or fill to introduce a considerable error in the computation. Even when the equivalent level sections are used there is, according to Wellington, "a constant tendency to deficiency" in the estimate of quantities.

This deficiency of quantities in the estimate is contrary to one of the fundamental principles upon which all authorities agree, namely, that all quantities should be estimated liberally. In some cases an arbitrary percentage is added at the end "to be on the safe side," or an arbitrary amount is added to "make an even figure," and insure sufficient quantities. In every case the purpose has been to allow for the deficiency which common experience shows is characteristic of preliminary estimates, computed in the usual manner and known to be mathematically incorrect. One reason for this deficiency is clearly indicated in the diagram illustrating the effect of transverse slope on the area



Relation Between Angle of Surface Slope and Horizontal Distance Between 5-ft. Contours.



Effect of Changes of Surface Slope on Volume of Earthwork. Base 20 ft.; Slope 1 to 1.

of the cross-section and showing the geometrical principles involved in computations using the level-sections from profile center-heights.

In country where the topography is especially rough and side-slopes are steep this becomes a serious problem. In the comparison of two or more possible routes the earthwork is an important item, and sure it may materially increase the cost it should be known to be within an estimated amount in order that financial interests may determine whether it would be profitable to make the investment or not. In these mountainous districts the earthwork is often the largest item of cost and the final construction work should show an improvement or a smaller volume of earthwork than the preliminary estimate. As it often occurs that the final yardage is greatly in excess of that originally estimated, and as in some cases financial difficulties have followed which have threatened the continuation of the work, it is proper that special precaution and care be exercised to eliminate constantly recurring errors which invariably produce deficient quantities, and which in special cases may affect the total materially.

Of course, in comparatively level country, the transverse surface slope is generally not of sufficient importance to be given special consideration, but it often happens that at river crossings or along stream bluffs there are surprisingly steep transverse slopes which should certainly justify attention. There is no place where error is more likely to creep in than in those locations where the usual conditions justify the practice of ignoring small errors, but which errors may at unusual places introduce large inaccuracies in the estimates. It is certainly evident that there is inconsistency in the practice of taking into full account small quantities on the level ground and then disregarding the effect of surface slope at some river bank where that effect may produce an error in yardage larger than any item that had previously been considered.

The effect of a slope of 30 deg. upon a 5 ft. cut is given by Raymond in his Elements of Railroad Enginering as amounting to an increase in volume of 60 per cent. He further suggests that "what sections may be considered level across may be determined by remembering that a cross slope of one in ten will be erroneously calculated by the level-section method by about 2 per cent., the truth being in excess, and a slope of one in five will be erroneously calculated by about 8 per cent." Steeper slopes increase this more rapidly, as they become very steep and may give rise to errors of over 60 per cent. as mentioned above. Raymond suggests, however, that "these values are roughly approximate and the more accurate method is to use a diagram for sloping ground."

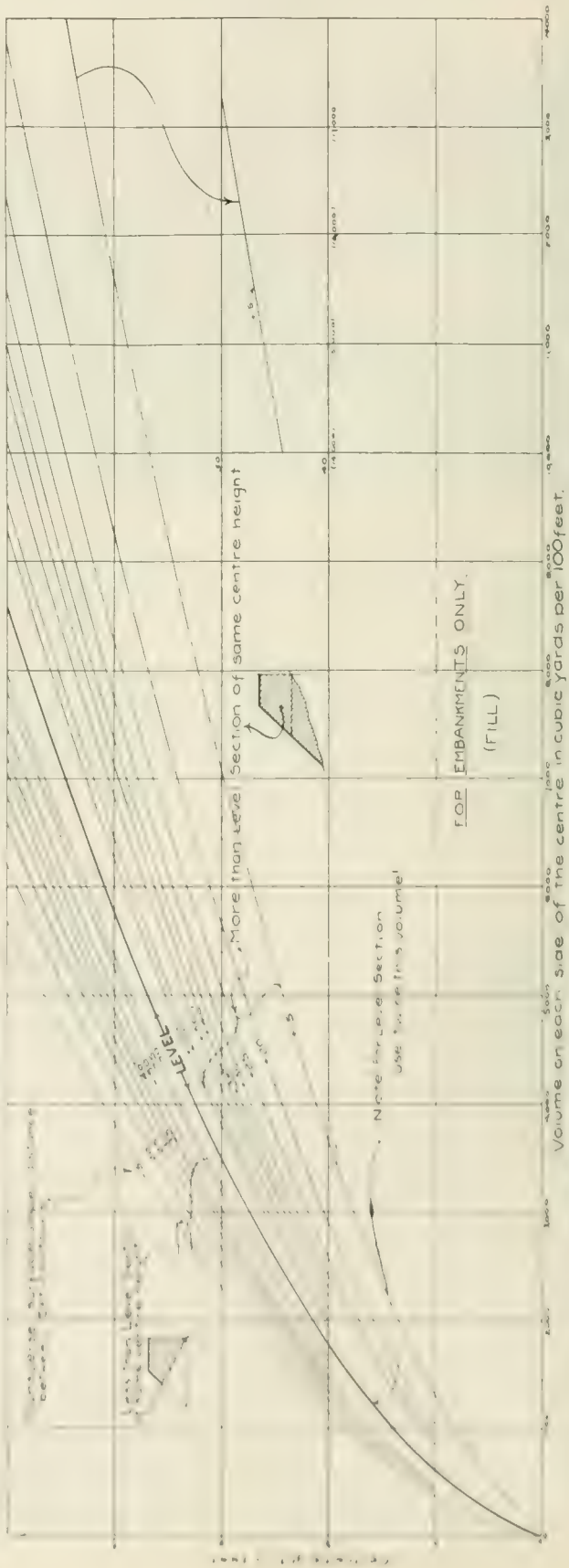
There has been a number of diagrams for earthwork in which the slope of the ground has been considered, among which those of Wellington and Trautwine are perhaps best known. These diagrams as well as the tables which consider transverse slopes [illegible] that either the angle be measured in the field or calculated from [illegible]. The latter method is most generally employed and frequently involves a considerable amount of computation. It has appeared that the work could be done more efficiently by [illegible] to angle in degrees. The data may be taken directly from [illegible] and applied to the diagram from [illegible] system to the other. In fact all computation work involved in trans-[illegible]

[illegible] do not take into account the fact that in these extreme cases a [illegible]

pears that when the surface-slope is very steep the cross-section should be taken approximately at least, if the quantity is to be estimated with a consistent degree of accuracy. On one of the western roads the following rule has been used:

"Where the transverse surface slope is steep and the 5-ft. contours are less than 15 ft. apart, cross-sections must be taken."

This limits the slope to one in three for the application of


LEVEL
More than Level Section of same centre height
Note Level Section use for this volume
FOR EMBANMENTS ONLY.
(FILL)
Volume on each side of the centre in cubic yards per 100 feet.

Effect of Changes of Surface Slope on Volume of Earthwork. Base 18 ft.; Slope 1½ to 1.

graphical methods and requires constantly that necessary data be taken for extreme cases. Since it cannot be expected that the contours on a topographical map are located correctly within two or three feet on scales usually employed, it is evident that it would be inconsistent to use this data as the measure of surface slope when contours are very close together, especially since the effect of small changes is greatest when the distance between contours is small. As has well been said by Mr. Lavis in his Railroad-Location Surveys and Estimates, "estimating is, to a certain extent, of course, a matter of guess work and judgment," and "there is plenty of room for the engineer to exercise his judgment even after having obtained the most minute information." It was his practice "as soon as the profile of the projected location has been made" to indicate "where allowance must be made for steep transverse slopes," and to further urge that "every effort be made to collect all available data."

It might be suggested that the expense of making such diagrams as those given would not be justified by the results, but it will be remembered that not only are the corrections above outlined easily made, but the probability of error in the use of tables is reduced as well, and this has often been shown to be a decided item in efficiency. The time required for making the diagram is relatively small and the method resolves itself into the making of a few short calculations with a table of level section volumes, as follows:

(1) Formulae:

Let s = slopes (as 1½ ÷ 1 for fill, 1 ÷ 1 for cut)
c = center-height (from profile)
b = width of base in feet
x = angle of slope in degrees
cot x = slope distance ÷ contour interval (5 ft.)

then the excess, E, of volume in cubic yards per one hundred feet of track, on one side of the center line would be,

$$E = \frac{(\frac{1}{2}b + sc)^2}{2\cot x + 2s} \times \frac{100}{27}$$

and the deficiency, D, on the other side,

$$D = \frac{2\cot x + 2s}{(\frac{1}{2}b + sc)^2} \times \frac{100}{27}$$

(2) Method. These values of E and D are added to or subtracted from a table of level section values or a single value of $E - D$ may be added to the tabular values to give the corrected volumes for changes of surface slope, which may then be plotted to any convenient scale.

Should it be desirable to make provision for changes of slope in the cross-section, which is more often the case than not, the data may be plotted, as shown in the charts already mentioned, and in cases of high fills or deep cuts this may prevent introducing a large error from assuming a uniform slope. In fact in some cases the ground may slope away from the center or be nearly level on one side and steep on the other, in which cases this form of diagram is convenient. There are other advantages also for this form of diagram among which may be mentioned the important fact that smaller quantities are plotted, and hence a larger scale may be used which increases the accuracy of reading the diagram. By the use of an ordinary scale, or special odometer designed for the purpose, the volumes may be read with consistent accuracy.

A method of tabulating the data which has increased the efficiency of the work and further reduced the probability of error is given below:

Form for Use with Earthwork Diagrams.

A. B. & C. R. R. Earthwork Estimate for Mile .....

Station.	Average Cut. Height Cut or Fill.	Contour Slope Dist.		Volume. Cut.		Fill		Remarks.
		+ L.	+ R	L	R	L	R	

The station numbers may be placed between the lines of the rest of the data in the table to assist in the identification of the item and the profile center heights, and contour distances may all be put in place before the diagram is used. Under remarks any unusual items, such as tunnels, trestles, bridges, or extremely steep surface requiring cross-sections, may be noted. The reference to book numbers in which the data may be found is also to be recorded under remarks. When the slope-distance is the same on both right and left, it may be given in one column or the other and a line drawn through the other side, and when level section a line may be drawn through both sides.

While it is obvious that there are many other items in the preliminary estimates which affect the total substantially, it appears probable that if these other items are considered with the same consistent accuracy that is suggested for the earthwork quantities the estimate may become a more satisfactory and reliable document, not only for the comparison of lines and fixing of grades, but also as an estimate of the approximate cost of the work for the consideration of the financial interests.

STUDY OF RAILS FROM PENNSYLVANIA LINES WEST.

Bulletin No. 135 of the American Railway Engineering Association gives the results of a study of 17 good rails taken from service on the Pennsylvania Lines of Pittsburgh. Ten of the rails were from the Northwest System and were removed under the direction of R. Trimble, chief engineer of maintenance of way, and the other seven were from the Southwest System, and were removed under the direction of W. C. Cushing, chief engineer maintenance of way. The rails had been in service from 7 to 17 years in main track. The tests made on these rails included etchings with picric and sulphuric acids and analyses of borings from the interior of the head, tests of the tensile strength of samples from the interior of the head and micro-photographs.

The analyses showed that the carbon content was within the limits prescribed by the Association's specifications, with the exception of four rails. The phosphorus is above the limit prescribed; in some cases very much so. The manganese is well within the specified limits, and the elongation showed up very well in all but two cases. The rails taken from the high side of curves did not show any indications of tendency to failure not found in the rails from the low side.

MAINTENANCE OF WAY EFFICIENCY.*

BY E. R. MEREDITH.

Supervisor, Philadelphia & Reading, Coatesville, Pa.

Efficiency in maintenance of way work is almost entirely relative. While the desired results are, broadly speaking, the same, the methods and means must be varied to suit widely differing conditions of financing or of operation. The problem consists in applying to the upkeep of a given mileage certain money expended for labor and material, so as to get the best results.

The money expended in maintenance work may be divided under three general heads, labor costs, material costs, and interest on capital tied up in stock on hand. In the expenditure of labor, local conditions are of paramount consideration, but several general rules may be laid down that apply to all labor expenditures. The first and most important of these may be expressed as follows: "Every re-handling is a dead loss." Every time the section force puts a truck on the track to handle material that could have been unloaded from the car at the point of use, it is wasting money. The labor of reloading excess material is a dead loss to the company, chargeable to the officer who over-estimated the material needed at the given point. Similarly two or three work train trips to supply material that could have been handled by one train movement mean the expenditure of money for which the property receives no real benefit. To

*Entered in the contest on How the Roadmaster Can Promote Efficiency, which closed July 1, 1911.

be successful in his chosen field, the maintenance officer must so plan his work and so dispose of his material that every movement of his men and every handling of his material is of direct gain to the work in hand. He must impress on his subordinates responsible for such work the importance of living up to this rule.

The second consideration in the handling of the labor item may be summed up as *esprit de corps*. To the roadway man, this means an individual loyalty to the employing railway, a healthy rivalry in the pushing of the work, and a flexible and well-trained organization. Personality enters greatly into the development of such a spirit among the men.

Recognition of individual excellence among the various foremen by money prizes, or even official annual ratings will go far toward bringing forth a rivalry in efficiency. An insistence on careful policing, well kept station grounds, and clean and orderly tracks and yards soon breeds a personal pride in the better foremen, or reveals by its absence the men who should be marked for demotion or discharge. Discipline for violations of the rules should be quick and keen, and always just, divorced entirely from the personal equation. Occasional bulletins showing discipline inflicted for the various offences during a given period will call the attention of the force to the need of observing the rules and the penalties of disobedience. Merit recognized by promotion, and a careful understanding by the employer of the character and ability of the individual laborers, so far as possible, will enable the employer to have at hand material to fill any vacancy that may occur, and will stimulate endeavor among the foremen, as they realize that their places can be filled at short notice, without detriment to the organization.

The handling and disposition of material offers a wide range for efficient management, as outlined above, but its economic use offers an even wider one. Personal inspection of ties, frogs, rail, switches, etc., which are reported for renewal, will enable the supervisor to save many times his salary every year. Careful sorting of material by disinterested parties to keep out of the scrap pile what may be economically repaired will show a large profit for the labor expended.

Capital tied up in stock on hand is usually given scant attention by subordinate roadway officers, but large savings can often be made in this line. Frequently on a single sub-division thousands of dollars' worth of materials are constantly on hand over and above the actual needs of the territory. The mobility of emergency material is a matter that deserves serious thought from every supervisor. The equipment of a car or two with emergency material and an understanding with the train runner as to the location and handling of such cars enables one to dispense with the old-time custom of keeping a supply of frogs and switches at every tool-house, even under the heaviest traffic. The supplies of other emergency material can be cut down to a minimum by careful supervision, and large amounts of capital tied up in this way can be released. Where various sections of rail are in use, a gradual weeding out of the switches and frogs laid with other than the ruling section will make a great reduction in the amount of stock needed on hand. Foremen also are prone to hoard up tools and material of which they have no actual need, and a rigid supervision must constantly be kept over their supplies of all kinds. Negligence in this matter always results in the accumulation of larger supplies at the section headquarters than is consistent with economy.

In summing up the subject, the best of intentions and the [illegible] zeal applied with judgment and understanding. The directing [illegible] and correlating the movements of his forces that each man [illegible] the general plan. In this way the physical effort of the laborer, the practical knowledge and skill of the foreman and the executive ability of the supervisor or roadmaster will combine to give the best net result for the least money. To the writer it appears an unquestionable fact that true efficiency is not dependent so much upon superior equipment, type of labor, or even hard work as upon the executive ability of the directing officer. Much, of course, depends upon well-kept and up-to-date equipment and more upon strong, sturdy and willing workmen, but in the final reckoning, the brain work of the heads of its various sub-divisional units makes or mars the efficiency of any maintenance of way organization.

HOW THE ROADMASTER CAN PROMOTE EFFICIENCY.*

BY F. W. RIZER,
Assistant Engineer, C., B. & Q., Chicago.

The maintenance officer of today is confronted with many serious problems in making his appropriations cover the many demands of heavier traffic and equipment at higher speed, which require heavier track, stronger bridges, more interlocking plants and block signals, and many expenditures for public accommodation which yield no revenue. The cost of railway labor and material have increased materially, and although the gross income has increased, it has not increased in the same ratio.

It is evident that some means must be provided by which the unit cost of maintenance shall be reduced, and as the cost of material, being governed by the laws of supply demand, cannot be lowered, this reduction must be effected in the labor charge.

Our trackmen are a hard-working, conscientious body of men, anxious at all times to learn, but with the many new and various forms of track appliances now in use, concerning which the trackmen have received little or no instruction, high efficiency cannot be expected. I have many times seen track appliances improperly installed, resulting in short life for the device and no benefit from the money invested. The section foreman should receive instruction as to the proper method of performing certain work, also as to the use and care of tools, as good tools are expensive, but will last for years if given reasonable care. Instruction should also be given concerning the construction and maintenance of frogs, switches, crossings and all track appliances so that the foreman may know how to correctly make minor repairs on the ground, which will not only save the cost of handling and the shop expense, but will materially add to the life of the device. The following instances illustrate the necessity of this instruction.

On most roads an attachment is provided on switch rods to take up the wear in the points, also to compensate for variations in the rod and switchstand. These attachments usually consist of an eccentric pin or bolt, and it is a simple matter to make the proper adjustment, but one can many times see when the foreman has placed washers and nut locks between the switch tees and the point rails instead of properly making the adjustment. In one instance a switch was reported out of order, in which it was found that the plate on which the hold-down pocket was secured had become skewed and did not allow the hold-down on the frog to enter the pocket, causing the spring rail to stand about half-open. A few blows of the spike maul straightened this plate and the spring rail moved to the proper position. The trackman did not understand the switch and did not know how to fix it.

Another illustration of this point was brought out where an inspection of a piece of track showed that a certain kind of nut-lock had been applied with the wrong face bearing against the nut, rendering the nut-lock useless and, in many cases, ruining it on account of its being tightened up too hard and its threads being stripped.

One of these [illegible] would have occurred if a little time had been spent explaining these devices and the foreman had fully understood what they were using.

*Presented to the convention [illegible] How the Roadmaster Can Promote Efficiency, [illegible] Feb. 1, 1911.

The company's standard track plans should be a source of much valuable information to the trackman, and the various plans should be explained to him in detail. A meeting of the roadmaster and foreman at regular intervals, where all could discuss various features of their work, would be of much benefit to the company and to the men.

Assuming that our trackman has benefitted by his instructions, what saving will he effect? This is, of course, an unknown quantity, but suppose that he would make a reduction of $1 per mile per month on account of his better understanding of methods and materials. On a railway of 10,000 miles this would mean a reduction in the maintenance of way account of $120,000 per year, accomplished by each man performing a trifle more work and by conserving the track material and tools in his care so that they would give longer service.

TRACK EFFICIENCY.*

BY L. C. LAWTON,
Division Engineer, A., T. & S. F., Newton, Kan.

There can be no true economy in track labor under the present transitory conditions of labor. Even the road master who deplores the fact that he is not making any section foreman, but who in the same sentence says he is not troubled by it, as he expects his present foremen to last as long as he holds the office, is of little more use to the railway than the tramp track man. In other departments of the road a system has been worked out whereby the men and officials of tomorrow are being produced. When this time comes in the track department we will have a wage on the section that will make the place desirable. We will have men of families, and have them well housed where their children can be in school. We will have their boys apprenticed on the track and give those who earn it more training in mechanics and in the engineering department. Both men and foremen will be able to look for increased pay for better work, and at the end for a pension. Thus every man would be a trained track man and a possible foreman.

Until this millenium comes the roadmaster must start with his foreman and work them into an interested organization. He must make each man proud of his position and let him know that he is the representative of the company for his section; make him feel that he is not merely to look after the joints, but that the railway's interests are just as much cared for by keeping stock off the right of way, or by seeing that his ditches do not wash cinders in on the farmers' pastures. Every railway is spending thousands of dollars now to settle the enmities caused by aggressive or unscrupulous employees during the time of less competition and more favorable legislatures. To overcome this, many meetings are being held to promote harmony and a general campaign is being made to show that the interests of the people and the railways are identical, but without giving those nearest the land the prestige or desire to meet the owners in like manner. Impress your men with the idea of meeting the farmer outside of the right of way with the comradeship of equal land owners. In that way they would be led to see the farmers' side, and many little things that irritate would never develop into the prejudice some have against the railways. Only by the developing of a loyal, energetic and at the same time tactful, set of foremen can the old regime be restored.

To promote efficiency, specialize. Know each foreman as you do each bad piece of track. Know how much he can do alone, and try to give him what he is lacking. Study the section through the foreman by knowing each cut and bad piece of dirt as he should. Encourage him to experiment with a piece that needs drainage or be able to give him expert advice. Whatever you do, do not let him continue to raise a bad piece of track or slide, in one way year after year. Keep your men up to date to the standard work on your road. We often find a foreman who does not understand what is wanted after stakes are set by the engineering department, as, for instance, when a new spiral is staked on curves. No system of track standards can be carried out unless your foreman thoroughly understands them and grasps something of the fundamental principles back of them. Let him have an assistant, in name at least, so the foremen can come together once a month to discuss maintenance matters. You will be surprised how much you can learn at such meetings; besides you will want that assistant after a while. Keep yourself informed as to best methods of other roads, and work up a "road" spirit, with the idea of going them one better.

More than any other one thing, encourage the foreman with new foreign labor. He does not know their language, is often worked against by the interpreter, and does not get the work done at first that he feels he should, and then he suddenly loses all ambition. Teach him the peculiarities of the people he is going to have, and successful methods used by other foremen. See that he is interested in these people and give them every assistance possible in getting comfortable homes. Only in that way can you count on permanent laborers and then only will the general efficiency be increased and your trouble in keeping laborers cease.

Keep in close touch with the foreman, but do not bother him with reports that are properly the work of your clerk. When requesting information, have a blank to fill. In writing up bad spots in track have a regular form showing the location and nature of the trouble, and two columns left blank for the foreman to fill out, with the date fixed, and, if necessary, the cause of the trouble. These should be returned to you, and in that way you will know that your "spotting" means something. A foreman will be more careful with track when he has to explain an obvious carelessness.

You are spending large sums in cleaning cuts, cutting right of way and keeping weeds out of branch lines. You can do this cheaper by sodding the cut slopes, getting the right of way into a good sod or allowing the farmer to put it into alfalfa or clover and by keeping the weeds down with cinders on screenings. You will have to prepare the figures to "show" the superintendent, these things but you can do it. In all this you are building for the future by doing necessary work and at the same time cutting your next year's charges. Always keep in mind that there is to be a railway there for a hundred years to come and make your work count against that time.

*Entered in the contest on How the Roadmaster Can Promote Efficiency, which closed July 1, 1911.

PROMOTING EFFICIENCY THROUGH THE FOREMEN.*

BY B. JAMES,
Supervisor, C. & E. I., Marion, Ill.

Roadmasters can promote efficiency by obtaining the very best men possible for foremen, and at all times selecting the best men from among their labor force to fill any vacancies that may occur. By so doing they will encourage the men to stay with their work, as they may look forward for promotion.

Also the foremen should be trained to work according to some prescribed system, and to work in such a way as to take advantage of the different seasons of the year to do the different kinds of work. It is also a good plan to get the foremen as deeply interested in their work as possible in order that they may look after it as though it were their own enterprise and their own money was being expended thereon. Roadmasters should also be close observers and study the character of their foremen in order to best know how to handle them, as all men cannot be handled in the same way.

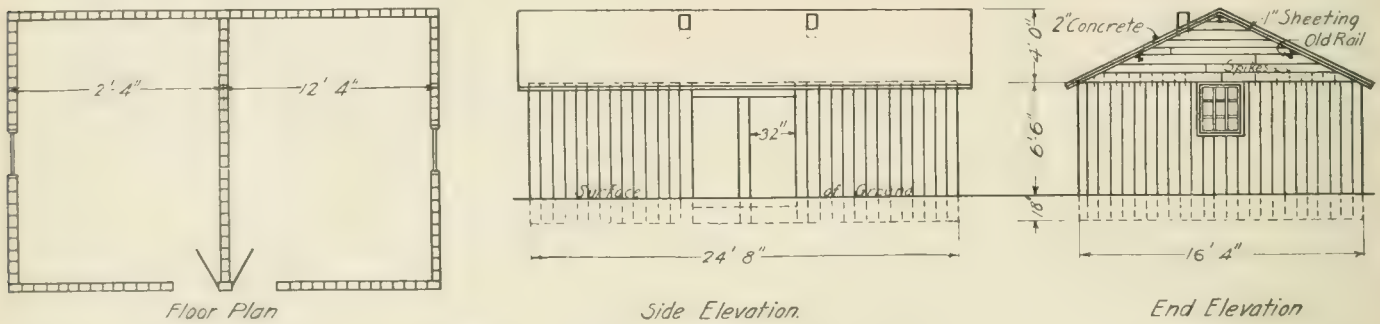
*Entered in the contest on How the Roadmaster Can Promote Efficiency, which closed July 1, 1911.

MEXICAN LABORERS' HOUSES ON THE SANTA FE.

BY L. C. LAWTON,
Division Engineer, A., T. & S. F., Newton, Kan.

One of the most serious problems of railway maintenance between the Missouri river and the Rocky mountains is that of securing and holding a sufficient supply of labor. Until the recent war in Mexico, Mexican peons were used almost exclusively on the Santa Fe; they are still used when they can be secured. The young Mexicans develop into a vagrant class, quite similar to the American hobo, within a short time, and to obtain a better trained and steadier class of laborers efforts are made to locate men with families on each section. This requires housing these laborers in a way not before attempted to any extent by the Santa Fe. The few families that have been employed previously have constructed their own dug-outs, or tie houses with mud roofs, similar to those usually found in New Mexico, but there is no earth in Kansas which will turn water or stand up like the adobe in the arid country, and it has been common after a heavy rain for the occupants of these dirt-roof houses to leave, the railway thus losing its section labor.

A very cheap but more substantial house has therefore been planned, as shown in the accompanying drawings, the particular advantage of which is that all material is scrap or second-hand, and can be picked up on any division and the house built by the men themselves. The style shown in plan A is erected in inconspicuous places on the main line, and on all branch lines, material being more readily secured, as either sawed or hewn ties will



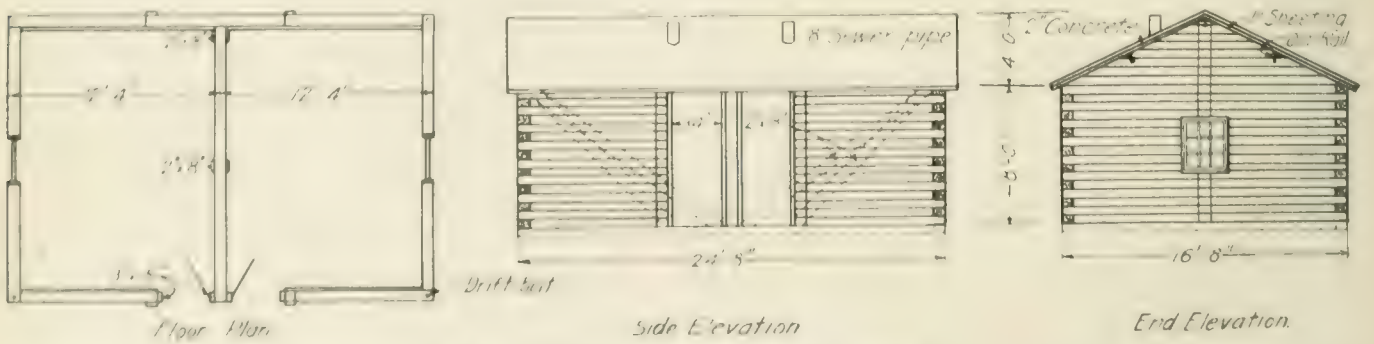
Section Laborers' House for Branch Lines.

hand 1 in. sheeting, 80 lineal ft. of second-hand 2 in. x 6 in. timber, 130 lbs. of second-hand barbed wire, 78 ft. of old 52 lb. rail, two 9 light sashes, 29 in. x 35 in., 875 lbs. of cement, 3½ cu. yds. of screenings, and two 12 in. lengths of 8 in. sewer pipe. The screenings are secured from rock ballast such as is used on the track, costing from 10 to 20 cents per yd., and making a waterproof concrete.

Plan B shows the type of house erected in conspicuous places along the main line. In this case old bridge ties are laid flatwise and shaped with mud or adobe, the partition being made in the same way. The material required for this house consists of 215 old ties, 57 board ft. of second-hand 1 in. sheeting, 140 lineal ft. of second-hand 2 in. x 8 in. timber, 36 lineal ft. of 3 in. x 8 in. timber, 130 lbs. of barbed wire, 78 ft. of old 52 lb. rail, two 9 light sashes, 29 in. x 35 in., 875 lbs. of cement, 3½ cu. yds. of screenings, and two 12 in lengths of 8 in. sewer pipes.

STANDARDS FOR REINFORCED CONCRETE DRAWINGS.

The variation in the standards on drawings of reinforced concrete is so great that many engineers have felt the need of some standard for such drawings which would make them more universally readable. A recommendation for such a standard has recently been made by the committee on Reinforced Concrete Practice of the Concrete Institute of Great Britain, which includes the proper scales for drawings of various classes and the proper conventions for showing reinforcement. Three scales are suggested as being sufficiently elastic to cover all conditions:



Section Laborers' House for Main Lines.

For very large jobs small scales would have to be substituted. On drawings to [illegible] scale main reinforcing bars would be shown by thick, solid lines; secondary reinforcing bars by medium solid lines, and the outlines of the concrete and other details by thin solid lines. With this scale it is usually advantageous to omit reinforcement in adjoining parts. With 1" to the foot scale bars should usually be shown by double lines. The committee thought it inadvisable to color drawings of reinforced concrete or to dot in the concrete in any way, since, if it is necessary to reproduce the drawing, the reduction would ruin the effect of the dotting.

General News Section.

In a fire at Brownsville, Tex., August 1, the office building and freight house of the St. Louis, Brownsville & Mexico was destroyed; loss, $40,000.

A charter has been granted at Altoona to the Brotherhood of Railroad Shop Men, an organization which seems to have been formed in opposition to the American Federation of Labor.

The station and train employees of the Interborough Subway, New York City, now dress in white duck uniforms. The new clothes are paid for by the company, and will be washed at the company's expense.

Both houses of Congress have passed a bill or resolution authorizing the army and navy to participate, next year, in the festivities which are to be held in connection with the completion of the Florida East Coast Railway.

The Chicago & Northwestern has ordered from the United States Electric Company, New York, 38 Gill Selector local battery Bell telephone train despatching outfits, together with two 40-key cabinets for Gill calling keys.

The Toledo & Ohio Central has ordered from the Western Electric Company, Chicago, telephone selector equipments for a telephone train despatching line from Bucyrus to Toledo, 70 miles, and for another from Bucyrus to Thurston, 78 miles.

George W. Bennett, general foreman of boilermakers in the West Albany shops of the New York Central and president of the Master Boilermakers' Association, has been appointed a district boiler inspector by the Interstate Commerce Commission.

The Southern Pacific, always ready for new ideas, has abandoned the use of green flags as tail-end markers on passenger trains and the first of August saw the last of them on all Southern Pacific passenger trains, lamp markers being used in place of them, day and night.

Senator Jones, of the state of Washington, has introduced in Congress a resolution calling upon the president to make a survey for a railway from Controller bay, Alaska, to Mantanuska and the Bering coal fields, and submit to Congress an estimate of the probable cost of such a line.

The Nashville, Chattanooga & St. Louis has established auditor revising clerks at junction points with connecting lines, to check through billing. One man, during June, corrected 418 errors made by connecting lines. In many cases he telephoned connections for authority to eliminate these overcharges.

The Oregon-Washington Railroad & Navigation Company has brought suit in the United States Circuit Court, at Portland, asking an interlocutory injunction restraining the Oregon State Railroad Commission from enforcing the 14-hour state employment law. The company operates, and desires to continue, under the 16-hour federal law.

The new freight classification yard of the Pennsylvania at Northumberland, described in the *Railway Age Gazette* last March, pages 491 and 682, has been opened for business. This yard covers 700 acres of ground, and is over three miles long. The engine house accommodates 52 locomotives, and there is a large freight transfer shed.

The roundhouse and shops of the Washington County Railway at Salmon Falls, Me., were destroyed by fire August 9; loss, $110,000. Eight freight cars were destroyed and nine locomotives and nine passenger cars were badly damaged. As the Washington County has now been absorbed by the Maine Central, it is conjectured that these shops will not be rebuilt.

A plan by which the cost of the pending investigation into the practicability of electrifying the Chicago railway terminals will be properly apportioned among the interested roads has been decided on by the General Managers' Association of Chicago. In making the assessments against the different roads such factors as mileage of tracks within the city, passenger terminals, wheelage, and amount of business as determined by earnings, will be considered. It is estimated that if the investigation requires two or three years, as is expected, it will cost between $200,000 and $300,000. As previously mentioned from time to time in the *Railway Age Gazette*, the following staff of engineers is in charge of the investigation: chief engineer, Horace G. Burt; electrical engineer, Hugh Pattison; terminal engineer, Louis H. Evans, and mechanical engineer, Theodore H. Curtis.

Telephone despatching is now in operation on the Coast Division of the Southern Pacific between Salinas and Santa Barbara; also over the entire Shasta division; on the Sunset, the Sunset and Western and the McKittrick branches, and will soon be installed between Sacramento and Sparks. The despatcher has full control over the line, and no operator is allowed to call up another station. The despatcher will do the calling for him if business requires it. According to an officer of the S. P. it is only a question of time until the telegraph will serve only as an emergency service on that road.

The Chicago & Western Indiana has now acquired all of the property necessary for its proposed passenger station at Polk and Dearborn streets, Chicago, to replace the old Polk street depot. Judgments amounting to $199,587, and covering three lots on Federal street, south of Polk, have been before the court since June 5, and have finally been decided in favor of the railway. With the acquisition of this property the railway now owns all the land between Clark and State streets, from Polk to Taylor streets. The litigation, involving the condemnation of the property, was bitterly contested throughout the trial and extended over a period of seven weeks. The owners of the land claimed that it had a value for railway purposes of from $4,000 to $5,000 per front foot, while the railway placed its value at from $1,000 to $1,200 per front foot. The verdict gives a valuation of $1,700 per front foot.

Postmaster-general Hitchcock has sent to Congress a communication recommending a radical readjustment of the basis on which the government shall pay the railways for carrying the mails. He would pay the carriers on the basis of cost, with the addition of 6 per cent. profit, the cost to be computed not by weight, but by the amount of space used in the cars, with proper modifications for large quantities of mail and frequent trains. He thinks that he would thus save $9,000,000 a year. At the hearings before the special commission in New York City last week the estimates of the second assistant postmaster-general, purporting to show the cost of transportation of second-class mail, were discredited by the testimony of a former second assistant postmaster-general, who declared that no statistics had ever been gathered relative to the transportation of the mails which would afford any reasonable basis for the averages which are now given out by the department.

Great Northern Hotel Train.

Members of the Minnesota State Automobile Association last month—July 20-28—made an automobile tour from St. Paul to Helena, about 1,200 miles; and they took their hotels along with them—or rather they took a single hotel, consisting of an engine and 12 cars of the Great Northern Railway. The tourists in their automobiles traveled from 120 to 210 miles a day and their hotel train kept along with them, reaching each stopping place in time to be ready to receive the guests for dinner or supper as might be necessary. The train consisted of a baggage car, containing a dynamo; a garage car; 5 standard sleeping cars; 2 dining cars; 2 business cars and 1 observation car. On each division it was hauled by a single powerful locomotive. According to a statement issued by H. A. Noble, general passenger agent, the hotel train left St. Paul Thursday, July 20, at 8:30 a. m., and made stops as follows: noon, St. Cloud, evening, Alexandria, 140 miles; Friday noon, Barnesville, evening Fargo, N. D., 121 miles from Alexandria; Saturday noon, Grand Forks, evening Devils Lake, 195 miles for the day; Monday noon Rugby, evening Berthold, 195 miles for the day; Tuesday noon Williston, evening Culbertson, 167 miles; Wednesday noon Glasgow, evening Malta, 183 miles; Thursday noon Havre, evening Great Falls, 210 miles; Friday noon, Wolf Creek, evening Helena. Mr. Noble gives the length of the tour from St. Paul to Helena as 1,288 miles. Musical and other entertainments were given in the observation car each evening; and Al Ray, the chief of the Great Northern detectives, accompanied

the train to protect the passengers from train robbers; and we are told that not only were the autoists heavily armed, but that Dr. Dutton, referee in the contests of the cars, "is one of the best pistol shots in the United States." The dining cars proved themselves popular in spite of the "hospitable eagerness" of the people along the route to entertain the tourists. The garage car carried all sorts of material and facilities for repairing automobiles, and the vacuum cleaners of the sleeping cars were used to clean out the automobiles. The train was furnished with telegraphic news twice a day and had all of the other conveniences of the most complete express trains.

Threatened Railway Strike in England.

Agitation, looking to a strike of railway and dock employees throughout England and Scotland, has been the principal topic of news in the cable despatches throughout the past week; and in Liverpool on Tuesday there was serious rioting and over 3,000 soldiers were on duty to aid the police in keeping order. Two persons were killed by the troops and the situation was described as a reign of terror. A strike of dock laborers in London last week was settled in a short time by the granting of a large part of the workmen's demands, though not until there had been enormous losses, due to delays in transporting food, accompanied by fears of a partial famine. Thousands of tons of perishable provisions were left to rot on the docks. The railways were tied up, partly by the difficulties in the city and partly by small strikes among their own men. The members of the railway brotherhood are under an agreement with their employers binding them from 1907 to 1914 to submit all disputes to arbitration, but the excitement of the strikes and disorders which have taken place, and the apparent success of the demand made, appears to have thrown the railway employees off their feet. As we go to press the brotherhoods of railway men throughout the United Kingdom are reported as having decided to go out on strike within 24 hours.

Mr. Buxton, the president of the Board of Trade, conferred with the railway managers Wednesday morning and with employees' representatives in the afternoon, both sides having refused to concede anything. Mr. Buxton asked the companies to agree at least to a discussion with the union, but the companies refused. How far the unions will be able to tie up traffic is the question. The railway companies promise an effective though restricted service. Sir W. Guy Granet, general manager of the Midland, which has offered a bonus of 50 per cent. on the amount earned during the strike to such of its men as remain loyal, said: "The government has undertaken to put at the service of the railway companies every available soldier in the country. We have been arranging with the war office this afternoon where the troops shall go, and everywhere troops are moving to the principal centers in the north of England and in the midlands to insure that the railway service shall be carried on. The government realizes that the recent partial strikes paralyzed the trade of the country, and that if transport were further held up conditions would go from bad to worse, so every nerve is being strained to prevent internal transport from coming to a standstill. The railway managers have made adequate arrangements to carry on an efficient but necessarily curtailed service of passenger and goods trains, but if adequate protection fails us, of course we cannot carry it on. England is a wonderful country for railways. You may shut up one line, but it would require an extraordinary organization to shut up all the routes to the great centers. I do not anticipate that more than 25 [illegible] Where there are signal boxes, say three miles apart, we shall [illegible] flag the trains. All the railway systems will be worked as one. [illegible]"

Ninety-two Miles in 66.56 Minutes on a Motorcycle.

An "Indian" motorcycle has been driven for an hour at a greater speed than was ever accomplished by any other vehicle traveling on wheels; or, to be exact, 92 miles in 66 minutes, 33.6 seconds. This statement is made by the company which manufactures the motorcycle and is based on a test made by Mr. de Rosier, riding on a mile track at Playa del Rey, Cal., February 7 last. Mr. de Rosier started to see what he could do in one hour, at the end of which time he had covered 83 miles, 135 yards; but the managers of the test instructed him to keep on, hoping to make a record for 100 miles, their purpose being defeated, however, by the failure of his supply of gasolene. The rate in miles per hour for the 92 miles was 82.93. The best time which has been made by de Rosier for a single mile was 40.8 seconds.

Illuminated Slow Boards.

The London & Southwestern has lately installed a number of roadside speed notices, which, from the description that is given of them, appear to be similar to those in use on the Northern of France and described some time since in the *Railway Age Gazette*. This indicator consists of a large lantern fixed on a post and having a translucent glass front bearing on its face figures indicating the rate of speed, in miles per hour, to which trains are limited in passing over the curve or other hindrance immediately in advance. Each lantern is provided with two long-burning oil lamps, which are kept burning both night and day. For a given piece of track three indicators are used; first, one at a distance of about ¼ mile in the rear, bearing numerals showing the rate of speed; second, one bearing the letter *C*, which is at the commencement of the section to which the speed limit applies; and a third, bearing the letter *T*, showing where normal speed may be resumed.

Iron and Steel Exports and Imports.

The exports of iron and steel manufactures during the fiscal year ended June 30, 1911, aggregated 1,910,298 tons or $230,725,351 in value against $179,133,186 in 1910 and $183,982,182 in 1908, the previous high record. The growth during 1911, which exceeded that of any earlier year, was distributed among nearly all the important classes of iron and steel exported. The rails exported in 1911 amounted to 391,428 tons, as compared with 369,578 tons exported in 1910. The structural iron and steel exported during 1911 was 176,085 tons, as against 120,228 tons in 1910.

The following table shows value of exports for the first six months of the calander years 1911 and 1910:

	1911.	1910.
[illegible]	[illegible]	$14,513,394
[illegible]	[illegible]	18,949,082
[illegible]	[illegible]	17,358,503
[illegible]	[illegible]	16,852,760
[illegible]	[illegible]	17,058,042
June	20,310,053	16,503,204
Totals	$125,876,506	$95,811,485

The imports of iron and steel manufacturers in 1911 were 565,937 tons, an increase of 46,856 tons over last year. Imports in June, 1911, totaled 29,394 tons, compared with 23,375 in May, 1911, and 30,322 tons in June, 1910. This shows that the general trend of imports has been lower while that of exports has been higher.

Eighteen-Hour Train Derailed at Fort Wayne.

The Pennsylvania Special, the 18-hour Chicago to New York train which left Chicago at 2:45 Sunday afternoon, August 13, was derailed just west of Fort Wayne, Ind., and four employees were killed and four trainmen, 17 dining and Pullman employees, three mail clerks and 29 passengers, were injured. The train was running late and was being pulled by two engines; and was derailed while running at high speed over a sharp curve at the west end of the track elevation work under way in Fort Wayne. Both engines and four cars left the rails. The engine of a freight train standing on an adjoining track was struck by the two passenger engines and all three were wrecked. The injuries were confined to trainmen and passengers in the forward coaches. The train was made up wholly of steel cars, and to this fact may be attributed the escape of the passengers from fatal injuries.

The Chicago *Record-Herald* gives the following details:

Charles P. Skillman, who resides directly opposite the spot where the wreck occurred, saw the whole thing as he sat on his veranda. "The passenger train," said Mr. Skillman, "was coming

at a terrific rate of speed. Just across the bridge which spans the St. Mary's river it veered into a new switch placed there because of track elevation work. I think the train was going at too great a rate for the switch to stand, for as I watched it seemed to me that the rails of the switch slid from under the passenger directly over to the freight train standing on the north track. . . ." From Valparaiso to Winona Lake the engine which brought the train out of Chicago was working badly, so the engine which was to take the train from Fort Wayne to Crestline was sent to Winona Lake to meet the flyer. . . . Robert Russell of Toronto and Fred Beckwith of New York, passengers, were imprisoned in the vestibule between the diner and the car immediately to the rear, and were unable to escape from their narrow prison. Their cries attracted rescuers who cut away the roof of the car and saved them.

"After the crash," said George Mitchell, of Los Angeles, "there was a panic such as I never supposed could happen. I saw strong men seize a woman whose companion had broken a window and was pushing her through it, pull her back and crawl out themselves. Several men in a panic of fear rushed over me and my family, and as a matter of fact, we were the last to get out of the car. My daughter, aged 14, has a bad cut on her leg, but the rest of us escaped with only bruises and slight cuts. If it had not been that the cars were of steel I think that we should all have been killed."

This train was derailed at Indiana Harbor, 128 miles west of Fort Wayne, one week previously.

Passenger Station Platforms Lighted by Approaching Trains.

That the platforms of small passenger stations could be lighted much better than they usually are, without increasing the cost, if the lights were kept burning only when needed, is obvious to any one; and now the signal department of the Southern Pacific has taken up this idea and carried it out; and at one station the cost of the platform lights was reduced from $14 a month to $2.

The scheme is simple. The circuit which provides current for the electric lamps on the station platform is closed by a solenoid, energized by the power line, and controlled by a relay in a line-wire circuit extending from the station each way to the first automatic block signal; and the passage of an approaching train past this block signal, throwing that signal to the stop position, closes this control circuit and thereby energized the station lights. The block signal, of course, remains in the stop position until the train has passed out of that block section (beyond the station). When the signal goes to the clear position, the control circuit is opened, the solenoid is de-energized and the lights go out. The control circuit has circuit closers at both ends, one to be worked by the signal which is actuated by the northbound trains and the other by southbound. Thus the platform is lighted from just before the approach of a train until a short time after it leaves. By local switches the station agent can energize the lights at any time, or can cut off the power entirely.

This scheme was used first at Burlingame, San Mateo, and Paso Robles, Cal., on the Coast division. It is to be installed at other stations. It was first suggested to the superintendent of the division by employees of the signal department. At Burlingame, where the cost has been reduced, as above stated, there were formerly two arc lights; now the station has two arc lights and five 16-candle power incandescent lamps. If it were desired to keep the platform lighted for a longer time the control circuit might be extended to the second signal from the station.

Master Blacksmiths' Association.

The nineteenth annual meeting of the International Railway Master Blacksmiths' Association opened at the Boody House, Toledo, Ohio, August 15. The first session was given over to addresses by the mayor, by B. A. Worthington, receiver of the Wheeling & Lake Erie, and by the president of the association, J. J. Connors, master blacksmith, Atlanta & West Point, Montgomery, Ala. The secretary-treasurer's report showed the association to be in a flourishing condition, the membership having increased from 283 to 314 since the last convention, and the balance in the treasury having increased from $557 to $566, although the expenses during the year have been considerably heavier than usual.

The following officers were elected at this meeting: F. F. Hoeffle (L. & N.), president; T. J. McSweeney (B. & O.), first vice-president, and A. L. Woodworth (C. H. & D.), secretary and treasurer, with office at Lima, Ohio.

The reports and papers which were presented and discussed included the following: Tools and formers, drop forging, high speed steel, frogs and crossings, flue welding, locomotive frame making and repairs, oxy-acetylene for welding and cutting metals, case hardening, spring making and repairs, piecework and other methods of wage payment.

The following firms had exhibits in the parlors of the hotel:

Acme Machinery Company, Cleveland, Ohio.—Forgings and working model of Acme forging machine.

Ajax Manufacturing Company, Cleveland, Ohio.—Large number of forgings made in railway shops on Ajax machines. Represented by J. R. Blakeslee, J. A. Murray, H. D. Heman, A. L. Guilford and Henry Gaul.

Chambersburg Engineering Company, Chambersburg, Pa.—Catalogs, steam and hydraulic forging tools. Represented by H. L. Nixon.

Clement Restein Company, Philadelphia, Pa.—Belmont steam hammer packing. Representatives, H. O. Fettinger and Norman B. Miller.

Colonial Steel Company, Pittsburgh, Pa.—Tool steel catalogs. Represented by W. A. Nungester and A. H. Ackerman.

Crucible Steel Company of America, Pittsburgh, Pa.—Catalogs, high grade tool steels, including high speed steels, alloy steels and carbon tool steels. Representatives, F. Baskerfield, R. L. Williams, F. A. Lawler, Wm. Stevenson and H. W. Stocke.

Goldschmidt Thermit Company, New York.—Thermit welding apparatus and samples of thermit welds, including pipe and rail welds; steel alloys. Represented by H. D. Kelley and Henry S. Mann.

Halcomb Steel Company, Syracuse, N. Y.—Samples showing physical characteristics of electric furnace chrome vanadium steel. Represented by Thomas J. Moore.

Hoskin Manufacturing Company, Detroit, Mich.—Recalescent outfit. Representatives, Wilford V. Young and F. Jay Shults.

Houghton & Co., E. F., Philadelphia, Pa.—Case hardening compounds. Representatives, J. W. Kelley and E. Niessen.

National Machinery Company, Tiffin, Ohio.—1½-in. wedge grip bolt header in operation. Weighs 18,000 lbs. and is motor driven. Represented by E. R. Frost, H. E. Lott and Carl L. Ernst.

Railway Materials Company, Chicago.—Catalogs, Ferguson oil furnaces. Representatives, T. B. Cram, E. C. Folsom, G. E. Hoeffle, J. V. Githens and B. C. Hooper.

Ryerson & Son, Joseph T., Chicago.—Catalogs, spring repairing machinery. Representatives, Fred Gardner, H. H. Linton and J. G. Kirby.

United Engineering Foundry Company, Pittsburgh, Pa.—Catalogs of high speed forging press. Represented by J. A. Eden, Jr., and F. V. McMullin.

American Association of General Passenger and Ticket Agents.

The fifty-sixth annual convention of the American Association of General Passenger and Ticket Agents will be held at the St. Paul Hotel, St. Paul, Minn., on September 19. C. M. Burt, Boston, Mass., is secretary.

Railroad Chemists & Engineers of Tests.

The date of the next meeting of the Railroad Chemists & Engineers of Tests has been changed from September 7 to October 5. The meeting will be held at the Hotel Stratford, Chicago. W. A. Derby (C. B. & Q.), Aurora, Ill., is secretary.

International Railway General Foremen's Association.

William Hall has been made secretary of the executive committee of the International Railway General Foremen's Association. All communications for this committee should be addressed to him, care of the Chicago & North Western, Escanaba, Mich.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

Air Brake Association.—F. M. Nellis, 53 State St., Boston, Mass.

American Association of Demurrage Officers.—A. G. Thomason, Scranton, Pa.

American Association of General Passenger and Ticket Agents.—C. M. Burt, Boston, Mass.; next meeting, St. Paul, Minn., Sept. 19, 1911.

American Association of Freight Agents.—R. O. Wells, East St. Louis, Ill.

American Association of Railroad Superintendents.—O. G. Fetter, Carew building, Cincinnati, Ohio; 3d Friday of March and September.

American Electric Railway Association.—H. C. Donecker, 29 W. 39th St., New York; October 9-13, Atlantic City, N. J.

American Railway Association.—W. F. Allen, 75 Church St., New York; November 15, Chicago.

American Railway Bridge and Building Association.—C. A. Lichty, C. & N. W., Chicago; Oct. 17-19, 1911, St. Louis, Mo.
American Railway Engineering Association.—E. H. Fritch, Monadnock Block, Chicago; annual convention, March 19-21, 1912, Chicago.
American Railway Master Mechanics' Association.—J. W. Taylor, Old Colony building, Chicago.
American Railway Tool Foremen's Association.—O. T. Harroun, Bloomington, Ill.
American Society for Testing Materials.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.
American Society of Civil Engineers.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.
American Society of Engineering Contractors.—D. J. Haner, 13 Park Row, New York; 3d Tuesday of each month, New York.
American Society of Mechanical Engineers.—Calvin W. Rice, 29 W. 39th St., New York.
Association of American Railway Accounting Officers.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.
Association of Railway Claim Agents.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 22, 1912, Los Angeles, Cal.
Association of Railway Electrical Engineers.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago; annual, November 6-10, Chicago.
Association of Railway Telegraph Superintendents.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.
Association of Transportation and Car Accounting Officers.—G. P. Conard, 75 Church St., New York; December 12-13, Louisville, Ky.
Canadian Railway Club.—James Powell, Grand Trunk Ry., Montreal, Que.; 1st Tuesday in month, except June, July and Aug., Montreal.
Canadian Society of Civil Engineers.—Clement H. McLead, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.
Car Foremen's Association of Chicago.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.
Central Railway Club.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.
Civil Engineers' Society of St. Paul.—D. F. Jurgensen, 116 Winter St., St. Paul, Minn.; 2d Monday, except June, July and Aug., St. Paul.
Engineers' Society of Pennsylvania.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.
Engineers' Society of Western Pennsylvania.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.
Freight Claim Association.—Warren P. Taylor, Richmond, Va.; annual, Buffalo, N. Y.
General Superintendents' Association of Chicago.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.
International Railway Congress.—Executive Committee, rue de Louvain, 11 Brussels; 1915, Berlin.
International Railway Fuel Association.—D. B. Sebastian, La Salle St. Station, Chicago.
International Railway General Foremen's Association.—L. H. Bryan, D. & I. R. Ry., Two Harbors, Minn.
International Railroad Master Blacksmiths' Association.—A. L. Woodworth, Lima, Ohio; annual, Aug. 15, Toledo, Ohio.
Iowa Railway Club.—W. B. Harrison, Union Station, Des Moines, Ia.; 2d Friday in month, except July and August, Des Moines.
Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York.
Master Car Builders' Association.—J. W. Taylor, Old Colony building, Chicago.
Master Car and Locomotive Painters' Association, of United States and Canada.—A. P. Dane, B. & M., Reading, Mass.; Sept. 12-15, 1911, Atlantic City, N. J.
New England Railroad Club.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.
New York Railroad Club.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.
Northern Railway Club.—C. L. Kennedy, C., M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.
Omaha Railway Club.—H. H. Maulick, Barker Block, Omaha, Neb.; [illegible]
[illegible] W. A. Deeds, C. B. & Q., [illegible]
Railway Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.
Railway Club of Pittsburgh.—C. W. Alleman, P. & L. E., Pittsburgh, Pa.; [illegible] except June, July and August, Pittsburgh.
Railway Industrial Association.—G. L. Stewart, St. L. S. W. Ry., St. Louis, Mo.; annual, May 12, 1912, Kansas City, Mo.
Railway Signal Association.—C. C. Rosenberg, Bethlehem, Pa.; annual, Oct. 10, Colorado Springs, Colo.
Railway Storekeepers' Association.—J. P. Murphy, Box C, Collinwood, Ohio.
Richmond Railroad Club.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.
Roadmasters' and Maintenance of Way Association.—Walter E. Emery, P. & P. U. Ry., Peoria, Ill.; September 12-15, St. Louis, Mo.
St. Louis Railway Club.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.
Society of Railway Financial Officers.—C. Nyquist, La Salle St. Station, Chicago; Sept. 12-14, St. Paul, Minn.
Southern Association of Car Service Officers.—E. W. Sandwich, A. & W. P. R., Montgomery, Ala.; annual, October 20, Atlanta, Ga.
Southern & Southwestern Railway Club.—A. J. Merrill, Grant bldg., Atlanta, Ga.; [illegible] March, May, July, Sept., Nov., Atlanta.
Telegraph Interchange Club.—J. G. Macomber, Woolson Spice Co., Toledo.
Traffic Club of Chicago.—Guy S. McCabe, La Salle Hotel, Chicago; [illegible]
Traffic Club of New York.—C. A. Swope, 290 Broadway, New York; last [illegible] June, July, and August, New York.
Traffic Club of Pittsburgh.—E. L. Walters, Oliver building, Pittsburgh.
Transportation Club of Detroit.—J. P. Mackie, 7042 Stewart Ave., Chicago; annual, June 12, 1912, Louisville, Ky.
Transportation Club of Buffalo.—[illegible] first Saturday [illegible]
Transportation Club of Detroit.—W. P. Hooley, L. S. & M. S., Detroit, Mich.; [illegible]
Travelling Engineers' Association.—W. O. Thompson, N. Y. C. & H. R., [illegible] Chicago.
[illegible] W. B. [illegible] P. O. Box 167, C. Winona, Minn.; [illegible] annual, June, July and August, Winnipeg.
[illegible] W. Taylor, [illegible] Chicago; 3d [illegible]
[illegible] J. H. Wells, 1111 Merchants Block, Birmingham, Ala.; [illegible] Chicago.
Women Railroad Employees' Protective Club.—[illegible] Los Angeles, Cal. Subway Terminal Building, Chicago; [illegible] Chicago.

Traffic News.

The Western Classification Committee, whose meeting in Milwaukee last month was adjourned, resumed sessions in Chicago on August 14.

The absorption of the Pacific Express by the Wells Fargo Express Company, which has now been carried out, results in the abolition of about 40 offices of the Pacific company in Texas cities, and towns.

Announcement has been made by the Northern Pacific that hereafter its trains into and out of Winnipeg, Man., will arrive at and depart from the new terminal station at that place.

The Southern Pacific in Mexico has reduced first class passenger fares from 7 cents a kilometer to 5 cents, or about 8 cents a mile. No change has been made in second class fares nor in the rates on the Sonora Railway.

The Pennsylvania Lines west of Pittsburgh will next week run a "Seed and Soil" lecture train for the benefit of the farmers on its lines in Ohio and Indiana, carrying lecturers from the Ohio State Agricultural College.

Second class party fares from Kansas City, Omaha and Council Bluffs to Minneapolis and St. Paul have been withdrawn by the railway companies operating between these points, effective October 1 on the Wabash and September 15 on the other roads.

The Atchison, Topeka & Santa Fe, the Union Pacific, the Missouri Pacific and the Chicago, Rock Island & Pacific have indicated to the Public Utilities Commission of Kansas that they will haul seed wheat free to the farmers in the eleven counties of northwestern Kansas who suffered during the recent drought in that section. It is estimated that four of the counties will need a total of about 125,000 bushels of seed.

Wisconsin now has a law providing that upper berths in sleeping cars, when not engaged or occupied, shall be left up so as not to disturb the person occupying the lower berth. Any corporation violating this law is subject to a fine of $50 to $100, and any porter or other person in charge of the car violating the law shall be deemed guilty of a misdemeanor and will be subject to a fine of $100 or imprisonment not exceeding six months.

The Illinois Traction System, which has opened an office in the McCormick building, Chicago, is soliciting freight from Chicago for points in Illinois on its lines. While the tracks of the system do not enter Chicago, it is said that plans for securing such an entrance are under way. On completion of an extension of this road between Morris, Ill., and Joliet, direct connection will be had with the Chicago & Joliet Electric Railway, which runs between Joliet and Chicago.

Traffic officers of the roads belonging to the Railway Ticket Protective Bureau have met in Chicago to discuss the advisability of continuing the bureau as a means of preventing a renewal of wholesale ticket scalping. Although some of the roads, thinking that the work of the organization has been accomplished, decided to withdraw from it, the general belief is that the expense of maintaining the bureau is a small item compared with the benefits which are derived from its operation, and that it should be continued.

The Iowa Railway Commission has refused to grant the petition of the railways asking for an increase in the minimum carload weights on shipments of cattle, hogs and sheep. After hearing both shippers and railways it was decided by the commission that the ordinary carload of the ordinary farmer in Iowa [illegible] on account of the size of the farms in that state, that an increase in these minimum weights would work to the disadvantage of many shippers of live stock. As no evidence was presented by shippers against raising the minimum weights on shipments of horses, the increase asked for by the roads will be permitted to take effect as to them.

[illegible] merchants of Galveston, Houston, Dallas, Fort Worth, San Antonio, Beaumont, Waco and Sherman, Tex., and

Oklahoma City, Okla., have formed the Seaboard & Gulf Steamship Company, with a capital of $1,000,000, to run steamships between New York and Baltimore and Galveston. It is charged that previous attempts to compete with the established lines between these points have resulted in the large companies taking over the independent companies or cutting their rates to a point where the latter were forced out of business. As the present company is to be run on a co-operative plan, it is believed that it will be able to compete very successfully with the established lines.

Car Surpluses and Shortages.

Arthur Hale. chairman of the committee on relations between railways of the American Railway Association, in presenting statistical bulletin No. 101, giving a summary of shortages and surpluses by groups from April 13, 1910, to August 2, 1911, says:

"There is a decrease in the surplus of all classes, the total decrease being 20,297 cars, bringing the total surplus down to 130,136, the lowest figure since the report for January 4. The decrease is principally in coal cars, although box cars shows a reduction of 3,071, and miscellaneous cars 1,862. The total car decrease is heaviest in group 2 (Eastern), although group 3 (Middle), also shows an improvement in the demand for this class of equipment. The box car decrease is general, with the exception of an increase in group 6 (Northwestern), which is probably due to the assembling of empties for grain movement."

The accompanying table gives surpluses and shortages by groups in the last period covered by the report, and the chart shows total bi-weekly figures in 1907 to 1911.

Freight Car Balance and Performance.

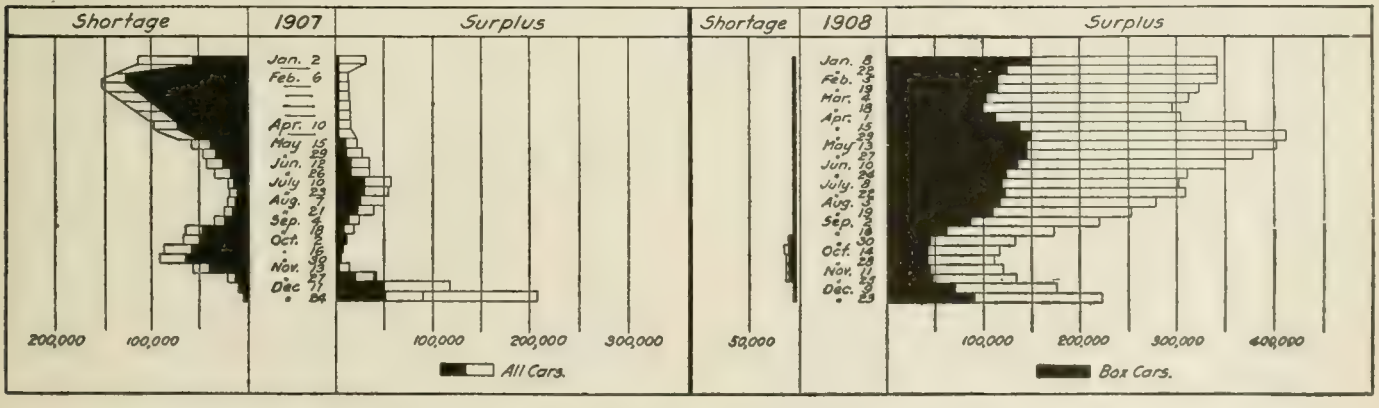
Arthur Hale, chairman of the committee on relations between railways of the American Railway Association, in presenting statistical bulletin No. 102, covering car balance and performance for April, 1911, says:

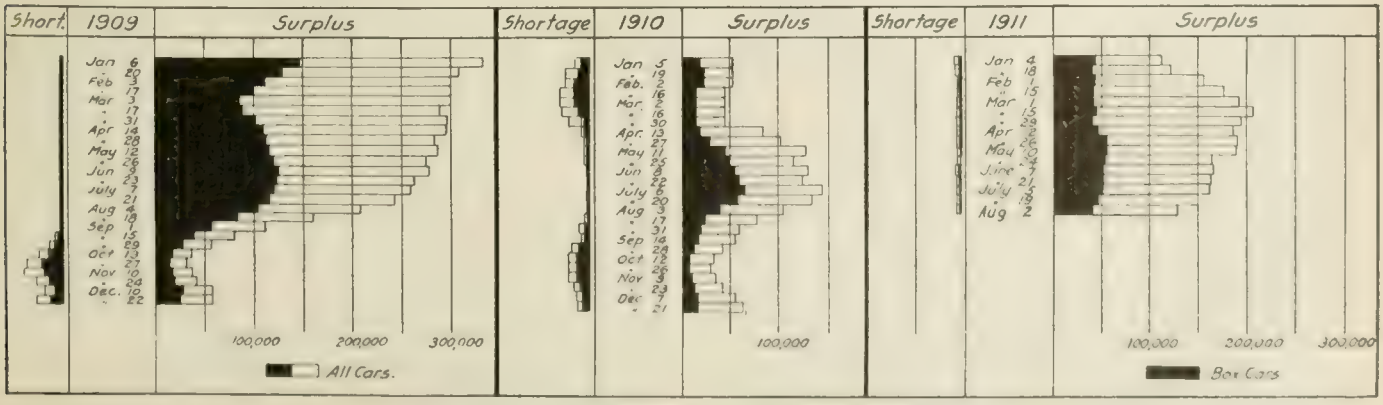
"As noted on the chart there was a general drop from the usual 'peak' performance of March, the only exception being in

Car Surpluses and Shortages.

Date.	No. of roads.	Surpluses: Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.	Shortages: Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.
Group *1.—August 2, 1911	7	1,935	933	1,560	338	4,766	0	68	300	0	368
" 2.— " 2, 1911	26	3,472	188	4,788	3,851	12,299	13	1	413	0	427
" 3.— " 2, 1911	27	4,920	520	28,303	3,772	37,515	22	100	0	3	125
" 4.— " 2, 1911	10	908	136	1,375	1,153	3,572	127	124	0	0	251
" 5.— " 2, 1911	20	3,193	443	3,206	1,809	8,651	65	40	192	0	297
" 6.— " 2, 1911	26	12,433	1,019	3,013	7,335	23,800	10	6	0	5	21
" 7.— " 2, 1911	4	1,414	48	483	794	2,739	0	0	0	0	0
" 8.— " 2, 1911	19	6,330	180	2,483	4,515	13,508	0	0	0	0	0
" 9.— " 2, 1911	12	2,028	318	501	837	3,684	0	0	0	15	15
" 10.— " 2, 1911	19	6,054	820	2,143	9,506	18,523	2	0	0	0	2
" 11.— " 2, 1911	5	917	51	27	84	1,079	320	161	0	58	539
Total	175	43,604	4,656	47,882	33,994	130,136	559	500	905	81	2,045

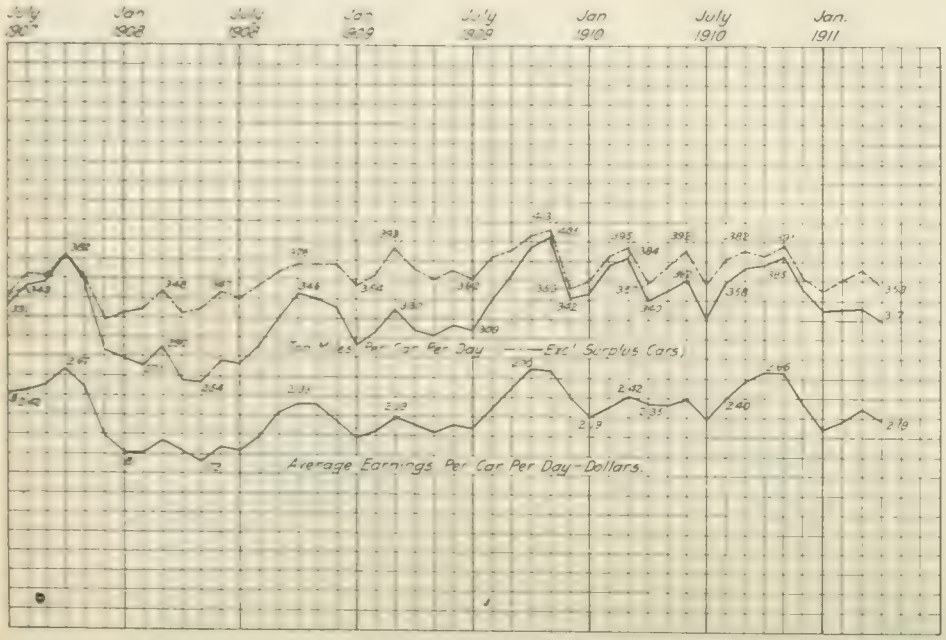
*Group 1 is composed of New England lines; Group 2—New York, New Jersey, Delaware, Maryland and Eastern Pennsylvania lines; Group 3—Ohio, Indiana, Michigan and Western Pennsylvania lines; Group 4—West Virginia, Virginia, North and South Carolina lines; Group 5—Kentucky, Tennessee, Mississippi, Alabama, Georgia and Florida lines; Group 6—Iowa, Illinois, Wisconsin, Minnesota and the Dakotas lines; Group 7—Montana, Wyoming and Nebraska lines; Group 8—Kansas, Colorado, Missouri, Arkansas and Oklahoma lines; Group 9—Texas, Louisiana and New Mexico lines; Group 10—Oregon, Idaho, California and Arizona lines; Group 11—Canadian lines.

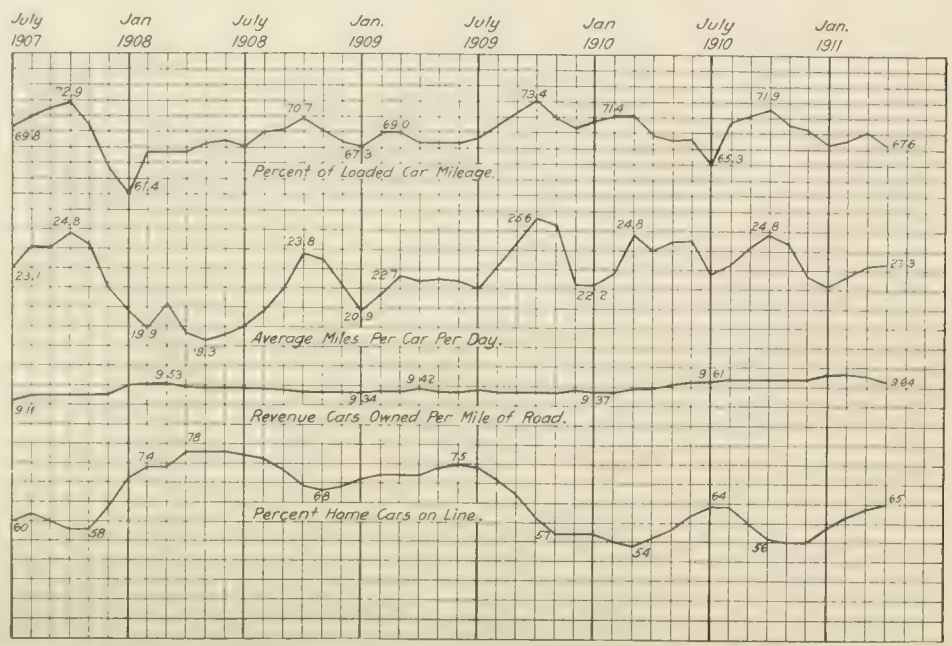




Car Surpluses and Shortages in 1907 to 1911.

	New England	N. Y., N. J., Del., Md., Eastern Pa.	Ohio, Ind., Mich., Western Pa.	Va., W. Va., N. and S. Carolina	Ky., Tenn., Miss., Ala., Ga., Fla.	Iowa, Ill., Wis., Minn.	Mont., Wyo., Neb., Dakotas	Kan., Colo., Okla., Mo., Ark.	Texas, La., New Mex.	Ore., Idaho, Nev., Cal., Ariz.	Canadian Lines.	Grand Total.
				100,113	170,[illegible]	388,723	18,[illegible]91	135,887	17,646	143,348	106,760	2,148,603
	14,141	48,[illegible]42	[illegible]	71,[illegible]00	46,[illegible]6	77,880	2,766	94,231	16,839	63,810	75,5[illegible]2	1,398,137
	[illegible]	3,[illegible]18	[illegible]	[illegible]	[illegible]6	[illegible]6	3,[illegible]8	41,014	14,[illegible]88	50,360	30,[illegible]8	720,892
	13,[illegible]3	[illegible]267	21,[illegible]4	16,[illegible]	164,831	320,[illegible]94	9,[illegible]14	1[illegible],15	31,[illegible]7	114,370	105,950	2,119,029
	3,[illegible]2	[illegible]1	3,[illegible]0	[illegible]29	[illegible]	[illegible]	1,688	[illegible]	11,481	[illegible]	[illegible]	[illegible]
	[illegible]	64	[illegible]	64	64	72	42	69	86	45	71	65
	[illegible]	84	86	89	32	26	67	80	73	35	29	34
	100	[illegible]	104	101	96	98	109	99	159	80	100	99
	[illegible]	41,[illegible]3	14,[illegible]80	3,[illegible]3	6,079	13,860	1,470	5,856	[illegible],053	12,528	2,691	103,965
	84,[illegible]4	33,[illegible]4	34,[illegible]3	150,[illegible]5	169,910	393,554	21,714	140,801	33,180	126,898	108,641	2,222,994
	[illegible]	[illegible]4	[illegible]70	6.76	8.11	7.59	5.84	9.05	6.17	5.29	6.97	6.86
	1,[illegible]8	[illegible]0	[illegible]27	3,138	2,692	6,343	505	2,688	577	2,596	2,158	34,799
	81	75	84	61	65	62	43	52	58	49	50	64
	11,111,[illegible]26	[illegible],[illegible]8,[illegible]62	143,[illegible]4,130	14,[illegible]3[illegible]9	134,473,110	268,124,120	23,241,599	86,337,090	26,765,877	120,937,031	96,519,218	1,552,855,248
	13[illegible]	[illegible]8	18.7	[illegible]1	24.4	23.7	35.7	21.4	26.4	31.8	29.6	23.3
	[illegible]3	67.5	68.3	67.7	66.5	70.3	75.6	68.1	63.5	69.8	72.0	67.6
	[illegible]7,[illegible]8	6,887,[illegible]8,[illegible]11	1,[illegible]4[illegible],[illegible]58	1,[illegible]35,[illegible]27,[illegible]96	1,461,[illegible]36,935	2,149,922,843	351,367,803	1,138,588,434	296,987,179	1,612,003,533	1,141,362,097	19,352,567,997
	15.0	14.6	14.7	13.9	11.8	12.8	15.8	13.2	11.3	13.5	11.8	13.7
	18.[illegible]	[illegible].9	21.4	[illegible].4	17.8	18.7	20.8	19.6	17.6	19.4	16.4	20.4
	[illegible]3	[illegible]4	[illegible]8	3[illegible]	289	301	586	282	208	428	350	317
	$[illegible],[illegible]43	$4[illegible],[illegible]65	$11,[illegible]6,331	$10,49[illegible],[illegible]2	$[illegible],655,705	$[illegible],[illegible]55,705	$[illegible],622,041	$2,[illegible]13,488	$[illegible],417,612	$14,68[illegible],274	$8,626,390	$146,140,600
	[illegible].[illegible]8	[illegible].[illegible]4	1.75	[illegible].[illegible]5	2.05	[illegible].[illegible]0	4.83	2.27	4.10	3.42	2.71	2.27
	[illegible].41	[illegible].[illegible]8	1.68	[illegible].[illegible]2	2.13	2.25	4.45	2.28	2.59	4.30	2.71	2.30
	2.[illegible]4	2.05	1.60	1.97	2.06	2.17	4.14	2.18	2.43	3.87	2.65	2.19





Car Loading, Earnings and Performance in 1907 to 1911, Inclusive.

the average miles per car per day, which shows an increase from 23.2 to 23.3 (average excluding surplus cars 26.0), this increase being at the expense of the loaded mileage which dropped from 68.6 per cent. to 67.6 per cent. The decreases were not, however, so striking as the April decreases in previous years, although it should be remembered that the March, 1911, performance was below that of 1910.

The ton miles per car per day decreased from 332 to 317, the average excluding surplus cars being 353, as compared with 369 in March. The earnings were decreased from $2.28 to $2.19, the average excluding surplus being $2.44, as against $2.58 in March. As usual in April, the return movement of cars to their home lines has begun, the cars on home lines increasing from 63 per cent in March to 65 per cent. in April."

The accompanying table gives figures by groups for April, and the charts show totals in 1907 to 1911.

The Commission's Attitude Toward Competition.

Very few even of railway managers deny that it is advisable that there should be a tribunal for the adjustment of differences between the railways and the shippers. The Interstate Commerce Commission is such a tribunal.

It has at times seemed to the railways that the commission instead of being a tribunal in all that the term applies has considered itself as the representative of the shippers in their controversies with the railways. That this is not true is evidenced by the fact that approximately one-half of the complaints made to the commission in three or four years following the passage of the Hepburn Act were decided against the complainants. It has, moreover, rendered decisions that have tended to relieve the railways of burdens that the shippers had forced on them and of which they could not relieve themselves. Such are the decisions that elevation allowances and divisions of through rates with industrial lines and tap lines are unlawful. Certain of its decisions, however, have seemed to consider different railways under different corporate ownership as not entitled to the fullest consideration that separate corporate ownership would seem to imply. Such is the decision compelling the line between Portland and Seattle to participate in the division of a through passenger rate from the Missouri river, while the company owning the through line from the river believed that it should have the through traffic rate, or else its local rate for the shorter haul. Another such decision is that which for the benefit of wholesale merchants at Kansas City and other points on the Missouri river reduced the through rates from the East. If it is the will of the people that separate lines under separate corporate ownership should be utilized as though they were parts of one system it would seem unfair that they should prohibit the amalgamation of such lines under one ownership. That is, if the lines are to be deprived of the advantages of competition they should be allowed the benefits of amalgamation, especially as the commission now has the power to prevent the evils that in earlier times might have ensued from such amalgamation.—*L. E. Johnson*, before the Southern Shoe Wholesalers' Association.

INTERSTATE COMMERCE COMMISSION.

The commission has suspended until December 13 certain tariffs filed by railways west of Chicago, making an advance of 25 per cent. in the freight rates on "feeding cattle."

The commission has issued an order reducing the rates on citrus fruits from Florida to 215 points in Northern states. An order was issued some time ago making reductions to Western cities, and the roads were notified to make these other reductions themselves; but they have not done so, apparently because they could not agree on the division of the rates, and so the commission steps in. The rates are to take effect October 2.

The Commission has announced hearings as follows: By Commissioner Lane on the application of the long and short haul clause over the Shasta route in San Francisco August 30, and in Portland, September 4. At Los Angeles on September 14 on rates on barley, bran and wheat. On September 25 on the pipe line question in Houston, Tex. By Commissioner Prouty in the cases of the Mohair Growers' Association and on rates on wool, hides and pelts from various Western points to Eastern destinations in Chicago September 6; in Albuquerque, N. M., September 12; in Denver September 14; in Salt Lake City September 19; in Portland, Ore., September 26, and in Phoenix, Ariz., October 2.

STATE COMMISSIONS.

The decision of the New York State Public Service Commission, Second district, refusing a certificate of necessity to the Buffalo, Rochester & Eastern is reported on page 318.

The governor of Massachusetts has appointed Frederick J. Macleod chairman of the State Railroad Commission in place of William P. Hall, who has been appointed a judge of the superior court.

The Wisconsin Commission has notified the railways that under the law passed this year, chapter 160, the commission must be notified as early as possible of all intended changes in freight rates; and reasons must be given for making each change.

The Ohio Public Service Commission has ordered the Cincinnati, Hamilton & Dayton to provide better passenger and freight service between Wellston and Ironton. Passenger trains spend so much time loading and unloading freight that passengers complain that the trip between the two cities—50 miles and back, cannot be made in a single day.

The California State Railroad Commission has established through routes and joint rates for the Oakland & Antioch Electric Railway, and the Atchison, Topeka & Santa Fe, and ordered them to be put in effect September 12. The decision states that the electric road may compete with the Southern Pacific in freight traffic between San Francisco, Oakland, Stockton, Concord, Hookston and Walnut Creek.

The Colorado Railway Commission has issued an order dismissing the case brought by George J. Kindel against the Adams, the American, the United States, the Wells-Fargo and the Globe Express companies alleging that they violate the United States postal law by carrying for hire over post routes established by law packets weighing four pounds and less, single books, etc. It was also charged in the complaint that the rates, rules and tariffs which the defendants have on file with the state commission contain and provide for illegal rates and charges. The companies denied the allegations in the complaint. Basing its opinion on a decision of the Interstate Commission in a case where the questions involved were identical, the Colorado commission dismissed the complaint indicating that if the acts complained of were in violation of the United States postal laws it would have no jurisdiction and that it did not believe they were in violation of the laws of Colorado.

The New York State Public Service Commission, Second district, in an opinion by Commissioner Decker, has ordered the installation on or before September 1 of passenger train service on the Mahopac Falls Railroad between Mahopac Falls, one of its termini, and Baldwin Place or such other station on the Putnam or Harlem division as the operating company, The New York Central, may deem appropriate. The service required is not less than one morning train south-bound from Mahopac Falls and one evening train north-bound to Mahopac Falls, each to be run so as to afford reasonable through service to and from New York City, such service to continue for a period of not less than six months. The company is also required to keep accurate account of the train revenues and operating expenses in connection with the passenger service. The road is two miles long and connects with the Putnam division of the Central at Baldwin Place. It has been without passenger service since 1900, during which year it was discontinued without lawful authority from the state. The complaint also involved alleged inadequate freight train service to and from Mahopac Falls, but that part of the complaint is not sustained.

COURT NEWS.

Suits based on the illegal shipment of oil from Olean, N. Y., to points in Vermont, for which the railways and the Standard Oil Company have recently paid heavy fines, are still in the United States court at Buffalo; and on application of the government attorney last week, Judge Hazel held that the Standard Oil Company might be prosecuted for two untried indictments, containing about 200 counts each. The defendant argued that the alleged offense was covered by the fines already paid, but Judge Hazel sustained the government, holding that each shipment was a separate offense; the lump sums paid could not be taken to cover all of the shipments which had been made.

REVENUES AND EXPENSES OF RAILWAYS.

(For explanations see issues of August 4 and 11.)

	Mileage operated at close of year	Operating revenues	Operating expenses	Maintenance of way and structures	Maintenance of equipment	Traffic	Transportation	General	Total operating expenses	Net operating revenue or deficit	Outside operations, net	Taxes	Operating income or loss	Increase (or decrease) compared with last year
										YEAR ENDED JUNE 30, 1911.					
		$614,588	$3,810,410	$355,538	$444,451	$183,270	$1,055,307	$109,251	$2,147,817	$662,593	.....	$131,146	$531,447	$75,322
		14,544,431	44,845,084	6,066,121	6,248,435	500,351	21,229,175	1,104,621	35,148,703	9,666,381	$68,236	2,089,905	7,644,712	2,346,519
		98,977	1,071,030	193,067	207,592	7,455	483,143	27,749	849,996	222,034	.....	24,614	197,420	- 105,057
		154,475	1,703,294	158,128	237,331	69,611	378,647	99,986	943,703	759,591	2,092	63,789	697,894	378,375
		17,908	109,368	7,072	1,005	11,693	28,029	6,355	54,154	52,214	.....	2,719	49,495	—
		344,788	3,118,255	609,655	272,445	20,681	939,430	56,504	1,898,715	1,319,540	1,454	162,169	1,155,916	28,696
		37,167	1,183,738	342,676	354,030	66,806	852,168	60,418	1,676,398	143,359	82	45,480	188,757	—
		5,555,865	31,050,672	3,798,896	5,844,794	548,532	9,192,005	733,289	20,117,517	10,933,155	9,445	1,020,373	9,922,227	1,494,433
		4,265,488	14,992,519	1,739,947	2,395,998	494,685	5,405,474	410,562	10,446,636	4,145,883	- 26,380	422,604	3,696,899	- 556,965
		2,004,873	12,781,344	1,158,361	1,977,032	279,782	4,538,102	396,986	8,344,463	3,936,881	15,215	338,129	3,583,537	165,480
		22,535,567	88,272,208	13,406,279	14,761,805	1,581,805	28,543,204	2,249,500	59,541,936	28,730,282	- 107,089	3,049,124	25,574,069	3,850,535
		334,713	1,766,300	251,266	361,169	86,956	786,704	69,495	1,555,590	210,710	.....	52,031	158,679	-69,386
		220,965	1,244,993	235,306	258,717	38,650	479,644	36,289	1,048,606	196,387	.....	57,305	139,082	—115,497
		718,440	2,589,065	359,804	370,075	67,071	877,053	80,031	1,754,034	845,031	- 8,495	119,188	717,348	100,714
		405,384	2,006,790	263,817	355,670	19,245	576,885	96,136	1,311,753	695,037	.....	60,423	634,614	13,575
		805,192	7,172,731	839,640	1,124,608	106,154	2,320,411	209,233	4,600,047	2,572,684	.....	345,435	2,227,249	528,485
		12,956,014	60,977,031	7,553,295	12,317,364	1,334,163	21,333,835	1,347,571	43,856,228	17,120,803	—56,464	2,671,290	14,393,049	2,388,375
		2,134,783	9,157,854	1,434,907	1,397,197	235,477	3,888,568	271,779	7,227,928	1,899,906	3,646	254,344	1,641,916	386,232
		46,875	1,465,795	156,914	209,358	13,839	482,450	45,195	907,756	558,039	.....	41,766	516,273	3,053
		11,641,309	53,993,734	9,178,192	9,490,455	1,124,903	17,588,595	1,097,677	38,479,822	15,513,918	40,403	1,938,089	13,616,232	2,350,170
		4,801,981	17,385,415	2,142,490	2,845,491	447,554	5,777,943	536,459	11,449,937	5,935,478	3,124	697,583	5,241,019	413,382
		2,857,755	12,343,863	1,863,673	2,261,008	425,103	4,429,496	300,680	9,279,960	3,043,903	10,107	285,904	2,747,892	- 174,875
		26,214,679	62,153,434	6,980,036	7,193,425	351,999	24,526,959	1,846,213	40,898,632	21,254,802	1,399,792	3,578,363	19,076,232	—253,313
		17,278,812	64,905,439	8,065,462	7,911,231	1,127,233	21,601,478	1,024,356	39,729,760	25,175,679	441,292	3,296,797	22,320,174	—3,198,722
		104,182	1,331,755	206,773	356,990	13,864	485,863	55,495	1,118,985	212,770	.....	18,730	194,040	36,363
		884,204	2,386,615	308,242	260,887	33,124	808,491	70,649	1,481,393	905,222	.....	17,722	887,500	—24,127
		11,384,378	40,843,519	5,011,644	5,443,977	1,006,310	14,583,492	1,184,945	27,230,368	13,612,151	.....	1,762,872	11,849,279	1,025,180
		1,646,280	2,603,462	261,462	81,583	4,995	846,743	57,336	1,252,119	394,161	.....	73,116	321,045	- 229,102
		2,754,580	8,453,197	1,471,369	1,396,828	374,784	3,100,994	209,503	6,553,478	1,869,719	59,282	288,741	1,521,696	1,045,063
		6,735,503	21,782,004	2,836,577	2,884,953	711,839	7,423,677	623,521	14,480,567	7,301,437	-10,250	818,600	6,473,187	342,250
		1,122,759	2,753,152	86,099	30,737	450,670	47,070	889,728	233,031	.....	60,008	173,023	—	—
		31,866,443	91,108,764	11,350,368	11,066,396	2,033,963	25,048,463	2,734,947	52,234,137	38,874,624	94,352	3,703,544	35,265,432	—4,421,422
		2,631,446	388,153	246,183	8,094	979,673	74,442	1,696,545	934,901	166,303	333,930	767,274	- 118,226	—
		4,777,627	456,134	569,026	108,047	1,365,427	109,379	2,608,013	1,169,664	.....	171,052	998,612	224,095	—
		1,140,010	147,653	121,999	14,099	410,035	29,612	723,398	416,612	.....	38,940	377,672	—26,741	—
		2,741,023	10,807,342	1,963,711	1,502,764	179,964	3,488,759	287,597	7,422,795	3,384,547	- 4,044	432,892	2,947,611	1,119,251

Mileage operated June 30, 1910: [1] 2,038 miles; [2] 908 miles; [3] 9,039 miles; [4] 4,550 miles; [5] 4,590 miles; [6] 1,724 miles; [7] 5,814 miles; [8] 1,099 miles; [9] 3,015 miles. — Indicates Deficits, Losses and Decreases.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

G. E. Bramon has been appointed auditor of expenditures of the Chicago, Burlington & Quincy lines west of the Missouri river, with office at Omaha, Neb.

Richard Burr, comptroller, and the entire auditing department of the Wells, Fargo & Company Express are being transferred from New York to Chicago, where they will have offices in the company's building at South Fifth avenue and West Polk street. E. A. Stedman, vice-president and general manager has opened offices in the Harris Trust & Saving Bank building, Chicago.

Incident to a change in the legal department of the Chicago, Burlington & Quincy, E. E. Whitted, attorney at Denver, Colo., in charge of Colorado, southwest Nebraska and northwest Kansas territory; and E. T. Clark, attorney at Sheridan, Wyo., in charge of Wyoming, South Dakota and Montana territory, will hereafter report direct to the Chicago office instead of to the Omaha office as heretofore.

T. J. Freeman, receiver and general manager of the International & Great Northern, has been elected president, and will direct the affairs of the company from his office in New Orleans, La. George H. Taylor of New York has been elected first vice-president; Henry Martin, superintendent at Palestine, Tex., has been elected second vice-president, and Alfred R. Howard remains as secretary and treasurer, with office at Palestine. H. B. Henson remains as assistant secretary and assistant treasurer, with office at New York City. The charter of the new company provides that the headquarters shall be at Houston, and it is said that large numbers of men and their families will have to move from Palestine to Houston.

Incident to the recent change in the general claim department of the Missouri Pacific, by which it will become a part of the office of the vice-president and general solicitor, the following district claim agents, who will report to the heads of the legal departments of their districts, have been appointed: J. M. Amos at St. Louis, Mo.; W. L. McCutcheon at Sedalia, Mo.; N. W. Morrow at Poplar Bluff, Mo.; W. O. Reeder at East St. Louis, Ill.; H. H. Larimore at Kansas City, Mo.; C. D. Jeffers at Little Rock, Ark.; and A. V. Miller at Monroe, La.

Operating Officers.

Harry G. Bridenbaugh has been appointed trainmaster of the Freeport, Madison and Dodgeville districts of the Illinois Central, with office at Freeport, Ill., succeeding John F. Dignan, promoted.

A. De Bernardi, superintendent of the Missouri Pacific at Falls City, Neb., has been appointed general superintendent of the Western district, with office at Kansas City, Mo., succeeding W. J. McKee, resigned.

F. Hartenstein, superintendent of the Long Island Railroad, has been appointed superintendent of the Grand Rapids district of the Pere Marquette, with office at Grand Rapids, Mich., succeeding Theodore Ensel, resigned.

M. Marea, master mechanic of the Toledo, St. Louis & Western at Frankfort, Ind., has been appointed general superintendent in charge of maintenance and operation of the St. Louis, Troy & Eastern, with office at St. Louis, Mo.

C. J. Larimer, assistant superintendent of the St. Louis, Brownsville & Mexico, at Kingsville, Tex., has been appointed superintendent of the New Orleans, Texas & Mexico and the Beaumont, Sour Lake & Western, with office at De Quincy, La., succeeding C. T. Mason, resigned to go to another company, and the office of assistant superintendent at Kingsville, Tex., has been abolished.

A. M. Burt, superintendent of the Fargo division of the Northern Pacific at Dilworth, Minn., has been appointed superintendent of the Rocky Mountain division, with office at Missoula, Mont., succeeding M. M. Fowler, resigned. B. O. Johnson, superintendent of the Yellowstone division at Glendive, Mont., succeeds Mr. Burt, and T. H. Lantry, trainmaster at Spokane, Wash., succeeds Mr. Johnson. T. F. Lowry, assistant superintendent at Glendive, Mont., succeeds Mr. Lantry as trainmaster at Spokane, and the office of assistant superintendent at Glendive has been abolished.

J. B. Austin, Jr., whose appointment as superintendent of the Long Island Railroad, has been announced in these columns, was born October 31, 1873, at Philadelphia, Pa. He was educated at the University of Pennsylvania, graduating in 1894 as a civil engineer. While in college he was employed during the vacation months for three years on locating parties with the Pennsylvania Railroad under the engineer of branch lines. In 1894 he entered the service of the Philadelphia Bureau of Surveys on grade crossing elimination work in Philadelphia, where he remained until 1897, and during the next two years was engaged in locating and constructing electric railways. In 1899 he went to the Great Northern as assistant roadmaster, and was then consecutively clerk in the auditor's office, chief clerk to the superintendent and assistant general superintendent, and trainmaster. He was out of railway work from 1902 to 1904, during which time he was with the Lackawanna Steel Company as superintendent of the yard and railway department. In 1904 he went to the Long Island Railroad as engineer of maintenance of way, which position he held until his recent appointment as superintendent.

Traffic Officers.

Edward M. Orr has been appointed soliciting freight agent of the Chicago, Rock Island & Pacific, with office at Oklahoma City, Okla.

J. B. Bailey has been appointed contracting agent of the Erie Despatch, with office at Dallas, Tex., succeeding R. L. Castleberry.

James F. Murdy has been appointed soliciting freight agent of the Louisiana Railway & Navigation Company, with headquarters at New Orleans, La.

Rupert V. Lloyd, traveling passenger agent of the Seaboard Air Line, at Richmond, Va., has been appointed district passenger agent, with office at Richmond.

E. C. Roxbury has been appointed traveling freight and passenger agent of the Denver & Rio Grande, with office at Kansas City, Mo., succeeding O. T. Schaeffer, resigned.

Frank S. Bishop, general eastern passenger agent of the Illinois Central, at New York, has been appointed also general eastern passenger agent of the Central of Georgia, with office at New York.

H. W. Hoey, general agent of the Hocking Valley, at Cincinnati, Ohio, has been appointed a traveling freight agent, with office at Columbus, Ohio, and the office of general agent at Cincinnati has been abolished.

T. Coleman has been appointed passenger and ticket agent of the Missouri, Kansas & Texas, with headquarters at Joplin, Mo., succeeding P. W. Strieby, who has been transferred to Oklahoma City, Okla., as passenger and ticket agent.

Walter C. Young has been appointed traveling freight agent of the Nashville, Chattanooga & St. Louis, with office at Memphis, Tenn., and J. C. Ryan has been appointed soliciting freight agent, with office at Nashville, Tenn. E. E. Cleary has been appointed acting claim agent, succeeding S. D. Cowden, on detached duty.

C. E. Carlton has been appointed commercial agent of the Fort Worth & Denver City, with office at Houston, Tex. W. A. Blank, chief clerk in the freight department at Amarillo, Tex., has been appointed traveling freight agent, with headquarters at Amarillo. R. P. Neely, traveling freight and passenger agent at Wichita Falls, Tex., has been transferred to Fort Worth, Tex., succeeding H. B. Sperry, resigned to accept service with another company, and W. B. Shepperd succeeds Mr. Neely.

H. A. Noble, whose appointment as general passenger agent of the Great Northern was announced in our issue of August 11, began his railway career as office boy in the Milwaukee office of the Milwaukee, Lake Shore & Western, which was absorbed by the Chicago & North Western in 1892. Subsequently he filled various clerical positions in the auditing department of the latter road until 1899. He then went to the Chicago, Mil-

waukee & St. Paul and served in various clerical capacities in the passenger department for about a year, when he was assigned to the advertising department. He remained in the latter position until he became connected with the Great Northern and was placed in charge of the advertising department, in which office he had much to do with immigration and colonization work. On the establishment last year by Congress of the new Glacier National Park, the southern boundary of which is marked by the right-of-way of the Great Northern, his responsibilities were increased as the opening of the park presented newer and greater advertising possibilities. On August 1 Mr. Noble relinquished these duties to become general passenger agent, with headquarters at St. Paul, Minn.

Engineering and Rolling Stock Officers.

L. L. Ulrey has been appointed foreman of the air brake department of the Chicago & Eastern Illinois, with headquarters at Oaklawn, Ill.

Walter H. Donley has been appointed master mechanic of the Illinois Central, with office at East St. Louis, Ill., succeeding F. G. Colwell, resigned to go with the Delaware, Lackawanna & Western.

H. A. Witzig has been appointed master mechanic of the Missouri Southern, with office at Leeper, Mo., in charge of shops and rolling stock, succeeding to the duties of Thomas Goulding, superintendent of motive power, resigned to go to the Chicago, St. Paul, Minneapolis & Omaha.

A. S. Abbott, master mechanic of the St. Louis & San Francisco, at Sapulpa, Okla., has been appointed mechanical superintendent of the First district, and J. Foster, master mechanic at Kansas City, Mo., has been appointed mechanical superintendent of the Second district, both with offices at Springfield.

Porter Allen, assistant supervisor of Division No. 3, Philadelphia division of the Pennsylvania Railroad, has been appointed supervisor of Division No. 15, Pittsburgh division, with office at Uniontown, Pa., succeeding S. H. Kuhn, transferred, and J. E. Zullinger has been appointed assistant supervisor of Division No. 14, with office at East Greensburg, succeeding H. M. Grimm, transferred.

G. A. Purdy has been appointed general foreman of bridges and buildings of the Missouri, Kansas & Texas of Texas, with headquarters at Denison, Tex., and O. O. Horton, who holds the same title, has been transferred from Denison to Smithville, Tex. These changes are incident to the promotion of J. L. McDonald from general foreman of bridges and buildings at Denison to superintendent of bridges and buildings, with office at Denison, announced in these columns last week.

E. M. Weaver, whose appointment as engineer maintenance of way of the Long Island Railroad, has been announced in these columns, was born in April, 1865, at Danville, Pa., and was educated at the Danville Academy. Mr. Weaver began railway [illegible] on the Pennsylvania Railroad and [illegible] in the operating department of that road. He was out of railway work for one year, during which time he was in the employ of the Union Switch & Signal Co. He then went to the New York Central & Hudson River, where he remained for nine years, in charge of the signal departments on the Hudson, Harlem and Putnam divisions and at the [illegible] terminal. In Jan., 1903, he went to the Long Island Railroad as signal engineer, which position he held until his recent appointment as engineer maintenance of way.

OBITUARY.

[illegible] Dayton, [illegible], and for many years [illegible] the Hartford division of the New York, New Haven & Hartford, died last week at his home in Hartford. Mr. Dayton was born in East Haven, Conn., in 1829, and began railway work in 1851, as a machinist on the Hartford & New Haven, now a part of the New York, New Haven & Hartford, and from April, 1853, to 1860, was a locomotive engineman. He [illegible] and engineer, from 1860 to 1862 he was [illegible] superintendent. He was promoted to superintendent of the Hartford division in 1872, and he retired from active [illegible] January, 1901.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Missouri Pacific has ordered 15 Pacific type locomotives from the American Locomotive Company.

The Pennsylvania, it is said, will build 15 passenger locomotives, 10 freight locomotives and 10 switching locomotives at its shops at Altoona, Pa.

The Erie has divided an order for 40 mikado locomotives between the American Locomotive Company and the Baldwin Locomotive Works, and will build 20 locomotives at the company's shops.

The St. Louis & San Francisco has ordered 12 switching locomotives and 8 Pacific type locomotives from the Baldwin Locomotive Works. The Pacific type locomotives will be used on the Chicago & Eastern Illinois.

The Government Railways of Japan have ordered 12 Pacific type locomotives from the American Locomotive Company. The dimensions of the cylinders will be 18½ in. x 24 in., the diameter of the driving wheels will be 63 in., and the total weight in working order will be 132,000 lbs.

CAR BUILDING.

The St. Louis & San Francisco is in the market for 250 flat cars.

The Pennsylvania is making inquiries on 700 fifty-ton box cars and 26 flat cars.

The Havana Central is said to be in the market for a number of coal cars. This item is not confirmed.

The Duluth, Winnipeg & Pacific has ordered 20 stock and 10 refrigerator cars from the Mt. Vernon Car Company.

The Chicago, Memphis & Gulf has ordered 50 flat cars, 50 box cars, 1 caboose and 1 coach from the Central Locomotive Works.

The Erie has ordered 1,000 all-steel hopper cars, 1,000 all-steel coal cars, 1,000 fifty-ton gondola cars and 1,000 forty-ton steel underframe box cars, and will build 500 flat cars at the company's shops. The Standard Steel Car Company will build the hopper cars and coal cars, the Pressed Steel Car Company will build the gondola cars, and the American Car & Foundry Company will build the box cars.

IRON AND STEEL.

The Baltimore & Ohio has ordered 1,750 tons of rails from the Carnegie Steel Company.

The Oregon Short Line has ordered 20,400 tons of rails from the Illinois Steel Company.

The Boston & Maine has ordered 1,700 tons of bridge material from the Phoenix Bridge Company.

The Mobile & Ohio has ordered 819 tons of structural material from the American Bridge Company.

The St. Louis & San Francisco has ordered 4,100 tons of 65-lb. rails from the Pennsylvania Steel Company.

The Southern has ordered 5,000 tons of open hearth rails from the Cambria Steel Company, and 5,000 tons from the Maryland Steel Company.

General Conditions in Steel. On July 31 the unfilled tonnage of the United States Steel Corporation was 3,584,085 tons, an increase of 230,7 tons over the previous month and the best showing since July 31, 1910, when there were 3,970,931 tons. The Steel Corporation is now operating at 76 per cent of its capacity, which indicates a production at the rate of over 14,000,000 tons a year. Steel men believe that the government crop reports are more pessimistic than the facts warrant and that if the present depression in Wall street is not prolonged orders will continue to come in at the same high rate as during the past three weeks.

SIGNALING.

Signaling On the New York, Westchester & Boston.

The contract for the block and interlocking signaling on this road has been awarded to the Union Switch & Signal Company, Swissvale, Pa. The block signaling consists of 32 automatic signals on the six mile section of four tracks from West Farms, New York City, the Southern terminus, northeastward to Mount Vernon, N. Y.; eight automatic signals on the two mile section of double track from Mount Vernon eastward to New Rochelle, and 24 automatic signals on the double track section from Mount Vernon north to White Plains, 8½ miles.

These signals are spaced to permit of approximately a 2½ minute headway at the maximum speed of express trains. In locating the signals consideration was given to the possibility of the future use of automatic stops and overlapping the control of signals. The present signals are so placed that with a minimum amount of rearrangement and the addition of the extra blocks necessary, this same headway can still be maintained should the overlap system be required, and all apparatus is being supplied with the parts necessary to change over to this system.

The block system will be operated by alternating current at 110 volts 60 cycles. There will be six interlocking plants, two of which are passing sidings on the double track between Mount Vernon and White Plains; one for two storage siding connections at New Rochelle; one for crossovers on the four track section between West Farms and Mount Vernon; one for the White Plains terminal, including connection to the future extension and the switches for the platform tracks; and one for the junction at Mount Vernon, where the double track sections to New Rochelle and White Plains diverge from each other.

The interlockings will be power operated, all-electric Union style "F" type, operating on storage battery at 110 volts. The storage battery, motor generator and heating system will be housed in the lower floor of the tower buildings.

The signals in most cases will be suspended from catenary bridges in which the mechanism case, supported by the bridge truss is at the top of the post. The well-known Union style "B" mechanism will be used, operating center-pivoted two-position home and distant blades.

This railway is designed for electric operation in which alternating current at 11,000 volts, 25 cycles is distributed to a trolley wire supported by a catenary structure on bridges. These bridges are used, as has been mentioned, to support the signals. Power for the signal system will be obtained from the 11,000 volt distribution. At Mount Vernon a duplicate set of frequency converters will be provided for this purpose. The 11,000 volts will be stepped down to 440 volts necessary for the converter which will deliver alternating current to a duplicate set of signal mains throughout at 2,200 volts 60 cycles. Motor generator sets connected to the signal mains will be used at each interlocking for charging the storage batteries.

An underground conduit system is being laid down throughout the entire territory, for the telephone cables, telephones being the only means of communication that will be used. A separate duct is being provided in the conduit system for the signal cables. The 2,200 volt signal mains will be carried on cross arms on the catenary bridge legs.

All the latest appliances known to the art for safely and expeditiously handling traffic will be used in the signaling of this road and the construction work will be of the most permanent kind and in keeping with the work of the other departments. Some of the special features are:

The absence of A. C. wires common to more than one source of energy. The control of the circuit on both positive and negative wires for A. C. signals. The division of D. C. energy at the more important interlockings. Two separate and distinct indications of the approach of a train into the first two blocks in rear of the home signal. Approach and route locking time and emergency releases.

Lever light indicators will be used on the interlocking machines and all other indications will be given by lights on the track diagram. No indicators of the semaphore type will be used.

Fiber conduit will be used, throughout, instead of wood trunking and loricated pipe will be used for the conduit risers on the bridge legs. The signal and telephone work will be installed according to plans and specifications prepared by the signal department of the road.

Supply Trade News.

Arthur T. Herr has been made western representative of the Inter-Ocean Steel Company, Chicago, with office at the First National Bank building, Denver, Colo.

The Isthmian Canal Commission will receive bids until August 28 on miscellaneous supplies, including plate girders, manganese steel castings, locomotive and car springs, untreated ties, etc. Circular No. 642.

F. E. Guy has been made traffic manager of the Cement Products Exhibition Company, Chicago, with office in the Frick building, Pittsburgh, Pa. Mr. Guy will assist exhibitors in shipping exhibits to Chicago by the best routes and at the most favorable rates.

The H. W. Johns-Manville Company, New York, recently bought the sole American rights to the English J.-M. Sea ring packing. These J.-M. Sea rings are moulded of a laminated material (asbestos, flax or duck), in the form of a wedge, with its thin end turned inwards. There is a hollow space in every ring, between the lip and the heel of the ring, into which the steam follows, so that the steam itself, not the gland pressure, makes the packing pressure tight.

The gross sales of the Western Electric Company, Chicago, for the month of July, show a falling off of 3 per cent., as compared with July, 1910, but the first seven months of the current fiscal year show an increase of 4 per cent. over the corresponding period of last year. The company is earning at the rate of $66,000,000 a year, which is close behind the high record of $69,000,000 which it earned in 1906. In the East, the business during July was good; the falling off occurred in the central and western districts. The cable manufacturing department shows the chief decrease. The electrical supplies branch shows a small gain, and the business in the telephone apparatus department is good. Abroad, the company's business is satisfactory and shows a larger rate of increase than in this country. While the number of customers has increased, the value of the average order during the past year has fallen from $72 to $70. The company is now employing 26,000 persons, as compared with 29,000 in 1906, which is the largest number ever on the company's books at any one time. The Western Electric Company will soon open a branch office at Richmond, Va., which will be in charge of H. W. Hall, heretofore manager of the Denver, Colo., office. This will make the twenty-fifth distributing office of the company.

TRADE PUBLICATIONS.

Hydraulic Pumps.—The Watson Stillman Company, New York, has issued catalog No. 81, superseding catalog No. 71, of its hydraulic pumps and accessories. One of the features of the design of these pumps is that all valves are placed above the cistern top where they may be easily examined. It is claimed that these pumps do not trap air, a great advantage in hydraulic work. The many types and styles of pumps are illustrated and described and prices are included.

Storage Batteries.—The Gould Storage Battery Company, New York, has devoted bulletin No. 12 to the storage battery installation in the Detroit river tunnel plant. In this installation a Gould storage battery and its regulating apparatus supplies the means whereby the Detroit Edison Company is enabled to economically pull the load of the Michigan Central trains through the tunnel. The bulletin is illustrated and gives a good account of the success with which this system has met.

Roofing.—The General Roofing Manufacturing Co., East St. Louis, Ill., has reprinted a report of the Northwestern Lumbermen's Association, Minneapolis, Minn., on the manufacture of various styles of roofing. This report was written by a committee after a thorough investigation of many of the leading roof manufacturing plants in this country. Its purpose is to give the consumer and the retailer a more thorough knowledge of the materials used so that they cannot be imposed upon by fraudulent claims.

Railway Construction.

New Incorporations, Surveys, Etc.

Atchison, Topeka & Santa Fe.—According to press reports, this company will spend a large sum of money for improvements at Sibley, Mo., where the road crosses the Missouri river. A new bridge is to be built on the old piers. The other improvements to be made include grade reduction work and putting in four miles of second track.

Baltimore & Ohio.—An officer writes that double-tracking work is now being carried out by Lorimer & Galliger, Chicago, on the Chicago division, between Hamler, Ohio, and Holgate. A contract for the work was awarded some time ago.

Boston Elevated.—An officer writes that this company is planning to build an elevated extension from the Sullivan square terminal at Charleston, Mass., over a private right-of-way, through Everett to Malden, three miles. Part of the right-of-way has been secured.

Buffalo, Rochester & Eastern.—The New York Public Service Commission, Second district, has again refused to issue a certificate of necessity to this company. The company was organized in 1907 to build from Buffalo, N. Y., east to Rochester, thence to Troy, about 300 miles. The report of the commission is noticed on page 318.

California Roads.—Surveys have been made for a line, it is said, from Cottonwood, Shasta county, Cal., via Millville to Whitmore. Clinton Walker is said to be interested.

Canadian Pacific.—Engineers are now at work, it is said, locating new yards on Island No. 1 at Fort William, Ont., and grading work will be started soon for the six miles of track to be laid there. Connection is to be made with the new yards via the McKellar river bridge and the new Kaministikwia river bridge.

Chicago, Milwaukee & Puget Sound.—According to press reports, a contract has been given to D. J. Burke, Lewistown, Mont., for completing the grade on 18 miles of the branch between Lewistown and Hilger.

Colusa & Hamilton.—See Southern Pacific.

Denver, Laramie & Northwestern.—An officer writes that contracts are to be let at once for building a 43-mile extension. The line is now in operation from Denver, Colo., north to Greeley, 56 miles, and the extension will be continued northwest via Severance, Wellington and Laramie, Wyo., to a point in central Wyoming, and ultimately to Seattle, Wash. The line is being built to carry agricultural products and livestock on the first 150 miles, and coal beyond that point. (September 30, [illegible])

[illegible] & Pacific.—An officer writes to confirming the reports that a line is to be built from Orestod, Colo., on the Denver, Northwestern & Pacific, southwest to Dolsero, on the Denver & Rio Grande, 42 miles, that this is one of the [illegible] proposed lines, but nothing definite has yet been decided.

[illegible] & Western.—Incorporated in Wisconsin with $150,000 capital, to build from Wausaukee, Wis., to Girard Junction, [illegible] to build an extension to Dunbar, 12 miles, in Marinette county. J. W. Wells, Menominee, Mich.; C. B. Culbertson, Detroit, and J. A. Culbertson, Kenilworth, Ill., are interested.

[illegible] Railway.—Incorporated in Maryland with $50,000 capital to build from Cumberland to Piney Mountain, [illegible] miles. Directors: [illegible]

[illegible] & Pacific.—This road is reported as about to be sold to the Chicago, Milwaukee & Puget Sound. It is said that the purchasers will build an extension from Piney Mountain, [illegible] miles, to Piney Mountain, [illegible] miles, to Piney Mountain, [illegible] miles, to

important trestles, each 125 ft. long. The line is being built to carry farm products, lumber, mining products and live stock. Gilbert Lay, president, St. Clair, and W. B. Payne, engineer, Rolla. (July 21, p. 158.)

Mobile-West Shore Traction.—An officer writes that this company has asked for incorporation to build from Mobile, Ala., south to Alabama Port, on the western shore of Mobile bay, about 25 miles. H. Austill, president; J. N. McAleer, vice-president; E. E. Posey, secretary and treasurer, Mobile. W. B. Delchamps, J. R. Peavy, C. V. Hollinger and M. J. McDermott, and the above officers are directors.

Oakland & Antioch (Electric).—A contract has been given by this company for piercing a one-mile tunnel beneath the hills between Contra Costa and Alameda counties, Cal., on the line between Oakland and Walnut Creek. (August 4, p. 269.)

Oklahoma-Shawnee (Electric).—Incorporated in Oklahoma with $3,000,000 capital, to build from Oklahoma City, Okla., southeast to Shawnee, about 40 miles, with a branch north to Chandler, 30 miles. The incorporators include: L. E. Patterson, president of the Oklahoma City Traction Company; H. A. Kroeger, C. Combs, M. E. Springer, A. R. Bettis and A. Cook, all of Oklahoma City.

Pennsylvania Lines West.—An officer writes that this company has given contracts to the Brownell Improvement Co., Chicago, and to P. T. Clifford & Son, Valparaiso, Ind., for grade separation work in Cleveland, Ohio, from Central to Hamilton avenues.

Portland & West Coast Railroad & Navigation Company.—Incorporated in Oregon with $1,000,000 capital and headquarters at Portland, Ore. The plans call for a line from McMinnville, southwest via Sheridan and Willamina, along the course of the Yamhill and Little Nestucca rivers, thence north to Bay City, Tillamook county, about 80 miles. The incorporators include: W. F. Prier, C. F. Hendrickson and J. H. Upton.

Seattle-Tacoma Short Line (Electric).—A contract has been given to the Homer-Crosby Construction Company, Seattle, Wash., for building a line from Seattle, south, via Youngstown and Des Moines to Tacoma, about 35 miles. E. C. Million is interested in the project.

Southern New England.—See Grand Trunk.

Southern Pacific.—An officer writes that the Colusa & Hamilton, which was recently incorporated in California, will build from Harrington, Cal., on the Southern Pacific, northeast via College City to Grimes, thence northwest via Sycamore to Colusa, thence north along the west side of the Sacramento river to Hamilton, about 60 miles. E. E. Calvin, president, and William Hood, chief engineer, San Francisco. (July 28, p. 198.)

According to press reports, the Willamette Pacific, recently incorporated in Oregon with $1,000,000 capital, is to be built by the Southern Pacific interests. The projected route is from Eugene, Ore., west along the Siuslaw river to the Pacific coast, thence south to Marshfield, about 125 miles. It is expected that the work will be finished in two years at a cost of about $8,000,000. At Marshfield connection is to be made with the Coos Bay, Roseburg & Eastern, now operating a 28-mile line from Marshfield to Myrtle Point, which is owned by the Southern Pacific. It is understood that the construction of the new line means the abandonment by the Southern Pacific of the project to build from Drain, about 38 miles south of Eugene, west to Coos bay, on which some work has already been carried out. The officers of the new company are G. X. Wendling, president; S. O. Johnson, vice-president, both of San Francisco, Cal.; R. M. Cross, vice-president; S. R. Brodie, secretary, both of Portland, Ore.; C. H. Barrell, secretary, Los Angeles, Cal., and C. R. Breck, chief engineer, Eugene, Ore. (See Willamette Pacific, June 30, p. 1714.)

An officer writes that a contract has been given to the Utah Construction Company, Ogden, Utah, to build a branch from Tulasco, Nev., northeasterly to Metropolis, eight miles. Maximum grades will be 1 per cent., and maximum curvature 10 deg. The principal prospective business is in agricultural products. (July 28, p. 199.)

Southern Railway.—This company has just completed revision and double-tracking work on the line connecting the Chattanooga, Tenn., passenger terminals and freight yards with Ooltewah Junction, where the tracks of the Atlanta and Knoxville divisions meet. This line is 13.75 miles long and is now open for freight and passenger service.

Vallejo & Northern (Electric).—According to press reports, this company has made financial arrangements for building a section of 17 miles between Vallejo, Cal., and Woodland. (May 12, p. 1133.)

Wichita Falls Route.—An officer writes that a contract has been let to the Texas & Oklahoma Construction Co., Wichita Falls, Tex., for work on the Wichita Falls & Northwestern, from Hammon, Okla., north via Moorwood, Leedy, Trail, Camargo, Vici, Detroit, Woodward, Fort Supply and thence into Beaver county. Track has been laid on five miles of the main line and in the material yard. Some of the work will be rough. Maximum grades will be 0.7' of 1 per cent. The line is being built to carry alfalfa, cotton, corn, wheat and other farm products. (Aug. 11, p. 305.)

Wichita Falls & Northwestern.—See Wichita Falls Route.

Willamette Pacific.—See Southern Pacific.

Wisconsin & Northern.—This company has petitioned the railway commission of Wisconsin for a certificate of convenience and necessity to build an extension from Shawano, Wis., via Appleton to Menasha (March 31, p. 814.)

RAILWAY STRUCTURES.

Bigelow, Kan.—The Missouri Pacific plans the construction of new passenger stations at Bigelow and Greenleaf, in the near future.

Binghamton, N. Y.—An officer of the Delaware & Hudson writes that a contract has been given to A. E. Badgeley, Binghamton, for putting up a roundhouse, and work is now under way. Contracts for all material and equipment for this roundhouse have also been let.

Centralia, Ill.—The Illinois Central has begun work on a new classification yard, which will include the following: Southbound, receiving yard, 8 tracks; classification yard, 16 tracks; departure yard, 20 tracks; northbound, receiving yard, 17 tracks; classification yard, 32 tracks; departure yard, 16 tracks; all tracks having a capacity of 80 cars. The group of shop buildings will include an office and store building, 40 ft. x 60 ft.; car repair shed, 88 ft. x 800 ft.; blacksmith shop and locker building, 25 ft. x 210 ft.; storehouse and office building, 25 ft. x 310 ft.; wood mill, 50 ft. x 120 ft.; powerhouse, 85 ft. x 160 ft.; machine shop and boiler room, 160 ft. x 170 ft.; roundhouse office, including lockers and lavatories, 30 ft. x 130 ft.; oil, store and office building, 30 ft. x 140 ft.; three 40 ft. cinder pits; a coaling and sand plant; 42 ft. track scale; 50 stall enginehouse; 85 ft. turntable; 3 penstocks and 2 water tanks and a number of small accessory buildings. The shop group will be served by 9 tracks, with a total capacity of 520 cars, and the roundhouse group by 12 tracks, with a capacity of 532 cars.

Des Moines, Iowa.—The Des Moines City Railway is said to have awarded the contract for building a one-story brick addition to its power plant.

Dillon, Mont.—See Gilmore & Pittsburgh under Railway Construction.

Dumbarton, Cal.—The Southern Pacific will build a new station at Dumbarton, at a cost of $20,000.

Grafton, W. Va.—The Grafton Traction Cmopany (Electric) has awarded the contract for building a bridge 574 ft. long over the Tygarts Valley river, to cost about $30,000.

Granger, Wash.—The Oregon-Washington Railroad & Navigation Co., has been granted a permit to put up a new station at Granger.

Greenleaf, Kan.—See Bigelow, Kan.

Joplin, Mo.—The St. Louis & San Francisco has let the contract for building an eight-story passenger station and office

building, which together with other improvements at this place will cost about $1,000,000. The company will occupy the main floor and basement of the building.

Los Angeles, Cal.—The Los Angeles Railway (electric) has given a contract to Arthur S. Bent, Los Angeles, it is said, to put up new car shops in Los Angeles.

Louisville, Ky.—The Louisville Railway (electric) has bought land for the erection of a repair shop and a plant for building street cars. Work on the building will be commenced in the near future.

Moncton, N. B.—Contracts are said to be let to C. A. Murray and John A. Lea, Moncton, for putting up stations and other buildings between Moncton and Beaver Brook, on the Grand Trunk Pacific. The value of the contracts is about $150,000.

M. & K. Junction, W. Va.—The Baltimore & Ohio is building a helper station, to cost $100,000, at M. & K. Junction, and upon completion of the work the present station at Rowlesburg will be closed.

Nashville, Tenn.—An officer of the Louisville & Nashville writes that a contract has been given to the Foye-Proctor Company, Nashville, to build reinforced concrete retaining walls and underpasses under the Nashville-Louisville line, from Eighth to Fourth avenues in Nashville. The value of the contract is about $50,000.

North Berwick Junction, Me.—The Boston & Maine will build an 85-ft. turntable at North Berwick.

Pajaro, Cal.—The Southern Pacific will establish a new terminal about a half-mile from Pajaro, and will put up a new station, also a round house. The estimated cost of the improvements is $50,000.

Porterville, Cal.—The Southern Pacific will build a new station it is said, at Portersville.

Port Arthur, Ont.—The Canadian Pacific will put up a dock at Port Arthur, it is said, to cost $230,000.

Sacramento, Cal.—Announcement has been made that the Southern Pacific will put up a combined passenger and freight station on I street, in Sacramento.

St. Clair, Pa.—The Philadelphia & Reading will build a new roundhouse.

Sibley, Mo.—The Atchison, Topeka & Santa Fe (see *Railway Age Gazette* of July 21, under Iron and Steel) has awarded the contract to the American Bridge Co. for the material for a bridge over the Missouri river at Sibley. The bridge will be built on the present location and will be of single-track width, but with gauntlet tracks. It will require 9,910 tons of structural steel. The grade on the east approach will be reduced from 0.8 to 0.5 per cent.

[illegible] will build a new concrete dock this fall on the Toledo water front, to cost about $300,000. Application has been made to the War department to establish the dock line. Plans for the structure have already been completed.

Toronto, Ont.—The Canadian Pacific has been given a permit to build the new office building on the corner of King and Yonge streets, Toronto.

[illegible] Bids to be asked by [illegible], secretary, Department of Railways and Canals, Ottawa, Ont., up to noon, August 25, for building a stone passenger station for the Intercolonial Railway at Truro, N. S.

[illegible] to abolish the present grade crossing at National avenue in West Allis, and build a [illegible]

[illegible] Brazil [illegible] with a representative of the Brazilian Paul [illegible] for the building within the next [illegible] a railway between Rio Pardo and Cacimba, passing by [illegible] and Campos Novos, with branches to the ports of Antonina and Paranagua. This line will permit of the journey [illegible] in about 12 hours.

Railway Financial News.

Atchison, Topeka & Santa Fe.—At the annual meeting October 26 the stockholders will be asked to authorize an issue of $100,289,000 convertible bonds. President Ripley says that the object in asking so large an issue is to prepare for requirements a long time ahead. It is not expected that any will be sold for at least six months. The company now has $289,000 common stock in its treasury, so the amount to be issued to prepare for all of the proposed bond issue will be $100,000,000. The stockholders will be asked also to secure the release of $10,800,000 of the preferred stock deposited by the reorganization committee in 1896 for various purposes. In addition they will be asked to approve the purchase of the line from the Needles, Cal., to Mojave, now operated under lease from the Southern Pacific.

Chicago, Terre Haute & Southeastern.—A dividend of 1 per cent., payable September 1, 1911, has been declared on the $6,500,000 income bonds. This is the second payment of interest on these bonds.

Detroit, Toledo & Ironton.—This property will be sold at auction in Detroit on October 5 in pursuance of the foreclosure decree in favor of the New York Trust Company.

Iowa Central.—See Minneapolis & St. Louis.

Evansville & Terre Haute.—A cash dividend of 5 per cent. has been declared on all the outstanding stock, both common and preferred. This is the same rate of dividend which was paid on both classes of stock in 1910, and the *Commercial & Financial Chronicle* says it is understood that the declaration represents an adjustment of dividends in connection with the merging of the Evansville & Terre Haute with the Chicago & Eastern Illinois.

Minneapolis & St. Louis.—Newman Erb has been elected a director of the Minneapolis & St. Louis and of the Iowa Central. It is announced that Mr. Erb has acquired a large stock interest in these roads and is joining Edwin Hawley in the immediate development of these properties. See Railway Construction.

Missouri, Oklahoma & Gulf.—See Oklahoma City Terminal Railway.

National Railways of Mexico.—J. N. Gilbrath, head of the Mexican branch of the Waters-Pierce Oil Company, and formerly general manager of the Mexican Central, has been elected a director of the National Railways of Mexico, succeeding M. G. Ribon, resigned.

Oregon-Washington Railroad & Navigation Company.—Henry C. Frick has resigned as a director and member of the executive committee. Frank A. Vanderlip, president of the National City Bank, New York, and a director of the Union Pacific, has been elected a director and member of the executive committee of the O.-W., and of the Oregon Short Line, succeeding Mr. Frick.

Oklahoma City Terminal Railway.—This company has been organized, with $75,000 capital stock, to take over the bonus raised by the Chamber of Commerce of Oklahoma City, for the building of terminal facilities for the Missouri, Oklahoma & Gulf.

St. Louis & San Francisco.—This company has sold to Speyer & Co. about $3,000,000 equipment trust notes covering about $3,300,000 worth of cars and locomotives. The entire amount of the issue has been sold privately by Speyer & Co.

St. Paul & Des Moines.—This road, which was sold to the Chicago, Rock Island & Pacific two months ago, is now known as the St. Paul & Kansas City Short Line.

Union Pacific.—Announcement has just been made that Henry C. Frick resigned from the board of directors about two months ago. It is said that the resignation is caused solely by Mr. Frick's desire to lessen his business duties.

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A RESIDENT of the state of New York holds a railway bond of $1,000. Under the new law of the state, by sending to the comptroller a tax of five mills or $5, the bond becomes permanently exempt from taxation—otherwise, under the statutes, it must incur local taxation. The same holder of the railway bond moves over the state line eastward and becomes a resident of Connecticut. Unless his bond happens to be issued by a Connecticut railway—in which case it escapes all tax to the personal holder resident of the state—he can escape local taxation, as in New York, through payment of a tax to the state. But, instead of $5 with permanent exemption, he must pay 4 mills, or $4 *yearly*. If he holds the bond, say, for ten years, his taxes are $40, instead of the $5 in New York state. The disparity between two adjacent states illustrates sharply the divergencies in railway taxation in the states, and in both cases may mean double taxation. For if the New York resident had held a New Haven railway bond, it would have already paid a corporate tax of 1 per cent. on its par to Connecticut; while the Connecticut resident's bond—if of an outside railway—has carried also its outside corporate tax, direct or indirect. Nevertheless, the new statute of New York, substituting permanent exemption from railway and other bonds on payment of a small state tax, is a direct step in advance. It does not extinguish the inequitable double taxation levied on both the railway corporation and its bondholders, but does materially modify it; it does not eliminate the tax dodgers, but it tends to reduce them numerically; and it sets an example for other states where the blending of personal and corporate railway taxation has been as conspicuous as unjust.

THE bulletin of the New York state department of labor for June last showing that for the first three months of the present calendar year there were more idle persons than during the same period in 1910, but an increase in wages from $3.18 to $3.26 per day, brings up a railway reminiscence which for other reasons is likely to remain vivid. It will be recalled that early in the year 1908 railway managers had decided that the time had come for a reduction of wages to meet the great decrease of traffic and that President Roosevelt just then checked the plan by his notification that federal investigation would follow any reduction. Read between and under its lines it was tantamount to the statement that federal sympathies and influence would be on the side of a strike should one ensue. The normal and logical result followed. The railways reduced their working force instead of wages. They were compelled to employ fewer men at the old rate instead of the larger number of men at the reduced wage; and in this the unions not only acquiesced, but in some cases the idleness and hardship of the discharged men that the rest might retain their old pay was hailed as a triumph of the union principle. Certainly we do not now recall that any union that would have assessed itself for strikers levied any assessment in 1908 for the idle members who were victims of hard times on the railways. Whether the increased wage along with increased idleness which the department of labor now returns has in it the direct influence of the Roosevelt utterance of three and a half years ago cannot be stated positively; but the indirect influence, at least, can be strongly inferred. The inference is clearer still that to the employer the necessity of cutting down forces continues to outweigh the risk of a strike. As the lower paid employees go first, the average raise in rate of pay indicated by the official figures is readily explained.

FIREMEN can be trained to be competent and efficient monitors for enginemen, if reasonable effort is put forth to that end. We said this last week, basing the statement on what we believe to be reasonable considerations and on well-known facts and good evidence. At the same time the rules and practice of many roads either discredit the statement or, in effect, deny its importance; and, therefore, it is gratifying to be able to print, in this issue, a letter from "L. N. S.," confirming what we said. "L. N. S." is an experienced operating officer of a large eastern road (but his name does not begin with S), and his reputation backs up his words. Every one must admit that with two lookouts on every engine, each animated by an intelligent purpose to aid the other, the disregard of signals, with its disastrous consequences, would be immensely reduced. This being so, the question at issue is a vital one on every road. "L. N. S." writes interestingly on other phases of discipline, and with a vigorous pen. His thrusts at the brotherhoods, and at congressmen hit the mark. His suggestion that the Federal steamboat inspection service ought to be copied in the railway field is in the same line with the recent recommendation of an officer of the

Southern Pacific, who told us about the effectiveness of the government's marine supervision on the Pacific coast; but the majority of conservative railway officers will be slow to endorse the idea. They will be sure to recall the well-known dangers of governmental action in such matters—political appointees and inefficiency. Admitting the efficiency of the steamboat supervision, could the same be duplicated in the railway service? For ourselves, the *bête noire* of this problem is the difficulty of retaining efficient superintendents. Straight-from-the-shoulder discipline is all that "L. N. S." claims for it; but the campaign is a long one, and too frequent changing of shoulders has upset many promising schemes.

"L. N. S." is not the only reader interested in discipline, as will be seen by the other letters printed along with his. The government investigation on the Bridgeport collision is reported in this issue, also. Inspector Belnap recommends automatic stops and the use of approach-locking, though the absence of approach-locking had nothing to do with this accident. As to whether anything can be done, more than is now done, to insure a good lookout on engines, he says nothing. Without automatic stops he would require that, in cases like this, trains be brought to a stop before setting the switches for the crossover. In recommending such extreme caution he has the support of the English Clearing House code, which prescribes similar safeguards. How strictly the English railways adhere to requirements of that kind is, however, another question. Inquiries have frequently shown that when in a hurry they relax some of the rigid provisions of their rules. Either in England or America, a reduction of speed, and a whistle acknowledgement to the signalman that the speed limit had not been forgotten, ought to be a sufficient safeguard. As to the recommendation to use automatic stops everywhere, the most natural observation that will occur to most railway officers is that Mr. Belnap is fortunate to have been able to settle so knotty a question in six lines!

THE British railway strike is of interest to American railway men, chiefly by reason of the marked differences of conditions in the two countries. Strikes of shopmen occurred three weeks ago, but the main strike lasted only two days. Trainmen, signalmen and the lower grades seem to have been banded together. But the traditional English conservatism is found among all classes, and the percentage of men refusing to strike appears to have been large. England is so thickly populated, so full of cities depending on the railways almost literally for their daily bread, that the trouble was bound to come quickly to a head, as it did. Even the strikers' families soon saw the danger of food scarcity. The method by which the settlement was so quickly reached is interesting—and in a way, simple. A single government ministry, having large statutory powers, and also having a strong motive in its desire to please an important branch of its suporters, the labor voters, promptly used two weapons: it provided ample military forces to keep order, and it promised the railways that they should be allowed to raise transportation rates to offset such increases of pay as might have to be granted. In this country both of these points would be causes of anxiety in case of a strike. The military would be a doubtful reliance, because of divided authority, of the inherent difficulties in using it and of our non-military pre-[illegible] A promise [illegible] to raise rates almost immaterialized in our labor difficulties last year; but the trouble with that is, that even with a definite promise it may not be possible to secure great advantage from it. This, indeed, is a doubt still pending in England. The shippers will claim that indus-[illegible] evidence in carrying charges, and there [illegible] issue. Whatever the result, the working of the conciliation board will be of universal interest, for it seems to be true that English directors have for the first time openly recognized the labor unions.

THE POLICY OF RAILWAY SINKING FUNDS.

J. WILLARD GIBBS, formerly register of bonds of the Pennsylvania Railroad, in a recent article criticises somewhat severely the general policy of American railway companies of adopting a general plan of refunding maturing bonds instead of providing for them by sinking funds started at the outset of the particular issue of bonds. His theory is the ultra-conservative one, with much on its face to commend it, that nothing so safeguards the stockholder as the carefully guarded and continuously maintained sinking fund, necessarily made from net earnings over cost of operation and regular fixed charges, including taxes and interest; that it is a constant force preserving and increasing a railway corporation's credit; and that it has a specific and emergency value in a period when railway credit might otherwise fall and when, in periods of acute depression, its resources can be used—if in cash or gilt edged securities—for profitable investment and perhaps, one may add, in retiring at a relatively low market price part of the same loan that the fund is established to take up at maturity.

No one can question the doctrinal soundness of the theory. It is, in a large sense, the application of the rule for the individual to the corporation. The wise individual owning capital, either does not run into debt at all, or if forced to do so by the conditions of his business, provides ahead for payment. He may renew his well secured notes at the bank, but his ultimate plan is their payment from profits, not by new loans. But the railway has differed from the individual at two important and fundamental points: It has been—and is—not only an everlastingly "going" concern, but a law of its life has been expansion. New properties to be acquired, new terminals to be built, new leases, new mergers to be made, have constituted a vital principle of its being and of its normal development. A great number of these liabilities will bring returns only in the more or less remote future. The question then is; shall the sinking fund be established with presumptive impairment of dividends, discontent of stockholders, and a certain lapse of credit which always follows a reduced dividend, or is reliance to be placed rather on the increased net earnings that follow wise expansion and development in due season? Is a decreased net debt or increased net earnings the major factor in railway credit, both being admittedly a positive factor?

But even if it is conceded that the theory of universal sinking funds would have been a counsel of perfection if adopted at the outset of American railroading and continued ever since, its application to present conditions becomes pretty fantastic. The capital stock of our railways in 1910 as just returned by Poor's Manual was $8,380,819,190; bonded debt and other bonded obligations combined, $10,509,941,103; or, with profit and loss net surplus subtracted $9,474,241,162. Bonded debt thus exceeded capital stock by somewhat more than $1,000,000,000. What the sinking fund requirement would be on the great bonded debt is obviously the merest guesswork, so infinite in variety are the bonded debt forms and separate amounts. But, as a broad generalization, if it called for only an annual 2 per cent., or say $188,000,000, where would it leave the $275,289,173 paid during the year as dividends on stock? The psychological condition of a good many hundreds of thousands of American railway shareholders receiving on an average about 1 per cent. in dividends, and the general effect on railway credit, may be left to the imagination. One can, of course, indulge his fancy in the opposite direction and imagine a period of wondrous railway prosperity with railway baiting and other evils of the past, and such big net earnings as would crystallize the sinking fund theory into wide practice. But the wildest optimism sees ahead no such Utopia for the railway.

The actual drift is, for better or worse, in the direction opposite to that of sinking funds toward, as we have heretofore pointed out, great schemes of general refunding as illustrated in the Great Northern and New York Central plans. The theory that annexes to such methods and other new loans, conservated

sinking funds for liquidation of bonds at maturity will hold fast enough when it answers the question: where is the sinking fund to come from without calamitous effect on dividends? Until conditions change radically, except in the case of a very few exceptionally prosperous railways, that question must remain unanswered.

THE GROWTH OF TRAFFIC IN THE UNITED STATES.

THE summary of the statistical report for the year ending with June, 1910, given out by the Interstate Commerce Commission, shows that in that year freight transportation at last recovered from the shock caused by the industrial disturbance which suddenly arrested the progress of the country in the last half of 1907. Traffic in 1910 was greater than ever before. This does not mean that it was "satisfactory." The normal course of traffic in this country is continuous growth. If it is not greater in any year than in the previous year, it means misfortune; and if it decreases it means disaster. We had one such sudden arrest of growth in 1893, shown in the traffic of the year ending with June, 1894. Freight traffic in the three years previous had grown at an average rate of about 7 per cent. a year; but in 1893-94 it fell off no less than 14 per cent., from 93,588 to 80,335 millions of ton-miles, and it recovered slowly till 1898, when it suddenly jumped 20 per cent., as if to make up for the lost time.

The rapid growth continued till 1903, when it was 82 per cent. greater than in 1897—a tremendous growth. Then for two years it was almost stationary. but in 1905 there was a gain of nearly 7 per cent., the next year one of 16 per cent., culminating in 1906-7 with nearly 10 per cent., and reaching 236,601 millions of ton-miles—a growth of 37 per cent. in three years, and a pace that could not possibly be kept up. Freight traffic fell off the next year nearly as much as it had gained the year before, and remained stationary for still another year. The gain in 1910 was greater than in any other year of railway history, but, though 16 per cent. greater than in 1909, it was less than 8 per cent. greater than in 1907, which to an industry which had grown 37 per cent. in the three years previous seems something like stagnation. It is, however, significant in that it shows that the great increase in facilities provided before 1908 is beginning to find employment, which is further shown by the addition to equipment in 1910 of 3 per cent. in locomotives and also in freight cars.

The passenger traffic, strange to say, seems not to have been affected by the industrial depression. It has never ceased to grow and to grow fast. After the panic of 1893 travel fell off 14 per cent. in one year, and it was not till 1899 that it was as large as in 1893-94. But since 1899 it has not decreased. It gained 50 per cent. from 1899 to 1904, 26 per cent. from 1904 to 1907, and 16 2/3 per cent. from 1907 to 1910, when it was 124 per cent. greater than in 1899. The gain in 1910 was the greatest made in any one year.

The railway mileage has of course increased meanwhile, but not at all in proportion to the traffic. Witness the passenger-miles and ton-miles per mile of road at three-year intervals:

	1901.	1904.	1907.	1910.
Pass.-miles, per mile...	89,721	104,198	123,259	138,250
Ton-miles, per mile....	760,414	829,476	1,052,119	1,085,745

Actually the passenger traffic has grown more than the freight traffic in the period (54 per cent. against 43 per cent.), and it has grown much more steadily. The only sign of stagnation is that it was substantially the same in 1909 as in 1908; but it increased nearly 5 per cent. from 1907 to 1908, while freight traffic *decreased* 7.7 per cent. This is probably largely due to the fact that wages have been maintained at an unusually high figure since 1907, more so than in any other period following financial troubles.

The year covered by the last report is already a year old; but we may learn from it at least that the country has not ceased to grow, and that it recovers in time from its disasters and unwisdom. The traffic in this last year was equivalent to 346 miles of travel and a ton of freight hauled 2,733 miles for every inhabitant of the country, which can be equalled no where else in the world.

RAILWAY AND INDUSTRIAL MONOPOLIES.

THE *Springfield* (Mass.) *Republican* questions the statement recently made by the *Railway Age Gazette* that certain large industrial corporations have more nearly complete monopolies of their lines of business than is possessed by any railway or combination of railways in the United States, and that, therefore, there is as good reason for regulating them as for regulating railways. It says:

> "It has been many years since competition in through traffic has been able to break through a uniform system of rates maintained by the railways in greater or less arrangement with each other. They are necessarily monopolistic from the close restriction which must be imposed on the number of franchise grants within a given area. On the other hand, the United States Steel Corporation controls not more than 60 per cent. of the industry, has not, as yet, by any means acquired a monopoly of the country's ore supplies, and is not only exposed to large actual, but to great potential competition. . . . There is no comparison between the ordinary industrial trust and the railway as a monopolist."

These statements by a newspaper which is edited very ably, illustrates what seems to us, a widespread misconception about railway competition in this country. No doubt, the public interest requires that close restriction be imposed on the number of railway franchises granted within a given area. Both railway owners and the public are better off where there is one good railway subject to proper public control than where there are two or more parallel and competing lines which divide the business. But until recent years there was almost no restriction on the construction of parallel and competing lines; and even now such limitation exists in only a few states, such as New York and Wisconsin. There has been an inevitable tendency for parallel lines to make rates by agreement or to consolidate; but there are still in every section of the country roads that are under different financial control and management, and between which competition in the solicitation of business, in the rendering of service, and to some extent even in the fixing of rates, prevails. When two or more roads have different traffic managers there are always sure to be differences of opinion as to what rates ought to be; and in a great majority of cases the opinion of the one who thinks they should be the lowest will prevail. The rate made by parallel roads under present conditions ordinarily will be the same simply because the law requires them to be published; and there cannot be two rates or two prices in a market where rates and prices are public.

A form of railway competition which is more prevalent and more difficult to eliminate is what may be called indirect competition. If two roads tap the same points of production or reach the same markets, either with their own rails or by their connections, there is bound to be competition between them. Each of them must in its own interest protect and foster the industries of its own territory, and to do this it will constantly seek to so fix rates as to give its own producers and consumers an advantage over the producers and consumers on other roads. That is competition. The railways of Kansas compete with the railways of North Dakota in laying down wheat in the Chicago market, although they are in no sense parallel. The grain-carrying roads leading to the Gulf of Mexico compete with those leading to the Atlantic seaboard, although they are not parallel and never come in direct contact.

Finally, all the railways of the United States are exposed to vessel competition. They have to meet the rates of steamships which carry goods from Europe to the Pacific coast, of coastwise vessels, of lake steamers, and of boats on other inland waterways. They have to withstand the rivalry of the Canadian roads and canals for United States business. There is no protective tariff that safeguards the railways of

the United States from the encroachments of foreign railways or steamship lines.

If, then, the United States Steel Corporation and some other industrial concerns control even 50 per cent. of the business in their respective lines, they are nearer monopolies than any railway or combination of railways, for, clearly, no railway or combination of railways controls anything like 50 per cent. of the transportation business or could exert as much influence on rates as these industrial concerns can on prices, even if there were no regulation of rates at all. True, the railways, as a whole, might combine to raise rates, as many have in the past; but such general advances usually have not got cold before individual lines have begun rapidly making reductions here and there, with the result that in a short time most or all of the advances have been frittered away.

However, as the *Railway Age Gazette* said in the editorial which the *Springfield Republican* criticizes, it does not necessarily follow, because the business of certain large industrial corporations is "clothed with a public interest," that they should be subjected to the same kind of regulation as the railways. The kind of regulation that has been adopted for the carriers has not yet proved itself a success even as applied to them; and until it has passed the experimental stage in the railway field, it would be very unwise to extend it to others.

CAR VENTILATION

LAST winter the traveling public must have noticed a marked improvement in the ventilation of cars, especially sleepers and those provided for first-class travel. This was largely the result of the application of exhaust ventilators and the better regulation of temperature. The best general account of the state of the art of heating and ventilating passenger cars is found in a report on the subject in the proceedings of the Master Car Builders' Association for 1908. This report covers 32 pages and describes the principal systems in use at that time, but it contains little as to the relation of the quality of the air to health and comfort, beyond a quotation from the description of the Pennsylvania system of car ventilation, as developed for coaches by Dr. C. B. Dudley. The pamphlet containing this description covers 34 pages, and was published in 1904. Since that time an extensive and valuable investigation of the subject of ventilation of sleeping cars has been conducted by Dr. Thomas M. Crowder of Chicago, and the results of his work are contained in a paper presented at the annual meeting of the American Public Health Association, Milwaukee, Wis., September, 1910. This paper covers 51 pages, and is illustrated with numerous tables and diagrams. An abstract of it will be found in this issue.

The paper comprises the most complete investigation of the quality of the air in passenger cars that has ever been made, and it discusses in a most intelligent manner the requirements for good ventilation. It reaches conclusions as to the relation of the temperature of the air to its content of carbonic acid and moisture which are new, and have a direct bearing on the amount of air required for the maintenance of healthful conditions in sleeping cars.

The normal proportion of CO_2 in pure air is commonly stated as 4 parts in 10,000, and the proportions given here for various conditions will use this method of rating. The average CO_2 found in sleeping cars carrying 15 passengers and ventilated in the ordinary manner by deck sash and 7 parts in the body of the car in the breathing zone. With the deck sash open one-half, the CO_2 in the lower berths averaged 8.43, and in the upper berths 9.67 parts. The tests made in cars equipped with the exhaust ventilators connected to the deck sash and now generally used by the Pullman Company, gave an average CO_2 of 6.33 parts for the lower berths and 6.76 parts for the upper berths. When lower berths were occupied by two persons the average was found to be 7.7 parts. Tests made in cars equipped with exhaust ventilators gave 9.9 parts CO_2 in 10,000. The average hourly air supply to the berths of cars without exhaust ventilators was 1,300 cu. ft. per person, while that supplied with exhaust ventilators averaged 1,900 cu. ft. The experiments have also demonstrated that the berth is not similar to a closed compartment, but is subject to the effects of air supply and air currents through and around the curtain. Forty-three observations made in day coaches with 32 passengers gave an average of 9.38 parts $C O_2$.

With the car standing still the exhaust ventilators are not effective, and it was found that the contamination reached 15 parts $C O_2$ in cars at stations awaiting very late departures, and in a few instances it was as high as 20 parts. This should call for supplemental ventilation in the way of electric fans, not to circulate the foul air in the usual way, but arranged to either supply fresh air directly or exhaust the bad air. Open sash and open doors assist materially in this respect if the weather is not too cold. With cars in motion, it has been demonstrated that the exhaust ventilators cause an average of 40,000 cu. ft. of air per hour to enter the breathing zone of sleeping cars, and this is sufficient to afford a fair degree of ventilation for 40 persons, as it changes the air in the car ten times per hour. As the sleepers do not average 20 passengers per car, the supply is double that ordinarily supplied to well ventilated coaches.

While this investigation and most treatises on ventilation have to deal principally with the content of carbonic acid in the atmosphere, it has been demonstrated that this gas is not alone responsible for the discomfort of bad ventilation, and the closing portions of Dr. Crowder's paper deal with this interesting and important phase of the subject. A very badly ventilated room may contain 50 parts $C O_2$ in 10,000, but this of itself cannot have any harmful influence or toxic effect producing distressing symptoms. It is rather the exhaustion of oxygen, increase in temperature, and the larger proportion of aqueous vapor which cause discomfort. The lack of oxygen causes lassitude, and excessive temperature and vapor prevent the usual dissipation of body heat to the surrounding air. Carbonic acid, while not directly responsible for these conditions, is associated with their production, and the degree of bad ventilation generally is taken as proportional to the percentage of $C O_2$. The principal point is that if the temperature of the air is kept low, a larger percentage of $C O_2$ can be permitted in the air without discomfort. With a temperature of 64 deg. Fahr., $C O_2$ as high as 15 to 18 parts will not ordinarily produce discomfort. Heat stagnation is generally the cause of discomfort in cars as well as in houses, and this is the result of the physical condition of the atmosphere, quite independent of the degree of respiratory contamination or of any change in its chemical composition. The problem of properly ventilating a railway car is, therefore, chiefly a question of how to regulate its temperature. Where cars are close and stuffy the temperature is invariably high, and odors are then more noticeable.

The overheating of cars is the paramount evil to be guarded against in the attempt to maintain comfort and good hygiene. In sleeping cars it is necessary to have twice as large a proportion of radiating surface as is usually required for heating residences, as the number of persons occupying a given space is much larger and the air must be changed more frequently. A system is therefore needed for cars which is capable of being quickly controlled to meet rapidly changing conditions. Such a system, with multiple units of radiating surface, each with a separate control, is now being used experimentally. It is encouraging and a great satisfaction to find that conditions in sleeping cars are tending toward an ample supply of fresh air at a uniform temperature of about 60 deg., and this is almost equal to that in a comfortable bedroom in a residence.

This much accomplished, attention should be directed to the ventilation of coaches, where conditions are even more difficult, on account of the more crowded space, and where the great majority of railway passengers are still suffering from overheating of the cars and bad ventilation generally.

Letters to the Editor.

PHYSICAL EXAMINATION OF EMPLOYEES.

Boston, August 19, 1911.

To the Editor of the Railway Age Gazette:

I have read with interest your editorial of this week on the Bridgeport derailment. While your title contains the word "discipline," and while the salient features of discipline are dealt with in a comprehensive manner, you touch but lightly on the question to the health of engineers and firemen, which is an important element in discipline. It seems to me that this point should receive much more emphasis than it usually does. You say that it would be an extreme course to examine enginemen daily. This may be so; but surely every man ought to be examined by a competent authority after having been absent from his duties for a considerable time on account of sickness. I understand that on the New Haven road there is no regulation requiring this; and, in fact, that the examination for eyesight is about the only test that is in regular use on that road. In the case of Curtis, none of the reports indicate that anyone but himself was responsible for the decision that he was well and able to satisfactorily assume his duities when he came back to work.

Firemen, flagmen and others on whose vigilance the safety of trains depends, ought also to be examined. We do not so often hear of cases of heart disease or apoplexy among firemen and flagmen; mainly, I suppose, because they are usually younger than enginemen, and also because a failure on their part is not so likely to make trouble; but surely in formulating any scheme of discipline, according to the high standards which you set forth as desirable and necessary, these other classes ought to receive due consideration. FOREMAN.

GENERAL MANAGERS AND DISCIPLINE.

Philadelphia, August 21, 1911.

To the Editor of the Railway Age Gazette:

I have been reading your article of last week in which you discuss the remedy for such failures of engineman as caused the wreck at Bridgeport, Conn., in July. I feel quite sure that railway officers generally will agree with you that there is room for a great "jacking up" in the discipline of both engineers and firemen. This difficult problem of discipline, with grievance committees devoting their nights and days to a study of the best way to get around the officers with whom they have to deal, and constantly planning, in conjunction with the higher officers of the unions, to make regular and frequent attacks all along the line, from the trainmaster through the different officers up to the president, or as high as they can go, is, indeed, a perpetual burden and one which only the most energetic and persistent railway officer can adequately cope with.

But do you not bear down with excessive severity on the division superintendent? Your list of questions, printed in fine type, must surely appeal to all practical railway officers—especially if one reads between the lines—as touching on most vital points; but are you not assuming a good deal, in your introductory paragraph, in putting those questions into the mouth of the general manager? It has been my observation that the general managers do not do much in the way of asking questions of this kind. Loaded down with other duties, they leave discipline to the officers below them. And yet, with the mammoth railway system of today what is more necessary than this constant calling to account from headquarters? A half dozen superintendents are sure to fall far short of pursuing a uniform policy, and the general manager (or general superintendent) is in duty bound to constantly watch the discipline in order to avoid inconsistencies. The unions insist on dealing with a high officer. They have to do this to brace up their own dignity. The high officer cannot administer all discipline, but he can at least study the conduct of all his superintendents; and if he does that with a determination to deal with the enginemen fairly he will see that those questions of yours are not only asked, as often as necessary, but also that they are properly answered.

On the main point, that reasonable energy in administering discipline will produce a high degree of efficiency on engines and nearly or quite abolish our disgraceful smash-up record all railway officers must agree. G. H.

DISCIPLINE OF ENGINEMEN.

To the Editor of the Railway Age Gazette:

Your editorials of August 11 on the Batavia accident, and the 18th on the Bridgeport case are well timed and to the point, especially in view of the more recent Fort Wayne accident. In the solution of this subject both the managements and the men responsible for the safety of railway operation are confronted with a task which must be quickly and rightly solved if they hope to escape indictment at the bar of a stern public opinion which will define and enforce with a strong arm the law of the land enacted for criminally negligent offenders.

Under present conditions with the power of control over operation and discipline circumscribed by the men, it is but natural that the manager who has a bargain to drive in the interest of his business should make certain concessions in the requirements of the service not necessarily jeopardizing its safety; but a concession, any concession, serves as the entering wedge for other and more drastic demands from the men until finally the employees in the engine and train service become mere automatons, performing in a grudging, perfunctory way only the service actually defined in their agreement. This, as you know, has been the result on many roads.

The last part of your last editorial, referring to the fireman's function as a monitor, strikes a vital point. Until the advent of organization agreements it was never contended on live, actively managed railways that firemen could not see and call signals to their enginemen; and a thorough, exacting investigation of this subject now by disinterested, competent authorities would conclusively demonstrate the unreasonableness of this claim. And this monstrous assumption that a fireman cannot find time to observe signals is virtually incorporated into most of the rules for firemen, in the clause that they shall observe . . . when not otherwise engaged. I have made many trips on locomotives of fast passenger and freight trains, and have yet to find the first fireman who did not see and call every signal to his engineman at the proper time. The difficulty of seeing signals through smoke is a false issue. The black smoke nuisance very quickly disappears when effective measures are employed to require firemen to fire properly.

What good is accomplished by preaching co-operation from the house-tops when the engineman and fireman take refuge behind the bulwark of their organization agreement and refuse to be dislodged from their stronghold, either in the interest of safety to the public to themselves or to their co-employees?

On many roads there are still among the employees a fair proportion of men of the old school who by their precept and example exert a healthy influence for good upon all with whom they come in contact. Unfortunately these conservatives are growing fewer each day, while the upstart who knows by heart every article in his agreement before he learns the A B C of his rules is out-talking and out-voting the better class in every issue involving the general welfare of all.

A situation such as I have outlined is only too familiar to railway officers generally. There are, however, occasional rays of light among the clouds. On roads where the management has given due attention to the matter the personnel of the employees' committees is changing from the rabid agitator with few good qualities except ingenuity, to the conservative, level headed

man who has the ability to analyze each case brought to his attention, and the courage to speak his mind fairly and freely upon every issue. The slogan that it is easier to keep out of trouble than it is to get out of it, is being appreciated, and officers are drilling it into the minds of the men, with the result that there is upon some roads a marked reduction in the demerit record from year to year, with a correspondingly increased efficiency in the service.

Effective discipline is the keystone of safe operation. Under the organization of most roads the superintendent is made directly responsible for the discipline of the forces employed on and running over his division. But with the constantly growing right of appeal from the decision of the superintendent to the highest officer, and the almost constant activity of the paid general chairmen and committees of the various organizations the superintendent has a perplexing task. He is told, perhaps not in so many words, that he must keep the committees away from the general office. General managers who ask those searching questions which you print in fine type, and which, evidently, are framed to support, not undermine, the superintendent are few and far between. Most superintendents will think not only your questions but your general managers are imaginary.

On a busy division the superintendent is required to devote a considerable part of his time to a discussion of the merits of his discipline with the committees. No matter how diligent he has been in ascertaining all the facts of a case, or how careful he has been to analyze them; nor what justification he may have for the infliction of discipline; he is still confronted with the appeal, and is told by the committee that their men disagree with him. By and by, either directly or indirectly, the appeal reaches the top, with the chances in favor of a reversal or modification of the superintendent's decision, based on the statement of the committee that a reversal would have a good effect on the men and that they (the committee) would see that the offense did not occur again. A victory in one case is followed by a demand in another and so on until almost every decision by the superintendent is reviewed by his superiors.

Until the advent of the 16-hour law enginemen and firemen were frequently worked long hours. This, together with the defects of the old type of signals and their liability to give incorrect indications frequently justified clemency in the discipline for signal violations. But the science of railway signaling has advanced so that signals do not fail, except on the side of safety; distant signals are located in the rear of home signals, more than the full braking distance for the highest authorized speed, and men are not overworked; they are given as much more than the legal stipulated hours of rest as they request. Notwithstanding all this, collisions and derailments from the disregard of signals continue. Enginemen expatiate on their multifarious responsibilities. Is there a practical railway man who will soberly claim that an engineman with signals definitely located and uniform in character, and with air brakes to control the train at his fingers' end, has more to do now than he did twenty years ago? Then signals were irregularly placed, hand brakes were his dependence for control, and he was required to keep his eyes constantly glued on the track ahead expecting a [illegible] and signals are sometimes disregarded. What can be plainer than that our first need is a great infusion of care, vigilance and [illegible] have votes; the Congressman likes Washington and wants to [illegible] superannuated enginemen or firemen. The poor superintendent will then have the testimony of three witnesses (provided they still live), instead of two, who will swear that the signal was clear. What guarantee will Congress give that the lookout will stay awake; that he will take his rest when off duty, or that he will refrain from going on duty when he is not physically and mentally fit for the task before him?

That our discipline is full of holes is strongly indicated by the fact that enginemen get sleepy and run off derails, disregarding the signals protecting them. Automatic stops have their place, but at best they are not foolproof and lack the element of flexibility absolutely essential to the operation of a steam railway handling all classes of traffic.

Should the locomotive engineman intrusted with the lives of passengers not be held to the same degree of accountability as the doctor for the lives of his patients? The automobile chauffeur, the street car motorman or the driver of a team who accidentally runs down a person on the street is arrested and made to prove his innocence or to show that the accident was unavoidable. The locomotive engineman disregards a fixed signal indicating stop, without knowing it, until something happens, or until he is called upon for an explanation. If some one is killed or badly injured he is dismissed or suspended. The inquest is held and a show made of placing the responsibility, but frequently without the slightest rational regard for the merits of the case from a railway standpoint. The authorities need votes, the matter dies out, the engineman is reinstated with his rights of seniority, and he goes back to the throttle. In the eyes of his fellow employees he is vindicated and he is exonerated by the easy going prosecuting attorney.

The real trouble with the discipline of most roads is not in its plan or scope, but simply that it is weak. Punishment is inflicted by the division superintendent or his subordinate, "because he has the authority." It is reversed by the executive officer because he lacks the something necessary to straighten out his superintendent or get a new one. Real straight-from-the-shoulder discipline backed by a common sense application of the rules will stay put if the railways will have it so. This, combined with an energetic application of the law for the criminally negligent offender will do more to make railway travel safe than all the fool-proof "safety devices" in the patent office.

Why is it that Congress and state law-making bodies have taken such a keen interest in the welfare of the employee and allowed the public to suffer at the hands of the negligent employee? The automatic coupler law, the air-brake law, and others have been passed and enforced at the expense of millions of dollars, all in the interest of the employee. Every road in the country is covered by inspectors from the state and interstate commissions, searching out the slightest violations of the above mentioned laws on the part of the companies; but has any one ever heard of one of these inspectors calling attention to violations of the operating rules on the part of trainmen or to dangerous practices coming within their observation? The public is paying the bill; why not make these inspectors and their high priced commissions of some real value to the public in the interest of greater safety to passengers?

Suppose Congress should start something by enacting a law empowering the interstate commerce commission to review all [illegible] on the part of enginemen or trainmen, and providing that no employee disciplined for violation or disregard of signal indications should have his sentence mitigated without government approval. The commission disciplines the railway for every infraction of law brought to its attention. Every employee in the train or engine service is a detective serving the government for nothing by reporting violations coming within his observation; yet refusing to give the same information to his division superintendent, or immediate superior, on the ground that he doesn't want to be a "snitch."

Yet frequently, serious accidents are caused by negligence of employees, the cause of which is so carefully covered up by all concerned that the superintendent experiences extreme difficulty in ferretting out the culprit. What better argument could

be asked for in favor of government control over discipline than to refer to the operations of floating craft in New York harbor. The captain and chief engineer obtain their licenses from the Board of Harbor Supervisors. This board has the power to investigate accidents and suspend or revoke licenses, and it is more feared by the captains and chief engineers than the combined discipline of all the employers. Their employers can dismiss them, but so long as they retain their licenses they can obtain employment elsewhere. But once their licenses are revoked their occupation is gone. Herein lies the effectiveness of discipline as applied to marine operations. Similarly applied to steam railway operation it would create that moral awaking on the part of officers and men which is absolutely necessary to safe operation.

L. N. S.

TRAINMEN AND SAFETY APPLIANCES.

St. Louis, August 16, 1911.

To the Editor of the Railway Age Gazette:

It will be recalled that T. H. Curtis, president of the Master Car Builders' Association, in his address at the annual convention, June 19, speaking of defective safety appliances, showed that as to couplers and uncoupling devices . . . . over 2,000 out of 5,000 defects reported could have been righted within an average of one-half hour's time for each defect; and that as to air brakes of the 16,000 cases reported, 10,000 could have been repaired by detaining the car from service only one-half day, at the most, and these repairs would have required only labor. The greater part of the defects mentioned would have been obviated by greater care and supervision. In other words the labor and material cost necessary to correct the defects was practically negligible.

When we take into consideration the limit of time at the disposal of the inspectors, or the difficulties under which most of the inspections are made, we have cause to congratulate ourselves on the fact that the showing made is as good as it is, and that more defects are not overlooked.

As the laws applicable to safety appliances are now more stringent than in the past, it is fair to assume that even greater vigilance will be necessary on the part of the inspectors. The time allotted to the inspection of trains, especially fast through freight at intermediate terminals is limited, and with inspectors at these points to examine and test every hand-hold, grab iron, ladder iron, sill step, release rod, running board, etc., the conditions will necessariiy entail either a large increase in the number of men employed, or an unreasonably long detention of cars. But it would be almost impossible to keep the number of inspectors necessary continuously employed at other work when there are no trains passing to be inspected, and an insufficient force would result in endless complaints from shippers. Every car having any one of the numerous safety appliances defective carries with it the possibility of a penalty assessed against the road; so the railways truly are placed between horns of a dilemma.

In view of the present state of train control, involving so little time and effort on the part of trainmen, why would it not be possible for us (the transportation department), to co-operate with the mechanical department in these matters to the advantage of both? With the introduction of automatic couplers, air brakes, block signals, etc., the trainman's work has been reduced to the minimum, and time must necessarily hang heavy on his hands when going over the road; time flies with a busy man. This thought has fostered the idea that if we required the trainmen to inspect and report on safety appliances enroute, we should not only relieve the mechanical department, and expedite the movement of trains through terminals, but confer a real benefit on the trainmen themselves.

The duties of the trainmen necessarily carry them over the entire train with more or less frequency during the entire trip. The idle time at their disposal is ample, especially where, by law, we are required to carry more trainmen than are actually necessary. Therefore why not have the trainmen inspect for defective safety appliances, and bring their trains to terminals thoroughly inspected with every defective car properly carded? Then the terminal car inspectors could proceed to make the necessary repairs immediately upon arrival, instead of first holding the train for inspection and then again having to delay the train to repair the defects found.

The trainmen certainly are in better position to detect any defective safety appliances than any other employee connected with train operation, coming as they do directly in daily contact with them, and having the entire train absolutely under their personal supervision for hours at a time. They could soon learn to familiarize themselves with the commission's requirements, so as to be able to report correctly on all matters. The conductor's record of cars handled would afford absolute check on any negligence where an incoming crew failed to report defects which were afterward discovered by others.

Of course there may possibly be objections raised on the part of the trainmen; yet, as the safety appliances are placed on cars for no other purpose than increased safety for the trainmen, why should they not be more interested in their proper maintenance than anyone else? And why should they not render every possible assistance with this end in view, especially as it will entail so little extra labor on their part as to be hardly worth considering? We might fairly claim that the work is directly in line with their full duty. On many roads, conductors are now required to fill out cards for defective or inoperative air brakes found enroute; why not include all other safety appliances?

R. P. F.

COLLEGE MEN AND RAILWAY WORK.

New York, August 4, 1911.

To the Editor of the Railway Age Gazette:

The letter of "Yale 1894" in today's issue gives good advice to the engineering graduate wavering after a year or two in railway work, but the average beginner will not turn down the more alluring pay and privileges in other lines for the railways' dim prospects. He does not claim wonderful ability, and he knows he may never arrive.

The writer passed safely through the first stages, and attained the confidence of his superiors. But he kept his eyes open, and noted glaring flaws in the theory that the best man wins. He saw poor men unloaded on other offices at increased salaries, while the good ones remained at their old pay. He saw a man barred from promotion because he alone in the office was familiar with a certain piece of work. For several years he was under a favorite whose office drew plums galore. To get more varied experience he secured a transfer to an unpopular office. The educational advantage did not balance the political disadvantage. The salary scale was 20 per cent. lower. A financial scare came, and his new office was bisected on a two days' notice, one of the victims being an elderly full member of the American Society who had served the road faithfully several years. Apparently no effort was made to place them in the popular office, which suffered no cut at all, though overrun with green men. The writer was not cut off, but he did not wait for the next time.

On our greatest railway, it is generally understood that if a man lives long enough he will get credit for his ability, and your biographies of its higher officials usually show continuous service with the one road. But most of your other biographies show frequent shifts in the early years. Why? Because the man could not get the recognition he knew he deserved. Other capable men are too poor, too timid, or perhaps too loyal to shift, and they never get recognition. The young graduate does not know all this, but the brighter he is the sooner he guesses it, and unless the fascination of the railway has a firm grip, he tries something else.

1903.

THE PEKING-KALGAN RAILWAY; CHINA'S MOST DIFFICULT PIECE OF CONSTRUCTION.

BY LEWIS R. FREEMAN.

It is a fortunate circumstance for the Chinese in their contention for the full supervision of the expenditures of all railway loans from foreign syndicates, that the Imperial Peking-Kalgan Railway, which up to this time stands as the most difficult venture of its kind yet attempted in China should have been financed, engineered and built solely by Chinese. Of even greater importance in support of this contention is the fact that this road has set a record for low cost of construction which, all things considered, has seldom been equalled.

The Peking-Kalgan Railway runs from the capital of the Empire to the chief city on the caravan route to Russia. It is now 130 miles long and is being extended. It was built from the surplus earnings of the government-owned Imperial railways of North China, and from the first reconoissance to the driving of the last spike no foreigner had anything to do with its construction. To-day its operation is entirely in the hands of the Chinese. That it was built in spite of natural obstacles to construction which foreign experts declared were absolutely prohibitive to any Chinese engineer and possibly even to themselves, is a personal triumph of no mean magnitude for the chief engineer, Jeme Tien-Yu. That it was built at a cost almost without parallel for similar construction—at a lower figure per mile even than some of the foreign-built roads on the level floor of the Yangtze valley—is a striking object lesson for Europe and America and will be a powerful weapon for the Chinese in their contention for fairer terms in borrowing foreign money. The road is now operating at a profit, and the directors of the Imperial Railways of North China have succeeded not only in providing their government with a line that is strategically valuable, but with one that earns a return on the money invested. From first to last, from whatever standpoint it is regarded, the Peking-Kalgan line is a great triumph for the Chinese.

The name of Jeme Tien-Yu stands out above all others in the record of the Peking-Kalgan Railway, and his achievements in connection with that enterprise alone are sufficient to have won him the undisputed title of China's leading engineer. He was one of a number of Chinese students who were sent to America about 1880 to receive university educations. Jeme-Tien-Yu was the only one who undertook a course in engineering. He graduated from Yale in 1883, and then went to a technical school in England for several years. On his return home he went into the employment of the Imperial Railways of North China, where, working under the able British manager of that line, C. W. Kinder, he rose post by post, outstripping many foreigners who were senior to him in point of service. Later he was appointed chief engineer of the Peking-Kalgan line.

Preliminary surveys for this line were made in the summer of 1905 and construction work was begun in October of the same year. At the end of nine months the first section of the road, 32 miles long and reaching to the mouth of the Nankow pass, was completed. Chinese were employed in every department, from the lowest coolie or camel-driver up to the chief himself. The saving of the salaries of high-priced foreign officials, interpreters and various middle men became apparent at once. An even greater saving was found in procuring earthwork and similar constructive materials directly from petty contractors along the line, instead of giving the contract to big contractors and then paying all the commissions necessary in their system of subletting and re-subletting contracts. This practice is not confined to China, but is carried to greater lengths there than anywhere else, and its abuse has been responsible for the great expense of so much work done by foreign syndicates in that country. For earthworth on this first division of the Kalgan line the average cost was about two cents per cubic yard; while after the Nankow pass was reached and the embankments had to be made out of broken boulders, the cost rose to three cents a cubic yard. Broken stone for concrete was purchased for from 13 to 33 cents a cubic yard, delivered ready for use, and sand for the same purpose averaged about three cents a yard.

Tunnel, Culvert and Section of Great Wall.

Most of this section of the road runs over flat plain, gradually sloping to the mountains. The Peking station is at Liutsin, a short distance outside of the great wall of the capital, as very

few Chinese railways penetrate the walls of any of the old cities, both on account of the lack of space inside and because of the violent prejudices of the conservative element of the people against such desecration. For some distance the line runs through a fertile farming country dotted with small villages. The most striking feature of this part of the journey is Waushoushan, the $50,000,000 summer palace of the old Empress Dowager, with its roofs of Imperial yellow tile standing out strikingly against the green hillside upon which it stands. Shortly the country commences to show traces of erosive wash from the mountains, and before long the crossing of numerous cuts and arroyos of gravel and boulders begins. The bridges are all solidly built of steel and concrete, and the largest of them is nearly 300 ft. long, having five 30 ft. spans and one of

Bridge on the Peking-Kalgan Railway.

110 ft. The steel superstructure of this bridge—with the exception of the long span, which was supplied from England—as well as of all the other bridges on the line, was built in the shops of a Chinese concern at Shanhaikuan.

This Liutsin section of the road has a total of 21 bridges and 17 drains, aggregating 1,352 linear feet of openings. All of these constructions are of steel and concrete and bear every stamp of strength and permanency.

At Nankow are quarters for employees, machine shops, locomotive sheds and numerous other railway buildings of excellent construction. There is an up-to-date foundry in connection with the machine shop, where castings of any size required in locomotive and car-repairing can be made. A well-equipped hotel, built and managed by the railway, fills a long felt want of tourists.

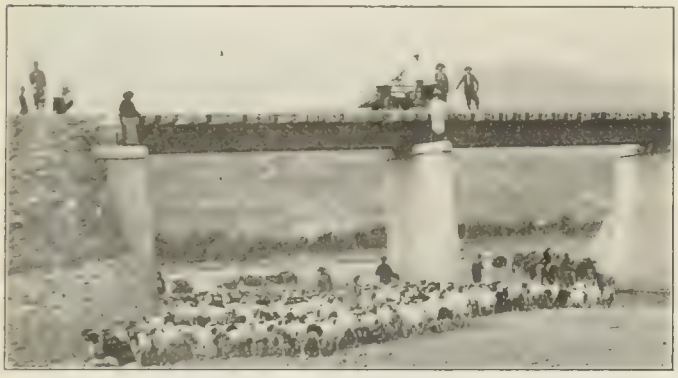
The Nankow pass section, the most difficult piece of railway engineering in China, was the next portion of the road to be built. This pass must have presented a very discouraging aspect to the Chinese engineer when, with the honor of his country at stake and with the "inevitable" failure, prophesied by all the foreign engineers in the East staring him in the face, he started over it for his first tentative study. There is a rise of 1,800 feet in the ten miles from the mouth of the pass to the summit at Pataling, and the gorge is so narrow that it seemed almost impossible in places to keep the necessary curvature without tearing down the mountain. Five distinct surveys were run, and on the earlier ones some of the curves were sharp enough to "break the back of a snake," as Mr. Jeme-Tien-Yu stated it.

Slowly, and with infinite pains, a practicable line was determined upon, and along this the present road has been built. Even the most exhaustive surveying, however, could not solve all of the problems, and at a point not far from the summit tunnel, where it was necessary to have a station and sidings, a switch-back was introduced. However, a station being necessary, the inconvenience of the switch-back is minimized.

The general direction of the railway up the pass is about parallel to that of the old stone-paved highway which leads down to Peking from the plains of Mongolia, the road over which all the Tartar invasions of the Chinese empire have come since the time of Ghengis Khan. The general aspect of the country, in its rockiness and lack of heavy vegetation, is strongly suggestive of some of the lower reaches of the more northerly passes of the Chilean Andes in South America. The railway up the pass is one continuous succession of cuts, fills and tunnels. The fills, regardless of their height, are for miles faced with cut and fitted

Curve on the Kimingyih Division; Cut Stone Used to Prevent Erosion; Grass Planted on Bank.

granite blocks. All the overhanging boulders have been removed, or securely cemented into place even for hundreds of yards up the mountainsides, while the solid rock of the cuts is trimmed as smoothly and evenly as if lined with plaster. The 19 bridges and the 36 culverts are all steel, concrete or cut stone, and in many instances where swift mountain torrents are crossed



Bridge at Entrance of Nankow Pass; Mongol Herders with Goats and Ponies.

cemented beds for the water have been laid to prevent undermining.

The tunnels of this division are four in number, their respective lengths, in order as approached from below, being 1,200 ft., 150 ft., 450 ft., and 3,570 ft. The first tunnel which was driven through limestone was completed in about six months. The other three tunnels, all of which are in granite, were completed in good time. The one at the summit, the longest in China, took over a year.

The summit tunnel, which runs under the Great Wall, was driven according to thoroughly up-to-date practice. A shaft was sunk near the half-way point, and with the aid of fans, drilling machines and modern hoisting apparatus, work was carried on in both directions from the center, as well as from the ends of the tunnel. This shaft, with another which was sunk to admit air near the northern portal of the tunnel, have since been lined [illegible] as permanent ventilators. All of the tunnels are lined throughout with concrete, which is also used for the portals.

The open cutting in the pass, half of which is in solid rock, amounted to 640,000 cubic yards, while the fills required an aggregate of 1,275,000 cubic yards of material. The latter, except such as was provided from the cuts, was obtained cheaply by blasting it out of the nearby mountainsides. The labor for all of this earthwork cost only $220,000.

The third or Chatao-Kimingyh division, 38 miles long, was of comparatively easy construction. There are 17 bridges and 32 drains—in all 2,662 ft. of linear openings. The principal engineering feature is a 1,000-ft. bridge having ten 100-ft. spans at Huilahsun.

The fourth or Kimingyh-Kalgan division is also 38 miles long,

Typical Bridge Over Mountain Torrent; Camels Thrown Out of Business.

and in engineering difficulties rivals that of Nankow pass. At Hsiangshupo 16,500 ft. of granite and sandstone have been cut through to make a way for the road along the steep bank of the Yangho, the cut varying from 10 ft. to 85 ft. deep. There are 2,075 linear feet of openings, 21 bridges and 130 drains.

Switchback in Nankow Pass; Peking-Kalgan Railway.

At Kimingyh the company is operating a coal mine of its own, and the installation of a thoroughly modern plant promises to soon provide fuel for all its needs. A 15-mile branch to the Mentoken coal fields gives the excellent product of those mines an outlet to the Peking market.

Of the character of the roadbed of this splendidly-built line the photographs give a very good idea. The ties are mainly of Japanese hard wood of a class which would cost in the vicinity of a dollar in the United States, but which are laid down in China for less than half that figure. On the mountain divisions creosoted ties are used, with provisions to prevent rail creeping.

Tank, Engine House and Shops at Division Terminus.

For the main line, which is of standard gage, 85-lb. rails are used; for sidings and branches, 60-lb. rails.

The locomotives for the mountain divisions of the line are mostly Mallet articulated compound. Such of the passenger cars as have not come from the shops of the Imperial Railways of North China at Tongshan are of American manufacture, but the company will doubtless build all of its own cars in future. The China-made cars are of a modified British type, a sort of a compromise between a side-door compartment car and one of the center-aisle type. The third class cars, for which the fares are amazingly low, are hardly more than open-sided freight cars with benches along the sides. The freight cars of all classes are of 30-ton capacity, with two trucks.

The following two paragraphs were taken from an article on the Peking-Kalgan Railway which appeared in *The Chinese*

Station in Mountains, Nankow Pass; Retaining Wall to Support Crumbling Ledge.

Students Journal. They make a strong plea for full control of expenditures in railway construction by the Chinese.

"In the construction of a railway, economy, which must not be confounded with cheapness, must always be kept in view. All railways which have been built, and are being built, in China must be paid for by our people, and our people are poor. A railway line is not a clubhouse or a private mansion upon which the owner or owners may expend millions merely for the gratification of their sense of beauty or for an exhibition of their wealth, but is a commercial investment. The amount of capital invested in it must be commensurate with its power of paying dividends, and in the case of Chinese railways the redemption of the bonds must not for a moment be forgotten. Economy on the Peking-Kalgan Railway has been reduced almost to a science. There is no temptation to spend money recklessly, as no five per cent. commission on every tael spent can enrich the coffers of any corporation. There are no engineers who must have foreign style residences, cement tennis courts, ice-making machines, palatial house-boats and princely salaries before beginning work. There are no interpreters to browbeat the contractors, to make trouble with the local officials, and to make a fortune in little or no time. All contractors deal with the engineers directly, and no graft exists. The figures for the price of materials explain in a large part why a railway built under our own supervision and by our own engineers is so very much more economical.

"Another very important advantage gained is the peaceful condition of the coolies during construction, due to the absence of misunderstanding between engineers, the coolies and the country people. No disturbance of any kind, still less of any rioting, has ever happened, and the work has proceeded so smoothly and quietly that the local officials are never called upon to suppress disorders or punish offenders. There can be no unpleasantness arising through the interfering of foreign consuls and the referring of insignificant incidents to the ministers in Peking. One and all understand that the railway is a Chinese railway, that our own money is being spent, that the coolies are our own people, though they are coolies, that the officials are officials appointed by the Emperor, and the result is that the work proceeds without a hitch of any kind."

LETTERS FROM AN OLD RAILWAY OFFICIAL TO HIS SON, A GENERAL MANAGER.*

XIII.

Chicago, July 1, 1911.

My Dear Boy: One of the easiest things to measure, because definite in terms and limited in quantity, is money. The things which money may represent are hard to measure because often intangible and indefinite. The money account may or may not reflect efficiency in performance. Have we not been grasping at the shadow of money at the expense of the substance, effect? Consider, if you please, the working of a bank, perhaps the corporate institution in whose efficiency the public has the greatest confidence. In a small country bank one man does all the work. Later he requires a clerk or a bookkeeper. As the bank grows there are self-suggesting divisions of labor along such well defined positions as teller, paying or receiving, cashier, vice-president, president, etc. In the first place, the same man handles the money and its written representations, the accounts. When we reach the stage of having both a teller and a bookkeeper the one is a check on the other, because of a difference in point of view. I do not understand that a bank considers its bookkeepers more honest than its tellers or vice versa. The bookkeeper came along to check the teller, not because of such marked variations in humanity, but because of the volume of business. There was more than one man could do.

The large corporations, including the railways, seem to have followed governments into a fundamental fallacy in the matter of money and accounting. Because, now and then, in spite of safeguards, a trust is violated and money embezzled a remedy is sought by segregating in administration all activities having to do directly with fiscal affairs. The ultimate effect is dwarfing to administration and fatal to maximum composite efficiency. In a compact establishment like a department store or a large manufacturing plant, the closer contact of the departments concerned minimizes the evils of this segregation. The operations of a government or of a railway extend over so much territory that such close contact is impossible. The result is that our bookkeeper is too far away from the paying teller. The bookkeeper then arrogates to himself fancied qualities of a superior

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being blessed with a rectitude born of the guardianship of money. Yes, we must have the transactions of one man checked by another more or less disinterested. This is not alone a question of integrity, but concerns the failings of the human mind. The more conscientious and careful the engineer the more does he desire a check on his own calculations by competent persons. We accept the estimates of the engineer, swallow them whole sometimes. We tell him to go ahead and blow in the company's money or credit to accomplish a desired result. This is because we have confidence in his professional ability. When it comes to one of the components of his constructing work, the disbursement of real money, a lay function, we balk. We say to him, this is so different that your vouchers and checks are worthless until mulled over by a distant circumlocution office. This office, it is true, has no first hand, practical knowledge of what you are doing, but because this is money we feel safer by imposing such a check. But when the bookkeeper sat in the same room, like a bank, and checked the engineer, this was a good working hypothesis. Did we not outgrow it long ago? We trust the engineer to hire a thousand men, to incur a legal obligation for us to pay them. Why send the pay-rolls several hundred miles to be checked by a lot of boys? Why not let the engineer disburse, subject to a real check, after the fact, by a competent disinterested inspection of his work?

The same general line of reasoning applies to all the activities of a railway. We endeavor to insure integrity by disbursing only through the central offices of the auditor and the treasurer. By the same reasoning a large bank would keep its customers waiting at one window because only one teller would be allowed to pay out money. A bank can count its cash at the end of a day, but it can never tell exactly what remittances its correspondents have in the mail. A railway's money is even more in a state of unstable equilibrium. All night long some of its ticket offices and lunch counters are open. All night long cash fares are being collected on trains. The exact amount of money on hand at a given moment is only an approximation. This is natural from the characteristics of a railway. It would be a hard matter to stop every train and determine the exact location of every freight car, at home or earning per diem, at any particular moment of time. We can, however, approximate sufficiently closely to the conditions to serve all practical purposes.

Tremble not at my coming, Clarice; I would not push the auditor off the pier. Rather would I put him on the band wagon and let him blow a bigger horn. Is not accounting one of several components of operation of which collection and disbursement are yet others? Why not frankly admit that a railway is too unlike a department store to put all the cashiers and bookkeepers on a single floor? Why not interweave accounting with operation? Why not make such operating units self contained, as experience may prove wise and practicable? Some of the best roads in the country now have division accounting bureaus in order that the superintendent may keep his operating expenses in hand. The next step must be a division disbursing officer. A pay-roll and certain kinds of vouchers, including some for claims, must become cash without the worthless certification of the general office.

Returning once more to the bank for inspiration and for light, [illegible] The policy is dictated, the methods are prescribed by a central authority. Efficiency, integrity, and uniformity are insured by inspections and audits by competent experts free from local affiliations.

[illegible]

Some of the men in this new department will be recruited from the earnest officials and clerks of the accounting department of today. These men fail to attain the result they so loyally desire, not from their own limitations, but from the fallacy of the system under which they work. They deal with accounts—mere symbols; with money a representative. Their work, to be effective, must deal with things, and above all with men. Audit is extremely important, but not all-important. Audit is a component part of a larger activity, inspection. The word inspection on railways is unfortunately and improperly associated with the thought of secret service and underhanded spotting. True inspection is as open as the day and as welcome as the evening. The earlier station agents resented the creation of the traveling auditor as a reflection upon their integrity. The station agent of today—and as a class what splendid, honest men they are—welcomes the traveling auditor, because his visit means a clearance The public accountant had a long fight for recognition of his legitimate function, first in England and later in this country. Today he is established and desired by the general accounting officers of railway corporations.

Following the public accountant comes the efficiency engineer. While one inspects conditions, the other audits accounts. By an easy process of evolution the two positions sooner or later merge into one. The volume of business may warrant a segregation, however, into component activities. Sooner or later the final certificate must include inspection of men and things as well as audit of accounts.

We, the railways, are big enough to have our own efficiency engineers. This is a distinct function for the staff as contra-distinguished from the line. Efforts, more or less crude, to introduce special staff work have signally failed on a number of railways. The underlying cause has been a violation of the principle that the staff can never as such directly command the line. The temptation of the special staff men, call them inspectors or efficiency engineers, if you please, is to become meddlers. They are so enthusiastic for the cause that they desire to save the country and reform the road all on the same day. The men who succeed at special staff work are those who stick to the principle enunciated. An inspector, because he is a staff officer, should never give an order.

The coming new department of inspection or efficiency, like all innovations, will have its troubles. One of the temptations will be to build up an office full of clerks to check a lot of unnecessary reports. The head of the department, whether he be called general inspector or vice-president, will have to remember that untrained persons do not necessarily become endowed with superior intelligence and professional acumen by the privilege of personal contact with him and assignment to his department. To be successful his department will consist of a corps of highly trained inspectors of official rank and experience, capable of first hand dealing with things and men. The tendency of both inspection and audit is to become perfunctory. One remedy, found efficacious by the army, is definite and periodic rotation from the line positions. The law of the survival of the fittest will bring out those all-around men who can succeed in both line and staff. The superintendent who has been detailed as an inspector for a year or two will return to a division with a broader view and will be a better superintendent. He will not resent the inspection of his division by the other department, because conscious of the fact that the inspectors are at least his equals, and perhaps his superiors, in experience and rank. These inspectors will certify not only that the money has been honestly and legally expended, but wisely and efficiently as well. While an absolute essential, honesty is not the only component requirement of good administration. The one road on which good intentions are standard ballast is not as yet telegraphing its accidents and its density of traffic to the Interstate Commerce Commission.

Affectionately, your own,

VENTILATION OF SLEEPING CARS.*

BY THOMAS R. CROWDER, M. D.

For the purpose of securing a suitable exchange of air in railway cars many types of ventilators have been suggested, and not a few have been given practical tests. About three years ago I was asked to report on the efficiency of one of these ventilators that had been applied to a few sleeping cars, and which seemed to be of considerable practical usefulness. All air contains carbon dioxide as a normal constituent. The average amount in pure air is commonly stated to be 4 parts in 10,000. The average for fifteen samples, which were collected in the country districts of Illinois in 1907, was 3.6, with a maximum of 4.

For thirty-nine samples from the streets of Chicago during the same period, the average was 4.06 with a maximum of 5. The carbon dioxide in the expired breath averages more than 4 per cent. (400 in 10,000). In a mixed community of persons at rest it will average about 0.6 cu. ft. per person per hour, and the variation will be a small one.

If there were no ventilation whatever the air of an ordinary railway coach, containing 4,000 cu. ft. of space and occupied by 20 people, would have 34 parts of carbon dioxide per 10,000 of air at the end of one hour of occupancy. But no car is air-tight, consequently the carbon dioxide will never reach its theoretical limit. It is plainly impossible to measure directly the amount of

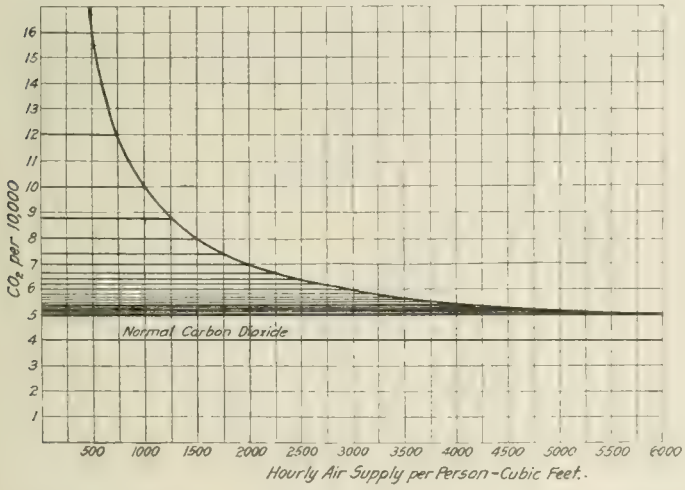


Fig. 1—Hourly Air Supply Per Parts of Carbon Dioxide.

air flowing into a car, but the amount of the interchange may be readily computed from the actual amount of carbon dioxide found from time to time by applying the figures given above to a simple mathematical procedure. Fig. 1 represents graphically the mathematical relation between the carbon dioxide in the air of a room and the hourly air supply per person, assuming 0.0004 as the proportion of carbon dioxide in the outside air and 0.6 cu. ft. as the average hourly excretion. It is seen that the increase above the normal is in an inverse ratio to the air supply. Six thousand cu. ft. per person per hour allows an increase of 0.0001 in carbon dioxide; 3,000, an increase of 0.0002; 1,000 an increase of 0.0006, and so on. With any given air supply the carbon dioxide representing respiratory contamination increases directly as the number of people present. Numerous reports are to be found upon particular types of ventilators and ventilation systems as applied to railway cars. An excellent and extensive report of this order was made by a committee of the Master Car Builders' Association, in 1908, in which the various systems in general use were reviewed in detail. There is, however, no series of analyses extensive enough on which to base any comprehensive opinion as to the deficiencies of natural ventilation to be overcome, or as to the adequacy of the devices applied in keeping the air of the breathing-zone freed from the products of respiration.

The Garland ventilating device, described in the *Railway Age Gazette* of June 22, 1910, page 1757, on which this report is based, is designed to remove air by exhaustion from the upper portion of the car, and its operation is dependent on train motion. A long series of anemometer readings have shown that each such exhaust ventilator will remove an average of about 15,000 cu. ft. of air per hour at a 40-mile train speed, and proportionately more or less for faster or slower speeds. One ventilator is placed over each alternate section of a sleeping car; thus there are 6 in the sleeping compartment of the ordinary 12-section car and 8 to a 16-section car, while two are applied to the smoking room and one to a stateroom. Toilet and dressing rooms are also equipped with one each in recent practice. It was desirable also to make determinations in cars not having the exhaust ventilators, but depending upon natural ventilation, for purposes of comparison. Samples of air were collected chiefly in the course of ordinary travel, the purpose being to study actual and general conditions as they exist normally. All of the observations were made at temperatures from below zero to 65 deg., being in the majority of cases below 40 deg. The larger portion of the observations were made during the night after the passengers had retired, in order to obtain a study of the chief feature of the sleeping car, namely, the occupied berths.

Before giving the analysis of the air inside of the car it is necessary to know the amount of carbon dioxide in the outside air. As the locomotive emits a large volume of gas, it is expected that the carbon dioxide content would be high. Leissner, a German investigator, found it to be 18 to 22.8 per 10,000, but my results show, in 46 determinations, an average of 4.04; the highest was 10, the lowest 3. The most ordinary condition for the natural ventilation of cars in cool weather is to have the doors and windows closed and a certain proportion of the small windows, called deck sash, at the top of the car open. For 153 observations the average carbon dioxide was 7.19 per 10,000, the maximum 13, and the minimum 3.5. The average number of passengers for the 153 observations was 15.05. A car carrying this number of people would require 28,300 cu. ft. of fresh air hourly to maintain the carbon dioxide at 7.19 parts per 10,000. In other words, there would necessarily be an air supply of 1,880 cu. ft. per person hourly. Adding to the open decks by opening one or both end doors to the vestibule (the outside vestibule doors being closed) would be expected to cause a greater air supply. Such is the case as shown by the 46 other observations. Tests were made with first the front, and then the rear door open, but there seemed to be no consistancy as to which door acts best in the capacity of a ventilator, for at times large quantities would enter and then again the air would leave the body of the car through the same door. It was also observed that a few open windows in the moving train admitted such a volume of surrounding air as to render the respiratory contamination almost undetectable. The comparative efficiency in four groups of tests stands: 18,500 cu. ft. of air hourly for the fully closed car; 28,300 when from one-fourth to all the decks are open; 32,500 when decks are closed and one door open; and 40,700 where end doors are open in addition to open decks. It is, of course, possible that a larger number of observations would materially change these figures, but it is not probable that their relation to each other would be greatly altered.

The results of the carbon dioxide determinations of air at the breathing level of sleeping cars, equipped with the exhaust ventilators previously mentioned, shows that the air supplied to the breathing zone, as computed from carbon dioxide determinations, is considerably less than the amount which leaves through the ventilators, as determined by actual measurement. But in spite of this the air supply is much increased and is better regulated than in cars not so equipped. Records of 294 determinations in 67 cars which were fitted with these ventilators were taken in which all doors and windows were closed. The maximum carbon di-

*Abstract of a paper presented at the annual meeting of the American Public Health Association, Milwaukee, September, 1910.

oxide was 10 parts per 10,000 of air, the minimum being 4.5 parts. The average carbon dioxide was 6.20 per 10,000 and the average number of passengers 14.88. There would be required 40,600 cu. ft. of air hourly to satisfy these conditions. It is seen that there is a distinct advantage in favor of the cars equipped with exhaust ventilators over those ventilated by the decks, and that this advantage represents an average addition in the air supply to the breathing level of about 12,000 cu. ft. of air per hour.

Fig. 2 shows clearly that the air supply to sleeping cars, as computed from 555 carbon dioxide determinations, is for all except the completely closed car without ventilators a large one relative to the number of passengers, and would not allow the average carbon dioxide to go above ten in any but this one condition unless the cars were crowded beyond their natural

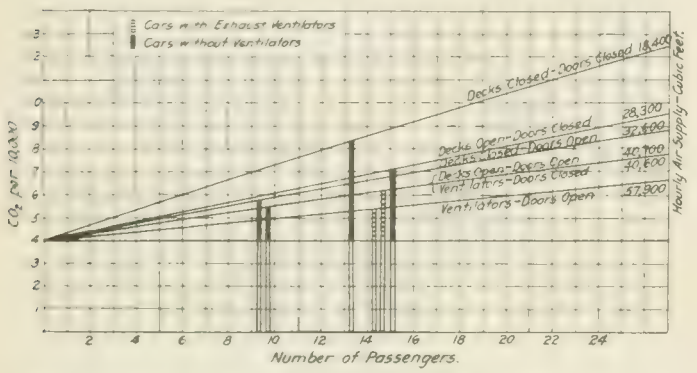


Fig. 2—Carbon Dioxide and Air Supply in Cars Under the Various Conditions Tested.

capacity. It very rarely happens that sleeping cars carry more than 25 passengers. Such a case did not come under my observation in the collection of these 555 and many other samples of the air. It should be understood that all of the above observations apply to the main compartment of the standard sleeping car in motion; and in setting down the number of passengers only those persons were counted who were actually in this compartment, and who had been there for a period of at least ten minutes at the time the samples of air were being collected.

In order to test the consistency of the results obtained and to find that the carbon dioxide actually does go up in proportion to the number of passengers, these 555 observations were divided into four groups, as shown below:

	Natural Ventilation.			Exhaust Ventilation.		
	Passengers.	CO_2	Hourly Air Supply.	Passengers.	CO_2	Hourly Air Supply.
[illegible]	7.15	7.91	23,500	9.10	5.58	34,600
[illegible]	11.79	6.64	30,500	13.51	5.95	41,600
[illegible]	12.77	7.[illegible]	31,200	17.65	6.46	43,000
[illegible]	9.16	6.[illegible]	28,700	23.24	7.42	43,000
Average.	14.79	6.[illegible]	28,500	14.82	6.11	42,100

From the above data it is seen that the carbon dioxide increased with the increase in the number of passengers. When the number is below 10 we cannot look on the results of the samples as of great value, because of the unequal distribution. In all the latter part of the work the samples were taken under these conditions, and those that were taken represent chiefly samples taken in single places in the car, and not average samples taken while walking up and down the aisle.

Another method of determining the ventilation of cars equipped with exhaust ventilators was to observe the rate of disappearance of the carbon dioxide from the cars after they had passed through a tunnel. Fig. 3 [illegible] observations under these conditions, it will be seen that there is [illegible]. Although the [illegible] for such cars [illegible] the empty car, the rapid disappearance of the gas [illegible] and the curve is a fairly representative one.

[illegible] from the tunnel to the [illegible] in one minute [illegible] average sample from the aisle for comparison. Samples from each place were generally repeated at 15 minute intervals, until 20 or more had been collected in the car. Two lower berths on each side of the car were generally selected, availability determining the choice, and one or two uppers when possible. In the test on cars without ventilators and with all doors and windows closed there were 321 determinations of carbon dioxide made in 21 cars for the lower berths and 41 in 11 cars for the upper berths, and their averages were as follows:

	Lower.	Upper.
Number of people in car	16.41	20.51
CO_2 per 10,000 cu. ft. of air—		
Aisle	7.32	8.37
Aisle, maximum	10.00	13.00
Aisle, minimum	4.50	6.00
Berths	8.32	9.17
Berths, maximum	18.00	18.50
Berths, minimum	5.00	4.50
Berths, tests giving CO_2 over 12	4	4
Berths, tests giving CO_2 over 10	37	8
Berths, tests giving CO_2 over 8	143	25
Berths, tests giving CO_2 over 6	8	1
Tests giving more CO_2 in berths	203	24
Tests giving more CO_2 in aisles	55	7
Hourly air supply per berth necessary to maintain average CO_2	1,389	1,161

In 17.1 per cent. of the berths the carbon dioxide was lower than in the aisle at the same time; in 63.2 per cent. it was higher

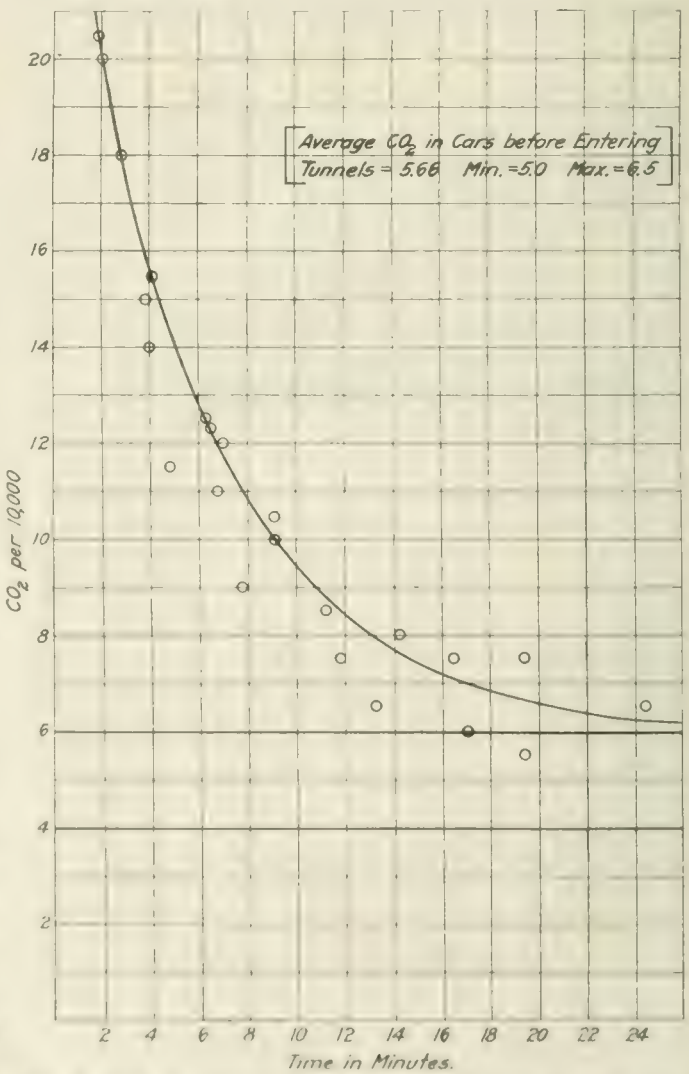


Fig. 3—Rate of Disappearance of Carbon Dioxide from Cars After Leaving Tunnel.

[illegible] in the aisle, and in 19.6 per cent. they were equal. The lowest average carbon dioxide for the berths of any car was 6.41, the highest was 9.78; inversely, the largest equivalent air supply was 2,473 cu. ft. per hour, and the smallest was 1,038 cu. ft. per hour. In a considerable number of the upper berths are occupied

the car is necessarily well filled. The higher number of passengers would logically account for a higher carbon dioxide in the body of the car. With open decks it would be expected to find better ventilation in the upper part of the car. In a comparison of the lower and upper berths in the same car, from 91 determinations for the lower berths and 34 for the upper we have the following averages: The lowers were 8.43 carbon dioxide per 10,000, and the uppers 8.85. The equivalent hourly air supply per berth was: lower 1,354, and upper 1,237.

In the test on cars equipped with exhaust ventilators there were 660 carbon dioxide determinations in 42 cars for lower

Cars.	Series.	Average CO_2 per 10,000 — Lowers	Average CO_2 per 10,000 — Uppers.	Equivalent hourly air supply per berth, cu. ft. — Lowers.	Equivalent hourly air supply per berth, cu. ft. — Uppers.
1	59	8.65	8.70	1,290	1,277
		7.47	9.63		1,065
	96	5.51	5.75	3,937	3,428
		6.36	6.62	2,541	2,290
5	104	6.13	7.25	2,812	1,846
Totals—Average.	...	6.51	6.70	2,391	2,222

The averages of the totals (132 lower and 53 upper berths) and the corresponding ventilation equivalent show that this difference is very small. It seems clear that the average ventilation of the lower berth in this type of car is on the average slightly

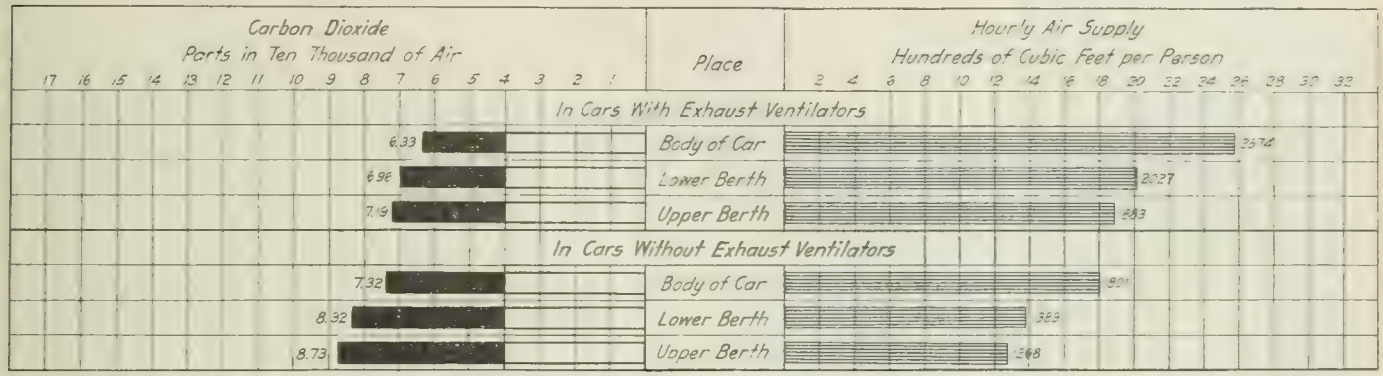


Fig. 4—Comparisons of Carbon Dioxide in Cars With and Without Exhaust Ventilators.

berths and 53 in 5 cars for the upper berths and their averages are as follows:

	Lower.	Upper.
Number of people in car	15.72	16.72
CO_2 per 10,000 cu. ft. of air—		
Aisle	6.33	5.95
Aisle, maximum	10.00	9.5
Aisle, minimum	4.5	4.5
Berths	6.96	6.70
Berths, maximum	13.5	10.5
Berths, minimum	4.5	4.5
Berths, tests giving CO_2 over 1	1	0
Berths, tests giving CO_2 over 10	23	1
Berths, tests giving CO_2 over 8	150	9
Berths, tests giving CO_2 over 6	169	17
Tests giving more CO_2 in berths	440	41
Tests giving more CO_2 in aisles	141	3
Hourly air supply per berth necessary to maintain average CO_2	2,027	2,222

In all but three of the 42 cars, the average carbon dioxide for the lower berths was higher than the average for the aisle; better than the upper, but the difference is so small as to be of no practical consequence. If we bring into comparison the conditions of the two classes of cars, those without and those with the exhaust ventilators, a decided advantage is seen to lie with the latter in the study of berth conditions, as was before noted in the study of air from the car body. This comparison is graphically represented for the general averages of the lower berths and the aisles in Fig. 4.

About 200 samples of air were analyzed from still cars and it was found that the carbon dioxide increases more or less rapidly when the car stops running according to the strength and direction of the wind. In only two instances did it pass above 20 per 10,000, and those were in lower berths. It is usual to find the maximum around 15 in cars that are occupied at stations awaiting very late departure. The effect of starting the train

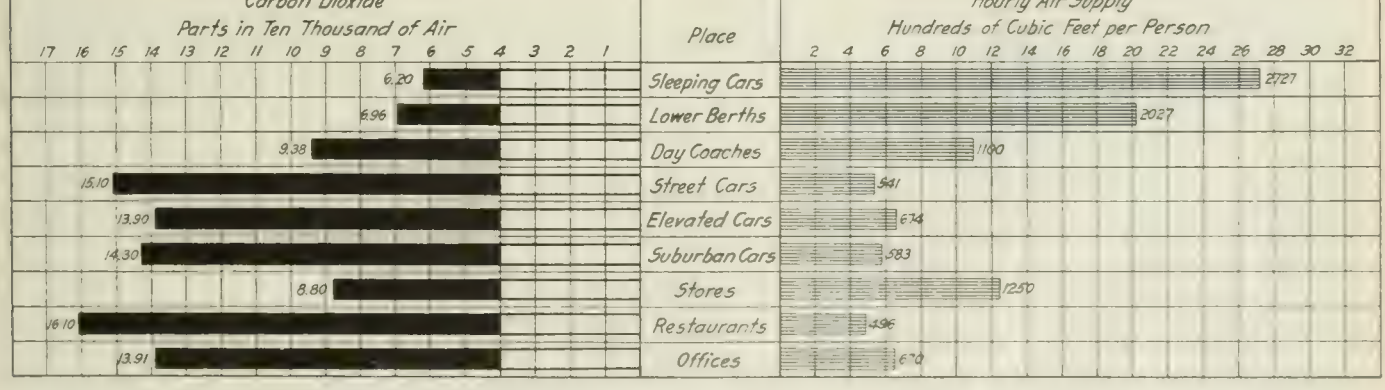


Fig. 5—Carbon Dioxide and the Necessary Air Supply as Determined in Various Congested Public Places.

but the average difference for all observations was only 0.63 parts per 10,000. The lowest average carbon dioxide for the berths of any car was 5.38 and the highest was 9.34; the largest equivalent air supply was 4,348 cu. ft. per hour, and the smallest 1,123 cu. ft. per hour. The upper berths was higher than the aisle at the same time in 94.3 per cent. and lower in 5.7 per cent.

I am able to compare the lower berths with the upper berths in five cars, as shown in the following table. Samples were taken from the lower and upper berths simultaneously.

is invariably to bring down the carbon dioxide rapidly. After 30 minutes it has reached as low a point as it can be expected to maintain.

It has been shown that an average of over 40,000 cu. ft. of air per hour enters the breathing zone of sleeping cars equipped with the type of exhaust ventilator herein considered. It has further been shown that nearly twice as much leaves through the ventilators. This difference is to be accounted for by the air working through the cracks and crevices of the car. There

are approximately 500 lineal feet of these crevices under windows, doors and decks, which if they were open only 1/50 in., and admitted air at one-half the rate of train speed would more than account for the 40,000 cu. ft. The ventilation of sleeping cars has been determined in terms of air supply, using carbon dioxide as the basis of computation, and it is now to be shown the cause of discomfort which may arise, supposedly as the result of insufficient air supply. It has been very generally accepted that carbon dioxide in such amount as is likely to be found in inhabited rooms, even up to 50 parts in 10,000, is in itself entirely harmless, but that when this is due to respiration certain poisonous organic bodies are also present, of which the carbon dioxide is an accurate index. The allowable amount of carbon dioxide as a respiratory impurity has been variously placed at from 2 to 10 parts, or a total of 6 to 14 parts, in 10,000 of air, the limit being placed at that degree of contamination at which the sense of smell begins to give the first indication of closeness to one entering the room from without. Determinations of carbon dioxide were made from the air of various places occupied by an unknown number of people for purposes of comparison and the average results are shown in Fig. 5.

It was suggested, long ago, by Hermans, a German investigator, that the discomfort was not so much the chemical changes in the air as it was the thermal. Heat and aqueous vapor increase rapidly in the ill-ventilated places with many occupants, and thus prevent the usual dissipation of body heat to the surrounding air. In experiments performed at the Institute of Hygiene in Breslin, Germany, it was shown that a healthy person placed in a closed cabinet could stand,with no symptoms of illness or discomfort, carbon dioxide, as breathed out by himself, up to the amount of 100 or 150 parts in 10,000, provided that the temperature and moisture were kept low. However, when the temperature and moisture were allowed to increase, depression, headache, dizziness and a tendency to nausea were experienced. Under these conditions the normal dissipations of body heat was interfered with. The evidence presented by investigators is such as to be convincing. It seems to be established beyond any reasonable doubt that discomfort is not due to any change in the chemical composition of the air but to physical changes only; and that to maintain a normal heat interchange between the body and the air is to avoid the development of those symptoms which are commonly attributed to poor ventilation. A certain amount of fresh air must be supplied, of course, but the most vital element of the ventilation problem becomes that of regulating the temperature of the air.

It seems probable that one main cause of the complaint of poor ventilation in the sleeping car berth is purely psychic. We are used to sleeping rooms with walls and ceilings far from us. In the berth they are very close. Their very nearness is oppressive. It seems as if there cannot be enough air in this small space to supply our wants. The sensation is often quite independent of the amount of air supplied and even of the temperature. The average carbon dioxide in the air of running cars rarely shows more than 10 parts in 10,000. No danger to health is to be apprehended under the conditions ordinarily obtained even in steel cars. Overheating is the paramount evil; it is the thing to be chiefly guarded against in the attempt to maintain [illegible] naturally overheated air in summer or to dry it when ex- [illegible] have in sleeping cars at least twice as much radiating surface as is demanded in common practice for heating the same space in [illegible]

GOVERNMENT REPORT ON BRIDGEPORT DERAILMENT.

The Interstate Commerce Commission has made public the report to the commission made by H. W. Belnap, chief inspector of safety appliances, on the derailment at Bridgeport, Conn., July 11. Following are the principal facts additional to those already given in the *Railway Age Gazette*. (July 14, page 90 and August 18, page 315.)

The telegraphic report from the railway, required by the commission, was not received until July 12, but Mr. Belnap was near Bridgeport and reached there in the afternoon of the 11th. The train had made eleven stops before reaching the place of the accident, which would indicate that the air brakes were in good working condition. The engine lodged more than 400 ft. from the point of derailment, indicating the speed at which it must have been running. The evidence showed that the controlled manual block signals were in good working condition. The interlocking is not equipped with approach locking; this did not contribute to this accident, but the lack of such locking might be the means of causing similar accidents. The crossover could not well have been made longer. It is limited on the east by the bridge which carries the tracks over Fairfield avenue, and this is a through girder bridge, the head-room for the street below being rather scant; and on the west the crossover could not be extended without taking it on to a curve. The home signal can be seen from the distant signal, though the view is obstructed for a short distance before reaching the crossover by a large tree, but still there is a view of the home signal for 1,000 ft. Engineman Curtis' sickness with measles was in April. He had apparently entirely recovered and had been on duty three weeks. The service records of Curtis, also of the fireman and signal man are good. In conclusion the report says:

. . . While it is urged that as an extra precaution all crossovers used for diverting trains from one main track to another in the direction of traffic should be long enough to reduce to a minimum the risk of overturning if they are taken at high speed, the proper thing to do is to prevent the high speed where it ought not to be used. This can be accomplished by the use of automatic train control apparatus, with proper speed control features. From the present rate of progress being made in the development of such devices, it is going to be some time before railways are thus equipped, and until such installations are in use, railways should require [see paragraph numbered 2, below].

. . . The signals and rules provided for the prevention of such accidents were adequate had they been observed. The tracks and switches were substantially constructed and safe for the train movement made had the rules been observed. The interlocking and block signaling apparatus performed their intended functions and were properly handled, though no approach locking was installed. . . . It is probable that the disastrous consequences of the disregard of rules and signals might have been prevented had it been reasonably practicable to have installed a No. 18 or No. 20 crossover instead of a No. 8 slip, and had same been used at this point.

As a preventive of such accidents, it is recommended—

(1) That in all situations where accidents are likely to occur through the non-observance by enginemen of signals or rules calculated to insure safety, automatic train control apparatus should be provided to insure that trains will be brought to a stop in case the signals or rules are not properly observed.

(2) That in the absence of such automatic control apparatus, on tracks where high speed trains are run, switches should not be set to divert a high speed train from one track to another at a crossover which is not safe for high speed until after the train has been brought to a stop.

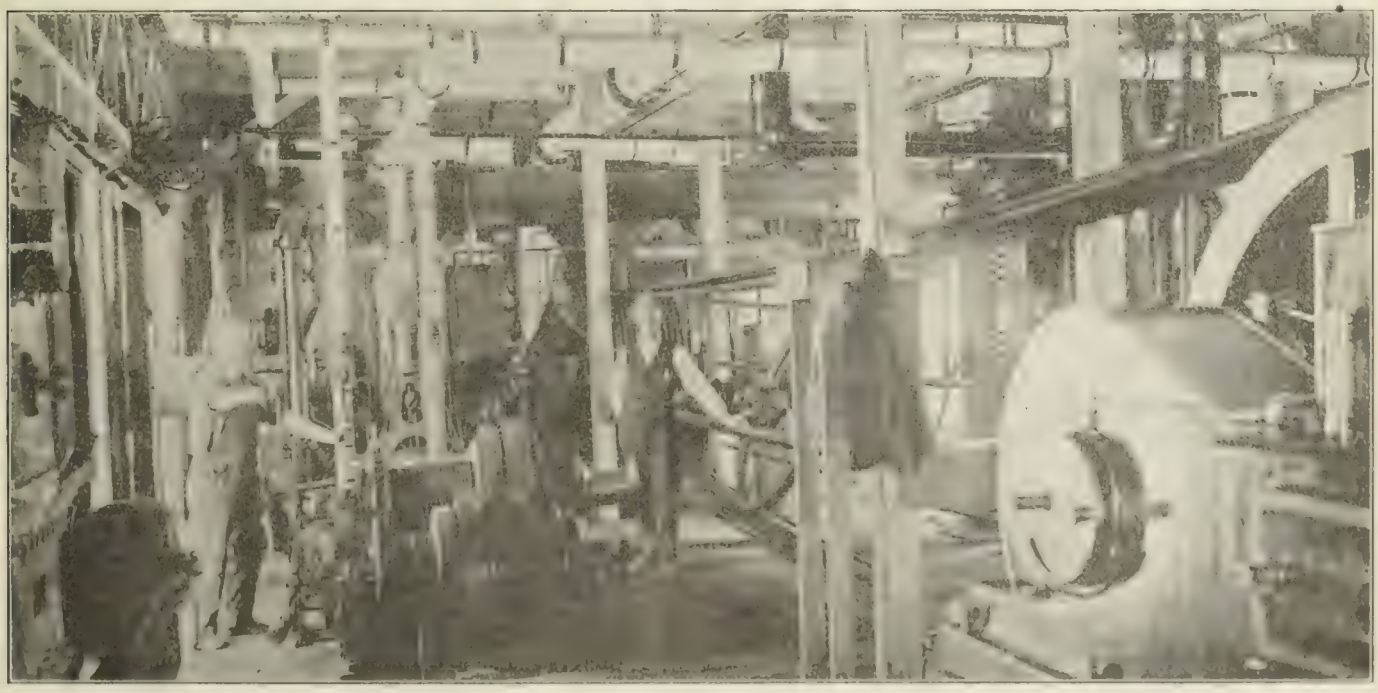
(3) That at all interlocking plants where trains are operated at high speed over facing switches, approach locking should be provided to prevent the switches being changed from the main or through route to a diverging route after a train has received the signals for the through route.

THE BURLINGTON SUCTION DREDGE.

To assist in building a second track between Savanna, Ill., and St. Paul, Minn., the Burlington has constructed a suction dredge, with complete auxiliary equipment. This line follows closely the east bank of the Mississippi river the entire distance, and the dredge is being used to build many of the fills across bays and sloughs. This line is the eastern and southern outlet for both the Great Northern and the Northern Pacific, and because of the heavy traffic handled it became necessary to start the construction of a second track two years ago, which construction is planned to continue until the entire division of 287 miles is double-tracked. At present, 87 miles of this is in operation and 10 miles additional will be completed within the next few weeks. In connection with this work the maximum curvature is being reduced from 3 deg. to 1 deg., while the ruling grade is being lowered from 0.3 per cent. to 0.2 per cent., compensated at the rate of .04 per deg. While in but few cases will it be difficult to reduce the grade to the required standard, the radical nature of the work brought about by the curve reduction will be appreciated when one considers that the road follows closely along the river, and its curvature is governed largely by that of the stream, high bluffs hemming it in closely on the other side. In reducing this curvature the new line crosses many bays which the old line went around. The majority of these cut-offs are very close to the channel of the river, and it is entirely feasible to build the embankments with a dredge, pumping up the sand, of which there are enormous quantities in the river.

While a new departure in railway equipment, the suction dredge is in very common use by the United States government in maintaining a channel on the upper Mississippi, and the design of this dredge was patterned closely after that of the more modern government fleet. The dredge is mounted on a hull 120 ft. long by 30 ft. wide, which is divided into eight compartments by seven longitudinal bulkheads, five of which are 6 in. and two 4 in. thick. This hull is made of Oregon fir treated with 5 lbs. of straight creosote per cu. ft. The bottom planking is 3½ in. thick, while the top decking is of 2½-in. material. All machinery is mounted on this barge. A 15-in. Morris centrifugal pump is connected to an 18-in. suction pipe, 50 ft. long, by two sets of accordion joints, and is swung on a 50-ft. catamaran at the side of the dredge, as shown in the illustration. This pump is

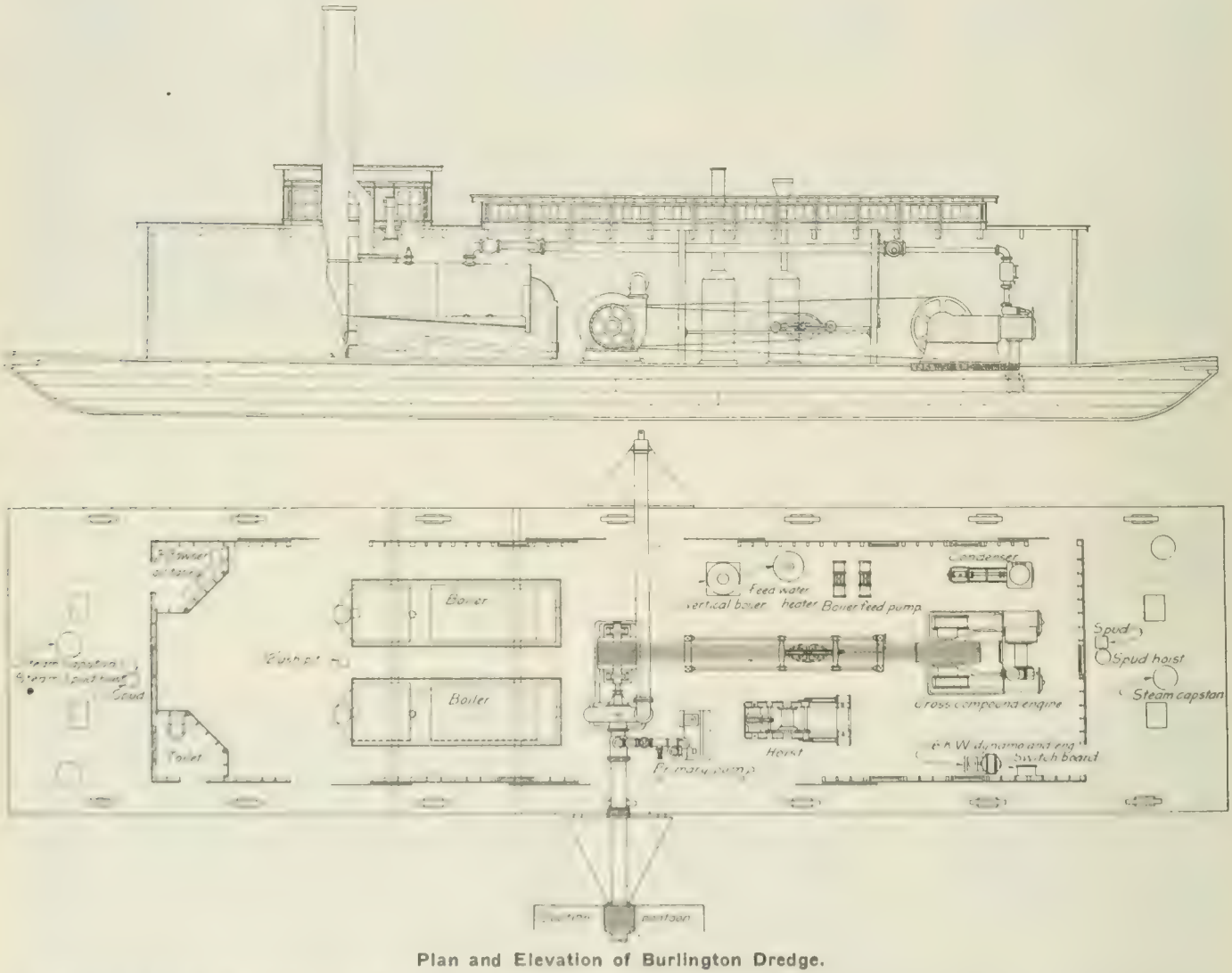
Suction Dredge at Work on Cut-off at Genoa, Wis.



Interior of Suction Dredge, Looking Toward the Boilers.

connected by a rope drive to a 13-in. x 26-in. x 13-in. cross-compound Ball engine, running condensing with a speed of 325 r. p. m., giving a discharge speed of about 13 ft. per second. Two 200-h. p. Lyons boilers, working with induced draft, furnish the power. One 5-in. centrifugal priming pump, one condenser pump and boiler feed pumps are also provided. Steam capstans are located in each end of the barge, while the boat is lighted by electricity furnished from a plant on the barge.

In addition to the dredge and towboat, there are two coal barges 18 ft. x 60 ft. Coal for the boilers is unloaded onto these barges at the nearest siding and towed by this boat to the dredge. Fourteen pontoons, 12 ft. x 32 ft. x 3 ft. are provided to carry the 15-in. discharge line. This pipe is suported on the pontoons by tackle swung from the A-frames, and the sections are connected together by flexible rubber joints.



Plan and Elevation of Burlington Dredge.

In operating the dredge two shifts of 10 hours each are worked. From 12 to 14 men are required on each shift, consisting of the chief engineer, winchman and fireman on the boat and one foreman and from eight to ten men on the land. When in operation the suction pipe is lowered through an opening in the center of the catamaran to the sand bed, the end of the pipe being suitably screened to prevent large sticks or boulders entering and injuring the pump. The catamaran is moved laterally and swung in a circle by cables attached to a winch on the dredge, giving a wide range of operation without moving the dredge. It is possible to move the catamaran without interrupting the pumping, but whenever it becomes necessary to move the dredge the plant must be stopped. In order to reduce these delays as much as possible the dredge is usually started at the up stream end of a fill and worked down stream by slacking on the anchor lines. Although the operator cannot see the suction end of the pipe, he can tell when to shift it by the color of the discharge on the bank, and by the reading of the vacuum gage. If the discharge is black, indicating that the point is in a mud bottom, it is moved, as this mud will not deposit readily, but will remain in suspension, and be carried away with the water. Clear water shows that no solids are being pumped. An endeavor is made to pump about 10 per cent. solids, that is, about 10 per cent. of the discharge is sand and 90 per cent. water. After the bank appears above the water the discharge is run lengthwise down the bank in order that it may deposit as large a percentage of the sand as possible. This discharge is deflected in the proper direction by the use of shields, which are simply pieces of sheet iron placed on edge in the sand. The successful construction of the bank depends to a great extent on the proper and skillful placing of these shields. It is possible to build the bank to an even 1½ to 1 slope without a large amount of labor. No material is handled by the bank men; it is all deposited where wanted by the proper use of these shields. With the pumps working in good condition the rate of output depends directly on the amount of material the bank men are able to hold.

At Genoa, Wis., about 15 miles south of La Crosse, where the dredge has been working this season, unusually favorable conditions have been encountered. An excellent bed of heavy, coarse sand is available in the river, and while it pumps readily it settles very quickly. This one fill will amount to about 300,000 cu. yds., the large quantity being favorable to economical operation, as it is expensive to move an outfit of this kind from one place

to another. During June of this year a total of 94,890 yds. of material was moved in 51 shifts, or an average of 1,861 yds. per shift. This is, of course, as unusual output and is due to the exceedingly favorable circumstances under which the dredge is operating. The more common method of making this fill would be by means of a steam shovel and dumping from a trestle, but a temporary trestle alone would have cost as much as the entire cost of the dredge work in this case, while the material would have to be hauled from the nearest sand pit, 7 miles distant.

In comparing this method with the more common methods it must be remembered that the field for the operation of the dredge in railway work is very limited; also that in the northern states it is possible to operate only from six months to eight months each year; and that when not in service the entire fleet is useless for other purposes. With the steam shovel outfit it is only necessary to lay up the shovel itself and the large cars can be diverted to coal traffic. All banks built by the dredge will wash very readily and must be promptly protected by riprap.

On the other hand, all interference with traffic incident to the operation of work trains on the main lines is done away with by the use of the dredge. This is an important advantage on this class of work, for when the demands of the traffic are

Dredge Showing Suction Pipe Raised Out of Water.

sufficient to require the construction of a second track the addition of numerous work trains results in much delay both to the traffic and to the work trains. Another disadvantage of steam shovel work not possessed by the dredge is that of the damage done to the ballast on the main line caused by material falling from the cars of the work trains. It is impossible to remove the sand, and it makes the track dusty for a long time.

The pontoons were built at Dubuque, Ia., by railway forces, while the rest of the fleet was built at the same point under contract by the Dubuque Boat & Boiler Works, the railway company furnishing all material and machinery. The fleet was first put in service about August 1, 1910. The entire outfit was designed and built under the supervision of T. E. Calvert, chief engineer, and W. L. Breckenridge, engineer maintenance of way lines east, and under the personal charge of W. J. Frien, architect, to whom we are indebted for the above information.

The Buenos Ayres Great Southern Railway, Argentina, has recently opened to public service a new branch railway from Saladillo to San Enrique, which comprises three intermediate stations; Ester, Pueblitos and Mamaguita. The new branch is 38 miles long. It will be served for the present by a mixed train which will run in each direction three times a week. The Chas to Ayacucho Branch Railway has also been opened to traffic. This branch is 91 miles long.

TRAIN RESISTANCE.

BY W. F. KIESEL, JR.

The bulletin on train resistance prepared by Prof. E. C. Schmidt and recently issued by the University of Illinois, describing tests with freight cars, adds much to assist in finally determining a general formula on train resistance of value to engineers, even though the author of the work has not attempted to develop a formula generally applicable to all cars. A study of this subject for the past ten years, or more, has permitted me to gradually develop a formula, the results of which agree very closely with those of the careful tests described by Prof. Schmidt.

In the April, 1897, number of the *Revue Generate des Chemins de Fer,* M. Barbier, of the Chemin de fer nu Nord, presented formulae for train resistance, which, in construction, have been followed by nearly all other investigators. In the *Railroad Gazette,* of May 21, 1897, M. Barbier's formulae were discussed, compared with others, and transformed into formulae with English measurements, as follows:

For [illegible] axles: $R = 3.2 + 2.5V\ \frac{(V + 30.8)}{1000}$

For truck axles: $R = 3.2 + 2.5V\ \frac{(V + 6.08)}{1000}$

Attention is directed to the fact that the composition of the train, the number of cars, and the total train weight have not been considered. In June, 1899, the Pennsylvania Railroad test department made some careful tests with empty and loaded freight cars, whose weights varied from 13 tons to 75 tons. These cars were in good condition and the most careful records were taken. The results clearly demonstrated that the resistance per ton at very slow speeds decreased as the weight per car increased. The following formula expresses the results very closely:

$$R = \frac{80}{W} + 1.1$$

R = [illegible] pounds per ton, and W = car weight in tons.

Comparison with tests made since indicate that the average freight cars are not in as good condition as those used in the test referred to, and that some allowance should also be made for variations in weather. Changing coefficients to conform, the formula reads:

$$R = \frac{100}{W} + 1.5 = \text{Resistance per ton;}$$

or $R = 100 + 1.5W =$ Resistance per car.

Using M. Barbier's general formula

$$R = C + C_1V + C_2V^2$$

or as rearranged by the *Railroad Gazette* in 1897,

$$R = C + C_1\left(V + \frac{C}{C_1}\right)$$

where

V = speed in miles per hour,

and substituting the value $\frac{100}{W} + 1.5$ for C,

making $C_3 = \frac{C_2}{C_1}$ and $C_4 = \frac{1}{C_1}$ the formula becomes:

$$R = \frac{100}{W} + 1\tfrac{1}{2} + \frac{V\,(V + C_3)}{C_4}$$

The values of C_3 and C_4 in the third term represent air resistance and all other resistances depended on speed and had to be empirically determined; they have been gradually modified due to a study of the tests and experiments of the past ten years. For best average results $C_3=16$, and $C_4=100$. These tests also indicate that the third or average speed term varies as the square root of W, which gives for resistance per car:

$$R = [\text{illegible}]\ W + [\text{illegible}]\ V\ V + 100\sqrt{W}$$

The resistance per ton will be this value divided by W, or

$$R = \frac{100}{W} + 1\tfrac{1}{2} + \frac{V\,(V + 16)}{100\sqrt{W}}$$

If W_1 is made to represent the total weight of the train back of the tender, and N the number of cars, then:

$$R = 100\,N + 1\tfrac{1}{2}\,W_1 + .01\,V\,(V + 16)\,\sqrt{W_1 N}$$

This formula gives good average results for solid trains, including passenger trains with open platforms. For mixed freight trains having various kinds of cars, which increase the air resistance, the denominator of the speed term should be changed from 100 to 90, or possibly 85.

For vestibuled passenger trains, presenting a rather smooth surface, the air resistance will be less, and the denominator of the speed term may be increased to 110, or, in exceptional cases, to 120. For ready comparison with tests and other data, a tabulation of the resistances in pounds per ton for various speeds and weights per car is given:

Freight Car Resistances in Pounds Per Ton on Level Tangents for Car Weights; in Tons.

Miles Per Hour.	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
5	6.735	5.710	5.025	4.535	4.166	3.879	3.648	3.460	3.302	3.163	3.054	2.954	2.867	2.790	2.722
10	7.081	6.200	5.308	4.768	4.411	4.110	3.868	3.669	3.502	3.361	3.239	3.134	3.041	2.958	2.885
15	7.540	6.430	5.682	5.143	4.735	4.415	4.158	3.945	3.767	3.615	3.484	3.370	3.270	3.181	3.101
20	8.110	6.940	6.148	5.574	5.138	4.796	4.518	4.289	4.096	3.931	3.789	3.665	3.555	3.457	3.370
25	8.792	7.550	6.705	6.099	5.621	5.250	4.950	4.700	4.490	4.310	4.154	4.017	3.896	3.789	3.692
30	9.586	8.260	7.353	6.661	6.182	5.779	5.452	5.179	4.948	4.750	4.578	4.427	4.293	4.173	4.066
35	10.491	9.070	8.092	7.375	6.847	6.383	6.024	5.725	5.471	5.222	5.062	4.894	4.746	4.613	4.493
40	11.509	9.980	8.923	8.144	7.541	7.061	6.668	6.339	6.059	5.817	5.606	5.420	5.254	5.106	4.972
45	12.638	11.590	9.845	8.998	8.340	7.814	7.382	7.019	6.711	6.438	6.210	6.003	5.819	5.654	5.505
50	13.879	12.100	10.858	9.936	9.222	8.641	8.167	7.768	7.427	7.147	6.873	6.644	6.439	6.256	6.090
55	15.231	13.310	11.963	10.959	10.174	9.543	9.022	8.584	8.208	7.882	7.596	7.209	7.116	6.912	6.727
60	16.696	14.620	13.158	12.038	11.209	10.520	9.959	9.467	9.054	8.694	8.376	8.232	7.848	7.623	7.418
65	18.273	16.030	14.445	13.243	12.324	11.571	10.946	10.405	9.964	9.569	9.222	8.913	8.636	8.388	8.161
70	19.961	17.540	15.824	14.534	13.518	12.696	12.013	11.435	10.988	10.505	10.124	9.784	9.480	9.201	8.957
75	21.761	19.150	17.293	15.896	14.790	13.898	13.152	12.517	11.978	11.504	11.086	10.714	10.380	10.080	9.805
80	23.672	20.860	18.854	17.341	16.142	15.171	14.361	13.916	13.061	12.564	12.108	11.701	11.336	11.007	10.707

To permit of a ready determination of the work locomotives may perform a knowledge of the resistance of the train back of the tender is not sufficient, as the calculations must necessarily include locomotive and tender resistances. Unfortunately, results of road tests made at home and abroad are given in pounds per ton for the engine and tender combined. There seems to be no valid reason why the tender should not be considered as a car. Similarly the weight carried by engine trucks offers about the same resistance as car weight.

This statement is corroborated by data given by Prof. Goss, in his book, Locomotive Performance, page 419, where the engine truck and the tender load of the locomotive is given as 100 tons; tractive effort to overcome rolling load resistance at 366 lbs. at 10 m. p. h., and 1,033 lbs. at 50 m. p. h.; or 3.66 lbs. per ton at 10 m. p. h., and 10.33 lbs. per ton at 50 m. p. h., agreeing very closely with the resistance per ton for two cars weighing 100 tons, or 50 tons each (see table) at 10 m. p. h. This is 25 per cent. higher than the figure in the table at 50 m. p. h. Prof. Goss further bases machinery resistance on cylinder and driver dimensions. It would seem advisable to introduce additional resistance based on the number of drivers coupled together. As it is extremely difficult, and probably impossible, to definitely determine whether the use of cylinder and driver dimensions, or, on the other hand, the weight on drivers should be used as a basis for machine friction, the weight on drivers has been selected.

Prof. Goss' experiments with Schenectady locomotive No. 1 show the machine friction to vary between 142 and 742 lbs. The weight on drivers was 28 tons, hence the machine friction varied between 5 lbs. and 26 lbs. per ton of driving weight. The Pennsylvania tests at St. Louis show values between 12 lbs. and 66 lbs., with 22 lbs. a good average. In the latter tests two values [illegible] that the engine and tender resistance is considered equivalent to [illegible] resistances, then:

[illegible]

Formulae by various authorities have been tabulated by Mr. [illegible]

equal to $(12 + .01V^2)\,P$, in which P = weight on drivers, the above formula will give results approximating the average results given in *Engineering* for four-coupled and six-coupled locomotives, but not as high as the results given for eight-coupled locomotives. The value 12P is rather too low, considered purely as the friction term. Prof. Goss' tests would point to a friction term equal to 15P or 16P, and the Pennsylvania tests at St. Louis to one equal to 22P. Without further careful road tests, it is impossible to assign values which can be definitely designed as machine friction and total head end resistances, and the value $M = (12 + .01V^2)\,P$ will serve the purpose as representing the difference between the actual locomotive and tender resistance, and the resistance calculated on the basis of the locomotive and tender being equivalent to three cars.

The object of arranging the formula in this shape is to enable the calculator to handle the whole train weight, including that of the locomotive and tender, as a unit, not only for grades and curves, but also for resistance on straight level track. The available power of the locomotive will be the total locomotive power less M, and the total train resistance opposed to this available locomotive power may be expressed by the following formula:

$$R = 100\,N + 1.5\,W + .01\,V\,(V + 16)\,\sqrt{W N}$$

R = total resistance in pounds.
N = number of cars back of tender, plus 3.
W = weight of train in pounds, including engine and tender.
V = speed in miles per hour.

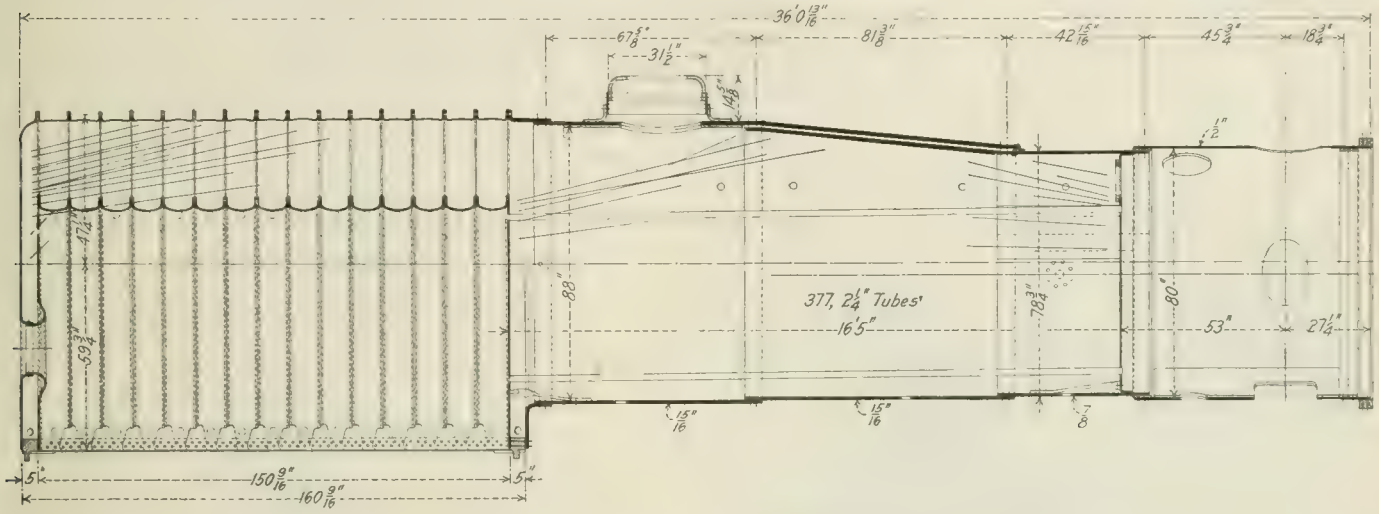
TRAIN TELEPHONE SETS.

On every section where we install telephone train despatching circuits, we equip every train with a telephone outfit, without selectors. The wrecking cars are provided with howler receivers, by means of which the despatcher can call them in on the line if necessary. The connecting pole we use is the invention of J. F. Richardson, Superintendent of Telegraph of the Eastern division of the Canadian Pacific. It is so arranged that connection can be made with any two wires on the line, no matter whether they are on the same arm or not. We do not install any equipment at outlying sidings, as the train equipment answers every purpose should a train become stalled. On account of the severity of our climate during a portion of the year, no one could use a telephone at a pole box, and each outfit contains sufficient flexible twin wire to lead the circuit into the baggage car or conductor's caboose.—*W. J. Camp* (C. P. R.).

[illegible] disaffected employees, or persons who pretend to be, cut [illegible] telegraph and telephone lines at Lille, France, and 87 at [illegible]. At Havre 10 telegraph cables connecting with England were severed, and attempts to derail trains have been made. A newspaper, *La Guerre Sociale*, had openly advocated measures of this sort. Its office was searched by the police and six members of its staff were arrested. It delivered its parting [illegible] as follows: "*La Guerre Sociale* will be published no longer; but brave fellows will continue to destroy railway tracks and telegraph lines."

MALLET LOCOMOTIVE WITH 20 DRIVERS FOR THE SANTA FE.

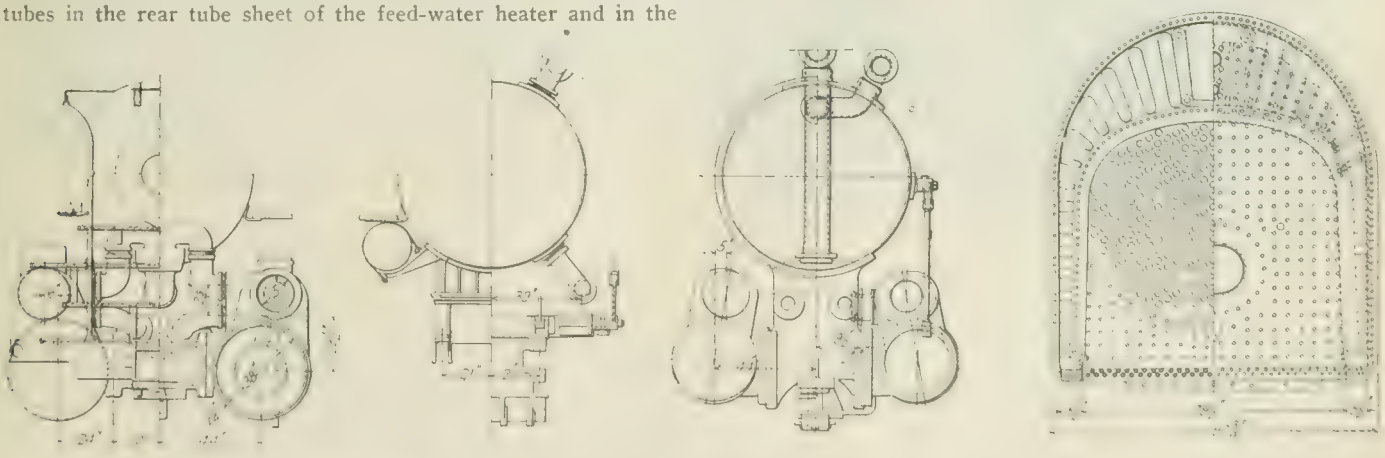
A brief article and a photographic view of a 2-10-10-2 type Mallet locomotive on the Santa Fe, was published in the *Railway Age Gazette* of April 14, page 908. These engines were rebuilt from Santa Fe type locomotives which were built at the Baldwin Works in 1902. The Santa Fe type locomotives weighed 287,000 lbs., and as single engines were probably the most powerful locomotives in the world, having a tractive effort of 62,800 lbs. Ten of them, which required new fireboxes, were selected for the conversion, and were fitted with new fireboxes of the Jacobs-Shupert type arranged for burning oil. The original low pressure cylinders were bushed from 32 in. to 28 in., and were used as high pressure cylinders of the Mallet locomotive.



Rear Section of Boiler for Santa Fe 2-10-10-2 Mallet Locomotive.

The front section of the Mallet, which was built by the Baldwin Locomotive Works, has a wheel arrangement similar to that of the rear unit, and low pressure cylinders 38 in. in diameter by 32 in. stroke. The front boiler section includes a feed water heater 106 in. long, located in the front portion next to the smoke-box. Back of the feed water heater is a narrow space 32 in. wide, with a manhole, which gives an opportunity to caulk the tubes in the rear tube sheet of the feed-water heater and in the front tube sheet of the reheater. The superheater is of the Buck-Jacobs type, consisting of a single drum, whose shell is integral with that of the boiler. The heads are riveted to this shell and support a set of horizontal tubes, which are welded in the heads by the oxy-acetylene blow pipe. An intermediate head divides the superheater into two sections, one for superheating the steam for the high pressure cylinders, and the other, a larger section, for reheating the exhaust from the high pressure cylinders before it passes to the low pressure cylinders. The front section of the boiler is attached to the smoke arch of the old section by a V-shaped ring joint. The articulated joint between the two sections of the frames is made with heavy steel castings, according to the usual practice of the Baldwin Locomotive Works in connection with Mallet locomotives. This is a simple rigid structure beneath the cylinder forming a large hinged pocket, which is partly shown in the drawing of the general plan of the engine.

The arrangement of the steam pipes is that developed by the Santa Fe in connection with their system of superheating and reheating. The steam passes from the dome of the rear section through the ordinary dry pipe, but the tee head is replaced by an elbow which connects to an outside steam pipe on top of the boiler. This leads to the high pressure superheater, and from the lower portion of this superheater there is another outside pipe which leads the steam to the high pressure cylinder. Exhaust from the high pressure cylinder passes through a long vertical pipe which extends to the upper shell of the smoke arch and connects with an elbow to another outside horizontal pipe on top of the boiler. This pipe leads to the reheater, and from here the steam passes by the usual pipe, with large ball and slip joints below the boiler and between the frames, to the low pressure cylinders. By this arrangement the steam pipe joints are all on the outside, where they are readily accessible for inspection and repairs. These joints are not subject to the intense heat which is liable to cause them to leak; when this leakage is in the smokebox or any of the smoke passages connected with the tubes it interferes with the draft of the engine. The

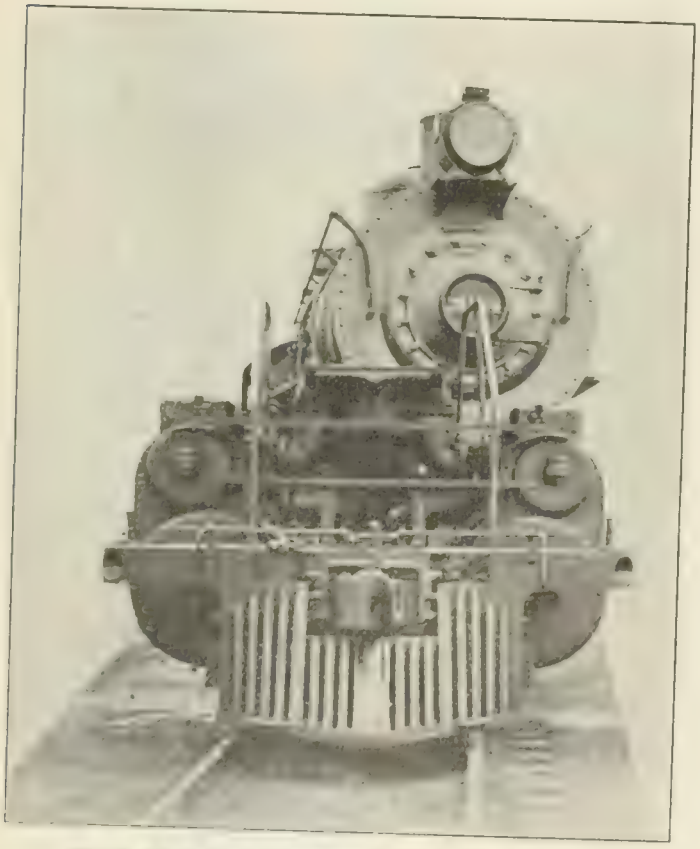


Cross-Sections Through the Santa Fe Mallet Locomotive and Its Boiler.

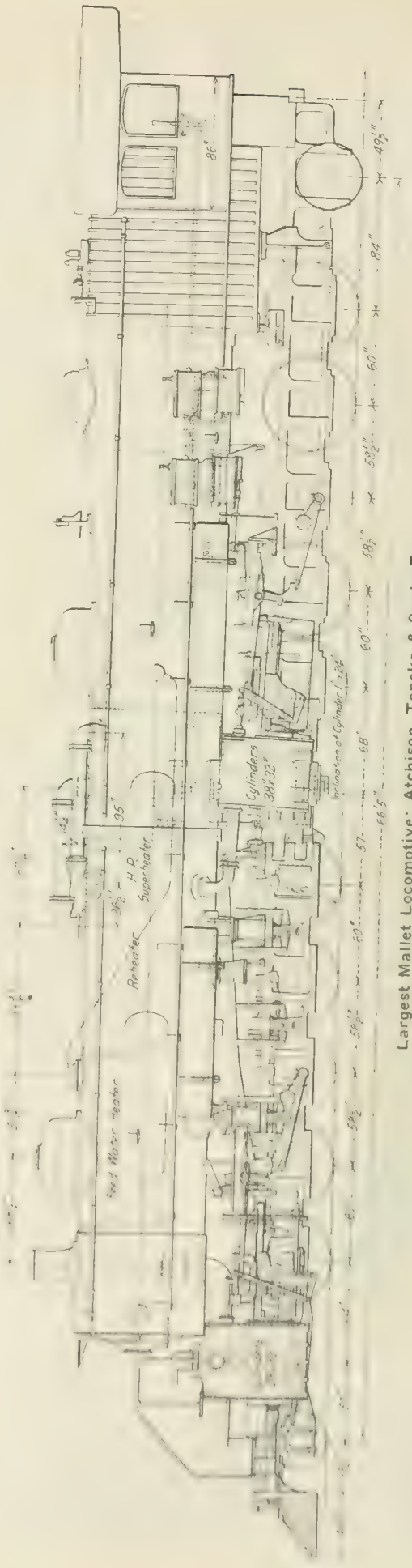
high pressure piston valve is 13 in. in diameter, and the low pressure, 15 in.; both are operated by the Walschaert valve gear. The feed water is delivered by two No. 12 non-lifting injectors, each capable of delivering 4,200 gal. of water per hour. There are two 8-in. Westinghouse cross-compound air pumps located on the left side of the engine and three main reservoirs having a combined capacity of 100,000 cu. in.

The tenders were designed and built by the Baldwin Locomotive Works especially for these Mallet engines, and on account of the unusual length the rear portion is tapered and the corners rounded to a large radius, so as to give a clear view to the engineer when backing up. The tender has a capacity of 12,000 gal. of water and 4,000 gal. of oil. It is mounted on two six-wheel trucks with cast steel frames, the design being quite similar to that used for passenger cars.

The principal novelty in this engine is its enormous size, and the fact that it is converted from the largest type of locomotive on a single set of drivers to the largest locomotive of the Mallet type. The principal features are the combination of designs developed by the Santa Fe and many of the details common to the Mallet locomotives as built at the Baldwin Locomotive



Santa Fe Mallet Locomotive on a Sharp Curve.



Largest Mallet Locomotive; Atchison, Topeka & Santa Fe.

Wheels.

Driving, diameter over tire	57 in.
Driving journals, main, diameter	11 in. x 12 in.
Driving journals, others, diameter	10 in. x 12 in.
Engine truck journals	6½ in. x 10½ in.
Trailing truck journals	7½ in. x 11⅞ in.

Boiler.

Style	Ext. wagon top
Working pressure	225 lbs.
Firebox, width and length	78¾ in. x 149⅝ in.
Tubes, number and diameter	377—2¼ in.
Tubes, length	16. ft. 5 in.
Heating surface, tubes	3,625 sq. ft.
Heating surface, firebox	294.5 sq. ft.
Heating surface, feedwater heater	2,659.5 sq. ft.
Heating surface, total	6,579 sq. ft.
Heating surface, superheating	2,328 sq. ft.
Heating surface, total equivalent	8,907 sq. ft.
Grate area	81.9 sq. ft.

Ratios.

Total weight ÷ tractive effort	5.55
Weight on drivers ÷ tractive effort	4.95
Tractive effort × diameter drivers ÷ heating surface	.963
Tractive effort × diam. drivers ÷ equivalent htg. surf.	.710
Total heating surface ÷ grate area	80.4
Total equivalent heating surface ÷ grate area	109
Firebox heating surface ÷ total heating surface, per cent.	4.48
*Firebox heating surf. ÷ total equiv. htg. surf., per cent.	3.3
Weight on drivers ÷ total heating surface	83.6
Weight on drivers ÷ total equivalent heating surface	61.7
Total weight ÷ total heating surface	93.7
Total weight ÷ total equivalent heating surface	69.1
Volume both cylinders, cu. ft.	30.1
Total heating surface ÷ vol. cylinders	21.9
Total equiv. heating surface ÷ vol. cylinders	29.6
Grate area ÷ vol. cylinders	2.72

*Total equivalent heating surface equals total heating surface (6,579 sq. ft.) plus reheating and superheating surface.

TUNNEL VENTILATING PLANTS.

The Pennsylvania is installing a large ventilating plant in one of the tunnels under Baltimore. This tunnel is 4,963 ft. long and has a cross sectional area of 432 sq. ft. It was determined that it would require 450,000 cu. ft. of air per minute. This volume will drive a current of air through the tunnel with a velocity of 12 miles per hour, and will give a complete air change in 4¾ minutes.

Immediately over one of the portals is the fan room, the floor of which is 28 ft. above the tracks. In this room are two large electrically driven Sirocco fans, with fan wheels or impellers 12½ ft. in diameter. A division plate divides the breadth of these wheels into two equal sections and air is received from both sides. The air is discharged downward into the tunnel through a nozzle which lies close to the roof. This nozzle is flattened and curved to fit the tunnel arch, so that the air comes out through a slit along the arch extending from the springing line at each side. This draws in air from the portal on the principle of an injector. When a train is moving with the air current, the smoke is driven ahead of the engine; when moving against it, the smoke is blown back over the cab without bothering the engineman.

To discharge the volume of air required and to overcome the frictional resistance of the tunnel, the fan wheel must revolve at a speed of 104 r. p. m., which will require about 190 h. p. to drive it. Only one of these fans is intended to be run at a time, the other is held in reserve for use in case of accident.

Charles S. Churchill, chief engineer of the Norfolk & Western, who designed the ventilating plants of the Gallitzin, the Big Bend and the Elkhorn tunnels of the Pennsylvania and the Norfolk & Western, also designed this plant. Previous to the installation of the ventilating plant at the Elkhorn tunnel at Coaldale, W. Va., on the Norfolk & Western, it required from 17 to 55 minutes to clear the tunnel of smoke, and during the four years immediately preceding the installation 26 men were asphyxiated. After the installation smoke appeared at the portal ahead before the engine appeared; and in less than a minute after the engine had passed out, the steam had vanished even from the roof, where it usually clings so persistently. The installation of this ventilating plant increased the maximum load of trains and resulted in a reduction of the number of trains necessary to carry a given load.

The Sirocco fan is made by the American Blower Company, Detroit, Mich.

FREIGHT CAR FOR SHIPPING TRANSFORMERS.

A special steel car with a portion of its floor at about the axle height was recently delivered to the Westinghouse Electric & Manufacturing Company by the Atlas Car & Manufacturing Company, Cleveland, Ohio. It was made so that heavy electric transformers may be shipped assembled and ready for installation and immediate use on arrival at their destination. The car will accommodate an oil insulated self-cooling transformer of 2,000 kva. capacity, which will stand 16 ft. above the top of the rail.

The car is entirely of steel, is 35 ft. 5 in. long, and has a capacity in the well of 150,000 lbs., or 75 tons. The surface of the floor in the well is but 2 ft. 2 in. above the top of the rails. The frame is of heavy built up steel girders. The trucks are of 205,000 lbs. capacity with 6 in. x 11 in. journals, 33 in. wheels, and M. C. B. springs of extra large capacity. The center plates are wrought steel and the boxes, brasses, etc., all conform to M. C. B. requirements for 205,000 lbs. capacity journals. Each car is equipped with Westinghouse air brakes, Westinghouse friction draft gear and M. C. B. automatic couplers. The car weighs 53,000 lbs.

Car of 250,000 lbs. Capacity for Shipping Transformers.

The committee of the Belgian Parliament to which was referred the estimates of the railway minister, has reported in favor of increasing both passenger and freight rates, which were long lower than elsewhere in Europe. The committee finds that the employees are insufficiently paid, and that the only way to get money to pay them what they earn is by raising the rates.

General News Section.

At Chicago August 20, Lincoln Beachey in a Curtiss aeroplane soared to a height of 11,152 ft.

A bill which has been introduced in Congress by Senator Poindexter to provide for the conservation of resources in Alaska, contains provisions looking to the construction and operation of railways in Alaska by the government.

The post office department has asked the roads carrying mail between Chicago and St. Louis to make bids for a mail train in each direction, leaving at about 8 p. m. and arriving at about 2 a. m. Bids are to be received not later than August 25.

The Baltimore & Ohio has filed suit in a Pennsylvania court to restrain the enforcement of the full crew law of that state, complaining that it is vague and contradictory, and imposes unreasonable penalties. For non-compliance the road might be fined two hundred millions of dollars a year.

The Supreme Court of Georgia has affirmed the decision of the county court in favor of the railway, the Nashville, Chattanooga & St. Louis, in a case where the state of Georgia sued for the value of engines, cars, etc., belonging to the state—the Western & Atlantic Railroad—and used by the N. C. & St. L., the operating company.

H. W. Belnap, chief inspector of safety appliances, has recommended to the Interstate Commerce Commission that the Minneapolis, St. Paul & Sault Ste. Marie be prosecuted for violation of the hours-of-service law; this because of a collision near Superior, Wis., July 5, in which four trainmen were killed and two injured. The men responsible for this collision had been on duty 18 hours, 50 min. Mr. Belnap says that a length of 107 miles of this road had no telegraph office either day or night.

At the La Salle street station of the Rock Island Lines and the Lake Shore & Michigan Southern at Chicago, there have been installed for test automatic electric megaphone devices for calling trains and the names of persons wanted at telephones. The apparatus consists of telephone sounders placed inside bell-shaped megaphones, and a phonograph can be used for calling a long list of stations. The calls are made through a telephone transmitter connected with some 40 of the devices hung in various rooms of the station, and they are heard simultaneously in all rooms.

Attorney-General W. T. Stead and several states' attorneys in Illinois have filed objections in the United States Circuit Court at Springfield, Ill., to the recent report of Walter McClellan Allen, master in chancery in the 2-cent fare case of the Chicago, Peoria & St. Louis. The report was to the effect that the 2-cent fare law was confiscatory as to this road, as it could not earn 6 per cent. from passenger business on the road's investment. The principal objection to the report are the bases Mr. Allen used for the division of common expenses and the property valuations in the state, between the freight and passenger business.

The aeroplane has finally gratified the space-writer prophets of the daily papers by serving as a carrier of news in a business-like way. The French airman, Vedrines, one Sunday morning carried some bundles of newspapers and also some letters from Paris to Deauville, a watering place, and made the journey in about an hour less than is taken by the fastest railway [illegible] in 1 hour, 43 min. The report from which we take this information [illegible] postal service."

[illegible] that the so-called jobbers' tariffs, complained of in the suit and [illegible]

at the expense of wholesale, jobbing and manufacturing interests in interior Kansas, and that the effect of such a reduction would be to materially reduce their own revenues.

The railway commissioners of Maine have made a report on the collision which occurred at Grindstone July 28, finding that the excursion train was at fault and that the conductor did not attempt to control the movement of the train after it had left the last station where it had stopped. At that place the engineman said that he could reach Grindstone in time to clear the opposing train, and the conductor relied on the engineman's judgment. The engineman was killed. On the same day that the commission's decision was published, the grand jury of Penobscot county, after considering for five hours a proposal to indict the conductor for manslaughter, refused to take action.

In a telegram explaining that he could not accept the invitation of the Oregon Development League to address its meeting at Astoria, on account of complications resulting from the Spokane rate case, Howard Elliott, president of the Northern Pacific, said: "It is too bad that so much time and attention of some of us, who are doing our honest best to advance the welfare of the country, is taken up by investigations and litigations. It would seem to me that in our country we could advance farther and faster if we had a 'closed season' for legislation. If we could have no more new laws for the next five years, I believe your state would go ahead more rapidly than any of us imagine."

Arthur Hale, general agent of the American Railway Association, who returned last week from Europe, has moved his New York office to the Underwood building, at 30 Vesey street, where the offices of the American Railway Association and the Bureau of Explosives are already established. Now that Mr. Hale is back it is probable that a new secretary will be elected for the arbitration committee on the per diem rules in place of H. F. Campbell, who died suddenly on July 29, as noted in our issue of August 4. Mr. Hale has been in Europe two months, having been called to London suddenly in June by the illness of his daughter, Mrs. Kurt Diederich, with typhoid fever, who, however, died before Mr. and Mrs. Hale were able to reach her.

Thomas J. Freeman, president of the International & Great Northern, has filed an application with the Texas Railway Commission, asking that a new valuation of at least $35,167,000 be placed on its property in Texas, the object being to use the valuation fixed by the commission as a basis for stock and bond issues. In the petition presented by President Freeman, reference is made to a previous valuation of the state commission, and it is stated that in the new valuation there should be included betterments amounting to $7,497,986 that have been made since the former valuation; that the valuation of the Fort Worth division should be included, and that 6 per cent. for franchise value should be added. It is pointed out that the tax board decided during the present year that the road is worth $36,076,982.

J. F. Holden, vice-president of the Kansas City Southern, has issued a publicity bulletin, calling the attention of employees of his road to the superior working conditions existing and high wages and salaries paid on American railways compared with those of Europe. Mr. Holden recently returned from a trip abroad, where he studied these matters carefully. His object in sending out the bulletin is to "show our own men the difference between the wages at home and those paid abroad; and to show the progressiveness of the railway owners and managers of the United States, who have far forged ahead of the owners and managers abroad in providing the necessary tools, namely, big engines, big cars, heavy rails, etc., whereby the men employed to handle trains can earn a greater wage [illegible] in England, France or Germany."

A meeting of representatives of 14 Chicago railways and Chief Merrett, city smoke inspector, and M. F. Harris, his assistant, was held on August 11 in the office of H. F. Wardwell, superintendent of motive power and equipment of the Chicago &

Western Indiana, and of the Belt Railway, to consider the smoke problem in Chicago. The utility and availability of various smoke eliminating devices were discussed, and the consideration of the plan of educating the men, which has been adopted by the Belt Railway, enabling them to greatly reduce the amount of smoke made and at the same time consume less fuel per unit of tonnage, was the most interesting feature of the meeting. During the last six months, compared with the corresponding six months of 1910, a reduction of approximately 55 per cent. was effected by the Belt Railway in the amount of dense smoke made, and during that time there was an increase in tonnage and a considerable reduction in the cost of fuel. In performing this increased work, in keeping with the city ordinance, the engines on this road have actually burned 8,318 tons less fuel than in the corresponding six months of the previous year. Mr. Wardwell attributes this great improvement largely to the education of the firemen and enginemen in the proper firing and handling of engines. Railway men and city officials present at the meeting agreed that education of the men is the largest part of the problem of eliminating smoke. The Belt Railway operates entirely within the city limits, which increases the difficulty of its smoke problem. Every one of the engines operating on it must be fired continually within the city limits, and, therefore, must constantly be in danger of violating the smoke ordinance.

Canadian Pacific Steamships.

An officer of the Canadian Pacific is quoted as saying that the company has ordered two steamships for the Vancouver-Hong Kong service to cost $5,000,000, from the Fairfields Ship Building Company of Glasgow, Scotland. The steamships are to be 595 ft. long, and will be required to maintain an average of 18 knots an hour. They are to be ready in January, 1913.

Conservation in Small Things.

The general manager of the Chicago Great Western has issued a bulletin to all employees, entitled "Conservation." He says in part:

"A penny saved is a penny earned," applies to individuals and corporations alike. The opportunity of a personal inspection of our railway housekeeping during the past few weeks has convinced me that we must begin, and at once, to *earn by saving*. Thousands of dollars' worth of property, belonging to the company, is lying useless for want of a little care, and a trifling outlay for repairs. One illustration will suffice: Twelve dozen hand lamps were collected, which, when sent to the general storekeeper's department, were found to need possibly an average of five cents' worth of repairs to make them again as good as new. It will not be necessary to replace them with new lamps.

In ten days, four carloads of surplus material were reclaimed.

It is my personal request that every employee join with me in this conservation movement. Make it a personal matter to make a systematic inspection of all material on hand—tools, stationery forms, empty ink bottles, etc. Anything that is of no immediate use in your department, tag and send to the general storekeeper, or deliver to the supply car when it reaches your station, with exception of stationery and ink bottles which are to be sent to the stationery storekeeper at Chicago.

"Scrap" should be picked up and assembled at some central point, where it can be conveniently and cheaply loaded for disposal. Tools when worn out have a certain value, and should be turned in. True economy is not parsimony, and when by our individual efforts each employee aids in thus "picking up" the company's money, as he would if he saw a penny, a nickel, a dime or a dollar in his way, we are sure there will be a good showing of *dollars saved* by our knowledge and practice of the principles of conservation.

The bulletin also gives a list of prices of things used by station agents, enginemen, trainmen, bridgemen and section men. This price list gives the new value, second-hand value and scrap value of each article. The startling difference in these values should serve as a great incentive to employees to conserve all material possible. For example, a coupler having a value of $9 new is worth $7.50 second hand, and $1.80 as scrap. A ball-bearing jack, which cost $12 new, is worth $11.10 second hand, and only thirty cents as scrap.

The B. R. & E. Decision.

The New York State Public Service Commission, Second district, has won public confidence. It does an enormous amount of work, does it expeditiously, is reasonable in expenditures and is fair to the corporations and fair to the people. A committee from the Illinois legislature has lately made a report confirming this view, being impressed with the total divorcement of the commission from politics, as well as with its absolute independence.

The statement that interior cities are disappointed at the refusal of the commission to authorize the construction of the Buffalo, Rochester & Eastern is not warranted. The proposed road was to pass north of Rochester, and there is no regret in Rochester. The *Syracuse Herald* says that the judgment of the commission will be contemplated with equanimity. The *Utica Observer* looks upon the action of the commission as broad and wise. The *Buffalo Express* shows that Buffalo does not regret that the road is not to be built. The *Troy Press* and the *Troy Times* both treat the subject lightly.

Governor Dix expected last January to send to the legislature a special communication in regard to the commission, but this communication never came, and it seems likely that the governor found upon inquiry that the commission was all right—Condensed from *Rochester Post-Express*.

The Demands of the Western Shopmen.

The demands of the machinists, boilermakers, blacksmiths, sheet metal workers and other shopmen presented to the officers of the Southern Pacific on August 1, were noticed in our issue of August 11, page 294. The demands were presented August 1 and answer was asked for in 30 days. The conciliatory action of the Illinois Central and the Rock Island, to which companies similar claims were presented, appears to have resulted in a lull in the agitation, at least in the newspaper agitation; and the laying off of large numbers of men from some of the shops of the Union and the Southern Pacific also seems to have affected the attitude of the shop men. The affiliation of the different trades above-named appears to be still incomplete, though so far as the Harriman lines are concerned, the "System Federation," formed at a convention at Salt Lake City in June, appears to have been fully organized. The convention appointed a general advisory board composed of thirty-six members, with E. L. Reguin, of San Francisco, as president; J. E. Crouch, of Sacramento, vice-president, and John Scott, of San Luis Obispo, secretary. Mr. Reguin is a lawyer as well as a machinist, and has been labor commissioner of San Francisco.

The rules which the shopmen propose for the shops of the Harriman Lines and which they presented to the Southern Pacific Company in the shape of a demand, are given below. Mr. Small, general superintendent of motive power of the Southern Pacific at San Francisco, says that the demands, if granted, would increase the annual expenses in his shops—that is, on the Pacific system alone—$2,976,000. Mr. Small says that within the last five years all of the craftsmen in the shops have had their pay increased, averaging 12½ per cent.; and, furthermore, the rates paid are higher than in the shops of any other railway in the country. On the Southern Pacific lines in Texas the increases demanded would mean an addition to expenses of $500,000; and the men there have had even higher increases than have those in California.

Shopmen of the Illinois Central tell the reporters that a "strike vote" is being taken throughout that system.

PROPOSED RULES GOVERNING SHOP EMPLOYEES, HARRIMAN LINES.

Rule 1. Work Day.—The standard working time shall be eight hours per day and six days per week. The working hours shall be from 8 a. m. to 12 noon; from 1 p. m. to 5 p. m. Night forces on a corresponding basis. Night men shall be allowed nine hours' pay for 8 hours' work. There shall be no lap shift worked. Working hours shall be bulletined. Where continuous service is necessary, three shifts may be worked as follows: 8 a. m. to 4 p. m., 4 p. m. to 12 midnight, 12 midnight to 8 a. m. Twenty minutes to be allowed each shift for lunch, with pay. All employees will be allowed one hour with pay at the close of the week, irrespective of the number of hours worked.

Rule 2. Reduction of Expenses.—When any reduction of expenses is to be made, employees shall first have the privilege of a

ninety-day leave of absence. If any further reduction is necessary, the last man hired within the jurisdiction where the reduction is to be made, shall be given a ninety-day leave of absence, or until such time as forces are to be increased, when the last man given leave of absence shall be the first man put back to work. Men granted leave of absence shall be furnished with transportation over the Harriman lines. Committee shall be notified by foreman that the services of employees are again required, and employees on leave of absence shall be given ten days to return to work.

Rule 3. *Overtime.*—All time worked other than bulletined hours shall be considered overtime. Overtime shall be paid for at the rate of time and one-half up to midnight. After midnight double time shall be paid until relieved. No employee shall work longer than one hour without being allowed time for meals. Employes required to work after bulletin hours shall be paid four hours for two hours and forty minutes' service or fraction thereof, if worked before midnight. If after midnight, they shall be paid four hours for two hours or fraction thereof. Sundays and all holidays, designated by the State or Nation, shall be paid for at the rate of time and one-half. Holidays falling on Sundays and another day observed by the State or Nation, this day shall be considered a holiday and paid for as such. No employee shall be required to work overtime more than two nights per week, or two consecutive Sundays. When overtime is required it shall be distributed. Employees shall not be laid off from regular working hours to equalize overtime worked. Overtime shall be confined to emergency cases. Men transferred from one shift to another shall be paid overtime for the first night or day, as the case may be. Employees when sent out on the road from their home station shall receive continuous time from the time called until the time they return, as follows: Overtime rates for all overtime hours, whether waiting, traveling or working, and straight time for what are straight time hours at the home station, whether waiting, traveling or working, with an allowance of $1.50 per day for expenses, provided that when away for a period of thirty-six hours, and have been given time for sleep and rest, that the regular rule for time and overtime shall apply thereafter. Expense money to be paid on the following day, except in the case of employee leaving the service of the company, he shall be paid at the time of leaving service.

Rule 4. *Definition of Work.*—All crafts must insert their definition of work in this rule.

Rule 5. *Competency.*—Competency of the employees entering the service shall be determined within thirty days.

Rule 6. *Employment.*—Employees shall not be requested to undergo any form of physical examination, or make out any form of personal record.

Rule 7. *Safeguarding Employees.*—Men shall not be required to work on engines outside of shop in bad weather. This not to apply to work in engine cabs. Before work on engines undergoing repairs in shops and roundhouses is distributed, it shall be cleaned. Roundhouses shall be piped or otherwise arranged so that when the engines are being blown down, the steam will be carried from the roundhouse, and the danger eliminated. This work to be completed within ninety days after the signing of this agreement.

Rule 8. *Apprentices.*—There may be one apprentice to every five mechanics in the shop. No apprentice shall be allowed to serve his apprenticeship where there are not proper facilities [illegible] Apprentices must know the first four rules of arithmetic, and be able to read and write the English language. If, when he reaches an apprentice does not aptitude to learn the trade, he shall be transferred or released from the service. Shop foremen and shop committee shall be the judges in the case. Apprentices shall be subject to same regulations as mechanics unless otherwise stated in this agreement. Apprentice shall not be permitted to work over time, neither shall they be put on the road. When [illegible] of mechanics are reduced the number of apprentices shall be reduced to accordance with the [illegible] apprentices employed previous to this agreement to be reduced to their respective [illegible] At the expiration of their apprenticeship, if retained by the company at the company, they shall receive the rate of pay paid to mechanics at that point. [illegible] [illegible] [illegible]

Organization of Missouri Pacific's Claim Department.

Under the new organization of the claim department of the Missouri Pacific, which became effective August 14, as was announced in the *Railway Age Gazette* of August 11, page 293, the general claim agent, who has his office at St. Louis, and who will be a member of the office staff of the vice-president and general solicitor, will exercise general supervision over the conduct of all matters of business pertaining to the claim organization. Under the supervision of the vice-president and general solicitor, he will authorize the settlement of, or settle direct, important cases in which the amount to be paid exceeds the limitations within which claims may be settled by the district claim agents under the supervision and authority of the chief officers in the law department of their respective districts. The office of the general claim agent will also act as a clearing house for the various district claim agents' offices, proper records being kept of all vouchers issued in settlement of claims, and monthly reports being made to the vice-president and general solicitor.

The location of district claim agents, with territory under the jurisdiction of each, are as follows:

St. Louis, Mo., in charge of St. Louis terminals in Missouri, Kirkwood to Carondelet; Sedalia, Mo., in charge of lines in Missouri west of Kirkwood, exclusive of Jackson county; Poplar Bluff, Mo., in charge of lines in Missouri south of Carondelet; East St. Louis, Ill., in charge of all lines in Illinois; Atchison, Kan., in charge of lines in Kansas, Nebraska and Colorado; Kansas City, Mo., in charge of Kansas City terminal division, all other lines in Jackson county, Mo., and lines from Atchison to St. Joseph, Mo.; Little Rock, Ark., in charge of all lines in Arkansas and Oklahoma; Monroe, La., in charge of all lines in Louisiana.

District claim agents, besides having charge of investigation and settlement of claims arising within their respective districts, will, when located at points where company hospitals are maintained, so far as practicable, handle the cases of all persons receiving treatment at such hospitals, under the direction of the principal officer of the law department in their districts and of the general claim agent. Assistant claim agents and stock claim agents will be appointed to assist district claim agents where conditions require such appointments. Operating department reports on prescribed forms will be furnished to the district claim agent regarding each accident or injury in the different districts, and in cases of serious injuries to employees, passengers and other persons, investigations will be made promptly under the direction of the district claim agent. Telegraph reports of accidents are to be made to the general claim agent and to the district claim agent in charge of the district where the accident occurs. Revised forms for engineers' reports of stock struck by locomotives are furnished and must be carried on each engine engaged in road service, the engineer being expected to fill out and file reports of all stock struck at the end of each run.

Work and Wages.

The Union Pacific has ordered reductions of forces and shortening of working hours at its principal shops. Similar retrenchment orders appear to have been given on the Southern Pacific in the Pacific states and in Texas. Men have been laid off also at some of the freight houses.

The Chicago, Peoria & St. Louis has made an increase of two cents an hour in the pay of boilermakers—from 34 cents to 36 cents.

The Texas & Pacific has reopened its shops which had been closed for two weeks. The Chicago & Alton has ordered its shops at Bloomington to be run to their full capacity.

The shop men of the Canadian Pacific west of Lake Superior are reported to be taking a vote on the question of striking, if they do not receive an increase in pay.

The firemen of the Lehigh & Susquehanna division of the Central of New Jersey have received an advance in pay.

Organization of Mechanical Department, St. Louis & San Francisco.

Effective August 15, a change has been made in the operation of the mechanical department of the St. Louis & San Francisco, by which, as stated in an official circular:

"General superintendent motive power will report to the general manager. He will have general charge of motive power, equipment and machinery; will direct all locomotive repairs described as Classes 1, 2, 3, and 4, and be responsible for boiler inspection and condition of locomotives, machinery and cars at all points. He will prescribe standards and see that all work is done in accordance therewith. He will keep all locomotives and car statistics, and handle all M. C. B. accounts, bills and vouchers.

"The general superintendent motive power will have charge of the operation of the shops and car works in Springfield, Kansas City and Memphis.

"The general superintendent will report to the general manager and be charged with the performance of all motive power, machinery and car work at all points excepting the operation of the shops and car works in Springfield, Kansas City and Memphis.

"Superintendents will report to general superintendents on all matters not specified above as coming under the jurisdiction of the general superintendent motive power, and will report to the general superintendent motive power on all matters specified above as coming under the jurisdiction of that official.

"Mechanical superintendents will report to the general superintendents and will advise with the superintendent on each division as to all mechanical department matters, excepting those at the shops in Springfield, Kansas City and Memphis.

"All shops, car works and mechanical department matters, excepting the operation of the shops and car works in Springfield, Kansas City and Memphis, will be under the jurisdiction of the master mechanics, who will report to the superintendents on their respective divisions."

The British Railway Strike.

The British railway labor unions carried out their threat last week to strike, though not until twenty-four hours or more after the hour which they had set, the leaders having continued in conference with representatives of the government up to Thursday night. The men finally went out on Friday, the 18th, and, according to their leaders, 200,000 responded to the order. At Liverpool, where the strike of dockmen also helped to paralyze traffic, the movement of trains was almost entirely suspended, but elsewhere the companies succeeded in keeping some of their passenger trains moving. Suburban travelers, however, suffered very serious delays. The Metropolitan Railway of London reduced its train service only about one-third. Press dispatches reported the strike as fairly effective in the north of England and in South Wales, but unsuccessful in the south of England. The Northeastern Railway suffered seriously. Reports are very contradictory and some of the newspapers even claimed that the strike was a fiasco.

The government quickly provided military protection at all important points. There were 50,000 soldiers on duty in London, and 8,000 at Llanelly, Wales. There was rioting at Birmingham, Derby, Sheffield and Llanelly. At Llanelly the soldiers, in subduing the riots, shot and killed two of the rioters. A mob set fire to a freight house and there followed an explosion in which several persons were killed. In Ireland some of the trainmen left their work, but, apparently, not a large proportion of the whole.

On the London & Northwestern a large proportion of the men remained loyal to the company and 600 clerks were assigned to duty at signal cabins and other places. The company issued a manifesto, thanking its employees and announcing that all who refused to strike would be given double pay during the strike period. Other companies made similar offers, but not so liberal. The suspension of freight traffic on the Great Northern compelled the fishermen on the north and east coasts to stop work.

The movement of passenger trains was much better on Saturday than on Friday, but the government, particularly Mr. Lloyd George, Chancellor of the Exchequer, kept up its efforts at peacemaking, and before midnight on Saturday it was announced that a settlement had been arrived at; and on Sunday the great majority of the strikers returned to work. The principal feature of the agreement was that the railways virtually abandoned their claim, never before modified to an appreciable degree, that the negotiators for the men must be their own employees; in other words, the railways, for the first time, agreed to meet the representatives of the brotherhoods as such. The agreement provided that the leaders of the men should induce them to return to work at once, that all should be reinstated, no one to be made to suffer for breach of contract; that conciliation boards should be convened at once; that employees of those classes not in-

cluded in the conciliation scheme of 1907, should have their grievances attended to, and that the interpretation of the agreement, if questions should arise, should be referred to the Board of Trade.

The agreement, as printed in the newspapers, is not entirely clear, but the representatives of the government repeatedly stated, in explicit terms, that the railways had agreed to have representatives meet the representatives of the employees face to face.

By Sunday considerable progress had been made in moving freight. On Monday it appeared that the strikers on the London & Northwestern had not returned to work and the Board of Trade was occupied all day in negotiations to settle this difficulty. There was a good deal of friction when the strikers returned, and scenes of disorder were reported on the Midland Railway and elsewhere. Large numbers of porters and freight handlers at Manchester refused to resume work.

The strike of dockmen at Liverpool not only aided in tying up railway traffic but delayed for a number of days most of the important transatlantic steamships. Disturbance of shipping was so extensive that exporters in New York City were put to much inconvenience and their shipments delayed. There was much difficulty at Liverpool as late as Tuesday of this week, the city refusing to reinstate 250 employees of the street car lines. In consequence of this, railway men and dockmen made further trouble.

The commission appointed to inquire into the questions at issue between the railways and their employees was announced in the House of Commons on Tuesday as follows: Chairman Sir David Harrel, who was Under Secretary for Ireland, 1893-1902. To represent the railways, Sir Thomas R. Ellis, Secretary of the Mine Owners' Association, and Sir Charles G. Beale, Vice-Chancellor of the University of Birmingham; to represent the employees, Arthur Henderson, labor member of Parliament, and John Burnett, chief labor correspondent of the Board of Trade.

Traveling Engineers' Association.

The annual meeting of the Traveling Engineers' Association will be held at the Sherman House, Chicago, August 29 to September 1. At the opening session on the morning of August 29, addresses will be delivered by Robert Quayle, general superintendent of motive power of the Chicago & North Western; and by C. E. Thayer (Southern Railway), president of the association. Routine business will then be transacted, after which there will be presented the report of the committee on the Value of Actual Demonstration as Compared with Oral Instruction in Air Brake Operation, J. B. Kelley, chairman. On Tuesday afternoon, August 29, there will be a report of the Committee on The Value of Practical Instruction in Fuel Economy. On Wednesday, August 30, there will be a report of the Committee on Proper Methods to Be Observed in the Efficient Handling of the Electric Locomotive, by S. A. Bickford, chairman. There will also be an address by F. O. Melcher, vice-president of the Rock Island Lines, and one by A. W. Whitford on the Jacobs-Shupert firebox. In the afternoon there will be a report of the Committee on the Latest Development and Improvements in Automatic Stokers, by J. R. Lucky, chairman, and a report of the Committee on the Mallet Compound Engine in Road Service, by J. B. Daugherty (B. & O.). On Thursday, August 31, there will be an address by T. A. Foque, general mechanical superintendent of the Minneapolis, St. Paul & Sault Ste. Marie. A report of the Committee on Lubrication of Locomotives Using Superheated Steam, by M. H. Haig (mechanical engineer of the Atchison, Topeka & Santa Fe), chairman, and a report of the Committee on Benefits Derived by the Use of the Brick Arch, by W. G. Tawse, chairman. On Friday, September 1, there will be addresses by Samuel O. Dunn (Railway Age Gazette), [illegible] report of the Committee on Increased Efficiency of Locomotives and Benefits Derived from Chemically Treated Water, by A. C. Kinyon, chairman; a report of the Committee on Subjects for Discussion, 1912, by W. O. Hayes (Hayes), chairman; a report of the Committee on Change in Constitution and By-laws, by D. Meadows (Michigan Central), chairman. There will follow the election of officers, the selection of place of next meeting and adjournment.

The exhibit of the supply manufacturers will be the best that has ever been given in connection with a convention of this association. All of the 3,800 ft. of space has been sold. The arrangement of the booths will be similar to that of the exhibit at Atlantic City. The supply manufacturers have also prepared an attractive entertainment programme. There will be a reception and ball at the Sherman House on the evening of August 29. On the morning of August 30 the ladies will be given a ride about the city in automobiles provided for the purpose. At night a ride will be given to members and guests of the association on the steamship Theodore Roosevelt, on which occasion there will be music and dancing. On the evening of August 31 a vaudeville entertainment will be given at the Colonial Theatre, which has been hired especially for that purpose and to which no one will be admitted but members and guests of the association. In addition to the regular vaudeville programme, a sketch which has been prepared for the occasion will be presented. Invitations to attend the convention have been sent not only to members of the association, but to every railway purchasing agent, master mechanic and superintendent of motive power in the United States.

General Passenger and Ticket Agents.

At the annual convention of the American Association of General Passenger and Ticket Agents, to be held at the St. Paul Hotel, St. Paul, Minn., September 19, reports will be received from the Standing Committee on Association Ticket Paper; from the Standing Joint Committee of the American Association of General Passenger and Ticket Agents, and the Association of American Railway Accounting Officers; from the Standing Committee on Standard Ticket Contracts; from the Special Joint Committee of the American Association of General Passenger and Ticket Agents and the American Railway Accounting Officers, relative to Uniform Interline Tickets and Minimizing the Use of Exchange Orders. Reports will also be received from the co-operating associations, including the Association of American Railway Accounting Officers, the American Association of General Baggage Agents, the Canadian Ticket Agents' Association, the American Association of Traveling Passenger Agents and the International Association of Ticket Agents. There will be an address by W. J. Craig, passenger traffic manager of the Atlantic Coast Line. C. M. Burt, Boston, Mass., is secretary.

Old Time Telegraphers' and Historical Association.

The Old Time Telegraphers' and Historical Association will hold its thirtieth annual reunion at Atlantic City, N. J., September 5, 6 and 7. The headquarters will be at the Marlboro-Blenheim Hotel. The president of the association is Col. William B. Wilson, Holmesburg, Pa.; secretary, F. J. Scherrer, 30 Church street, New York City. Col. Wilson is also president of the Society of the United States Military Telegraph Corps, which meets at the same time.

Central Railway Club.

The annual fall outing of the Central Railway Club will be held on September 8. The party will leave Buffalo in the morning and go down the river on a boat to the Island Club. After dinner there will be a business session, at which J. P. Murphy, Collinwood, Ohio, general storekeeper of the Lake Shore & Michigan Southern will present a paper on Conservation of Waste. Harry D. Vought, New York, is secretary

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting:

American Railway Association.—E. M. Nelly, 75 State St., Boston, Mass.

American Association of Demurrage Officers.—A. G. Thomason, Scranton, Pa.

American Association of General Passenger and Ticket Agents.—C. M. Burt, Boston, Mass.; next meeting, St. Paul, Minn., Sept. 19, 1911.

American Association of Freight Agents.—R. O. Well, East St. Louis, Ill.

American Association of Railroad Superintendents.—O. G. Jetter, Cincinnati Railway, Cincinnati, Ohio; 3d Friday of March and September.

American Electric Railway Association.—H. C. Donecker, 29 W. 39th St., New York; October 9-13, Atlantic City, N. J.

American Express Association.—W. F. Allen, 25 Church St., New York; November 15, Chicago.

American Railway Bridge and Building Association.—C. A. Lichty, C. & N. W., Chicago; Oct. 17-19, 1911, St. Louis, Mo.

American Railway Engineering Association.—E. H. Fritch, Monadnock Block, Chicago; annual convention, March 19-21, 1912, Chicago.

American Railway Master Mechanics' Association.—J. W. Taylor, Old Colony building, Chicago.

American Railway Tool Foremen's Association.—O. T. Harroun, Bloomington, Ill.

American Society for Testing Materials.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.

American Society of Civil Engineers.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

American Society of Engineering Contractors.—D. J. Haner, 13 Park Row, New York; 3d Tuesday of each month, New York.

American Society of Mechanical Engineers.—Calvin W. Rice, 29 W. 39th St., New York.

Association of American Railway Accounting Officers.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.

Association of Railway Claim Agents.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 22, 1912, Los Angeles, Cal.

Association of Railway Electrical Engineers.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago; annual, November 6-10, Chicago.

Association of Railway Telegraph Superintendents.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.

Association of Transportation and Car Accounting Officers.—G. P. Conard, 75 Church St., New York; December 12-13, Louisville, Ky.

Canadian Railway Club.—James Powell, Grand Trunk Ry., Montreal, Que.; 1st Tuesday in month, except June, July and Aug., Montreal.

Canadian Society of Civil Engineers.—Clement H. McLead, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

Car Foremen's Association of Chicago.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

Civil Engineers' Society of St. Paul.—D. F. Jurgensen, 116 Winter St., St. Paul, Minn.; 2d Monday, except June, July and Aug., St. Paul.

Engineers' Society of Pennsylvania.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

Engineers' Society of Western Pennsylvania.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

Freight Claim Association.—Warren P. Taylor, Richmond, Va.; annual Buffalo, N. Y.

General Superintendents' Association of Chicago.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

International Railway Congress.—Executive Committee, rue de Louvain, 11 Brussels; 1915, Berlin.

International Railway Fuel Association.—D. B. Sebastian, La Salle St. Station, Chicago.

International Railway General Foremen's Association.—L. H. Bryan, D. & I. R. Ry., Two Harbors, Minn.

International Railroad Master Blacksmiths' Association.—A. L. Woodworth, Lima, Ohio; annual, Aug. 15, Toledo, Ohio.

Iowa Railway Club.—W. B. Harrison, Union Station, Des Moines, Ia.; 2d Friday in month, except July and August, Des Moines.

Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York.

Master Car Builders' Association.—J. W. Taylor, Old Colony building, Chicago.

Master Car and Locomotive Painters' Association, of United States and Canada.—A. P. Dane, B. & M., Reading, Mass.; Sept. 12-15, 1911, Atlantic City, N. J.

New England Railroad Club.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

New York Railroad Club.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

Northern Railway Club.—C. L. Kennedy, C., M. & St. P., Duluth, Minn; 4th Saturday, Duluth.

Omaha Railway Club.—H. H. Maulick, Barker Block, Omaha, Neb.; second Wednesday.

Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

Railway Club of Pittsburgh.—C. W. Alleman, P. & L. E., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

Railway Industrial Association.—G. L. Stewart, St. L. S. W. Ry., St. Louis, Mo.; annual, May 12, 1912, Kansas City, Mo.

Railway Signal Association.—C. C. Rosenberg, Bethlehem, Pa.; annual, Oct. 10, Colorado Springs, Colo.

Railway Storekeepers' Association.—J. P. Murphy, Box C, Collinwood, Ohio.

Richmond Railroad Club.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

Roadmasters' and Maintenance of Way Association.—Walter E. Emery, P. & P. U Ry., Peoria, Ill.; September 12-15, St. Louis, Mo.

St. Louis Railway Club.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

Society of Railway Financial Officers.—C. Nyquist, La Salle St. Station, Chicago; Sept. 12-14, St. Paul, Minn.

Southern Association of Car Service Officers.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.; annual, October 20, Atlanta, Ga.

Southern & Southwestern Railway Club.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

Toledo Transportation Club.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

Traffic Club of Chicago.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.

Traffic Club of New York.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

Traffic Club of Pittsburgh.—T. J. Walters, Oliver building, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

Train Despatchers' Association of America.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.

Transportation Club of Buffalo.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

Transportation Club of Detroit.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.

Traveling Engineers' Association.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.; annual, August 29-September 1, Chicago.

Western Canada Railway Club.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

Western Railway Club.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Wednesday in month except July and August, Chicago.

Wood Preservers' Association.—F. J. Angier, First National Bank bldg., Chicago, annual, January 16-18, Chicago.

Traffic News.

The Memphis Freight Bureau has complained to the Interstate Commerce Commission that express rates from eastern cities are much higher to Memphis than to St. Louis, and that they are excessive as compared with freight rates.

The office of general western agent of the Central-Savannah (freight) Line, at St. Louis, has been abolished, and correspondence relating to Central-Savannah Line solicitation in that territory should be sent to the general agent of the Central of Georgia, Pierce building, St. Louis.

The Baltimore & Ohio is this week running on its lines in Ohio an "agricultural educational train." The train is in charge of the industrial department of the road and carries lecturers from the State Agricultural College, who will discuss corn and wheat cultivation, drainage and seed selection.

The Chicago, Milwaukee & St. Paul, and the Chicago, Milwaukee & Puget Sound are making a special second class harvest labor rate of $12 one way from St. Paul, Minn., and intermediate points to stations in Montana on the line of the Puget Sound. The tickets, which are limited to three days and are not to be honored in standard or tourist sleeping cars, were on sale August 17, 19, 22 and 24, and will be on August 26, 29 and 31.

INTERSTATE COMMERCE COMMISSION.

The commission has suspended from August 18 to December 16, certain tariffs on fresh meat and packing-house products from points in Texas and the southwest to eastern and northeastern points.

The commission has authorized the Virginian Railway to establish a rate of $1.65 a ton on coal from West Virginia to Washington, D. C., in disregard of the long-and-short-haul rule of the law; this to meet the competition of a short line.

STATE COMMISSIONS.

The Indiana Railway Commission has denied the right of the railways operating in that state to raise the minimum freight charge from 25 cents to 35 cents on intrastate shipments.

Complying with a law passed this year by the Minnesota legislature, the railway commission of that state will on August 31 take up the subject of making general rules to fix the percentage relation to govern in making joint rates between common carriers for the transportation of freight and express in carload and less-than-carload lots, will also take up the subject of making rules necessary to govern in the transfer of freight and express between carriers. Persons interested in these matters are invited to offer suggestions to the commission.

The Indiana State Railroad Commission has issued orders exempting from the requirements of the block signal law the following companies, each order referring to a line on which the commission accepts the plea that the business is not sufficient to warrant the expense of introducing and maintaining the block system: Cincinnati, Hamilton & Dayton, on the line west of Indianapolis and on the Fort Wayne division; Chicago, Indianapolis & Louisville, Monon to Michigan City, Wallace Junction to Victoria, Orleans Junction to French Lick and Bedford to Switz City; Lake Erie & Western, Kokomo & Michigan City division and the Fort Wayne, Cincinnati and Louisville division, including the Rushville branch. The commission has refused to extend until July 1, 1913, the time within which the Michigan Central shall make its block system uniform throughout the state of Indiana. The work must be done by next January.

COURT NEWS.

In the United States district court in West Virginia, last week, the Norfolk & Western announced that it would not contest the suits brought against it by the government for violation of law, in running trains on steep grades without a sufficient number of air brakes in use to comply with the statute.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

F. B. Bowes, vice-president in charge of traffic of the Illinois Central, with office at Chicago, has been elected also third vice-president in charge of traffic of the Yazoo & Mississippi Valley.

F. C. MacMillan, formerly general manager at Des Moines, Iowa, of the St. Paul & Des Moines, which since its purchase by the Rock Island is to be known as the St. Paul & Kansas City Short Line, has been appointed vice-president and general manager of the latter road, with office at Des Moines.

Briton I. Budd, formerly president and general manager of the Metropolitan West Side Elevated Railway, has been chosen president of the Chicago Elevated Railways, the new company which has absorbed the four Chicago elevated roads and the union loop.

George P. Herzinger has been appointed district claim agent of the Missouri Pacific, with office at Atchison, Kan. This completes the list of district claim agents appointed under the new organization of the claim department, the other appointments having been announced in our issue of last week. See item in General News Section, page 385.

Operating Officers.

G. Geiger, assistant division superintendent of the Southern Pacific at Sacramento, Cal., has been appointed superintendent of the Copper River & Northwestern, with office at Cordova, Alaska.

E. C. Noe, general manager of the Northwestern Elevated Railroad and the Chicago & Oak Park Elevated Railroad in Chicago, has been appointed general superintendent of the new Chicago Elevated Railways.

T. H. Williams, assistant division superintendent of the Southern Pacific at Stockton, Cal., has been appointed assistant division superintendent, with office at Sacramento, Cal., succeeding G. Geiger, resigned to accept service with another company. W. H. Stillman, trainmaster of the Shasta division, succeeds Mr. Williams, and V. S. Burnham succeeds Mr. Stillman.

E. E. Lille having resigned as superintendent of car service of the Spokane, Portland & Seattle, the Oregon Trunk Railway, the Oregon Electric Railway and the United Railways Company, that office and the office of superintendent of telegraph of these companies are abolished, and the duties of those offices will be assumed on the Spokane, Portland & Seattle and the Oregon Trunk Railway by J. Russell, general superintendent; and on the Oregon Electric and United Railways, by C. A. Coolidge, general manager.

O. C. Castle has been appointed car service agent of the Galveston, Harrisburg & San Antonio, the Texas & New Orleans, Morgan's Louisiana & Texas Railroad & Steamship Company, the Louisiana Western and the Iberia & Vermilion, with office at Houston, Tex., succeeding R. P. Granger, resigned. Mr. Castle was born at West Brownville, Pa., on January 22, 1874, and received his education in the common schools of Cuyahoga Falls, Ohio. He began railroad work in 1893 in the telegraph department of the Pennsylvania Lines, and became an assistant chief clerk in the office of the superintendent of car service of the Baltimore & Ohio in 1900, two years later becoming stenographer and statistical clerk in the office of the general manager. In 1903 he became special clerk to the superintendent of the Buffalo division, and for three years from 1904 was chief clerk to the superintendent of the Pittsburgh division. Since 1907 he has been with the American Railway Association as statistician for the committee on relations between railroads.

Traffic Officers.

J. D. Carter has been appointed commercial agent of the Fort Worth & Denver City, with office at Dallas, Tex.

W. E. Winchell has been appointed traveling freight and passenger agent of the Quitman, Gulf & Northeastern, with office at New Orleans, La.

A. W. MacElveny, traveling freight agent of the St. Louis & San Francisco at Houston, Tex., has resigned to accept service with the Atchison, Topeka & Santa Fe.

O. M. Ellsworth, general agent in the freight department of the Rock Island Lines at Pittsburgh, Pa., has been appointed general eastern freight agent, with office in New York City, succeeding F. B. Mesick, retired. T. W. Bennett, commercial agent at Louisville, Ky., succeeds Mr. Ellsworth.

W. A. Scrivner, commercial agent of the Trinity & Brazos Valley at Forth Worth, Tex., has been appointed division freight agent of the Texas & Pacific, with office at El Paso, Tex. R. H. Carrington, general agent at El Paso, has been assigned to other duties, and the office of general agent at that place has been abolished. G. L. Moore has been appointed commercial agent, with office at Oklahoma City, Okla.

N. M. Leach, traffic manager of the Texas & Pacific and the International & Great Northern, has had his office moved from San Antonio, Tex., to New Orleans, La. Frank Koch, assistant general freight agent of the International & Great Northern at Palestine, Tex., has been appointed assistant to the traffic manager of that road and the Texas & Pacific, with office at New Orleans. J. D. Webb, traveling freight agent of the Texas & Pacific at Dallas, Tex., has had his jurisdiction extended over the International & Great Northern.

Engineering and Rolling Stock Officers.

G. W. Hegel, principal assistant engineer of the Chicago Junction Railway at Chicago, has been appointed chief engineer, with office at Chicago.

M. Dailey has been appointed master mechanic of the Bellingham Bay & British Columbia, with office at Bellingham, Wash., succeeding W. J. McLean, resigned.

F. E. Phillips, assistant chief engineer of the Grand Junction & Grand River Valley, has been appointed chief engineer, with office at Grand Junction, Colo., succeeding E. L. Mosley, resigned to go to the engineering department of the Canadian Pacific.

A. M. Lupfer, chief engineer, and J. B. Ingersoll, chief electrical engineer, of the Spokane & Inland Empire, both with offices at Spokane, Wash., have resigned, and the engineering department has been moved to Portland, Ore., where it will be in charge of R. Budd, chief engineer of the Spokane, Portland & Seattle.

W. H. Fenley, formerly signal engineer of the Chicago Great Western, and lately connected with the Union Switch & Signal Company, has been appointed signal engineer of the Panama Railroad, with office at Colon, Canal Zone. He will sail from New York next week, his appointment becoming effective September 1.

H. Honaker, assistant master mechanic of the St. Louis & San Francisco at Memphis, Tenn., has been appointed master mechanic, with office at Birmingham, Ala. L. E. Foote, road foreman of equipment at Francis, Okla., has been appointed master mechanic, with office at Francis, and J. J. Shaw, division foreman at Enid, Okla., has been appointed master mechanic at Enid. William Henry, master mechanic at Monett, Mo., has been transferred with the same title to Neodosha, Kan. J. F. Long, general foreman of shops at Sapulpa, Okla., has been appointed master mechanic, with office at Sapulpa, succeeding A. S. Abbott, promoted, and B. A. Beland, roundhouse foreman at Springfield, Mo., has been appointed master mechanic, with headquarters at Fort Scott, Kan. See item under General News Section regarding a change in the organization of the mechanical department.

OBITUARY.

John G. Jennings, superintendent of telegraph of the Chicago, Rock Island & Pacific, with office at Chicago, died in Chicago on August 20. Mr. Jennings was born June 4, 1862, at Bellaire, Ohio. He began railway work with the Pennsylvania Lines of West Pittsburgh in 1878, having been successively messenger, yard clerk, operator, train despatcher and chief despatcher with that road. He was superintendent of telegraph of the Chicago, Rock Island & Pacific from 1904 to the time of his death.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The St. Louis & San Francisco is said to have placed an order for 20 locomotives with the American Locomotive Company. This item is not confirmed.

Kansas City Southern, mentioned in the *Railway Age Gazette* of March 10 as being in the market for 29 locomotives, is expected to place this order within a few days.

The Lehigh & New England has ordered two consolidation locomotives from the Baldwin Locomotive Works. The dimensions of the cylinders will be 19 in. x 26 in.; the diameter of the driving wheels will be 50 in., and the total weight in working order will be 145,000 lbs.

CAR BUILDING.

The Detroit United Railways have ordered 50 double truck city cars from the Kuhlman Car Company.

The St. Louis & San Francisco is said to have ordered 250 flat cars from the American Car & Foundry Company. This item is not confirmed.

The Queen & Crescent is said to be taking prices on 22 steel coke cars, 159 steel gondola cars and 175 steel hopper cars. This item has not been confirmed.

The Havana Central, mentioned in the *Railway Age Gazette* of August 18 as being in the market for coal cars, is in the market for 75 all steel 30-ton coal cars.

The Florida and East Coast is in the market for two 60-ft. all steel postal cars, four 70-ft. all steel express cars, two 70-ft. all steel combination cars, and eight 70-ft. all steel coaches.

The Baltimore & Ohio, mentioned in the *Railway Age Gazette* of August 4 as being in the market for a number of baggage cars and postal cars, is in the market for ten 70-ft. baggage cars, five 70-ft. postal cars and five 60-ft. postal cars.

IRON AND STEEL.

The Chesapeake & Ohio is making inquiries for 2,000 tons of bridge material.

The Wabash has ordered 2,500 tons of Bessemer rails from the Illinois Steel Company.

The Wichita Falls Route has ordered 10,000 tons of Bessemer rails from the Illinois Steel Company.

The Chicago & Western Indiana has ordered 1,200 tons of structural material for track elevation at South Chicago from the Mt. Vernon Bridge Company.

The Butte Anaconda & Pacific has ordered 4,000 tons of rails from the United States Steel Corporation. These rails will contain 1/10 of 1 per cent. metallic titanium.

General Conditions in Steel.—The shrinkage in orders due to the depression in Wall street is very much smaller than was expected. The Steel Corporation is receiving orders at the rate of over 30,000 tons a day. Rail orders have been very small, but contracts for fabricated steel have been unusually heavy. Steel men are satisfied with the outlook.

SIGNALING.

It is planned to equip the entire Panama Railroad with automatic block signals and to install interlocking plants at all points requiring the protection and facility of operation which they afford.

Supply Trade News.

H. R. Safford has been made chief engineer of the George B. Swift Construction Company, Chicago.

Hiram Oldershaw, secretary of the Vulcan Iron Works, Chicago, died at his home in New Britain, Conn., on August 18, at the age of 65.

Joseph P. Topping, vice-president of the hardware firm of Topping Bros., New York, died suddenly of heart disease at his home on August 17, at the age of 55. Mr. Topping was a member of the Hardware Club and of the Engineers' Club.

Henry W. Swoyer of the Richmond plant of the American Locomotive Company, New York, has been made general manager of the Brooks plant of that company, succeeding W. A. Wheatley, resigned to go to the Canadian Locomotive Company, Kingston, Ont.

T. W. Snow, who has been western manager of the Otto Gas Engine Works, Chicago, for the last 12 years, announces that the T. W. Snow Construction Company, Chicago, has purchased all the patterns, drawings and tools of the railway department of the Otto Gas Engine Works, and that in the future it will manufacture the railway specialties that he has been handling. These will include repairs for coaling stations, water stations and standpipes previously sold under the name of the Otto Gas Engine Works, which will be handled with the consent and good will of the Otto Gas Engine Works.

The McKeen Motor Car Company, Omaha, Neb., has received an order from the Victorian Railways of Australia for two standard all-steel 70-ft. motor cars. While these cars will be practically the same as the standard design, they will have the following special features: The coupling device will be the same as that used on the railways in England, the cars will be divided into first and second class passenger and smoking compartments, and the track gage will be 5 ft. 3 in.. The McKeen company has also received an order from the Monmouth, Macomb & Southern, Monmouth, Ill., for a standard 55-ft. motor car, and one from the Oregon Short Line for a fourth 70-ft. motor car. There are now 118 of these cars in service in the United States, and 45 railways are either running or have ordered them.

TRADE PUBLICATIONS.

Chicago & Alton.—The passenger department of the Chicago & Alton has issued a booklet entitled Summer Trips to Vacationland, giving views and descriptions of the summer resorts on Lake Michigan by his road.

San Pedro, Los Angeles & Salt Lake.—The passenger department of the San Pedro, Los Angeles & Salt Lake has issued a folder giving special time table and colonist rates, effective September 15 to October 15, 1911.

Derails.—The Hayes Track Appliance Co., Richmond, Ind., has published a small illustrated folder telling how Hayes Derails were adopted as standard on the Harriman lines after undergoing a six-year test on the Southern Pacific under most diversified conditions.

Great Northern.—The passenger department of the Great Northern has issued a 36-page booklet entitled North Dakota, describing opportunities for farmers, stockmen and dairymen. The booklet gives current land prices, crop and soil conditions and a colored map of the state.

Telephones.—The General Electric Company, Schenectady, N. Y., has devoted bulletin No. 1105 to the selection, installation and wiring of inter-phone systems. This bulletin illustrates and describes 12 different systems, and tells how to choose the best system for each service. It also includes valuable information on the installation of sets.

Turbines.—The Kerr Turbine Company, Wellsville, N. Y., has issued catalog No. 19 of its turbines, ranging from 2 to 600 h. p., for high, mixed or low pressure steam. The principle, construction and advantages of these engines are clearly

described, and illustrations, dimension tables and instruction for writing for estimates are included.

Lathes.—The Niles-Bement-Pond Company, New York, has published an attractive catalog of its engine and gun lathes. Pond engine lathes are furnished either belt or motor driven and with three styles of drive: double back geared, triple geared and geared head. Bement engine lathes are built to swing work with a minimum diameter of 84 in. The catalog includes detailed descriptions and unusually large photographs.

Fireproof Products.—The Dahlstrom Metallic Door Company, Jamestown, N. Y., has published a folder called "Modern Travel," in which it tells how its fireproof products may be used in the interior construction of cars in such a way that it is almost impossible for the eye to distinguish it from wood. The folder then goes on to say that these products combine great rigidity, and little weight besides their fireproof qualities.

Coal Crushers.—The Jeffrey Manufacturing Company, Columbus, Ohio, has devoted a small illustrated folder to its new single-roll coal crusher. The efficiency of small size stoker coal is well known, and these crushers are built to reduce any kind of coal to any size lumps in a single operation. Simplicity and strength characterize their construction and their capacity is large. The descriptions, diagrams and tables show clearly the many merits of these machines.

Rings.—The Standard Steel Works Company, Philadelphia, Pa., has published a very complete catalog of its rings, shells and ring dies. This catalog, which is well illustrated, shows many types of this class of material, and specifies the purpose to which each is best adapted. It contains cuts showing gear rims and blanks for built-up gears for heavy electric service, and built-up wheels for bascule bridges. Dimension tables of peened, screw, welded and plain pipe flanges are also included. All parts are made of forged and rolled steel.

Titanium Rails.—The Titanium Alloy Manufacturing Company, Pittsburgh, Pa., has published a booklet called Titanium, The Best Rail Ever Rolled, in which it gives many convincing proofs of the superiority of this rail over others. The booklet says that titanium is the most powerful of all deoxidizers and removes at least a portion, if not all, of the nitrides as well. In one case titanium rails have withstood the wear and tear of traffic for a year without showing any appreciable wear where no other rails could be used for more than eight months. Some excellent photographs show titanium rails in perfect condition adjacent to other rails in a much damaged condition after they have both undergone the same service.

FOREIGN RAILWAY NOTES.

The school for railway service at Linz, in upper Austria, which was ten years old, was transformed in 1910 into course of instruction for the middle grades of railway service, and the railway officials of various branches of service were appointed instructors. The course includes the following subjects: Commercial service, 7 hours per week; transportation, 5 hours; telegraph, 2 hours; administrative service, 2 hours; materials, 2 hours; accounts, 2 hours; traffic geography and statistics, 2 hours; railway technology, 2 hours; railway law, 2 hours; rail[illegible], 1 hour; [illegible], 1 hour; practice and inspections, 8 hours. All but history and geography are taught by active railway employees.

We noted some time back the increase of Russian freight cars [illegible] through the use of the pure Iron which [illegible] the figures for weight on the axle of the cars and printed in new ones. Latterly instructions were given to further increase the capacity, making it 32,500 lbs., and in many cases the trans[illegible] have been made in the most simple way. At least the authorities report that only a small part of the money assigned for the purpose had been used up to March last, but that [illegible] owing to [illegible] and delays on account of the [illegible] greatly increased, consequently the estimates were [illegible] to permit axle loads [illegible] to carry a load of 17,600 lbs. We must remember that on our lines [illegible] two poles so that each [illegible] 8,750 lbs. per wheel, plus one [illegible] of the weight of the car.

Railway Construction.

New Incorporations, Surveys, Etc.

Algoma Central & Hudson Bay.—An officer writes that the extension to be built by this company is to start from Hobon, Ont., on the Canadian Pacific, which is 194.5 miles north of Sault Ste. Marie. The route follows the east side of Oba lake and river, to a point on the National Transcontinental (Grand Trunk Pacific), at a point 142 miles west of Cochrane. The contract has been let to the Superior Construction Company, Sault Ste. Marie, and the work covers heavy clearing on the entire route about 101 miles. On the first 50 miles the average quantities per mile are as follows: Excavating solid rock, 5,238 cu. yds.; loose rock, 5,760 cu. yds.; common excavation, 14,625 cu. yds., and overhaul, 36,850 cu. yds. The balance of the work will average per mile: Solid rock, 93 cu. yds.; loose rock, 610 cu. yds.; common excavation, 16,330 cu. yds., and overhaul, 35,480 cu. yds. There will probably be two steel bridges in the future. The present construction work calls for putting up 25 pile bridges. There will be a number of stations, water tanks and a coaling plant. Work is to be started at once. Maximum grades will be 0.6 per cent., and maximum curvature 6 deg. (August 11, p. 303.)

Work is now under way by the Superior Construction Company, Ltd., Española, Ont., building an extension from Crean Hill. The contract includes the track laying, ballasting, stations, tank buildings, etc., on the Algoma Eastern, formerly the Manitoulin & North Shore. (February 24, p. 368.)

Algoma Eastern.—See Algoma Central & Hudson Bay.

Baltimobe & Virginia.—An officer writes that work is now under way on a line through Anne Arundel and Calvert counties to Drum Point. The grading work has all been finished. There is to be three important trestles. H. L. White, president, and L. E. Holloman, secretary and treasurer, Baltimore.

Bangor & Aroostook.—This company has applied to the railway commissioners of Maine for permission to make ten changes in the location of the line on the Ashland branch between the junction at Oakfield, Me., and the station at Squapan junction. Many of the curves are to be eliminated and the grades will be reduced. The total construction will be 92,952 ft., including a bridge over the east branch of the Mattawamkeag river at Smyrna Mills, and three other small bridges. The station at St. Croix is also to be moved a short distance.

California Roads.—The Palmer Annex Oil Company has started work on the construction of a line, it is said, from Guadaloupe, Cal., to the Cat canyon fields, about 30 miles.

Canadian Pacific.—Train service on the Forward division has been extended west to Ogema, Sask., and on the Alberta division a new branch has been opened between Irricana, Alb., and Standard.

Central California Traction.—This company will build a line, it is said, from Lodi, San Joaquin county, Cal., up Dry creek, with extensions to Jackson and Sutter creek.

Coos Bay Traction.—This company is planning to build from Coos Bay, Ore., east to Roseburg, about 50 miles. G. F. Averill, Marshfield, is interested.

Crystal City & Uvalde.—Work is now under way on an extension from Gardendale, Tex., east to Fowlertown, 12 miles. The line is eventually to be continued to Tilden, thence to the new gulfport of Aransas Pass, about 150 miles. (May 26, p. 1222.)

Cumberland Valley.—An officer writes that it is understood that the Cumberland Valley will ask for bids at an early date for between 400,000 and 500,000 cu. yds. of grading in connection with the proposed revision of line through Chambersburg, Pa. (June 9, p. 1333.)

Dominion, Donnegan & Peace River.—According to press reports, J. D. McArthur, Winnipeg, Man., who has a contract for building an extension of the Hudson Bay Railway for the Dominion government, from The Pass, Keewatin, northeast to a point on Hudson bay, has bought the rights and property of the D., D. & P. R., and is arranging to make surveys for a second line to be built to Hudson bay.

Houston & Texas Central.—This company has decided to build a cut-off, it is said, from Giddings, Tex., northeast via Caldwell to Stone City, about 50 miles.

Intercolonial Railway.—Bids are wanted by L. K. Jones, secretary, department of railways and canals, Ottawa, Ont., up to September 15, to build section No. 1 of the Guysboro-Country Harbor line, from Guysboro, N. S., to Country Harbor cross roads, thence to deepwater, Country Harbor. Plans are on file with the chief engineer of the department of railways and canals at Ottawa; the chief engineer of the Intercolonial Railway at Moncton, N. B., and at the office of the board of trade at Halifax, N. S.

Bids are also wanted up to September 15 for building a branch line from Dartmouth, N. S., to Deans.

Interurban Construction Company's Lines.—An officer writes that grading work is now being carried out by the company's men on an electric line from Invergrove, Minn., south via Hastings, Cannon Falls, Pine Island and Oronoco to Rochester, about 80 miles. A. T. Stebbins, president, Rochester, and W. L. Sountag, general manager.

Kansas City, Mexico & Orient.—See an item regarding new construction on this road under Railway Financial News.

Long Island Railroad.—Bids are to be opened by the Long Island August 28, for the elimination of grade crossings and electrification work on the North Side division between Flushing, N. Y., and Port Washington. (May 5, p. 1084.)

Maine Roads (Electric).—It is understood that the line from Skowhegan, Me., via East Madison village to Athens, 10 miles, will be built. The towns of Athens and Skowhegan have each voted to take $15,000 in stock, and the Maine Central will probably take an equal amount. The promoters include H. D. Eaton, Waterville; G. F. Ayer and J. E. Chapman, Athens.

Malibu Tidewater.—Incorporated at Los Angeles, with $800,000 capital, to build a line between Santa Monica and Oxnard, with a number of extensions. The company owns 15 miles of line, built several years ago, into the Rindge lands, to the north of Santa Monica, and as soon as the necessary right-of-way is secured the old roadbed is to be rebuilt and put in shape for the operation of heavy equipment. M. K. Rindge, president, and N. D. Darlington, chief engineer.

Manitoulin & North Shore.—See Algoma Central & Hudson Bay.

Missouri, Oklahoma & Gulf.—The Oklahoma City Terminal Railway was organized August 7, with $75,000 capital, to build a terminal on the proposed extension to Oklahoma City, Okla., of the Missouri, Oklahoma & Gulf. (August 11, p. 304.)

Oakland & Antioch (Electric).—An officer is quoted as saying that the company will build a branch from Walnut Creek, Cal., to Danville, seven miles. The company has under consideration the question of building a line to Martinez.

Oklahoma City Terminal.—See Missouri, Oklahoma & Gulf.

Oregon Short Line.—According to press reports, this company is planning to build an extension in Idaho to cover both sides of the valley between Idaho Falls and St. Anthony, both east and west of the present St. Anthony-Idaho Falls branch; in all, about 80 miles. The plans include an extension of the present spur out of Elva to Grant, north to the Elgin bench country in Fremont county, thence to St. Anthony, crossing the main line at St. Anthony and extending southeast to a point three miles north of Idaho Falls.

Pacific Electric.—According to press reports, this company will build a line from Redlands, Cal., to Highland, five miles.

Pecos Valley Southern.—This company, which operates a line from Pecos, Tex., south to Toyahvale, 41 miles, is planning to build an extension of about 45 miles, to Alpine, and ultimately south to Boquillas, on the Rio Grande border, about 90 miles additional. (May 26, p. 1223.)

Salt River Valley (Electric).—An officer writes that it has not yet been settled when contracts will be let to build from Phoenix, Ariz., to Scottsdale; also from Phoenix, via Tempe and Mesa to Chandler, and from Phoenix, via Glendale to Peoria. F. M. Winter, president, and J. C. Harwood, superintendent of construction and purchasing agent, Phoenix. (August 11, p. 304.)

Stuttgart & Southern.—Incorporated in Arkansas with $300,000 capital, to build from Stuttgart, Ark., south through Arkansas county to Bayou Meto, 25 miles. The incorporators include J. I. Porter, E. Tallman, J. L. Ingram and G. C. Lewis.

Texas Roads.—According to press reports from Roma, Tex., T. H. Holson, representing a syndicate of eastern men, is back of a project to build from Del Rio, southeast parallel to the Rio Grande, via Eagle Pass, Laredo, Roma and Rio Grande City to Sam Fordyce. (May 19, p. 1187.)

Toledo & Siletz Railroad & Navigation Company.—Incorporated in Oregon with $1,000,000 capital and office at Toledo, Ore. The plans call for building from Toledo, in Lincoln county, northeast to Dallas, in Polk county, about 40 miles. The company also plans to operate a system of boat lines on the Yaquina river. The incorporators include: C. R. Vrosno, E. J. Avery and J. Kentta.

Twin City Light & Power Company.—Work is now under way building a line from South Bend, Wash., to Raymond, five miles.

RAILWAY STRUCTURES.

Auburn, Wash.—The Northern Pacific is asking for bids for putting up a 25-stall roundhouse machine shop and coaling station at Auburn.

Buzzards Bay, Mass.—The New York, New Haven & Hartford has ordered from the Strauss Bascule Bridge Company, Chicago, a 40-ft. single leaf, double track bascule bridge to be used over the Cohasset Narrows, near Buzzard's Bay.

Cameron Lake, B. C.—A contract has been given to W. C. Holt, Victoria, for putting up a station at Cameron Lake for the Esquimalt & Nanaimo.

Chicago.—Darius Miller, president of the Chicago, Burlington & Quincy, in an interview in Chicago says that it is hoped that work on some features of the new union terminal in Chicago will be started next spring, though final plans have not been adopted. The rough estimate of the total cost of the new station and terminal is $25,000,000, of which $14,000,000 will be for land, $5,000,000 to $6,000,000 for station, and $5,000,000 for changes in track and other improvements. It is expected that the station will be built east of Canal street, between Jackson and Adams streets, with trainsheds extending north and south long enough to accommodate 15 car trains. The main entrance will be on Canal street. The terminal will thus occupy practically the entire space between Chicago river and Canal street, and between Van Buren and Madison streets. Mr. Miller denied the report that it has been decided to use electric-motive power. The station is to be built and operated by the Union Depot Company, in which each of the five roads using the station own one-fifth interest.

Dallas, Tex.—The Missouri, Kansas & Texas has awarded the contract for building a six-story office building. Plans have been completed and construction will begin as soon as possible. See Smithville, Tex.

Denison, Tex.—See Smithville, Tex.

Fall River, Mass.—Bids are wanted by the city auditor, up to August 29, for building a reinforced concrete bridge over the tracks of the New York, New Haven & Hartford at South Park, Fall River.

Flushing, N. Y.—See Long Island Railroad under Railway Construction.

Ft. Worth, Tex.—See Smithville, Tex.

Galveston, Tex.—The Gulf, Colorado & Santa Fe has let the contract for building the new roundhouse, storehouse, blacksmith shop, machine shop, power house and sand house mentioned in the *Railway Age Gazette* of July 14. The work will begin immediately and will be completed about January 1, 1912, at an estimated cost of $100,000.

Glenn, Cal.—According to press reports, the Colusa & Hamil-

ton will build a station at Glenn. This company was organized to build a 60 mile line from Harrington, on the Southern Pacific, to Hamilton.

Greenville, Tex.—See Smithville, Tex.

Kansas City, Mo.—The George A. Fuller Construction Company has sublet a contract to Callahan Bros. for the removal of 250,000 cu. yds. of earth for the basement of the new union station. The work will cost from $60,000 to $100,000, and will be finished in four months.

Port Arthur, Ont.—The Canadian Northern has given a contract to J. A. Whalen, Port Arthur, it is said, to build a bridge at a point 59 miles east of Port Arthur.

Quebec, Que.—Bids are wanted by P. E. Ryan, secretary of the commissioners of the Transcontinental Railway, at Ottawa, Ont., up to August 31, for the construction and erection of a terminal station in the city of Quebec. Plans are on file with Gordon Grant, chief engineer, Ottawa, and A. E. Doucet, district engineer, Quebec.

Ray, Tex.—See Smithville, Tex.

Reading, Pa.—Bids are wanted by A. L. Rhoades, county comptroller, Reading, up to September 14, to build a reinforced concrete viaduct over the Schuylkill river at the foot of Penn street, Reading. The structure will be 1,350 ft. long, 80 ft. wide, and will have nine 48-ft. arches, five 110-ft. arches and retaining walls. It is being built to carry street railway cars and highway traffic.

Seattle, Wash.—The Oregon-Washington Railroad & Navigation Company will build a new machine shop on Delaware avenue in Seattle, to cost $30,000.

Smithville, Tex.—The Missouri, Kansas & Texas, complying with a state law, has started construction on sheds for repairing and overhauling cars at the following points in Texas: Dallas, Denison, Ft. Worth, Greenville, Ray and Smithville.

Smyrna Mills, Me.—See Bangor & Aroostook under Railway Construction.

Tampa, Fla.—Bids are wanted by the board of public works, Tampa, up to September 6, for the construction of a reinforced concrete or concrete steel bridge, with bascule lift, over the Hillsboro river at Lafayette street, Tampa. The bridge will be 390 ft. between abutments, 80 ft. wide, with a 75-ft. draw span, and is to carry two tracks for street railways. D. B. McKay, chairman.

Wichita, Kan.—The Wichita Union Terminal Company has been authorized by the Atchison, Topeka & Santa Fe, the Chicago, Rock Island & Pacific, the St. Louis & San Francisco, and the Kansas City, Mexico & Orient to separate grades through the city and build a new union station. The building will be located on the south side of Douglas avenue, between the present stations of the Santa Fe and the Rock Island. The terminal company has been authorized to issue $2,500,000 in bonds to carry out the project. Douglas avenue, the principal street of the city, is now crossed at grade by the Santa Fe, Rock Island and Frisco. The tracks will be elevated through the city for a distance of [illegible] and subways will be built at Douglas avenue, First street and Second street. There will be a four track main line from the Frisco connection on the north to the Rock Island crossing on the south, with additional through passenger track and spur at the station. At Kellog street a re-enforced concrete viaduct nearly half a mile long will be built over the tracks of the Terminal Company and over the tracks leading to the Santa Fe, Rock Island and Frisco freight houses. C. J. Tilden, formerly chief engineer of the Santa Fe, will be the engineer in charge of the work.

The work of raising the scales of railway employees in Canada is being seriously pressed. The Western Railway Labor agitation has been started from the action of the Amalgamated Society of Railway Employees and the Transportation Brotherhoods, which is a double combination. Representatives of the railway union have conferred with members of the Carriage Builders' Union with the result that the latter is preparing to join. The Locomotive Engineers are also contemplating similar action.

Railway Financial News.

Carolina, Clinchfield & Ohio.—See Seaboard Air Line.

Central of Georgia.—The payment of the full 5 per cent. interest on the $4,000,000 first income bonds and the $7,000,000 second income bonds and a dividend of 1.458 per cent. on the $4,000,000 third income bonds has been ordered by the directors, payable October 1. These payments are for the fiscal year ended June 30, 1911. In 1907 and for two years previous 5 per cent. was paid on each class of security. In 1908 5 per cent. was paid on the first incomes, 2.8 per cent. on the second incomes, and none on the third. In 1909 and 1910 2.3 per cent. was paid each year on the first incomes and nothing on the others.

Chicago, Rock Island & Pacific.—At the annual meeting on October 12, the shareholders will be asked to authorize the payment of principal and interest of the $10,000,000 first mortgage bonds of the St. Paul & Kansas City Short Line, and the payment of principal and interest of $453,600 notes of the Rock Island, Arkansas & Louisiana for the purchase of 23 miles of road of the Little Rock & Hot Springs Western. (August 4, page 270.)

Detroit River Tunnel Company.—See Michigan Central.

Kansas City, Mexico & Orient.—This company proposes soon to issue additional 4 per cent. 50-year first mortgage bonds to the amount of $4,000,000, the proceeds to be used to build from Alpine, Tex., to San Sostenes, Mex. A line between these two points would complete the company's railway from its northern terminus to the west coast of Mexico, except for two short sections. The amount of these 50-year bonds now outstanding is $18,199,000. It is said that now, as in the case of former sales, the company will give a bonus in the shape of shares of common and preferred stock of the railway and of the company which has been formed to develop mineral lands in Mexico near the line of the road.

Little Rock & Hot Springs Western.—See Chicago, Rock Island & Pacific.

Michigan Central.—H. B. Ledyard, chairman of the board, has given out a statement to the following effect in regard to the standing of the Detroit River Tunnel Company bonds: "The original mortgage to the Guaranty Trust Company provides for an authorized issue of $30,000,000, of which $14,000,000 was reserved for future issue to provide for additions, equipments, etc. Of the remaining $16,000,000 only $14,000,000 was sold, about $12,000,000 of the proceeds of which has now been spent. A supplemental agreement has been made between the railway company and the trust company by which the $2,000,000 bonds of the $16,000,000 issue not sold are brought under the restrictions applying to the reserved $14,000,000."

Rock Island, Arkansas & Louisiana.—See Chicago, Rock Island & Pacific.

Seaboard Air Line.—It is understood that there will be a special meeting of directors in the latter part of September to act on the proposition to lease the Carolina, Clinchfield & Ohio.

This company has sold to Blair & Co., $1,500,000 4½ per cent. equipment notes maturing in 20 equal semi-annual instalments. The issue is to pay for 1,230 freight cars, 9 passenger cars and 25 locomotives ordered last April.

The New York Stock Exchange has listed $19,000,000 refunding mortgage 4 per cent. bonds, and has authorized the listing of $5,295,000, more up to January 1, 1912. The issue is mostly for refunding.

Southern Pacific.—A press despatch from California says that this company is to buy the Sonora Railway, in Mexico, which extends from Nogales on the Arizona line southward to Guaymas, 263 miles. The road is owned by the Atchison, Topeka & Santa Fe, but operated under lease by the S. P. It is of almost the same length as that section of the Santa Fe main line from Needles westward to Mojave, where the condition is exactly opposite, the road being owned by the Southern Pacific and leased to the Santa Fe. The directors of the Santa Fe have already laid before the stockholders a proposition to purchase this Southern Pacific line. The two proposed sales would offset each other, so far as mileage is concerned.

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AN energetic station agent or yardmaster, if [illegible] hand, could often economize labor or material to better effect than could the superintendent; and likewise the superintendent, if not held down so rigidly to estimates made, months previously, by his superiors, could manage his division more economically than is possible under regulations that must be rigidly uniform throughout a dozen divisions. A recognition of these truths leads one to sympathize with "Yardmaster," whose letter we print in another column. It is true, as he says, that if the officers were to give the station agent suitable authority they could see his ambition set him to thinking, to the benefit of the company in many cases. At the same time, we are bound to offer an excuse (not a defense) for the management. The manager is fearful, and with good reason, that too many of these subordinates will prove to be small-size men. He would find that to get the results promised by our correspondent he ought to have begun five years back, with educational processes. The agents, foremen and others must learn to do by doing, and that is costly. Still, that is the way in which all of us have to learn most of the useful arts of life. However well the general office does its work, there will always be room for the exercise of judgment and executive ability in the station, the yard and the small shop; and, given the right men—men who have been trained to think since 1906—an efficiency scheme of 1911 not only need have no antagonism to this idea of local initiative, but it can join hands with and make use of it. Our correspondent must remember another thing. He sees waste, and criticises the officers for not stopping it. But the labor leaders are criticising the same men because they do stop waste. Yard engines are not always idle waiting for way bills; sometimes the idleness is due to the brotherhood's "agreement"; it is an instrumentality for increasing pay, like the full-crew law. The yardmaster who sets out to economize will find that unenterprising officers are not his only antagonists.

A BULLETIN of the Bureau of Railway Economics shows that railways operating 60 per cent. of the mileage of the country had 1,069,570 employees on their payrolls on April 30, 1910, and only 987,790 on April 30, 1911. This was a reduction of 81,780, or 7.6 per cent. The number per 100 miles—there being meantime an increase in mileage—declined from 777 to 707, or 9 per cent. The bulletin mentioned is given elsewhere. It has been charged by some that the retrenchments reflected in these figures have been made in retaliation for the decisions of the Interstate Commerce Commission refusing to let the railways advance their rates. There are other much more probable causes for them. During the fiscal year 1910 business was good. The railways, therefore, increased the number of their employees to 1,699,420, or 196,597 more than the number in the fiscal year 1909. Toward the end of the calendar year 1910 earnings began to fall off. The decline became marked in the early part of 1911. During the first four months of the calendar year, ending April 30, operating revenues of all roads declined 3.6 per cent. Operating expenses decreased 1.1 per cent., with the result that net revenues declined 9.6 per cent. The decision of the commission told railway men that they could not get more net earnings by increasing rates; and, naturally, they sought to accomplish the end through reductions in expenses. The decline in business resulting in reductions of gross earnings had as much to do with the retrenchment policy as did the decision. The decline in earnings continued through May. In that month total operating revenues decreased $4,355,000, or 4.4 per cent., as compared with the same month of 1910. During the first five months of the present calendar year operating revenues of all roads declined 3.8 per cent., and net revenues declined 8.5 per cent. For the 11 months of the fiscal year ending May 31, there was a decrease of operating revenues and an increase of expenses resulting in a reduction in net revenue of 7.4 per cent., in spite of the fact that there was meantime an increase in the mileage operated. Concurrently with these reductions in earnings have gone on the

reductions in force. It is an interesting question what effect on the condition of the properties these retrenchments are having. The railway managers resented Mr. Brandeis' charge that the roads are inefficiently managed. Nevertheless, he stimulated them to diligence in seeking places to effect savings. Many of the economies that have been made have resulted from this and have not involved any impairment of the service to the public or deterioration of the properties. On the other hand, some retrenchments have been made which have affected service and the physical condition of the properties. But railway managers, like all other prudent business men, have to cut their coat according to the cloth. The Interstate Commerce Commission told them they should get increased revenues by greater economy in operation instead of by increases in rates; and they are doing it.

THE National Highways Protective Association is keeping a record, made up from the daily papers and kept as complete as possible, of all grade crossing accidents occurring in New York and New Jersey; and, of course, it finds the number appalling. This action, laudable in its motive, can hardly be of much value except to make plain its own uselessness. In other words the problem of grade crossing safety is of such magnitude and gravity that only the most heroic measures are adequate to its settlement. Statistics may almost be said to have lost their virtue. The facts which the association proposes to make public afford not the slightest enlightenment beyond what is already available in the state commission reports. That indefinable body called "the public" may read a few harrowing details which it has hitherto ignored; but it must be that the public's agents, the legislators, know their duty already, for the appalling figures showing the heavy totals of deaths and injuries at crossings have been laid before the legislatures of New York, New Jersey and the other populous states each year for a long time. What is to be done with this widespread and depressing problem? As in the case of the trespasser nuisance, the problem would undoubtedly be much nearer solution if the larger and more powerful body, the state, could assume the functions of the towns and cities in crossing removals. Massachusetts and New York have taken progressive action; but in both states the municipalities still bear a share of the burden, and the inability or unwillingness of these to shoulder even a small part of the heavy cost of grade changes is a principal obstacle in the way of reform. Interminable litigation or negotiations between railways and cities are at this moment the continuing causes of perpetual dangers at many crossings. At Worcester, Mass., the new union station, just completed, marks the close of a crossing campaign that has lasted a dozen years or more. To further shift local tax problems and governmental rights from the town to the state admittedly would be difficult, if not impossible; we do not know but the plan would encounter constitutional prohibitions. But if a state may rightfully build highways and costly bridges, why not pay for abolishing railway crossings? So far as the railways are concerned, there ought to be an advantage in dealing with a single body throughout a hundred miles of line rather than with a score of governmental units. But, whatever may be the difficulties and doubts concerning changes in the law, there can be no doubt that as things are under the present regime, the only force that has much power to hasten crossing improvements is the force of the tragedies that occur every now and then. Logically, improvements will not proceed much faster unless the tragedies

time ago in Chicago, and the meeting was marked by interested discussion of the technical phases of gardening. This association was formed in 1907 with 17 members. It has since held four conventions, and the membership has increased to 150, representing 35 roads. This progress is entirely due to the efforts of individual employees who are anxious to see the practice of horticulture on railway lands gain the recognition which it deserves. Although several roads have maintained departments for carrying on such work, the gardeners in charge have in the main been denied encouragement by railway managers in enlarging the field of their work and in introducing it on new roads. An expenditure made for planting flowers or sodding a cut may not result in as definite an increase in gross earnings as a similar expenditure for operating a freight train. However, the appearance of well kept parks and flower beds at stations, of neatly sodded banks in deep cuts and of fresh flowers on dining car tables are very effective in adding to the pleasure and comfort of travelers, and any such effort of a railway manager to please his patrons will win for his road many friends who not only will travel that way more often in the future, but will also influence their friends to go with them. Such a body of friendly patrons is also of great value to the road in preventing radical and ill-advised legislation. The roads which have practiced gardening have also found that the products of the gardener's work have a good influence on employees in making them more contented and in influencing them to be more careful in their work, which usually means that they are saving the company money. The sodding of cuts has the further argument in its favor that it prevents washing, thereby reducing maintenance costs, and the maintaining of station parks can be justified on the ground that without proper surroundings the value of a well-designed and costly station is considerably depreciated. The fact that some of the roads which first adopted gardening are now the most ardent advocates of the system is the best proof of the value of the investment. Several methods have been devised by railway gardeners materially to improve the appearance of the right of way at very small cost, the most common method being to offer prizes to station men, flagmen and tower men for their efforts along this line. Many other means of improving existing conditions are being devised, and the members of the Railway Gardeners' Association are taking the lead in this commendable work.

THE SUSTAINING POWER OF PASSENGER TRAFFIC.

THE Interstate Commerce Commission's returns for 1910, which we have heretofore printed, show the sustaining power of the railway passenger business of the country, not only absolutely but as compared with freight. Repeating some of these returns very briefly, they show in passenger miles per mile an increase, since 1901, of 54 per cent., as compared with 43 per cent. in freight ton miles per mile; and even during the panic period, 1907-8, they increased about 5 per cent., while freight business decreased nearly 8 per cent. The persistency of comparatively good passenger business as contrasted with freight in a period of business depression may indeed be accepted as a normal fact as well as its stronger sustaining power in general as established by the records of the last decade. It shares in this respect somewhat the same quality as the street railways, though in less degree. Hard times in business admittedly hits the freight business first, particularly that branch of it that covers factory products; passenger traffic is affected later and often only after a considerable interval. Yet, on the theory that business travel should go with business itself, one would

efficient agency of business it must have promoted the freight traffic that profits by every new aid in production. Incidentally, it has affected that active class, business and professional, that before its use traveled more. To it is to be added the automobile, likewise affecting a wealthy group of habitual travelers; and, finally, there has been the extension of competing street railways, using the term to include cross-country and long-distance lines.

Taking up these forces, originally or now giving service similar to steam railway travel, the long distance telephone has had hardly a perceptible qualifying feature. Now and then it may enable Brown to notify Smith to make a railway journey, but in the vast majority of cases it is a preventive; and its remote stimulus of railway travel is so small as to be negligible. Not so, however, with the parallel street railway. At first an active and serious rival of the steam line, it has now, apparently, taking the country as a whole, become, in its secondary stage, a feeder. A small rival still between near together stations of the steam line, it has grown more and more to be a feeder from farther points. Its rivalry has been sunk in its character as a subsidiary, saying nothing of the larger values of the electric line as a direct lateral and its facilities for focussing travel at the urban station. The automobile has the same duplex character of feeder and rival. It competes with the steam line at many points and often on long distances, but it also brings the home, the shop and the store in closer touch with the station. The rural home of wealth, formerly remote, is now hardly, by figure of speech, per automobile, across the street from the steam railway. The maxim that "travel makes travel," may prove as true in the relations of the automobile to the steam road as in the case of the trolley.

But there have been more positive elements of support in the passenger traffic. One has been the progressively increasing wage of the laboring classes. During the last decade, but especially since 1906, the higher wage has undoubtedly increased what may be called the traveling potentiality of the great wage-earning group. Its railway journeys may not be long nor individually many in number. But the size of the group makes a small percentage of increase large when expressed in passenger miles. Another influence, and perhaps a prime factor, in sustaining passenger traffic is the swift growth of the American city and large factory town as compared with the country districts. That it is the active center of population with its intensive and varied affairs that fills the passenger train relatively rather than the rural station stands with the assertion. Finally, there are forces more subtle and obscure that sustain and increase the passenger business. It would be interesting could we measure the higher railway comforts of the traveling public, the temptations of lower fares, expressed more specifically in the mileage book, the increased habit of travel bred by wealth and luxury. They are minor components, but they are there.

THREATENED STRIKE OF RAILWAY SHOP EMPLOYEES.

IT is only a short time since railway officers felt they were through for a while with negotiations and arbitrations about changes in wages and conditions of employment. They have made settlements with all classes of their organized employees; and business conditions did not seem to invite new demands. But now the press teems with reports of strike votes by employees in the shops of western roads. The main storm center is on the Harriman Lines. The various roads belonging to the Harriman system have, individually, contracts with the individual organizations of their shop employees. These provide that if either party desires their revocation 30 days' notice shall be given. Without giving the stipulated notices, the shop employees have demanded that the railway managers recognize a new federation of the various organizations of shop employees. The officers of some railways have done so. Those of the Harriman Lines have refused. They believe that contracts with the employees of each road should be made by that particular road; that recognition of the federation would give to it and its leaders excessive power, enabling them, perhaps, to tie up the whole system of 18,000 miles, because of grievances of men in one organization on one road; and that, in any event, they should not be asked to make contracts with the federation while they have contracts with the individual organizations.

Spokesmen for the employees say all they wish now is recognition for the federation. But they wish it as a means to certain ends. What those are is indicated by the proposed rules governing shop employees which they intend to press on the officers of the Harriman Lines through the federation if it shall be given recognition. These proposed rules were given in the *Railway Age Gazette* of August 25, 1911, page 383. Nine hours are now a day's labor in the shops of the Harriman Lines. It is proposed that this shall be reduced to eight hours, and that all mechanics, apprentices and semi-skilled men and helpers shall be granted a 7-cent flat increase per hour. Mr. Kruttschnitt says this would mean an increase in pay of 23 per cent., and a reduction of hours, etc., amounting to 13 per cent. more. It is further proposed "that no employee shall work by piece premium or bonus system. Where same is now in existence it shall be discontinued upon the signing of this agreement." A few months ago Mr. Brandeis, before the Interstate Commerce Commission, held the railways up to scorn because they had not generally applied the principles of "scientific management." He said that if they would do so they could save $1,000,000 a day. Press and public accepted this view, and the railways were roundly criticized for inefficient management. The most important feature of so-called "scientific management," is the payment of wages by the piece, premium or bonus system, the object of which is to reward each employee according to his merits, and thereby increase the average amount of work done, increase the wages received per employee, and, at the same time, reduce the expense of operation to the company. If the payment of wages according to the merits of individual employees be a feature of true scientific management, the shop employees of the Harriman Lines are threatening to strike to establish the principle that scientific management shall not obtain in railway shops.

Another rule demanded is that, "employees shall not be requested to undergo any form of physical examination or make out any form of personal record." The purpose of physical examinations is to test the physical competency of applicants for employment. In case of accident in its shops the railway is liable in damages to the person injured. The proposed rule is in effect a demand that the railway shall not make rules which will protect it against the results of employing incompetent workmen. The object of requiring the filling out of personal record forms is to enable the management to ascertain where candidates for employment have worked, what their experience has been, and why they have not stayed where they have been employed. To demand that railway managements shall not look up the past of prospective employees is to demand that they shall deliberately abstain from getting information as to their character and their fitness for employment.

Another proposed rule is: "Employees injured or becoming sick while in the service shall, if necessary, be sent to hospital for treatment, such treatment to be given free of charge as long as the patient and members of this organization think he requires it." The physicians in the hospitals are to have nothing to say about how long an employee requires medical attention. That is a point to be determined by the man's conscience and the vote of his union. If his conscience and his union decide that he shall be kept free and given gratuitous treatment for ten years the company is to have nothing to say about it but to pay the bills. It is further proposed that "employees shall be given equal membership on the board of directors of the hospital department." In other words, while employees are to be treated at the expense of the company, the employees are to have as much to say about the management of the hospital department

as has the company. This demand is almost as sweetly reasonable as the one that employers shall desist from the impertinance of inquiring into the pasts of applicants for work.

In the years 1899-1909 the wages of machinists employed on American railways increased over 30 per cent.; those of carpenters, 20 per cent.; and those of other shop men, over 23 per cent. How much they increased in 1910 over 1909 is not known. A bulletin of the Bureau of Railway Economics shows that the increases in the daily wages of all shop employees of the Atchison, Baltimore & Ohio, Chicago & North Western, Illinois Central, Northern Pacific, Pennsylvania, Southern and Union Pacific averaged 5.58 per cent. between 1910 and 1911. These lines have a total mileage of 47,500 miles located in all parts of the country, and the figures for them may be considered representative for all roads. Therefore, since 12 years ago, the different classes of the employees in railway shops have received increases in their daily wages of at least 25 to 36 per cent.

It is quite probable they would be satisfied at present with much less than they ask. It is quite probable, too, the railway managers will refuse to give them anything. There has been a feeling among railway managers for some time that they must soon make a firm and courageous stand against organized labor. There is no class of organized labor against which they could better afford to make this stand first than that employed in shops. A complete shut-down of the shops would not for some time interfere with train operation, and a partial closing would not for a still longer period seriously interfere with it. As work in the shops is similar to that in more other lines of business than any other work on a railway, it would be easier to fill the places of striking shop employees than those of most other classes of labor. The western roads are especially disinclined to do anything now which will increase their labor bills because the Interstate Commerce Commission has just ordered reductions in their rates, the full effect of which no one can foresee. If there was a strike in the shops and the railways won it, they would have an opportunity to introduce efficiency methods in many places where they would be loathe to introduce them if they knew the certain result would be to provoke a walkout. On the whole, therefore, the managers probably are more disposed to make a firm stand against the demands of the shop employees than they have been to resist any similar ones for some years.

NEW BOOKS.

[illegible]

6 in. x 9 in. Secretary D. B. Sebastian, Chicago, Rock Island & Pacific, La Salle street station, Chicago. Price: Morocco, 75 cents; paper, 35 cents.

The third annual convention of this association was held in Chattanooga, Tenn., May 15-18, 1911. Among the more important papers presented and discussed at the meeting were those on the testing of locomotive fuel; the railway fuel problem in relation to railway operation; petroleum—its origin, production and use as a locomotive fuel; and the organization of a railway fuel department and its relations to other departments. An account of this convention appeared in the *Railway Age Gazette* of May 19 and 26. The proceedings also contain a list of the [illegible]

[illegible]

leather, 4 in. x 6¾ in. Price, $2.00.

[illegible] mechanical engineer. Printed in small type, it gives brief, [illegible] having a mechanical training and contains formulæ, tables and [illegible] the strength of materials, structures and machine parts, energy and [illegible] needs of the experienced engineer. A valuable feature of this [illegible]

Letters to the Editor.

WIDE FIREBOXES.

New York, August 21, 1911.

To the Editor of the Railway Age Gazette:

Henry F. Colvin is entirely correct in his statement in your issue of August 18, page 312, that a wide firebox engine, as he defines it, i. e., one having a firebox extending over the driving wheels, was used in 1863, and engines complying with his definition, including the French locomotives illustrated in Colburn's Locomotive Engineering, pages 89 and 90, to which he refers, are shown and described in my paper before the Western Railway Club, pages 104 to 106 of Vol. 8 of the Proceedings, 1895, from which I quoted in my letter appearing in your issue of July 21. The date of construction of these engines is stated in that paper to be 1862.

His failure to fully agree with the statements of my letter is, however, rather a matter of terms than of substance, for the reason that the firebox which I stated was not put into practice until 1877, I also stated to be the wide firebox proper, by which is meant one which is located entirely above the wheels, and extended laterally beyond them for a substantial difference. The fireboxes of the French locomotives do not apparently project more than about 6 in. beyond the driving wheels, and they are described in *Le Genie Industriel* (Vol. XXIV, page 95), as being of a width as much as 71 in. This is less than that of the present medium width fireboxes, and manifestly does not comply with either the terms or the spirit of my reference to the wide firebox proper as being one which is extended beyond the driving wheels for a substantial distance. With entire respect to my friend Mr. Colvin, I therefore cannot admit that I am in error in my statement that the date of the first wide firebox proper was 1877.

[illegible]

COLLEGE MEN AND RAILWAY WORK.

[illegible]

The letters which your editorial on College Men and Railway Work has brought forth have been interesting to me, perhaps because I am not a college man and I may see things from a different point of view.

The one fact that every college man should understand before entering railway work is that the climb to the top is a long, hard pull, though it should be faster to a man with a college training than to one without. I have seen college men enter railway work and realized that they were more capable than I, simply from the mind training they got while in college. I have realized my deficiencies and have had to work all the harder to keep up with the college men. Their advancement would undoubtedly have been faster than mine, but after staying with it for two or three years they have become discouraged and gone into something else which seemed more lucrative. But I don't know of any that are as well off as they would have been had they stuck to railroading.

A college man in railway work sees superintendents and trainmasters well along in years who are greatly lacking in education. What the college man overlooks is that they do understand the art of railroading. To a man who has only been in railway work two or three years, the operation of a railway seems very simple, but let him go into the different departments, the roadway, the mechanical and the operating, and if he isn't inspired by the magnitude of the problems he will be discouraged at the possibility of ever knowing enough to be a superintendent. For an official must know something about all these departments. It may be that the official has not been in each different department, but he has been railroading so long that even in being in only one of the departments all

the time he has acquired knowledge of the others. This is being made simpler and quicker now by the student system that some railways have introduced.

A man entering the employ of a road without experience, whether he be a college man or not, has got to start at the bottom. If he knows more than others at the bottom it will soon be found out, but it will not do a bit of good to tell everybody he knows more. So I can not agree that a railway prefers an office boy in some position to one who may have a college education, but the office boy probably does get along better for the reason that he can not make comparisons between his education and the education of those who have been less fortunate, as "Yale 1894" suggests in his letter printed August 4. But with tact the college man would advance far more quickly than the office boy in the same position, because the college man knows more, and in railway work, as in any other kind of work, knowledge is power.

I believe there is a great need in railway work for college men, perhaps more in the West than in the East. But it is work and lots of it.

R. P. K.

TUSCALOOSA, Ala., August 8, 1911.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

I have read with interest the letter published in your issue of July 14, on College Men in Railway Work, signed "1903."

I am really surprised to note the ring of pessimism which pervades this letter, as I have always been of the opinion that there is no field of effort which promises such rich rewards ultimately as that of the railway service, especially to the college graduate whose mind has been trained to think logically, and to whom the numberless problems offered by the transportation business for solution should strongly appeal. That these problems do appeal only in a feeble manner to the college graduate is sadly evident by the small percentage of college men to enter the railway service, as pointed out in an editorial in your issue of June 23. The question why the railway work fails to attract and hold these men, and indeed many bright young men of non-academic training, becomes one of paramount importance, provided it be true that the effect on economical management by having these men in the ranks will be beneficial to the railways.

From the observation of the writer, it appears that many young men, and especially those of college training, make a mistake in the beginning of their career by obscuring from their vision those embryonic principles of railroading which must necessarily be mastered before any substantial advance can be made. Instead of recognizing the necessity of fully mastering these principles, it seems that they are more or less inspired in their choice of a vocation by the romantic stories of the careers of great railway builders—which stories in most cases, unfortunately, fail to catalog the myriad of hardships endured and obstacles overcome—which results in a certain amount of impatience when the visionary is exchanged for the actual.

With the combination of railways, the introduction of improved appliances, the enormous increase in traffic and from many other reasons, the railways have evolved from the homogeneous to the heterogeneous state. The day is past when the division superintendent can personally supervise the operation of his division unaided, and there has consequently grown up for his assistance our traffic, mechanical, engineering, telegraph and signal departments, with boundaries of operation—dependent on the policy of the individual company—more or less distinctly drawn.

Now, in entering the railway service, the new recruit enters one of these departments, or perhaps some other not mentioned. He has now exchanged the visionary for the actual, and the hardships which must be endured and the obstacles which are necessary for him to overcome in order to advance become more and more apparent to him. In his impatience for promotion, engendered perhaps by the false view he held of railroading before actually becoming connected with the business, he falls victim to that fault of human nature which is more or less common to us all: he fails to take advantage of his opportunities. And here is where the real trouble lies. As a general rule, I think that it is fallacious for him to believe that he can make any substantial advance in the business by simply mastering the duties of his individual position. He must not only appreciate the responsibilities of the man above him, but he must get a general conception of the business as a whole; for example, the sources of our enormous traffic, the most economical manner in which this traffic may be handled, the cause and prevention of waste and the innumerable other questions which will suggest themselves as he proceeds with his inquiries. Referring directly to the letter in your issue of July 14: would it not have been more profitable to the writer of that letter if he had taken advantage of his opportunity to acquire information about the various phases of the railway business which presented themselves while traveling around in pursuance of his duties, instead of reflecting upon the hardships of his position in being ordered at "11 p. m. to take the midnight express to X?" It would have served the dual purpose of making him more satisfied with his position and fitting him for some higher place.

The *Railway Age Gazette* is now publishing a series of letters, in one of which a certain system of divisional management is advocated, wherein the division superintendent is absolute monarch in his territory, which is destined to survive the departmental and semi-divisional management of most of our railways. When this time, which is fast approaching, arrives, how can the college graduate, or for that matter any other young man, expect to assume the responsibilities of the head of such a division, not to mention the realization of his dreams, unless he has a more or less thorough practical knowledge of the workings of the various departments?

The principle that a successful railway man must be an expert in one certain department and at the same time have a general knowledge of the workings of the road as a whole is immutable, and the college graduate must realize this fact and work towards this end if he expects to succeed.

I believe that college trained men have just as good chances in the railway business as in other line of work, and indeed can be imported with profit to the railways, if they can be made to recognize this principle. Unless they do, they and other young men are destined to failure, unless they succeed in rising by chance, and that chance is not sure enough for any of us to take.

A READER.

EFFICIENCY WITHOUT A "BUREAU."

SAVANNAH, Ga., August 3, 1911.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

The discussion now going on in your columns relative to the necessity of the so-called efficiency bureau leads to the inquiry: Is the present division organization securing the best possible results from an efficiency point of view?

In one of his able articles "D. A. D." refers to the period when the superintendent was the "whole thing." With the creation of higher offices the superintendent was shorn of more or less authority as regards increasing forces, salaries and making expenditures, all looking towards economy of operation. What is true as to the superintendent is also true as to agents, master mechanics, and, in fact, all division officers. The result is that such officers are judged as to efficiency by the relation that the total of division expenses *fixed by higher officers* bears to the revenue. There is a reluctance to make voluntary reduction in forces and expenditures by the man directly in charge because of the difficulty of securing authority for increases when the volume of business again makes an increase necessary. In dull periods, particularly as regards clerical forces, material reductions could often be made without in anyway imparing the quality of the work. Any man charged with the

supervision or direction of the work of others should possess, and generally does possess, the ability to direct such operations economically; and if his ability were judged by the direct results obtained in his particular department, *organized on his ideas of economy*, his ambition would be stimulated and he would be devising new means of economical operation, a stimulation impossible under the hard and fast rules now in vogue. Repairs and renewals, whether mechanical, roadway, bridges or buildings, could be conducted most economically during the periods when traffic is lightest, were it not for the enforced relation between expenses and gross earnings. When traffic is lightest, forces are smallest, when traffic is heaviest, forces are largest, and by reason of more interruptions the large force and the small force are very close together as to performance. We all study the weekly and monthly reports of revenues and expenses, but the directors make the appropriations for betterments and dividends on the basis of the annual report. Revenue and company ton miles, freight train miles, fuel consumption per train mile, etc., are all valuable statistics, but the final and only test is the net earnings for the fiscal year.

The master mechanic works a fixed force; so many machinists, so many boiler makers, with helpers in proportion, and this rule obtains all through his department, the maximum always fixed by his superior. At times he has a preponderance of boiler work, and machinists are waiting on the boiler makers, marking time, so to speak; but he cannot lay off machinists and take on boiler makers for the maximum of the latter is fixed; and because of this he retains his machinist force. Next week conditions will probably be reversed and he will need all his machinists. Who will say that he could not effect economies, if he, the man on the ground, were permitted to increase or decrease the force as the work in sight dictated? If operating his own shop would he not do so?

What is the loss, expressed in dollars and cents, in a terminal because of an insufficient number of car inspectors? How many hours does the two-dollars-an-hour switch engine wait on the blue flag controlled by the twenty-cents-an-hour car inspector?

How many hours are wasted by the same switching crew because of "no bill" cars? The station agent tells you he is waiting authority to put on an additional bill clerk at perhaps three dollars a day.

The section foreman runs out of ties. Does he reduce his force? No; he can always clean up station grounds, even if he did the same work a day or two before. He is not allowed to carry his lost days forward from month to month. The superintendent who instructed his track forces to burn right-of-way in wet weather was only following this line of education.

We have reached the point where the initiative is denied the division officer, the agent, and the foreman. Some one higher up must vote on the proposition always, and in most cases the opportunity has passed before the authority is given.

The superintendent in charge of millions of dollars' worth of property is surely competent to judge of the necessity for additional help on his division. His corps of assistants, trainmaster, master mechanic, division engineer, road master and chief despatcher constitute a better posted efficiency bureau, if clothed with the authority, than the $100,000 proposition submitted in your recent issue.

Following down this line, the station agent, responsible for the funds, the proper rates and charges, the care of, and prompt forwarding and delivery of freight, certainly has the executive [illegible] station? Charge against his pay roll (and don't forget to include stationery and station supplies), not the revenue, which he [illegible] but the [illegible] and [illegible] [illegible] [illegible]

WORCESTER UNION STATION.

The new Union Station at Worcester, Mass., is now in use, the structure having been completed in July, except for a few details at the east end, which await the decision of certain questions connected with the utilization of the old station. The new station was begun over two years ago, and the plans for it were shown in the *Railroad Gazette* of March 13, 1908. As will be recalled from the ground plan, then given, the station occupies a triangular plot facing on Front street, at the west side of Washington Square, the old station having been on the east side of the same square. The main tracks of the Boston & Albany lie on the south side of the station and the "viaduct" tracks on the northwest side. The viaduct, formerly used as a freight connection between the Boston & Maine on the north and the Boston & Albany and the New York, New Haven & Hartford on the south, now carries five tracks, and these are the main platform tracks for the Boston & Maine and the New York, New Haven & Hartford. The lines of the New Haven road approach from the west parallel to and on the south side of the Boston & Albany, so that all New Haven trains have to cross the Boston & Albany main tracks to reach the station. The plan made three years ago has been carried out substantially as then shown, except in a few details. The restaurant is at the east side of the waiting room and the smoking-room extends southward to the vestibule leading to the main entrance to the viaduct tracks. The construction of this station was a part of an extensive scheme for the elevation of tracks to abolish grade crossings, and the tracks on both sides have been elevated so that they are now on a level with the second floor of the station.

Union Station at Worcester, Mass.—Looking Southeast.

A view of the main facade of the station is given above. The towers, which constitute the distinguishing feature of the structure, are of white marble, extending 175 ft. above the street level. The three arches of the main entrance are buttressed by Ionic columns and the marquise which hangs over the doors is 100 ft. long. Below the marble of the towers the material is terra cotta and granite. On the front of each of the towers is a projecting balcony beneath which is a lion's head.

Worcester Union Station Looking Southwest—Tower of Old Station at the Left.

West End of Main Waiting Room.

These details, which give a marked richness to the general effect, are shown below.

In the general view of the station, in which the observer is looking southwest, the viaduct curved tracks with canopy sheds over the platforms, appear at the right, and a

Corner of Main Vestibule.

Detail of Tower.

glimpse of the Boston & Albany's tracks and platform sheds may be had at the left. The tower in this picture is that of the old station built in 1874-5. A picture of this station and tower was given in the *Railroad Gazette* of December, 18, 1875. Washington Square, in the foreground of this view, is now the subject of lively discussion in the Worcester city council and in the newspapers, proposals having been made to carry out extensive plans of beautification.

The main waiting room, which is shown below, is 128 ft. long x 80 ft. wide. In the view the observer is looking northwest, facing the ticket office. At the right of the ticket office are the telephone booths, and at the left is the main exit to the viaduct tracks. On the right of this room are the main entrances from the street, and on the extreme right of the picture is a florist's booth. The main vestibule is 100 ft. long x 20 ft. deep; the walls are of cream colored brick, with a dado 7 ft. high of Vermont marble. The offices on the upper floor of the station are reached by marble stairways at either end of the vestibule.

To one who judges by the pictures alone it is necessary to consider the size of the main waiting room, which is nearly two-thirds as large as that in the South station, in Boston, in order to get an adequate idea of the building as a whole, for the exterior front view is somewhat deceiving in this respect. The great elliptical arch is made up largely of three long panels of stained glass of light tints, softening the sun's rays, yet lighting the room thoroughly. In the center panel appears the coat of arms of the Commonwealth of Massachusetts. The walls of this room are of soft tinted cast stone, with a marble dado 4 ft. high. The columns, at the doors and elsewhere, are of marble. The ticket office is 35 ft. x 52 ft. At the right of this is the telephone room, above mentioned, and farther to the right is the women's retiring room, 20 ft. x 50 ft. The men's room is behind the ticket office, and is entered by the door at the left.

The restaurant is at the opposite end of the main waiting room; and on the south side (at the left, in the view) is a semi-circular vestibule which affords an entrance to the baggage room, to the parcel room and to the train platforms. One side of this semi-circular room is shown on page 400. In this vestibule there is a gallery at the second floor level connecting with the train platform on the south side and also affording an entrance to the offices which occupy the second floor of the building on the west, north and east sides. These offices occupy the whole area of the building, except the central portion, in which the main waiting room extends up to the roof.

Worcester Union Station, Waiting Room—Looking Northwest.

Another illustration shows some of the details of the west end of the main waiting room. The baggage room, occupying the southwest angle between the converging lines of the tracks is 175 ft. long, and in its widest part 100 ft. wide.

The Boston & Albany has five tracks passing the station, but two of these are devoted to freight trains, leaving only three for passengers. Passengers from the station reach the westbound passenger platform by means of three stairways. To reach the third or eastbound track they pass through a subway beneath the first two tracks and ascend stairs to an island platform, which gives access to the eastbound, and also to the

local or middle track. A similar subway at the northwest side of the station leads to the stairways giving access to the island platforms adjacent to the viaduct tracks. All of these stairways to the train platform are easily reached from the street without going through the building.

The station is owned by the Boston & Albany, the other roads paying rent in proportion to their share of the business done. The cost of the structure was about $750,000, of which about $200,000 was required for the granite foundation, a costly substructure of piles having been necessary. The architect was Samuel Huckel, Jr., of the firm of Watson & Huckel, Philadelphia. The building was put up by the Woodbury & Leighton Company, under the supervision of F. B. Freeman, chief engineer of the Boston & Albany, and M. S. Jameson, resident engineer.

LETTERS FROM AN OLD RAILWAY OFFICIAL TO HIS SON, A GENERAL MANAGER.*

XIV.

Chicago, July 8, 1911.

My Dear Boy: You write me that your work is heavy, that your territory is extensive, that you wish to divide it into two districts each under a general superintendent. If your president follows his usual practice and asks my advice it will be summed up in four letters, "d-o-n-t." For years I have been seeking in vain for a general superintendent's district with an entirely satisfactory administration. I know many strong general superintendents. The trouble is not with them, but with the system. Organization is a series of units. These units get out of balance when they are defective or incomplete. There is usually withheld from the general superintendent some such vital process as car distribution, on the specious plea that such activity is so different it can be more cheaply handled by some higher office. If the organization unit is created it must have the same full chance for life and development as the rest of the offspring. A principle in organization cannot be violated with impunity any more than in other branches of science.

The average general superintendent's office is a great clearing house for correspondence. Few matters receive final action and many are passed along to the general manager's office. The resulting delay usually does more harm than good. On the other hand, since we all like to feel that we are highly useful, the general superintendent, or his chief clerk, is unconsciously dwarfing the initiative of superintendents by requiring references to him of matters that should receive final action at division headquarters. If you do not believe it, check up a few general superintendents' offices and study the processes. I am not referring to jurisdictions where a general superintendent is required by charter or other legal requirements. I have in mind districts which are arbitrarily created by ill-considered executive mandate.

The general superintendent starts out with a brave determination to get along with a small staff. Sooner, rather than later, [illegible] an inevitable retarding bureau of correspondence. He perhaps has a $200 traveling engineer finding fault with the division performance of the $300 superintendent.

Sometimes a general superintendent is located at a large city [illegible] The Pennsylvania handles successfully large cities like Cincinnati, Cleveland and Chicago with a superintendent who has the authority of a general agent.

[illegible] fundamental principles, solves several vexatious problems.

Under the unit system every assistant should have his office of record in the same building with the head of the unit. For example, it is a violation of good organization to give a district passenger agent the title of assistant general passenger agent with an office of record at a city away from the general offices. If such outlying office of record is necessary, and it sometimes is, a complete unit should be segregated under a head with some such distinct title as district or division passenger agent. This does not, however, preclude having an assistant reside in the outlying city and maintain his office of record at the general office in the same file with the head of the unit.

If I were you I would appoint enough assistant general managers so that you can have one reside at each point where you have dreamed district headquarters are necessary. Give him a business car and a stenographer, but let him understand that his office file is a part of yours. Let him live on the road as a high class traveling inspector, superior in rank to the people he is inspecting. He is your staff officer with line authority available for action when in his judgment circumstances so require. He can obtain all necessary information from the files at division headquarters or by telegraphing your office. Your chief of staff, the senior assistant general manager, will promulgate instructions, while this traveling representative, like a trainmaster on a division, will see that they are carried out. When he finds it necessary to give instructions he should promptly notify your office, that the record may be completed and confusion avoided. He can do all this without becoming bureaucratic, without putting the company to the expense of a great circumlocution office maintained under the feudal notion of his royal importance. Railway administration suffers from too many offices and instructions, not from too few. The best officials, and the best train despatchers, give the fewest orders. It is a qualitative rather than a quantitative proposition.

The moral effect of the presence of an official cannot be discounted. We need more officials and fewer clerks. The railways are over-manned, because they are under-officered. The great mistake of the past, due to crude conceptions of organization, has been in creating offices rather than officials.

The same line of reasoning applies to the handling of outlying terminals on a division away from a despatcher's office. The old idea has been to locate a trainmaster with an office at such points. The moral effect of his presence is unquestionably good. The objection is that he must necessarily be on the road much of the time, and the train crews are handled by a clerk. Duplication results because most of the correspondence and records have to be referred to the superintendent's office. The Union Pacific has found it better under the unit system to have an assistant superintendent reside at such important terminals. His office, however, is located with the superintendent, which encourages travel back and forth, just what is desired, and discourages sitting in an office and carrying on correspondence which can better be looked after by the chief of staff in the superintendent's office. The train crews are under the immediate direction of the yardmaster when in the terminal, and of the train despatcher when on the road.

The railways of this country have suffered from rigidity in administration. The unit system permits an elasticity of assignment to take care of conditions as they come along. For example, your non-resident assistant general manager can, if desirable, chaperon three divisions when movement is heavy, and four or five, if you please, during the dull season. You can on short notice throw all assistants to the most exposed points. A non-resident assistant superintendent can likewise be sent to an exposed district. A permanently located trainmaster requires an official circular to have his jurisdiction extended, and if suddenly ordered away can leave only a clerk to represent the company. A railway has an ever present firing line. The more mobile the official force the more promptly can weak portions be reinforced.

A striking violation of the unit principle in organization is

to have the master mechanic report to the division superintendent in transportation matters and to the superintendent of motive power in technical matters. This is a half way attempt at divisional organization which lacks the courage of conviction. Better have a straight departmental organization with its divided authority and expensive duplication than thus to straddle the question. If the division is to be a real unit it must be complete and self-contained. The lack of balance in this attempt at divisional organization comes from the fact that units are mixed. The superintendent of motive power, a general officer with jurisdiction over the entire road, is a member of the general manager's staff. He has a rank and value superior to that of a divisional officer, the superintendent. The poor master mechanic is often puzzled which superior to please. His natural inclination will be towards the man higher up, the superintendent of motive power. Again, it is difficult for any three men to agree upon what are technical matters. The chief of staff method is not applicable to this phase of the problem, because units have been mixed. The master mechanic and the superintendent of motive power are not components of the same integral unit. The unit system of organization requires a superintendent of motive power to transact all business of record with the office of the superintendent of the division, a component unit of the general jurisdiction. The senior assistant general manager and the senior assistant superintendent, each, as a chief of staff for the head of his unit, decides promptly in the absence of the head of the unit what matters are sufficiently technical to demand the attention of a particular official. Clear cut, definite and prompt action is possible, with proper check and balances, because units are not mixed. The governor can introduce a balance without throwing the administrative machine out of gear to avoid stripping its cogs. The splendid personal equation of railway officials often serves to carry an illogical organization in spite of its fundamental defects. Similar violations of scientific principles in material things would cause bridges to collapse and locomotives to break down. The showing made by the railways is a tribute to the administrative ability of their officials rather than to their knowledge of organization. The Pennsylvania a half century ago, and the Harriman lines in more recent years, are said to be the only roads that have made comprehensive studies of the science of organization. Both of these great railways are prepared to stand the test of time. Both will grow stronger as the years roll by. So feudal is the conception of organization on most railways that the essential elements of self perpetuation are sadly lacking. Fortunately their traffic strength is so great and our country develops so fast that errors due to preconceived misconceptions and personal caprice are covered up by increased earnings. One encouraging sign is that railway officials have ceased to be quite so cocksure of themselves and are seeking the underlying reason for the faith that is in them. True science ever finds its vindication in impartial inquiry and intelligent investigation. The world advances by definite steps rather than by leaps and bounds. Do not lament the fact that some roads are groping ahead only to occupy the abandoned organization camps of the Harriman lines. Be thankful rather that they have moved forward at all, that though lacking in faith they are coming to a position admitting of enlarged perspective.

Affectionately, your own, D. A. D.

Dr. Haarmann, of Osnabwig, known in Germany as an iron master of extraordinary ability, and to the rest of the world for his exhaustive work on track, in which is figured nearly every thing that was ever tried in the way of rails, joint fastenings, etc., with many that were only dreamed of, has retired from active business life. He collected a museum of all objects pertaining to railway track, which he presented to the Prussian government It is now in Berlin, and should be studied by every man interested in the subject who goes there.

OHIO PUBLIC SERVICE LAW.

The act of the legislature of Ohio, changing the name of the railway commission to that of "The Public Service Commission," and granting large powers to that body, and which went into effect on June 30, is a document of 27 pages, and it has 90 sections.

The term "railroad" is used to include cars, by whomsoever operated, bridges, ferries, etc., storage elevators, express companies, water transportation companies and interurban railway companies; and the commission has powers of supervision over all alike. The law applies to transportation of passengers and property, storage, icing, sleeping-car operation, freight lines, etc.; and it is intended to regulate all services, practices and charges except such as are subject to federal regulation. The cost of maintaining the public service commission, not exceeding $75,000, is to be collected from the railways and public utilities in proportion to their intrastate gross receipts.

The term "railroad" includes interurban lines; but all other utilities are put in a class by themselves and numerous sections apply to these and not to railways. The term "public utility" is used to include all these other concerns—telegraph and telephone companies, electric light and gas companies, pipe lines, water works, street railways in cities or towns and suburban railways, but not to include steam or interurban railways. The law does not apply to public utilities not operated for profit, nor to those owned and operated by a municipality.

The public service commission is empowered to supervise and regulate. Where a property lies partly without the state, the power applies only within the state. The commission shall have power to inspect and examine; to call for books, records, contracts, etc., and require testimony. Any person refusing may be reported to the common pleas court, which must compel obedience.

Sec. 10. The commission is to keep informed as to the general condition of all public utilities. Every public utility must file copies of contracts with other public utilities. The commission shall establish a system of accounts for publicit utilities and prescribe the forms of record. If it shall determine that any expenditures or receipts have been improperly charged or credited it may order the necessary changes in such accounts.

Every public utility shall furnish reasonable and adequate service and make reasonable charges. Discrimination, by rebate or otherwise, is forbidden; nor shall free service or service for less than actual cost be furnished for the purpose of destroying competition.

Every public utility must file tariffs of all its charges by October 1, saying how long such charges have been in force.

Nothing in this act shall be taken to prohibit a public utility from entering into reasonable arrangements with customers or employees for the division of profits or for the making of charges according to quantity used, purpose for which used, etc., but all such arrangements must be filed with and approved by the commission.

No public utility shall make any charge except according to its published tariffs. Rates provided for by existing contracts executed prior to the passage of this law shall not be considered as discriminatory; but when any such contract terminates the commission may forbid its renewal. Unless ordered by the commission no change shall be made in rates in force June 30, 1911, except after 30 days notice to the commission.

A complaint in writing against a public utility must be made known to the utility and a hearing given, after notice of 15 days or more. If a public utility makes a complaint in any matter affecting its own product or service, the commission must publish notice thereof and then, after ten days, hold a hearing.

Whenever the commission shall be of the opinion, after hearing, that a rate is or will be unjust or preferential, or a service inadequate, or that rates are insufficient to yield reasonable compensation, it shall fix and determine reasonable rates; but in

considering reasonable compensation it must value a franchise only according to what has actually been paid for it (to the city or county).

The commission shall have the right to investigate and determine the value of all property of every public utility; but before final determination, must hold a public hearing. The commission may at any time, upon its own motion, make a revaluation. Whenever the rules, regulations, measurements or practices of a public utility are unjust or unreasonable, the commission shall determine the rules to be observed, the service to be installed, etc. Where repairs or improvements are found necessary the commission may order the proprietors to do what is necessary; and they shall obey such orders.

Every public utility occupying a highway shall, for a reasonable compensation, permit the use of its equipment, etc., by any other public utility whenever the commission shall determine this necessary. In case of failure of joint occupants to agree, the commission is to prescribe conditions and compensation. In emergencies the commission may temporarily alter rates and orders, with the consent of the public utility concerned.

The commission shall keep informed of all new construction, extensions, etc., to the property of public utilities and may prescribe the method of keeping construction accounts. The commission shall ascertain and prescribe suitable and convenient standard commercial units of the product or service of a public utility; also may ascertain and fix serviceable standards for the measurement of quality, pressure, voltage, etc.; and it may inspect meters. [This and the nine preceding paragraphs refer to sections apparently not applicable to railways. Some of these subjects as related to steam railways are dealt with in statutes already in force.]

Information in the possession of the commission shall be public except as the commission may withhold it for a reasonable time.

No person shall be excused from testifying on the ground that his testimony might tend to incriminate him, but such a witness shall not be prosecuted except for perjury.

When the commission orders a joint rate and the parties do not agree upon the apportionment the commission may, after hearing, fix the apportionment. All orders of the commission take effect in thirty days unless a different time is specified. When the tracks of a steam railway or an interurban or a suburban railway, or any of them, cross, connect or intersect, and if of the same gage, the roads may build connecting tracks; and if any road refuses, upon proper complaint, the commission shall investigate and may order a connection made, apportioning the cost thereof. The connection having been made, the railways shall afford all reasonable and proper facilities for interchange. Where a derailing device is required, the commission shall prescribe regulations and designate the company that shall be re-

Any person or railway aggrieved has thirty days in which to ask for a rehearing.

Any municipal corporation having a contract with a public utility may, within one year before its expiration, proceed to renew the contract or fix rates, etc., as now provided by law; but upon complaint of 1 per cent. of the voters, presented within two months, the commission shall, after due notice, give a hearing. Rates agreed upon between a city and the utility, if com-

The commission may require a public utility to make a deposit

reduced. Where the commission reduces the rates of a public

of streets, etc., except in accordance with the procedure just outlined.

quired by the commission after investigation. The commission is to prescribe depreciation rates, which must be sufficient to keep the property in a state of efficiency corresponding to the progress of the art or industry. The moneys for depreciation charges must be set aside and carried as a depreciation fund. This fund may be used to renew, restore, substitute, etc., but for no other purpose except upon the approval of the commission. If invested the interest must be added to the fund. The council of a city or town may require public utilities to make additions or extensions to their distributing plants.

No telephone company shall exercise a franchise where there is already a telephone company furnishing adequate service, unless the commission gives authority.

A public utility or a railway may issue stocks, bonds, notes, etc., payable in one year or longer, when authorized by the commission, and not otherwise. This section sets forth in detail the purpose for which securities may be issued and elaborate provision is made for giving hearings preliminary to granting authority to issue stocks, bonds, etc. No interstate railway or public utility shall be required to apply to the commission for leave to issue stocks, bonds, etc., on property outside of the state.

Properties now in the hands of receivers are exempt from the law as regards old securities, but the law applies to new or reorganized companies. Any director or officer making false statements to secure the issue of securities is liable to $500 fine or ten years in prison. Stock dividends, etc., are forbidden, except by authority of the commission. The commission may not authorize the capitalization of a franchise in excess of the amount actually paid to the town or city. The stock of a consolidated corporation must not exceed the sum of the stocks of the corporations consolidated. Bonds cannot be issued as a lien on any contract of consolidation, nor shall the debt of the consolidated company exceed the debts of the companies consolidated.

With the consent of the commission any two public utilities furnishing like service or product may contract with each other for joint operation; or they may consolidate, or one may buy the other. The procedure to secure this consent is set forth. With the consent of the commission any two or more telephone companies may consolidate, the commission first having ascertained the values of the properties. The commission may require any two or more telephone companies connecting with each other to operate a through line, and may prescribe joint charges.

Section 67 makes every public utility or railway liable to $1,000 fine for violation of the law, each day's continuance to be a separate offense.

Section 68 makes officers and agents liable to a fine of $100 to $1,000, or two years imprisonment, or both, for violation. The attorney-general must prosecute, in the name of the state, when directed so to do by the commission. Whenever the commission shall be of the opinion that any public utility or railway has failed, or is about to fail to obey the law, the attorney-general, on request of the commission, shall prosecute the offender or prospective offender. Any public utility or railway shall also be liable for treble the amount of damages caused by its violation of the law. Any public utility, or railway, or any person in interest, when dissatisfied with an order, may within sixty days proceed in the court against the commission. A complaint thus brought into the court shall not operate to suspend the order of the commission unless the court, after hearing, shall authorize such suspension; but the commencement of a suit shall suspend the order of the commission if the public utility or railway shall choose to continue the old rates and agree, with suitable bond, to refund the difference to customers in case a final determination shall order a reduction in rates.

When the commission serves an order it is the duty of every person or corporation to send a written acknowledgment of the receipt of such order, and also to comply with any requirement of the commission that within a time specified answer shall be made whether the terms of the order will be obeyed.

Section 75. This law does not prevent giving free or reduced rate service for the government, the state, cities, towns, etc., or for charitable purposes or for fairs, or to employees.

No franchises for an electric light company, gas company, water-works company or heating and cooling company shall be transferred to any corporation not duly incorporated under the laws of Ohio.

Companies formed to do business under this law are subject to the law, though they may have acquired no property and may not have begun business.

Section 81. The commission shall furnish information to other officers or commissions of the state and such other bodies shall similarly aid the public service commission in the performance of its duties.

Section 82. Where an investigation shows that a rate is unjust or that service is inadequate, etc., the public utility found to be at fault shall pay the expenses incurred by the commission.

Section 83. A member of the commission wilfully overvaluing property with a view to justifying higher rates, or undervaluing to prevent the exaction of a lawful rate, is liable to a fine of $1,000 or two years imprisonment, or both. The commission is to make an annual report December 15, printing 2,500 copies of it. It may appoint a secretary and suitable assistants and fix their compensation, but all appointments, salaries and compensations shall first be approved by the governor. Each commissioner shall receive an annual salary of $6,000.

RETRENCHMENT IN THE RAILWAY LABOR FORCE IN 1911.*

This study is the result of an attempt to ascertain what retrenchment in the number of men employed by the railways has been made in 1911 as compared with 1910. As the annual reports of the railways to the Interstate Commerce Commission for the fiscal year 1911 will not be ready for some weeks to come, a number of typical railways were requested, under date of May 8, 1911, to prepare a statement of the number of employees on their pay rolls on April 30, 1910, and on April 30, 1911.

The returns thus far received cover nearly 60 per cent. of the total operated mileage of the country and are as follows:

	Total operated mileage.	Total employees.	Employees per 100 miles of line.
April 30, 1911	[illegible]	[illegible]	[illegible]
April 30, 1910*	137,671	[illegible]	[illegible]
Increase	[illegible]	[illegible]	[illegible]
Decrease	[illegible]	81,780	70

*For about 4,500 miles of line, on which it was stated that no retrenchment had taken place, the number of employees was reported as of June 30, 1910, instead of April 30. However, this should not affect the conclusions, as it is not probable that many changes in labor force occurred in the two months succeeding April 30.

It will be perceived that while the operated mileage of the railways covered by the study had increased during the year between April 30, 1910 and April 30, 1911, by 2,000 miles, or 1.5 per cent., the men employed in operating the increased mileage had decreased by nearly 82,000, or 7.6 per cent. That is, the number of employees for every 100 miles fell during the year from 777 to 707, or 9.0 per cent. For each 100 miles of line, the total number of employees was less by 70 men in 1911 than in 1910. If conclusions may be drawn for the whole country from the reports of nearly 60 per cent. of the mileage, it would appear that during the year under consideration the labor force of the railways was cut by nearly one-tenth, as a result of effort to reduce expenses and effect economies at every point.

Railways representing 19,706 miles of line reported the following changes for the various operating expense accounts:

Account.	Employees per 100 miles of line. 1910.	1911.	Decrease.
Maintenance of way	301	231	70
Maintenance of equipment	155	151	4
Traffic	6	6	0
Transportation	462	373	89
General†	32	32	0

†Includes miscellaneous.

*From Bulletin No. 17 of the Bureau of Railway Economics, Washington, D. C.

It will be seen that the equipment, traffic, and general accounts remained practically stationary, but that considerable decreases occurred in maintenance of way and in conducting transportation. The number of maintenance of way employees decreased 23.3 per cent., and of transportation employees 11.1 per cent. Reductions in maintenance of way force frequently but not necessarily indicate retrenchment. One road reporting retrenchment stated, for example, that its reduction in maintenance of way labor force was due directly to unfavorable weather conditions. But a decrease in employees engaged in transportation can be due to but one of two things, or to both—decreased business or enforced economy.

Only a portion of the railways replying to the inquiries classified the changes in their labor force by occupation. These roads, which operate a total of 8,762 miles, reported changes as follows:

Occupation group.	1910.	1911.	Decrease.
General officers	19	19	
Other officers	48	49	1*
General office clerks	241	245	4*
Station agents	[illegible]	[illegible]	[illegible]
Other station men	455	456	1*
Enginemen	253	248	5
Firemen	[illegible]	[illegible]	[illegible]
Conductors	166	167	1*
Other trainmen	[illegible]	[illegible]	[illegible]
Machinists	255	245	10
Carpenters	216	203	13
Other shopmen	[illegible]	[illegible]	[illegible]
Section foremen	[illegible]	[illegible]	[illegible]
Other trackmen	1,390	1,226	164
Switch tenders, crossing tenders and watchmen	143	145	2*
Telegraph operators	[illegible]	[illegible]	[illegible]
Floating equipment	[illegible]	[illegible]	[illegible]
All other employees	[illegible]	[illegible]	[illegible]

*Increase.

This table shows that a majority of the occupation groups remained practically stationary, either changing not at all, or increasing or decreasing to a very slight extent. The largest reductions in force are found among the trackmen, the miscellaneous employees, and the shopmen. By combining the groups the changes will be brought out in bolder relief:

	[illegible]	[illegible]	[illegible]
Station men	610	606	4
Trainmen	1,202	1,165	37
Shopmen	1,287	1,227	60
Trackmen	1,559	1,395	164
Switch tenders, etc.	143	145	2*
Telegraph operators	[illegible]	[illegible]	[illegible]
All other employees	[illegible]	[illegible]	[illegible]

Trackmen per 1,000 miles were reduced 164, or 10.6 per cent.; miscellaneous employees 55, or 6.6 per cent.; shopmen 60, or 4.7 per cent.; and trainmen 37, or 3.1 per cent. Maintenance of way, represented by trackmen, is here shown to have suffered the greatest reduction in the number of employees, followed by maintenance of equipment, which is represented by shopmen; while conducting transportation, represented by trainmen, also underwent a decrease. Much the same relationship exists among the reductions in the operating accounts of roads that made only partial returns by occupations. The reductions reported by these roads, which have not been included with the reductions shown in the detailed tabulations just presented, center largely on the engineering department, maintenance of way, enginemen and firemen, and maintenance of equipment.

If the data which is presented above is representative, and the bureau has reason to think that it is, the conclusion seems clear that a considerable retrenchment in number of employees has been effected during the past year on the railways of the United States—not only retrenchment per mile of line, but also a retrenchment in the whole number of employees regardless of increased mileage. Not until the complete returns for 1911

are at hand will it be possible to make any general or definite statement regarding this retrenchment; but the figures cited above show the reductions to be largely in maintenance of way, transportation, and maintenance of equipment forces. That is, the retrenchment in process by the railways at the present time has not only touched the forces which are always the first to suffer when retrenchment is necessary, but is also beginning to cut into the transportation forces, which are maintained at a full quota until rigid economy is demanded.

RAILWAY WAGE INCREASES FOR THE YEAR ENDING JUNE 30, 1911.

In response to a circular letter sent by the Bureau of Railway Economics to a number of railways, asking for an estimate of the increase in their wage bill for the fiscal year 1911 as compared with 1910, replies were received from systems representing an operated railway mileage of 47,500 miles. These systems were the following: the Atchison, Topeka & Santa Fe, the Baltimore & Ohio, the Chicago & North Western, the Illinois Central, the Missouri, Kansas & Texas, the Norfolk & Western, the Northern Pacific, the Pennsylvania, the Southern Railway and the Union Pacific.

The data thus furnished has been tabulated and the results are presented herewith. It will be understood that this study is merely preliminary, and its findings are to be taken only as indicating in a general way the trend of railway wages in 1911. Later returns for the fiscal year 1911 when completed, will present the facts more fully and definitely.

In preparing their estimates, the railways included only such increases in total compensation to employees as were due to increased rates of pay, and excluded those due to enlargements in labor force. This was made easy by the fact that, as records on file in the bureau seem to indicate, on five miles in every six of the operated railway mileage of the United States a smaller force is employed in 1911 than in 1910. While the 1911 figures were sent to the bureau before the close of the year, and are partially estimated, yet they are considered as approximately correct.

A number of increases which were effective throughout the whole of the fiscal year 1911 took effect for the first time during the year 1910. As a result, the increase of 1911 over 1910 does not appear so striking as would the increase of 1911 over 1909 or 1908. Furthermore, a number of the increases which were in effect June 30, 1911, took effect during the fiscal year 1911, and will not make their full force felt until the fiscal year 1912. Hence the increase of 1911 over 1910 does not appear so marked as will that of 1912 over 1910. Therefore the showing in the following tabulations of wage increases for 1911 can be regarded as well within the facts.

The wages paid in 1910 by the ten systems named above, on the 47,500 miles operated by them, amounted to $300,527,000. The estimated wages [illegible] of the same systems for 1911, computed for the same force of employees as in 1910, is $315,163,000. The difference, $14,636,000, represents an increase of 4.87 per cent.

A number of the responding railways arranged the wage increases on their lines according to groups or classes, and these classifications have been tabulated below. The first table shows the increases distributed according to operating expense accounts, so far as the increases are reported in this manner. There are given in this table the mileage on which the particular data were reported, the total compensation in 1910 and 1911 corresponding to that mileage, and the amount and per cent of increase.

The second table shows the increases in the different classes of employees, so far as they are reported in this manner. Here again there are given the mileage, the total compensation in 1910 and 1911 corresponding to the same mileage, and the amount and per cent. of increase.

Table I. Amount and Per Cent. of Increase in Compensation, 1911 Over 1910, Distributed by Operating Expense Accounts.

Account.	Miles represented.	Compensation, 1910.	Compensation, 1911.	Increase. Amount.	Increase. Per Cent.
Maintenance of way and structures	14,015	$19,364,940	$20,123,924	$758,984	3.92
Maintenance of equipment	12,064	11,837,707	12,541,368	703,661	5.94
Traffic expenses	7,629	507,921	523,041	15,120	2.98
Transportation expenses	7,629	19,702,368	20,541,093	838,725	4.26
General expenses	9,581	1,394,524	1,447,918	53,394	3.83

Note.—As stated in the text, only such increases in total compensation are included in this table as are due to increased rates of pay, those due to enlargements in labor force being excluded.

Table II.—Amount and Per Cent. of Increase in Compensation, 1911 Over 1910, Distributed by Occupation Classes.

Class	Miles represented.	Compensation, 1910.	Compensation, 1911.	Increase. Amount.	Increase. Per Cent.
Enginemen	42,089	$21,448,106	$22,671,109	$1,223,003	5.7
Firemen	35,606	11,584,471	12,330,564	746,093	6.4
Conductors	42,089	13,274,634	14,253,712	979,078	7.4
Other trainmen	42,089	25,969,544	27,693,075	1,723,531	6.6
Station agents	19,741	2,275,320	2,358,061	82,741	3.6
Other stationmen	10,739	4,335,794	4,462,011	126,217	2.9
Machinists	23,152	4,442,630	4,710,129	267,499	6.0
Carpenters	9,913	3,354,726	3,534,030	179,304	5.3
Other shopmen	23,152	12,503,799	13,191,048	687,249	5.5
Section foremen	19,741	2,358,239	2,440,082	81,843	3.5
Other trackmen	27,201	15,871,299	16,186,443	315,144	2.0
Telegraph operators and despatchers	29,605	8,051,637	8,444,387	392,750	4.9

Note.—As stated in the text, only such increases in total compensation are included in this table as are due to increased rates of pay, those due to enlargements in labor force being excluded.

Grouping together the first four classes in the foregoing table as "trainmen," the next two as "station men," the next three as "shopmen," and the next two as "trackmen," we find the percentage of increase in wages between 1910 and 1911 to be as follows:

Group.	Per Cent. of Increase.
Trainmen	6.46
Station men	3.16
Shopmen	5.58
Trackmen	2.18
Telegraph operators and despatchers	4.88

As was to be expected, there was a considerable increase in the wages of shopmen, corresponding to the large increase shown under the maintenance of equipment account. Trainmen received increases amounting to over 6 per cent. Switch tenders, crossing tenders, and watchmen show wage increases, but the classification of employees as switch tenders and watchmen varies so much from road to road, and even on the same road from year to year, that the figures were too unreliable to be tabulated. Increases for the other classes, however, may be regarded as reliable indications of the tendency of railway wages at the present time.

FOREIGN RAILWAY NOTES.

The fastest German train now runs in Bavaria, between Munich and Nuremberg, making the distance of 123½ miles in 135 minutes, or at the rate of 54.9 miles per hour. It makes no stop on the way. Nuremberg is 690 ft. lower than Munich, and the train is 31 minutes longer going in the opposite direction.

The Swedish state railways have had a third-class sleeping car for seven months on a train between Stockholm and Gothenburg. There are three tiers of berths in a section, in each of which two persons can lie, the charge being 67 cents per person. The car was not very well patronized by sleepers, but the unoccupied sections could be used for other passengers. The accommodations were generally satisfactory, so far as the sleeping places are concerned; but there were complaints of a stifling atmosphere, which the railway men say was because passengers refused to open the ventilators for fear of drafts. A more general complaint was that the early risers found such an accumulation of baggage in the passage that it was almost impossible to move in it, which one who has traveled in Europe can readily believe. The management will probably ask for one or two more such cars and try them on a more frequented line.

SUPPLY CARS AND INSPECTION.*

BY W. H. WHALEN,

Superintendent, Southern Pacific, Los Angeles, Cal.

To the extent that a superintendent of a division can personally inspect premises and advise on the ground with the various employees depends his success in safely and economically conducting transportation and maintenance of way matters. Employees are willing to co-operate and carry out instructions if the superintendent's desires are placed fairly before them, as we are in an age when employees are ready to follow instructions and endeavor to give satisfactory service if only told what is wanted.

To make this inspection has been one of the hard propositions to solve in matters of this kind, and in fact has never been solved until the practice of running a monthly general inspection and supply train was introduced on the Southern district by H. V. Platt, general superintendent, about two and a half years ago. The train consists of cars loaded with the various supplies needed and cars equipped to carry the surplus material and scrap that is to be picked up. On the Los Angeles division this train is run monthly, leaving Yuma at 5:30 a. m. on the fourteenth of each month, the first day running to Calexico via Imperial Junction, and back to Imperial Junction, laying over there that night, from which point it starts the following morning at 5:30 for Colton, where it lays over for the night, leaving there the next morning at 6 o'clock for Los Angeles, taking in the side lines that day.

From this train the pay checks are delivered, and with this system we pay the employees within a few minutes of the same hour on the same date each month in the year. A complete inspection is conducted at the same time by the superintendent, and such of his divisional officers as he desires to accompany him, being always accompanied by the division engineer and the division storekeeper, making inspection of all premises, the interior of all buildings, and such equipment as is used by employees. He is able to determine the physical condition of all equipment, and to determine whether with it an employee is able to do his best work. All worn out or run down equipment is gathered up by this train and brought to the shops for repairs or to go to the scrap pile, where credit is given the division for it. Surplus material is gathered up and used to fill requisitions filled out of regular store supplies. He is able to see that the necessary supplies are on hand to enable section forces to protect trains properly in case of storm or accident; he is able to see that the right amount of material is given, and only in this way is he able properly to consider requisitions that have been made for supplies by the various departments. He is able to see each employee and talk to him about his work. An interpreter is taken along four times each year to give the foreign laborers a chance to explain anything that should rightfully come to the superintendent's notice; without such an interpreter, probably irregularities might creep in. At the same time they are given to understand that no train is too good to stop to take a doctor to them or bring one of them to the hospital. From the personal conference with the various employees and through the agency of this interpreter, the superintendent is able to build up a spirit of confidence and co-operation. A time inspector is taken along, and a record is made of each employee's watch. The agent at Los Angeles accompanies this train periodically that he may talk with the agents at the small stations and hear from them how satisfactory the loading of L C L shipments has been. This gives a chance to correct any irregularities that exist or that might result in unsatisfactory service to patrons of the road if allowed to go uncorrected. The scale inspector also accompanies the train periodically and balances up and looks after scales in general. About four times a year the roadmasters accompany this train over the entire division, each criticising and making notes of irregularities they find on each other's district. Such criticisms are considered at a meeting which is held in the superintendent's office immediately after the completion of the inspection trip, each roadmaster returning to his district and correcting any irregularities that have been found. On these trips the superintendent also has an opportunity of looking after the schooling of the children of families employed on the desert, and efforts are put forth to have every child who desires to attend school afforded an opportunity to do so.

*A fuller description of the equipment of the supply cars and their relation to stores is given in H. C. Pearce's book on The Supply Department.

ECONOMY IN THE TELEGRAPH DEPARTMENT.*

BY WILLIAM BENNETT,

Superintendent Telegraph, Chicago & North Western.

Savings may be effected in the telegraph department as in other departments. One way is by cutting down the volume of business, which method is being adopted to some extent. The use of the telegraph service has often been abused. There is a question, however, about this method of saving, as there is no way of determining where to draw the line. The elimination may be carried to such a point that the saving would more than be offset by losses sustained. Another method is to close some of the offices. Here also there is always a question as to the wisdom of the course. Another way would be to reduce maintenance expenses either by increasing the line covered by a maintainer, reducing supplies, or employing less expensive material and labor. These methods, on the face of them, do not appeal to many of us as entirely practical.

True economy is that economy which utilizes to the fullest extent the facilities at hand and produces the best results at the least expense.

Increasing the efficiency of telegraph lines, by duplexing, quadruplexing, employing machine telegraph apparatus and the typewriter machine is well known; but, you all know, the greatest innovation in the telegraph departments in recent years is the use of the telephone. .

The first cost of an up-to-date telephone train despatching line, complete, is considerable, but you will all agree that the expense is justified and that the improved service resulting more than pays a good rate of interest on the investment, not considering the saving in operating expenses made possible by closing telegraph offices which are but little used, and installing telephones at sidings and thus making it possible for the despatcher to receive information from, and issue orders direct to the trainmen.

When we get our despatching circuit working on busy divisions, there is usually a demand for a telephone message circuit. Some of the companies which seem not to have felt the restraining hand of economy too heavily have in some cases put up both circuits at the same time, which, of course, is the economical thing to do in constructing.

It is not anticipated that it will be much, if any, more economical to use telephone operators at stations than telegraph operators, but they are much easier to obtain and train into efficiency, and they can be well trained in much less time.

When a road has the despatcher's line and the message line in service, it is obvious that the wires may be used not only for these two very efficient services, but for other purposes. A large part of all despatching and message circuits now in operation have been simplexed for through telegraph work and a simplexed line can be duplexed and in some cases has been successfully quadruplexed. There is some question of the advisability of quadruplexing these simplexed lines, however, as they can be made to render more satisfactory service by compositing them and using the composite for through telephone service between division points.

In some cases plans are being made to extend this class of service in a little different way; instead of simplexing both despatchers' and message circuits, it is planned to phantom the

*Address read before the [illegible] Telegraph Superintendents' Association at Boston.

two circuits and simplex the phantom and then duplex the simplex. One place where the construction of such a line is now under way is on the Louisville & Nashville. This circuit will ultimately extend from Louisville to New Orleans with intermediate stations at Nashville, Birmingham, Flomaton, Mobile and possibly Bowling Green.

A case of wire economy which may be of interest to you, as it was to me, is on the Evansville & Terre Haute, where, with two No. 9 B. & S. copper wires and two No. 8 B. W. G. iron wires, the following service is obtained:

An ordinary telephone train despatching circuit with 29 regular stations.

A metallic block signal telephone circuit with 27 stations.

A through simplex telegraph circuit over the despatcher's lines.

A local simplex telegraph message circuit with 29 stations over the block telephone circuit.

It was found in actual practice that it would not be practicable to connect the 36 siding telephones on this division to the despatcher's line. The business done from these 'phones was of such a character and so great in volume that it would not be possible to issue all train orders if so much other business pertaining to occupied blocks, clear tracks, coal car orders and various other things were handled on the train wire. It was decided to connect these telephones to the block telephone circuits and have the trainmen get their information from the block office. But at this juncture another difficulty presented itself; if the sidings were not connected to the train wire, no train orders from the despatcher's office could be given direct to trainmen at these points. To remove these objections, the block circuits were so arranged that the block line (with whatever siding 'phones might be connected to it) could be connected through a repeating coil to the despatcher's line. Thus, while the despatcher's line was relieved of the business of the siding sets, it was still possible, when desired, to connect them to the despatcher's wire to receive important orders.

There are other features of interest on this division, which show the extreme flexibility of the telephone system. In some cases it was desired to connect the local message circuit at stations not equipped for block 'phone. A repeating coil was used in these instances. In one case it was desired to work a block normal northward out of a station, but there was a siding on this north block section which had considerable business with the chief despatcher, whose office was south of the block office; and the business was such that the track despatcher was not directly interested. The connection in this case was made the same as connecting the block to the despatcher's wire, except that a separate pair of wires was used, thus relieving the train wire of the extra load.

It might be worthy of note also to mention the fact that the through simplex telegraph circuit over the train wire is connected to a line running north to Danville and there, through a repeater, to the quad wire working into Chicago; also the local message telegraph circuit over the block wires works through

Automatic drops are wired in the despatcher's circuit at each

is out, he can readily determine the fact by glancing at his signal box when he returns. One telephone in such a station performs all functions for both block and despatcher's lines. Switching panels are provided on these lines so that if at any time trouble occurs on the despatcher's circuit, the despatcher's

cuit and the block wires cut into the train circuit. Other

the opposite direction, so that it is very seldom that the block circuit is out of commission; when it is, the trains can be

is always in commission up to the break in either direction, if

this ingenious arrangement, we believe is to be accredited to U. J. Fry (C. M. & H. P.), who has some of these circuits in operation.

The only possible further service obtainable from these circuits would be a through grounded composite telephone from end to end of the despatcher's line; but this might not be feasible, owing to disturbances from surrounding wires. Now, some of us may be skeptical of the possibility of an ordinary lineman keeping a circuit of this kind in operation, but the reports are that the circuits are giving good satisfaction and the man who is maintaining them is the same lineman who has worked on the telegraph lines of that division for some time.

Just what the saving is with the telephone over the telegraph is hard to calculate in this instance, as in most instances, as improved service is always considered more or less of a luxury, until for some reason, it is temporarily cut off, when every one interested begins to see that it is an every day necessity. No despatcher, who has used the telephone extensively will be likely to be contented to handle trains by telegraph for any great length of time.

Now, in view of the extensive possibilities, and of the increasing demands of traffic, true economy would appear to be for the telegraph departments to render all the service possible to both the passenger and freight traffic. Some of these means are utilizing the phantom telephone circuits or the message telephones for reservations, transfers, messages to secure traffic, tracing lost shipments, and a hundred other things. The truest economy is to increase the service by increasing the utilization of present facilities.

RAILWAYS OF THE MALAY STATES.

The railways in the United Malay States had at the end of 1908 a total length of 468 miles. The network consisted of the main line, beginning in the north in Prai, opposite the harbor of Penang, and cutting the province of Wellesley, the states of Perak, Selangor, Negri Sembilan and the Malacca settlement, southwards as far as the sultanate of Johore, with a total length of 252 miles; further, of a number of branch lines from this road, with a total length of 11 miles. Of this, the state of Perak has the section Taiping-Port Weld with 7 miles; Ipok-Trouoh 15; Topak Road-Telok-Anson 17; then the State of Selangor with the sections Batu Junction-Batu-Gaves 5 miles; Kuala-Lampur-Port Swettenham with 27; the State of Negri Sembilan, the section Seremban-Port Dickson, 24 miles; and Malacca, the section Tampin-Malacca, 21 miles. In the year mentioned in the report there were put in operation 40 miles of new road: the Seremban-Port Dickson to Ipoh-Tronok, as well as the prolongation of the main line from its former southern terminus Gemas to the boundary of the states of Negri Sembilan and the sultanate of Johore. The last-named section has for its object making a connection between the main line of the Malay United States and the Johore Railway, the northern part of which has been put in operation from the boundary to Segamet, 16 miles. Further, the railway net touches, on the northern terminus of the main line, Prai, the ports of Telok-Anson, Port Swettenham, Port Dickson and Malacca, on the west coast of the peninsula. The total capital invested in the roads already in operation was $45,501,086; being $3,285,992 more than in the previous year. This makes $97,136 per mile. Reckoning also the capital invested in motor cars for bringing passengers to the roads, the capital invested amounts to $45,923,430. Of this amount, the government has since the opening of the road in 1885 to the end of 1908 received back $18,173,633, or 39.94 per cent. of the investment. The general business depression had an unfavorable effect on the railways mentioned. Although on the average there were during 3¼ months of the year 40 miles more road in operation, the gross receipts were $225,202 less than in the previous year, being only $5,137,771. The clear profit for the year was $1,588,390, being 3.49 per cent. on the capital of $45,501,086.

Shop Section.

REMEMBER the annual convention of the Master Car and Locomotive Painters' Association, which meets at Atlantic City, N. J., September 12-15. The secretary, A. P. Dane, may be addressed care of the Boston & Maine, Reading, Mass. Among the subjects to be discussed are the best method of finishing the interior of steel passenger cars; concrete or cement floors of passenger cars from a sanitary standpoint; chemical and practical tests of railway paint shop materials; the painting of locomotives; paint mixing vehicles; removing varnish from car interiors; passenger car headlinings; preparation of painted parts of locomotives for repainting; relation of other departments to the efficiency of the passenger car paint shop; baking enamels; and linseed oil and its substitutes.

SEVERAL articles appear in this issue on the reclaiming of scrap material. Undoubtedly many of our readers may be able to suggest improvements on the methods which are described or outlined. In order to make these articles of the greatest possible value to our readers, we want every one of those who in reading them can see a way in which the methods can be improved on to immediately write us a letter telling just how they would improve them, or telling why the methods suggested are not the best. Such of these letters as are accepted for publication will then be published in the next issue, while the question is still fresh in the minds of our readers. Possibly you are using methods which are not mentioned at all, but which are giving you good results. Tell us about them. Letters accepted for publication will be paid for at our regular rates, the minimum payment for any article accepted being $3.

ABOUT a year ago we presented a large number of kinks from the Chicago & North Western shops at Chicago. The collection was prepared by those in charge of the shop, and was up to that time the most pretentious collection which had been prepared in this manner. This month we publish a similar collection of kinks from the Texas & New Orleans shops at Houston, Texas. Mr. Galvin, who is responsible for this collection, deliberately started out to locate and describe every good kink in the shops at that point, and this collection, which represents a portion of the kinks in the machine and boiler shops, is the result of his labors thus far. The collection speaks for itself, and we hope that he will obtain equally good results from his further investigations.

FIVE contributions were received in the competition on Reclaiming Scrap Material, which closed July 15. The articles were all very good and the judges were put to some difficulty in awarding the prizes. A. A. Burkhard, assistant general foreman in the car department of the New York Central & Hudson River at West Albany, N. Y., has been awarded the first prize of $35; and J. S. Sheafe, engineer of tests of the Illinois Central at Chicago, Ill., has been awarded the second prize of $20. The other contributors, all of whom presented splendid papers, were C. C. Leech, foreman of the Pennsylvania Railroad, Buffalo, N. Y.; W. H. Snyder, assistant general foreman of the New York, Susquehanna & Western, Stroudsburg, Pa.; and W. H. Wolfgang, draftsman of the Wheeling & Lake Erie, Toledo, Ohio.

LAST month we announced a competition to close October 15, on the benefits derived from attendance at the various conventions. During the past four months the *Railway Age Gazette* has published reports of the annual conventions of a considerable number of railway mechanical organizations. It has been suggested that there are too many of these associations. We do not believe that this is so, if these associations are doing the work for which they were intended. The question is: Are they properly conducted, and are they giving the best results possible? If they are, then they should receive the hearty support from the higher executive officers. To demonstrate that they are giving results—and we believe that they are—we have invited our Shop Section readers to tell us of the practical benefits which they have derived from membership in, or attendance at the conventions of the organizations in which they are specially interested. This is your opportunity. Are you going to take advantage of it? We have done our best to help your organizations—can you justify the interest that we have taken in them? A first prize of $35, and a second prize of $25 will be awarded for the best two letters or articles on this subject received before October 15. Articles not awarded prizes, but used for publication, will be paid for at our regular rates.

IN announcing our shop kink competitions, we have not at any time insisted that the kinks must be originated by the man who sends in the description, although we have suggested a number of times that as far as possible proper credit should be given to the inventor or designer of the various devices. We realize and understand that in a great number of cases the kinks may have been in use for such a long time that it is difficult to trace their history and to give proper credit for their design. In many instances those who have sent in collections of kinks have been very careful to give proper credit where it has been possible to do so. The man who takes the trouble of preparing the article is entitled to the credit for doing so, but it certainly will not detract from his reputation to acknowledge indebtedness to others for their assistance, or to give the names of those who designed or assisted in the design of the shop kinks. This statement is made because we do not want to have our position in the matter misunderstood, and because we want to have the assistance of our readers in pursuing a perfectly fair and square policy in the matter.

MR. BURKHARD'S article explaining the methods by which second-hand and scrap material is reclaimed and made use of at the West Albany car shops of the New York Central & Hudson River, is of more than ordinary interest, because of data showing in detail exactly what savings were made during the first six months of this year in reclaiming and reusing second-hand material at that point. It is true, of course, that West Albany is one of the largest and most important car repair points on the New York Central lines; but on the other hand, it must also be admitted that the smaller repair points are in a position to make equally important comparative savings. Mr. Burkhard's article describes the arrangement and equipment of the scrap platforms and briefly tells of the ways in which the old material is utilized.

RECLAIMING scrap material, in order to be productive of the very best results, should be reduced to a strictly commercial proposition, as is suggested by Mr. Leech's comment on the necessity of having a simple method of accounting in the handling of this work. If this is not done, it is quite probable that either those in charge will not fully realize the importance and necessity of pushing the work and in seeing that the rules and regulations laid out for it are fully lived up to, or in some cases they may go to the other extreme and spend so much money in reclaiming certain parts that there is not only no net gain, but a real loss. Mr. Leech also emphasizes the necessity of the economical handling of such material. In most cases the labor item forms almost the entire cost of reclaiming scrap and every precaution should be taken to reduce this cost to a minimum by carefully planning the work and arranging the

equipment and facilities to reduce the cost of handling to a minimum. Most of Mr. Leech's article, like that of three of the other contributors, is devoted to the car department, although a most important section considers the way in which the borings and turnings from different classes of material in the machine shop may be kept separate, and thus be disposed of to the best advantage. True, this is not such a serious problem in a large shop where certain machines can be assigned to handle certain classes of work exclusively, but it is a most difficult problem in the smaller shops where each machine may have to handle several different materials during the day. Mr. Leech's suggested solution of this problem for such shops is a good one.

MR. SHEAFE'S article on reclaiming scrap material is brief, but very much to the point. Over $1,600 a month is saved at the Burnside shops of the Illinois Central in repairing and reinforcing damaged I-section brake-beams, in re-rolling rods in a simple and small 2-high rolling mill and in reclaiming the paint skins and slops which are gathered up over the system. This is a saving which is well worth striving for and the department which is devoted to this work is most interesting and well worth visiting.

UNLIKE most of the other contributors in the competition on reclaiming scrap material, Mr. Snyder touches upon the locomotive department. He makes three good suggestions—the using of the old copper steam chest joints which have become flattened and which on many roads are discarded, the utilization of old jacket iron and the remixing and using of scrap boiler lagging. He also refers to the repairing of damaged parts of steel cars. It is remarkable how small a proportion of the damaged parts of steel freight cars actually get into the scrap heap. Those in charge of the maintenance of these cars, at least on the roads where there are large numbers of them, should be congratulated on the way in which they have reduced the amount of new material which is used for repairs to this class of equipment. We should have liked to have had more data of this kind presented in the competition. However, it is always acceptable and we shall be delighted to receive short articles along these lines from any of our readers. Mr. Snyder tells of a committee at his shop whose duty it is to visit the scrap platform each week and see that no useful material is wasted. This appears to be a splendid idea. Like any other thing which is really worth while doing, the reclaiming of scrap material can only be made a success by eternal vigilance.

MR. WOLFGANG'S article on reclaiming scrap material makes a number of splendid suggestions as to how various parts of car equipment can be reclaimed and used again. The arrangement of the article is especially good. His paper is the only one which makes any reference to the reclaiming of scrap by the use of the oxy-acetylene welding apparatus. A number of these outfits are now in use in different railway shops and car repair plants throughout the country and we should like very much to get detail information from these points as to just what results are being obtained. For instance, we should like to know the exact cost of repairing a body bolster or other part by this method, as compared to other methods; or, in cases where it would otherwise be necessary to scrap the bolster, the difference between the cost of a new one and the scrap value of the damaged one. Although the competition is closed, we [illegible] to secure data as to just how the work is accomplished, and shall of course pay for such information on the same basis as we do for all other articles which are accepted. It is not necessary to send in a long story, or to cover all of the work which is being done in this way at your plant. [illegible] good details and send in complete information covering them. [illegible] a great deal of your time and will be far more liable to get the article to us than if [illegible]

THE general shop kink competition which has been announced in the last two Shop Numbers, will close September 15. In talking the matter over with some of the foremen at the various conventions during the summer, we were surprised to find that there was some misunderstanding as to the illustrations which should accompany the contributions. Anything will do as long as it shows the kink up in such a way that its construction and operation are clearly evident in connection with the description. In some instances blueprints are available from the company files; in other cases some one about the shop may be able to take a good photograph; in a great many cases pencil sketches are sent in. Of course it is much easier to handle these if the sketches are accurate and carefully made, but in case this is not possible, we have no objection to receiving rough sketches. Most foremen are not mechanical draftsmen, but all of them can make sketches of some sort or another. Do not be discouraged because the copy you fix up does not compare favorably with the descriptions that you see in the paper. It is safe to say that a good many contributors have trouble in recognizing their articles at first glance when they finally appear in the paper, the transformation is so great. Quite often in meeting a foreman at a convention, or in his shop, he will remark in an off-hand way that he has a much better way of doing a certain piece of work than someone else who had a description of his methods published in a previous Shop Section. If you find that this is true of any of the kinks that you see in the Shop Section, do not wait until you meet the editor to tell him about it, but get busy and write to him immediately, describing your method and calling attention to its advantages as compared to the one in the article that attracted your attention. In doing this, you will accomplish several things; you will assist the first contributor by drawing his attention to the fact that his methods may be improved upon; you will assist our readers by showing them a better method than the one that they have already learned about, and you will have an opportunity of establishing your reputation among them. The requirements for entrance to the shop kink competition are three kinks and a prize of $50 will be awarded for the best collection. More than three kinks may be submitted, but the judges will base their decision on what they consider to be the best three in each collection. A second prize of $25 will be awarded for the next best collection, and those articles that are not awarded a prize, but are accepted for publication, will be paid for at our regular rates.

MASTER BLACKSMITHS' ASSOCIATION

WHILE the nineteenth annual convention of the International Railway Master Blacksmiths' Association, which was held at Toledo, Ohio, about the middle of August, was a good convention, as compared to those of the other foremen's associations, it was held under serious handicaps, and because of this was hardly up to the standard of last year. Two other large conventions were held in Toledo at the same time and the hotel in which the Master Blacksmiths' convention was held was not at all suited to its needs. The room in which the meetings were held was small, poorly lighted and very badly ventilated. Unfortunately, the weather was also very warm, thus complicating matters seriously. It is to be hoped that the executive committee in arranging for the place of meeting next year will be more successful in selecting the headquarters, for no matter how well the members may have been prepared to present their papers or take part in the discussions, the conditions under which they were working were such as to take most of the fine edge off of any inspiration which they may have had. However, in spite of this, the convention proved to be a fairly good one, as may be seen by studying over the account of it in this issue.

For several years very little change has been made in the subjects which have been assigned for committee reports. This is unfortunate and should be remedied. While case hardening, for instance, is an important part of the work of a smith shop, it is

hardly desirable to have a dozen or more members asked to report on it year after year when there is little possibility of any new or important developments taking place. It is true that at the recent convention one member had a good report on this subject, but on the other hand, 10 of the 12 members of the committee had nothing to say, and during the past two or three conventions, although the subject has been assigned for report, nothing important has developed. The same thing is true to a greater or less extent of several of the other subjects which were assigned for consideration this year. Any one who has kept at all in close touch with railway smith shops during the past few years must realize that there have been a number of most important developments and that there are many things in connection with its operation which could be discussed by the foremen to splendid advantage, and moreover, would be far more valuable in producing a lively discussion than some of the time worn subjects on the programme this year. For instance, in the all-important problem of reclaiming scrap material, the smith shop foreman can prove a most important factor. If this subject were to be assigned and care were taken to have men on the committee who were doing good work along this line, a number of good papers could be presented next year and such a lively discussion be provoked that the higher executive officers would be forced to recognize the necessity of sending their master blacksmiths to the annual conventions.

The manufacture and handling of bolts is a most important part of the smith shop work at some of the central shops where a large amount of manufacturing is done for the system. There are two or three shops in the country that are far ahead of their neighbors in their methods of handling this work. The association could do splendid work by placing a description of the methods used in the best shops on record and in thoroughly threshing out this subject, so that those who are not handling the work to the best advantage could mend their ways and obtain better results.

The subject of tools and formers has been before the association for a number of years, and with good results, for each year a number of good tools are presented. Unfortunately, however, the association has no provision for preparing and distributing advance copies of the papers on the various subjects, and so when a member presents a paper on the floor of the convention it is not very intelligible because those present have not had an opportunity to study the blueprints or sketches to which the paper refers, and of course the one or two blueprints which the author may have with him cannot be seen by the members generally while he is reading his paper. For this reason the discussion of these devices amounts to very little and other members are not in a position to show that they have better methods for doing the same work. The suggestion has been made that more of these tools and formers and shop kinks, should be presented before the convention and in order that they may be properly understood and that the discussions concerning them may be of real value, that the papers with the drawings or photographs be sent to the secretary well in advance of the time of the meeting, and that he make provision to have them displayed on the walls of the meeting room before and during the convention. If the drawings or photographs were placed in the order in which the papers were to be taken up, the members would undoubtedly find time to study them over before the reports were presented. It might be well for each contributor to send in two or three, or half a dozen blueprints, so that they could be posted at different places in the room and small groups could gather around them before the convention opened and during the recesses.

There is another phase of this question of tools and formers which should receive serious consideration on the part of the association. Take the matter of forging machines, for instance. Drawings, photographs and sketches have been presented showing the design of tools and formers used with forging machines, and yet, with the exception of the Tool Foremen's Association, at its last convention, no effort has been made to place on record the fundamental principles of the design of such dies and formers. The smith shop foreman who is about to install a forging machine in his shop has very little to guide him in designing the dies and formers, other than the general suggestions which he may receive from the manufacturer, or of detailed drawings which the manufacturer may be willing to furnish him in some cases. The result is that when he starts to design a set of dies for a special piece of work he soon finds that he is in trouble because of some little knack in the design which could easily have been incorporated if he had had at hand a good report or paper on the designing of the dies and formers. There is no good reason why a number of men in the association who have had wide experience with the forging machine could not get together and outline suggestions which would be most helpful to their brother foremen.

The more extensive use of the forging machine within recent years has greatly multiplied the number of dies and formers in use at most railway smith shops. Indeed there are so many of these at some points that difficulty is found in locating the dies when they are wanted. A few shops have systematically arranged for the care of the dies so that they may readily be located, but many shops have been more or less careless in the matter. A description of the best methods in use for caring for these tools would be appreciated by many of the members of the association.

Flue work is one of the questions which comes up at every convention, and while the members give their experiences, no effort has been made to bring out and place on record the best and cheapest way of handling flues. It would seem that the committee which is appointed ought to carefully investigate the conditions with a view to placing on record a complete description of two or three of the plants in this country from which the best results are being obtained. While it is true that the committees appointed on the various subjects cannot work as they do in some of the larger associations, where it is possible for the members to get together once or twice a year, still this handicap could be overcome to a certain extent and some real committee work could be done through correspondence, if the members would make a determined effort to do so. The problem is one with which all of the smaller associations have to contend, but the railways at large seem to be waking up to the necessity of having their foremen visit other shops during the year, and it is possible that in the future better results can be obtained than has been possible in the past. There is no good reason, however, why, if all the committee members send contributions to the committee chairman, he cannot combine the information into one report cutting out all useless or unimportant information. These are only a few suggestions as to subjects which might be considered to better advantage by the association. There are many other practical ones of equal, if not greater, importance, but they will not be discovered unless a determined effort is made to get out of that rut and broaden the work of the association.

The association has a committee on parliamentary law, and it might be a splendid idea for other organizations of like character to have similar committees. The work of this committee is to outline the way in which the reports should be presented, to prepare instructions as to how the discussions of the reports or papers should be conducted and other parliamentary rules for the conduct of the meeting. Unfortunately the committee does not report until after the convention has actually opened. It might be far better to have the committee draw up such suggestions as it thought wise and submit them to the executive committee during the year and have the executive committee approve of them. In this way those who are interested in conducting the meeting would know in advance just what they were expected to do. Foremen, as a general rule, are not accustomed to presiding at conventions or meetings, or of taking part in them, and in order to handle the work of the convention efficiently

they should give the matter some thought and study and be prepared to act quickly and intelligently when they are called upon.

MECHANICAL ARTICLES DURING AUGUST

THE articles of special interest to our mechanical department readers that have appeared in the weekly issues of the *Railway Age Gazette* since August 4, and to which Shop Number readers may wish to refer, are as follows:

Steel Motor Coach for the Pennsylvania. A new suburban line between the Hudson Terminal building, New York, and Newark, N. J., will necessitate the Pennsylvania Railroad using a special type of car to meet the clearances of the Hudson & Manhattan tunnel. This car is illustrated and described on page 280, August 11.

Mallet Superheater Locomotives; Delaware & Hudson. Six of these locomotives have been in pusher service since June, 1910, and a short time ago four more locomotives of a similar design, but equipped with fire tube superheaters, were placed in service. Comparative data is presented showing the service of these engines as compared to that of the consolidation locomotives which they displaced. The method of operating and handling the Mallets is also described. August 11, page 291.

Mallet Locomotives; Duluth, Missabe & Northern. The details of eight Mallet locomotives having the 2-8-8-2 wheel arrangement, which have recently been placed in service on this road, are described on page 312, August 18.

Pullman Equipment for the Chicago Great Western. This road has recently received a number of Pullman cars, among which is a steel compartment sleeping car with an observation parlor for the exclusive use of women passengers; also a men's club car. Both of these are illustrated and described. August 18, page 320.

Heating Cars Containing Perishable Freight. A description of the various methods used for this purpose, abstracted from a paper presented before a meeting of the American Association of Railroad Superintendents by E. F. McPike, refrigerator service agent, Illinois Central. August 18, page 322.

Trainmen and Safety Appliances. A reader suggests that the repairs or defects to safety appliances and other parts of the cars could be facilitated at inspection points by having the train men inspect the cars for such defects during transit. August 25, page 365.

Ventilation of Sleeping Cars. Abstract of a valuable paper presented before the American Public Health Association by Thomas R. Crowder, M. D. A large number of experiments were made under various conditions, both with and without exhaust ventilators, and the results are presented fully and in graphical form. August 25, page 371. An editorial on car ventilation commenting on these experiments, appears on page 362 of the same issue.

Train Resistance. W. F. Kiesel, Jr., as the result of a number of years study and experience, has developed a formula on train resistance which should prove of considerable practical value. August 25, page 377.

Mallet Locomotive with 20 Drivers for the Santa Fe. The 2-10-10-2 type Mallet locomotives which were converted from Santa Fe type locomotives in the shops at Topeka, Kan., and which are by far the largest locomotives in existence, are fully described and illustrated in the issue of August 25, page 379.

Freight Cars for Shipping Transformers. A high capacity well-car for this purpose, built for the Westinghouse Electric & Manufacturing Company, is illustrated and described in the issue of August 25, page 381.

The Demands of the Western Shopmen. A full text of the demands presented to the officers of the Southern Pacific will be found on page 383 of the issue of August 25.

NEW BOOKS.

Temperature-Entropy Diagram. By Charles W. Berry, Assistant Professor of Mechanical Engineering, Massachusetts Institute of Technology. Published by John Wiley & Sons, New York. Cloth, 5 in. x 7½ in. Price, $2.50.

This volume is the third edition of Professor Berry's treatment of the temperature-entropy diagram. It now consists of nearly 400 pages, several additions having been made in the chapters on the flow of fluids, the gas engine cycles and the non-conducting steam engine. The chapter on refrigeration and the warm air engine has been expanded into separate chapters on each subject. Entropy analysis in the boiler room has been added, as well as tables on the efficiency, water and heat consumption of the Rankin cycle. Professor Berry has for many years been deeply interested in the subject of the entropic diagram and his work has been of a very careful nature. With the increase in the use of the temperature-entropy diagram, as against the pressure-volume diagram, this book will find a special field among the students of thermodynamics.

Letters to the Editor.

EFFICIENCY.

Savannah, Ga., July 19, 1911.

To the Editor of the Railway Age Gazette:

The practical results gained from the discussion of articles on scientific management which have been published during the past several months in the *Railway Age Gazette,* have been of enormous value, if serving as nothing more than a stimulus to renewed endeavor. In speaking of efficiency engineering I take it in the broad meaning of the word that it covers the most economical methods of doing work in our shops. It goes without saying that all of us are, and have been in the past, striving for this result; that some of the plans advocated are impracticable of application to existing conditions, also goes without saying. On the other hand, the whole subject is a very important one, and the keeping of it before us has certainly served to keep us alive to the situation and increase our endeavors to attain the desired end.

F. F. GAINES.
Superintendent Motive Power, Central of Georgia.

SMOKE ARCH BOLTS.

Chicago, Ill.

To the Editor of the Railway Age Gazette:

Any machinist who has sledged, stretched, beaten and pounded a set of smoke arch bolts for two or more days and then had to drill them out, will often wonder why there is not some easier method devised whereby a cylinder can be taken from the boiler in a much shorter time. In these days of feverish haste, when every effort is put forth to get the engine out of the back shop as soon as possible, some method should be devised to overcome this difficulty. It occurs to me that the remedy lies in the introduction of a bolt with such a taper, whatever that may be, that one or two vigorous blows will cause it to register against the opposite side of the smoke arch. Such a bolt has been met with the criticism that "the arch might be broken while driving the bolts in," and "a reamer with some taper is already used," but that taper happens to be only 1/16 in. to the foot. My suggestion is to make a bolt with a taper of ¼ in. in 4 in., or one that will drive out easily, and one that will securely hold the sheet, liner and cylinder flange. I think the difference of time in fitting this bolt will be more than compensated for by the time taken in removing it.

W. W. REEVES.

INSTRUCTION OF APPRENTICES AND HANDY MEN.

July 11, 1911.

To the Editor of the Railway Age Gazette:

Would it not be well for your Old Railroader (*Railway Age Gazette,* July 7, page 49) to develop his own efficiency men? His ideas of what ought to be are good, but this continual harping about what the college man gets and does is getting stale. The college man cannot last any more than the apprentice, nor can he make a success unless he gets down to the work. He has the advantage of education. How many shops or roads give an apprentice an opportunity to learn to write an intelligent report? Would it not be better to provide the boys with the opportunities than to expect them to buy the knowledge to read blue prints? If the boy's parents do not want him to work, if they are to pick the vocation, he is to be pitied. You have a nonentity to start with.

I know of a road that introduced apprentice schools. Two years ago the laborer's job at 15c. per hour was preferable to the apprentice rates or position. Since that time the boys have been attending the apprentice school. An average percentage of less than 75 for school work each week brings the young man in contact with the master mechanic, and, in justice to the boys,

there are very few of them that have to go to him. Each summer the boys have their baseball team and have Saturday afternoons for practice and play. One of the old apprentices or graduates is kept in the office of the master mechanic all the time—usually for about six month periods. He follows test and record work, checking tire wear, making drawings, etc. The first man fell down. The second was recently promoted to a gang foremanship, and he has increased the output of his department in an amazing way. The third is digging away. The third week in the office he asked permission to come to the office Sundays and evenings to get into the technical papers and reports for study. Today there are fifteen applicants for the next vacancy. If the boys show at the end of six months that they are not fitted for work in the school and the shop, they are dropped. In two years only one has been so handled. The boys appreciate their school, their ball team and their chances of advancement so that every one is working for that six months in the office or a chance to get to the drawing room or the main shops. The boys are paid full time for their school hours, and on Saturdays the ball team is so paid when the shop works at that time.

Change your methods to suit the times. Make your opportunities attractive to young men; let the successful applicant be the boy that has the highest mark on his entrance examination and while holding him strictly to his work use him as a human being. Keep educating him along every line possible, and we will not hear so many wails about the college men. There is a place for everybody. After a good many years experience I want to say that the old railroaders are more to blame for the decadence of the mechanic than anybody or anything else.

There are plenty of bright American boys out of high schools who want to get into this work. They will make the best efficiency men. In six months one of these boys at the point above mentioned was promoted to assistant apprentice instructor. The assistants for locomotive and other tests on the road are picked from the school. Move up the men on their rating of efficiency and you will be amazed at the knowledge of the boys, their eagerness to get ahead and their desire to have the banner school on the road. Foster this spirit, because no foreman can make mechanics unless he has the material to work with. Officials above the foremen have got to do their part.

ANOTHER OLD RAILROADER.

TIRE HEATERS.

Cleveland, Ohio, August 12, 1911.

To the Editor of the Railway Age Gazette:

I have read several descriptions of tire heaters in the *Railway Age Gazette*, most of which are very easily rigged up; but I think we have the simplest and easiest rigged up device, and that it gives as good, if not better results, than any so far described.

It consists of an oil tank, similar to those described, using crude oil. The air is supplied to the tank by 1 in. hose with ¾ in. nipple connections. The oil is controlled by a needle valve, which connects to the ¾ in. air line leading to the burner. This air line is supplied by a T connection from the air supply to the tank, and is controlled by a ¾ in. valve.

The burner is made of 1¼ in. pipe bent to the shape of the tire, with ⅛ in. holes drilled 2 in. apart. The ends are left open and are about 8 in. apart. The hose supplying the mixture is reduced to ⅜ in. with a T connection with nipples 10 in. long, which are placed in openings of the burner. The air supply is at about 80 lbs. pressure. After the fire has burned one to two minutes, the air supply is turned on full. This gives a very hot fire, and a tire is heated so it can be removed in 8 minutes. It may be of interest to note that this same arrangement was used with all connections ⅜ in., but it took 30 to 40 minutes to remove a tire.

E. L. DUDLEY,
Machine Shop Foreman, B. & O.

ESTABLISHING AN EFFICIENCY SYSTEM.

July 20, 1911.

To the Editor of the Railway Age Gazette:

If the management of any large concern announced that its shop costs were extremely high and that an efficiency engineer was to be employed to find out the cause, every man in the shop would be "up in the air." But, on the other hand, if the management announced that its shop costs were high, and that it would like to check up the shop conditions, and desired each man in a supervising position to furnish an itemized account of the number of men he handled, together with a record of their rate of pay, age, kind and amount of work handled, and speed of machine (if any) operated, I am sure that some very surprising information would be secured. This is the first step in establishing an efficiency system, and I am sure that every foreman would be glad to assist in making this check. After securing this information, the work should be checked so as to simplify and systematize, cutting out all unnecessary moves.

Every concern, whether it be a private manufacturing plant or a railway shop, has foremen who handle their work along personal lines, regardless of the fact that they waste a lot of time and money. As an example take the blacksmith shop: One foreman may claim that it is cheaper to forge a certain job and dress it so that there will be no machine work required. Another foreman will claim it is cheaper to forge and leave a small amount to be finished on the machine, while still another will claim the cheapest way is to block out a rough forging and let the machine do all the finishing. This is a situation where the efficiency engineer can make a good showing. After checking up all the conditions that may effect this work, he can render a report that shows the cheapest method, regardless of the opinion of the blacksmith foreman.

In some plants new equipment is installed, but no advantage is taken of the better facilities. In a large manufacturing plant the entire tool equipment was replaced with high speed steel, but no change was made in the speed of the line shaft or in the sizes of the drive pulleys. The result was that the shop costs were increased, but no apparent increase in output was noticed. An efficiency engineer was employed, and the first thing he recommended was to have the machines speeded up.

In another large shop that was divided into several departments, considerable trouble was experienced in getting material trucked from one department to another. A careful analysis of the situation showed that while each department had 2 or 3 men whose sole duty it was to truck material, each gang waited for the other gang to deliver first. In this case all the men were formed in one gang under a leader, and a schedule was made so that the entire gang went to each department every hour and delivered or removed the required material. After working this way for one month it was found that 50 per cent. of the truckers could be taken off and still get the work done quicker than before. Take the belt question:—How do you know that you are not losing money on this one item if you do not keep a record of your belts? Check over your plant and see if you are not using leather belt in some damp place where a rubber belt would last longer and cost less to buy. Perhaps a machine is equipped with double belting, where single belting at one-half the cost would give better service.

In starting out on the efficiency idea, remember the old saying about foremen—that the best workman does not always make the best foreman. Perhaps an expert mechanic will start an efficiency system and base his results on the difference in speed of the regular operator and his own. This record makes a nice showing, but no good results are obtained. After the expert has left, the regular operator finds that he cannot handle the work as fast as the expert, and if the job is on a piecework basis he will not be able to make his regular rate. This kind of an efficiency system is a failure. The better idea to work out is to study any situation and simplify or systematize the work so that the regular operator will be able to increase his own work. Take

a planer job for example:—You may find that the reason why the operator does not turn out more work is that he does not take any heavy cuts, and that the reason why he cannot take heavy cuts is that he does not clamp his work on the machine properly. This man will learn more by having the reason of why he cannot take heavy cuts explained to him than he would learn in watching an expert do several jobs. He might be able to do the same job that the expert did, but if a different shaped job came along he would be lost, for he would go back to his old style of clamping.

In starting an efficiency system do not look for results too quickly. We all know that by investing a large sum of money in improvements work can be handled cheaper and quicker, but the successful efficiency system is the one where results are obtained in a quiet manner and without any great outlay of money. Explain to each workman that you are anxious to increase your output, but that you do not want him to think you intend to take it out of his "hide," but rather to take it out of the machine he is running. Perhaps this same man can offer some very valuable suggestions. Very often small jobs are overlooked in the haste to correct the big jobs, but while the big job is only done occasionally, the small one is handled daily, and more saving can be made by correcting the small job first.

"OLD TIMER."

RECLAIMING SCRAP MATERIAL.*

BY A. A. BURKHARD.

Assistant General Foreman, Car Department, New York Central & Hudson River, West Albany, N. Y.

There is a wide difference of opinion as to the economy in working up and using scrap and second-hand iron. To the writer there does not appear to be any question from a saving standpoint, or from the standpoint of safety when stock is used for certain classes of work. About two and one-half years ago we installed our present scrap platform at West Albany. At a plant the size of that at West Albany it is an easy matter to accumulate enough old second-hand materials to build almost any kind of a building. The building itself is, therefore, virtually made of second-hand and scrap materials. We accumulated enough old car sills for the framework and enough old corrugated iron from various parts of the road for siding. We then got hold of an old locomotive tank and boiler that had outlived their usefulness and an old second-hand pump and dammed up a ravine; our present water supply is from this source.

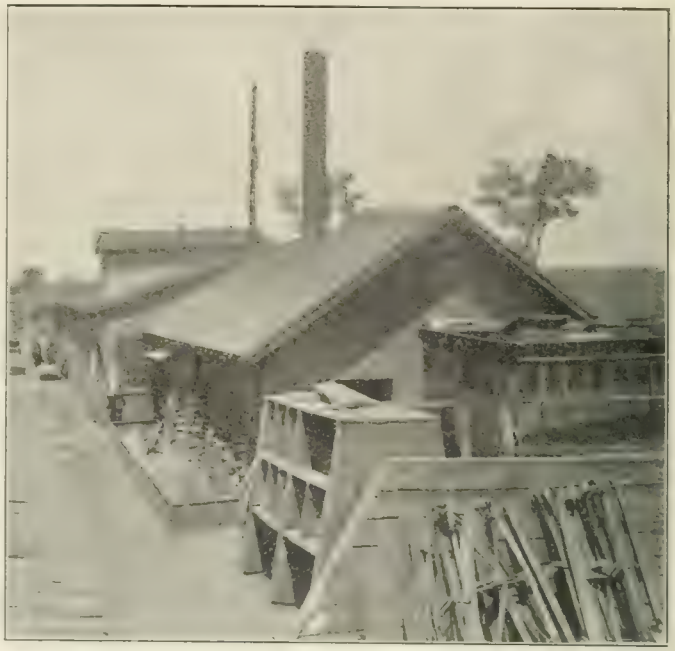


Fig. 2—Part of the Buildings at the Scrap Platform.

The reclaiming of material suitable for freight car repair work is handled by a man who is thoroughly familiar with all kinds of freight car castings and forgings, and he keeps in close touch with the store department. In this way we accumulate and keep in stock enough of this class of material to meet our

*[illegible] and awarded the first prize of $35.

Fig. 1—Scrap Round Iron Ready to be Cut Up and Straightened for Various Purposes.

demands and no more. All staple classes of material are, of course, reclaimed in larger quantities, the obsolete types being consigned to the scrap. We have a car demolishing plant five miles from the present scrap platform, where in the neighborhood of from 30 to 50 cars are demolished per month. These are of the old and lighter types. This scrap, together with everything accumulated within a radius of 300 miles finds its way to the scrap platform; it would be difficult to describe the different kinds of this material. Locomotive, building and bridge, passenger and freight car, electric material, and, in fact, everything used on a large railway system may be found there.

Fig. 3—A Few of the Bins on the Scrap Platform.

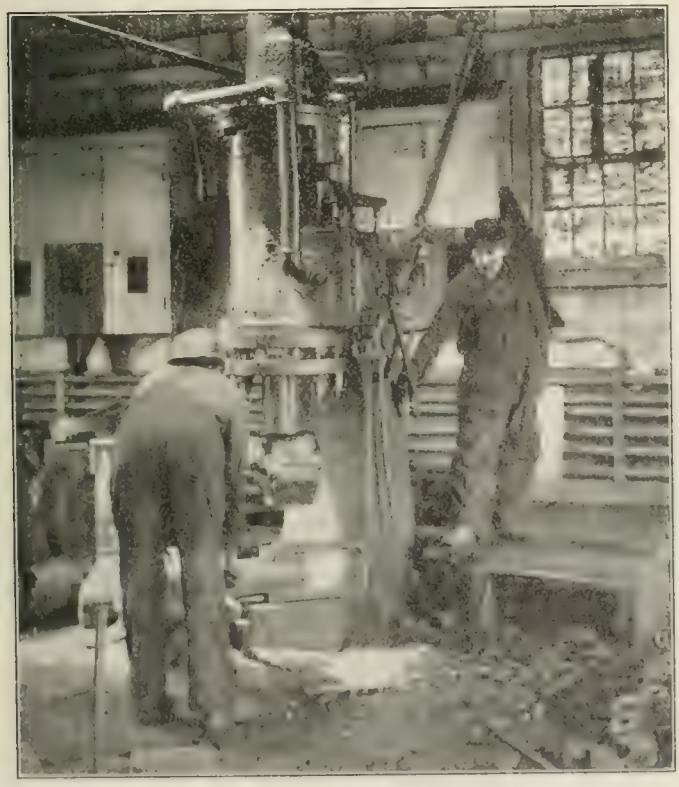


Fig. 4.—Removing the Yoke From a Coupler.

We have installed a number of machines and work that was formerly blocking the blacksmith shop is now being performed at the scrap platform, and the blacksmith shop is practically free of the old second-hand accumulations. Disposition of everything is made right at the scrap platform. It is either scrap or it is good. We have two hammers, one heavy and one light, which are used for straightening all kinds of iron, separating couplers from pockets, applying pockets to couplers, and, in fact, everything that a hammer can be used for. There are two blacksmith forges and one heavy coke furnace, which are used for heating iron for making all kinds of shapes, repairing brake beams, repairing train chains and other kinds of repair work that can be handled economically. We also have a heavy shear at the outside of the building, where all kinds of heavy "rounds" and bars are cut to the suitable lengths, and which is used for separating cast from wrought and malleable scrap, etc. A light punch and shear is used for cutting old bolts to suitable lengths. A nut tapping machine is kept busy at all times retapping the large accumulation of second-hand nuts.

It would be impractical to go into detail and give all the operations performed at the scrap platform, but it has reached such proportions that we could not handle the work in the blacksmith shop if we attempted to do there what is now being done at the scrap platform. Fig. 1 shows an old flat car with an accumulation of sorted round iron ready to be cut up and straightened for various uses. A small portion of the scrap platform buildings, which cover an area of 200 ft. x 60 ft. is shown in Fig. 2. The west end of the platform bins used for different classifications is shown in Fig. 3. It also shows the self-propelling hoisting machine which is equipped with a magnet.

Fig. 5—Riveting a Yoke to a Coupler.

Two of the force dismantling an old M. C. B. coupler pocket from the coupler is shown in Fig. 4, while Fig. 5 shows them riveting up an old Miner pocket to the same coupler. This work is to be performed in the future by a pneumatic home-made bulldozer, which has been made at West Albany and installed for such purposes and the straightening of brake beams, etc. A heavy shear separating pieces of wrought from malleable iron is shown in Fig. 6. Three iron racks made of second-hand 1 in. x 4 in. flat iron and angles are illustrated in Fig. 7. They are filled with second-hand wrought iron which has accumulated at the scrap platform. A section of a new iron rack which is being built to take the place of an old wooden one, which is 100 ft. long, is shown in Fig. 8. The new iron rack will be built entirely of second-hand iron.

A lot of shapes used in large quantities in the freight car repair shop and made entirely of second-hand iron are shown in Fig. 9. They include a set of coal-car side stakes plated with light ½ in. x 4 in. arch bar tie straps and 1 in. x 4 in. arch bars.

We have a large number of wooden coal cars that have been giving trouble, and we have found these to make an ideal side stake. Brake hanger pins, truss rod extensions, end sill and end plank hook rods, bolster hook rods, brake levers, brake

Fig. 6—Heavy Shear on Scrap Platform.

hangers, dead lever guides and anchors, coupler striking face plates, coupler carrier irons, draft timber cross tie straps, body tie rod clips, foot board brackets and brake connections used on our standard 80,000 lb. capacity coal cars and 60,000 and 80,000 lb. capacity box cars to which we are applying the heavy Miner draft gear are shown. We use thousands of these pieces each month, and the shapes that we make from old second-hand iron are just as good as if the iron were brand new. Box car door angle braces are accumulated from various sources, and are applied to box cars passing through the shops on account of the door sagging. You will notice the bottom of the door partially shown in the background, is equipped with a heavy wear iron. These we make out of old engine flues, flattening them. We also make square washers for freight car repairs from old [illegible]. For car side bearings used on some of the older equipment that has wooden body bolsters are made from old arch and tie bars.

It is impossible to show everything we make, and a few of the operations performed at the scrap platform that are not shown in the photographs, are as follows: Old M. C. B. follower plates are straightened and cut into sizes suitable for tandem gear. Jaws from old brake rods are cut off and made into suitable lengths. Knuckle pins are straightened. Old passenger car transoms are used for coupler face plates. Old flat iron from 1 in. x 4 in. to 1 in. x 6 in. is used to make truss rod twin washers. Center pins are made from old roller bars and brake staffs from 1¼-in. hog iron. Discarded eye beams, 8 in. x

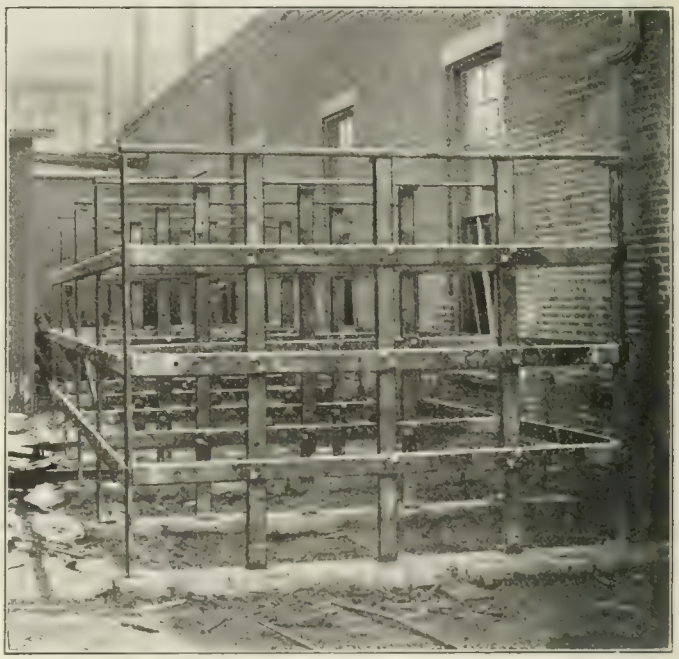


Fig. 8—A New Iron Rack in Course of Construction.

12 ft., are reclaimed from trucks to make caboose draft arms. Eye beams from standard steel platforms on coaches are used for caboose draft arms. Old discarded sill steps, too short for the present safety appliance standards, are made into running board brackets. Old accumulations of corrugated iron are used for spark shields under passenger equipment. Old boiler plates are used for coal car roller bar plates. Old channel irons 8 in. to 12 in. wide are utilized for reinforcing pressed steel flat cars

Fig. 7—Iron Racks for Storage of Second-Hand Wrought Iron.

This is just a sample of the various uses to which we apply accumulated second-hand iron.

Fig. 10 shows an 80,000 lb. capacity coal car equipped with the different parts that we make from second-hand iron, these parts being marked white. We have from 40 to 45 cars of this kind through the shops for general repairs and the application of the heavy gear every month, and are now starting the application of the heavy gear to all of the better equipment both box and coal. We will be able to make all the parts of second-hand iron, as there is a large accumulation of the sizes needed.

Fig. 9—Freight Car Parts Made From Second-Hand Material.

Following is a statement of savings effective by the reclaiming and re-using of second-hand material from January 1 to June 30, 1911.

Article.	Made from.	Amount derived if sold for scrap.	Number made.	Cost if made from new material.	Saving to the company by using second-hand material.
Carry irons	Arch bars	$1,323.00	7,150	$4,290.00	$2,967.00
Side bearings	Arch bars	1,498.50	9,435	4,906.20	3,407.70
Cross tie straps	Tie bars	1,350.00	9,650	4,439.00	3,089.00
Hook rods, 1 1/4 in.	Truss rods	621.00	4,180	2,006.40	1,385.40
Cross tie rods	Truss rods	229.50	1,895	758.00	528.50
Running board brackets	Sill steps	121.50	2,550	408.00	286.50
Coal car stakes	Tie bars	6,210.00	11,250	20,250.00	14,040.00
Twin washers	Arch bars	810.00	9,875	2,587.50	1,777.50
Truss rod clips	Tie bars	459.00	9,550	1,528.00	1,069.00
End strap rods	Tie rods	324.00	4,450	1,068.00	744.00
Head block plates	Passenger side bearings	1,390.50	3,745	4,568.90	3,178.40
Wear irons	Flues	2,791.10	5,435	3,543.50	752.40
Washers	Flues	30.60	5,750 lbs.	103.50	72.90
End posts	Steel rails	1,125.00	200	1,975.75	850.75
Draft arms	Dismantled platforms	81.00	210	1,470.00	1,389.00
Box car door angle	Angles	45.90	640	405.60	359.70
Springs	Dismantled Class "F" trucks	40.50	850	178.50	138.00
Safety strap	Tank bands	108.00	1,410	366.62	258.62
Built new [illegible] truck	Arch bars	324.00	1 truck 4 sets	1,766.40	1,442.40
Freight couplers		98,457.50	15,455	135,231.25	36,773.75
Freight pockets		4,981.50	10,150	24,360.00	19,378.50
Knuckle pins		310.50	10,025	1,002.50	692.00
Follower plates		612.00	3,000	1,800.00	1,188.00
Brake levers		1,224.00	5,785	3,471.00	2,247.00
Brake jaws		94.50	3,175	317.50	223.00
Bolts, all sizes		29,437.20	4,[illegible] lbs.	84,650.20	55,213.00
Brake beams, all kinds		4,100.00	18,250	46,537.50	42,437.50
Train chains		4,730.40	34,750	69,500.00	64,769.60
Nuts		1,683.00	245,630 lbs.	6,140.75	4,457.75
Head block arch iron		459.00	2,175	1,044.00	585.00
Side channels		810.00	1,125	2,250.00	1,440.00
I Beams		1,740.30	[illegible]	4,370.50	2,630.20
Truss rods		1,345.10	[illegible]	16,570.80	15,225.70
Bottom connections		1,012.50	5,535	3,321.00	2,308.50
Brake shoe keys		40.[illegible]	7,180	143.60	103.10
Total		$169,921.10		$456,330.47	$286,409.37

Total saving for the company, $286,409.37.

We are operating the entire freight car repair department without utilizing new iron for anything but coupler pockets and some of the larger bolts. A careful study of the reclaimation work for the past three years has resulted in an incredible reduction of expenses. The argument is often advanced that the increased labor entailed in working over old iron offsets the difference between the cost of new iron and the price obtained for scrap. Such is not the case. At West Albany we convert 1,000 lbs. of scrap iron for $.80, which includes supervision, maintenance, etc. Add this to the scrap value ($6) and it will be seen that a saving of $8.20 per 1,000 lbs. is effected, as new iron costs at least $15 per 1,000 lbs.

The remolding of scrap asbestos into commercial sizes of pipe covering and the utilization of scrap rubber for matting, etc., is now receiving our attention. In fact, the reclaiming of old materials proves to be the most interesting part of our daily routine.

Fig. 10—The White Parts Are Made From Second-Hand Material.

ECONOMIES OF THE SCRAP YARD.*

Foreman, Pennsylvania Railroad, Buffalo, N. Y.

Does it pay to reclaim second-hand parts of cars and locomotives? Yes, if the conditions are right, and they are properly maintained. By this, we mean (1) that a yard must be of sufficient size to allow ample room for bin and platform space; (2) ample track facilities, both for loading and also the unloading of scrap sent in from along the road; (3) plenty of room for the yard or shop laborers to wheel in scrap gathered up daily about the yard or shop to any desired bin or place; [illegible] ing different varieties of scrap to the more remote points in [illegible] found when wanted. Such material as may need straightening [illegible]

System of Accounting.—Under ideal conditions the scrap yard should be conducted on strictly storehouse lines, both as to handling and accounting. That there is money in the scrap proposition is undeniable, as witness the many scrap yards scattered all over any large city, and note the variety of scrap material, ranging from boilers of all descriptions and ages to bolts of all sizes and lengths. That there is also much loss due to a poor system of handling, or rather lack of system, is also undeniable.

Reclaiming Scrap Bolts.—Many roads reclaim all, or nearly all, scrap bolts. The writer knows of one company doing this at an average cost of 1.3 cents per pound, very much below the cost of new bolts. Even that figure can be reduced by improvement in the system of handling. Too many operations will cut into the profits. The company referred to has laborers gather up the old bolts of all kinds and sizes from the tracks and yards where car repairs are made. They are thrown into a car along with other scrap material. When the car is unloaded, the bolts are loaded into wheel-barrows and taken to the bolt shop. There they are classified in square, symmetrical piles, sometimes six feet in height, very nice to look at and pleasing to the eye, but expensive. From here they are picked over and taken [illegible] the bolt planing machine, and cut off to required lengths; for example, an 8-in. bolt is cut to 6 in. in length, thus doing away with the old threads and allowing new ones to be cut in the threading machine. The straightening is quickly done under a [illegible] steam hammer.

While the operations of planing, straightening and thread-

ing must of necessity go with the reclaiming and re-use of old bolts, and the quantity turned out is dependent on the facilities and the speed of the operators, the operations incident to the delivery of the old bolts to the shop will certainly stand improvement. An ideal method with which the writer is familiar is to fit up an ordinary gondola or box car, the latter preferred, with bins so that when the bolts are loaded they are thrown into the proper bins at once and are classified at the start, each bin in the car being plainly marked. Similar bins are provided at the bolt shop and the bolts are unloaded directly into these. No piling or sorting is necessary. Carrying out this idea of scrap classification still further, another car is provided with bins for scrap of various kinds, such as wrought iron, steel, cast iron, couplers, etc. Placed at a convenient point in the repair yards, or moved about when expedient, it is an easy matter to have the various kinds of scrap material thrown in the proper compartments in the car, and the scrap is thus classified at the first handling. Two or more old cars that have been condemned for road service can be assigned to the shop department and be cheaply fitted up for these scrap cars. This provides a car for loading while one is being unloaded at the bins.

Scrap Car Axles.—Most roads that have shops of considerable size manufacture a large amount of material for freight car repairs. Good and economical use is made of scrap iron axles and some steel ones in the manufacture of standard freight car material and locomotive parts.

Reclaiming Old Nuts.—The writer is familiar with a large road that had never made any use of scrap nuts. Some time ago a system was installed at a repair point of considerable size, a laborer being assigned to pick up all the old nuts and put each kind in a box of convenient shape, holding from twenty-five to fifty pounds. These boxes when filled are delivered to the shop and the nuts, already sorted and classified, are retapped on a high-speed nut tapping machine at an average cost for all operations of one cent per pound, as against two cents per pound and more for new nuts purchased. It is not unusual to thus reclaim three thousand pounds of nuts in a month. Certainly some saving in that.

Car Wheels.—The question of the expeditious and economical handling of scrap wheels is a difficult one with most shops. There is seldom room enough for the storage of more than a few hundred wheels at a time; there should be space for many times more. Long delay in moving the wheels or in loading or awaiting orders to load, or holding wheels for a better price, causes so much extra handling, and interferes so much with the entire system of wheel production that in many cases the profits resulting from the sale of scrap wheels are very much reduced. If conditions can be made to conform, there is but one ideal way of handling scrap wheels, and that is directly from the dismounting machine into the cars, the loading platform being on a level with the wheel shop floor, and the loading tracks so arranged that the floor of the car is level with the platform and the distance from the wheel shop as short as possible. As each wheel is pressed off at the dismounting machine it may be rolled directly into the car with one handling. Or, if happily, there is room for a loading platform of very generous width and length, a large number of wheels can be stored, awaiting disposition, though this means handling each wheel twice. The writer is familiar with a road that always handles each wheel three times, and sometimes four, in the process of dismounting and final loading on the car. It does not require very much business acumen to figure out the resultant loss with this kind of a system.

Borings and Turnings.—Another difficult and vexatious problem is the proper handling of the borings and turnings accumulating from the different machines in the shop. Here we have the problem of separating the various metal turnings, including steel, wrought iron, cast iron, malleable iron, and very likely several varieties of brass and bronze. In a large shop where the brass work is usually assigned to certain machines, iron forgings to another group, steel work to still another, and so on, not much difficulty arises. It is in the small shop where a large amount of work must be turned out on a small number of machines that the trouble occurs. It is impossible to do otherwise than to give each machine a variety of work, the material of which may be steel, brass, iron forgings and cast iron, all in one day, or, indeed, in the short space of several hours. Where this class of scrap is sold the buyer possibly wants all steel, and does not want it mixed with cast iron, or does not care to buy a carload of wrought iron turnings and find a large percentage of brass in the center of it. Where one machine has to be used for so many different classes of work and kinds of material, there is bound to be some mixture, even with extreme care, but it can be kept to a minimum. If there was time to clean the machines and carry away the turnings between each piece of work, the problem would be easy, but in the interest of speed and economy this is not possible.

A fairly good plan, adopted by the writer, is to have boxes made for lathes and other machines where it is possible to use them, to go under the machine. The box is as long as can conveniently be managed and of a width not to interfere with the operator. The depth should be about 6 in., depending on the vertical space under the machine or lathe. The lathe box, for illustration, is partitioned through the center at right angles to its length into two compartments. A sliding cover is made large enough to cover one compartment at a time. Thus, when one end of the box is being used for cast iron turnings, and the next piece of work put in the lathe is steel, the box can be quickly turned end for end; the sliding cover is then pushed over the cast iron compartment and all mixture is prevented, the steel turnings dropping down into the other half of the box. The box should be of such height as to allow room between it and the under side of the lathe bed for a good sized pan made of heavy galzanized iron. This can be used when both compartments of the box are occupied and another kind of metal is to be worked on. These pans should be large enough to cover the open end of the box. Placed thus directly under the work a large percentage of the turnings and borings will drop into the pan. If it is necessary after the piece of work is finished to work on still another kind of metal, the pan may be quickly removed and another one substituted. It is the duty of the shop cleaner, or attendant, to take up the filled pans or boxes and deposit their contents in the proper scrap bins, which should be done every day.

Looking over the situation, then, as outlined above, we find the following essentials necessary to the successful handling of the scrap problem: Plenty of room must be provided; economy in handling should be looked after; a plain and simple system of accounting must be used, and it pays to have intelligent and competent supervision to obtain the best results.

There are now in operation two important Chinese state railways. One is from Pekin by way of its harbor Tsientsin northward to Mukden in Manchuria, with a branch to Ninchmang, the harbor at the head of the gulf of Pe-chi-li. The Japanese authorities, in possession of the South Manchurian Railway, a little further east, have diverted to it the chief southbound traffic of that part of Manchuria, consisting of beans, bean oil and bean-cake, and the country suffered from inundations, in spite of which the earnings of the Chinese Northern Railway for the 15 months from October 1, 1908, to the end of 1909 were $7,172,600, which was more than ever before. The working expenses are reported as only 31¾ per cent. of the earnings. The other state railway is the line from Pekin to Hankow, built by a Belgian company, but taken over by the government afterwards. Its gross receipts were $5.513,205 in 1909, which is 4½ per cent. more than the year before and 24 per cent. more than in 1907. The net earnings were 33 per cent. of the gross, 7 per cent. more than in 1908, and 13 per cent. more than in 1907. This road was not worked by the state until 1909.

SHOP KINKS

TEXAS & NEW ORLEANS AND GALVESTON, HARRISBURG & SAN ANTONIO.

BY FRANK GALVIN,

Master Mechanic, T. & N. O., Houston, Texas.

RADIAL ATTACHMENT FOR SLOTTING QUADRANTS.

A device for slotting reverse lever quadrants is shown in Figs. 1 and 2. It consists of an arm clamped to the bed of the slotter in which slides an adjustable fulcrum which may be clamped

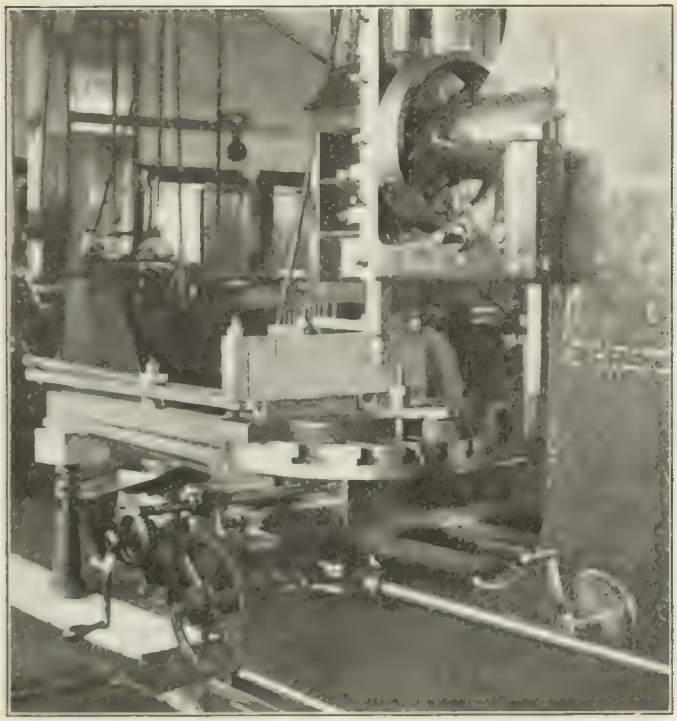


Fig. 1—Radial Device for Cutting Teeth in Quadrants.

to give the desired radius. An ingenious contrivance made with a nut, a screw and a suitable index plate is used to insure the proper spacing of teeth. By this improvement considerable time is saved, and all the quadrants are cut with standard teeth. With this device the accurate adjustment of the quadrant may

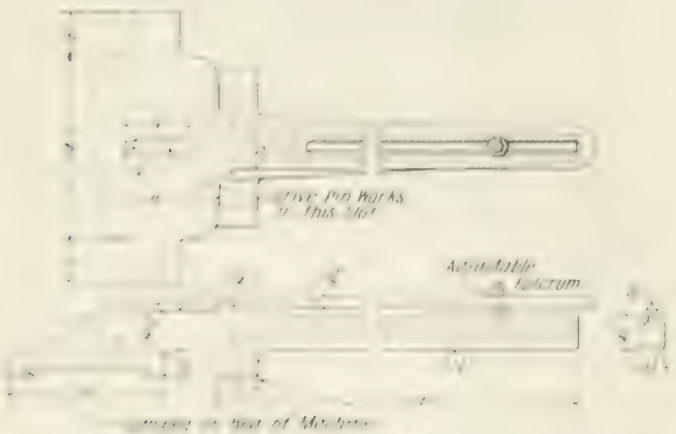


Fig. 2—Radial Attachment for Slotting Machine.

JIG FOR SHAPING ROD BRASSES.

An attachment to be used on a shaper for machining rod brasses is shown in Figs. 3 and 4. It consists of a heavy angle block rigidly clamped to the table of the shaper. The brasses are clamped to the plate *B*, which has a bearing in the vertical leg

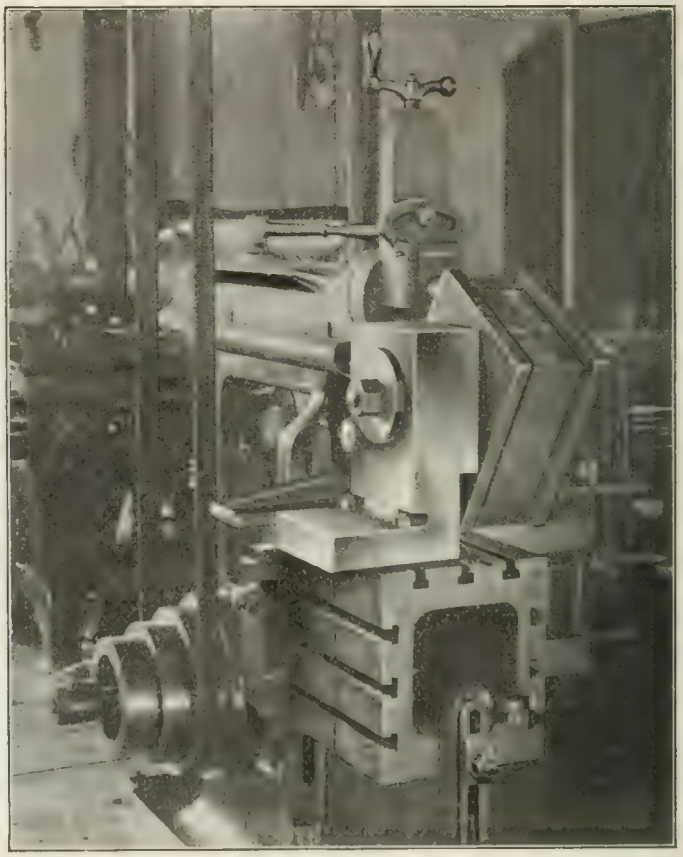


Fig. 3—Angle Chuck for Shaping Rod Brasses.

of the block. This plate is free to swing, and has four tapered index holes for a hardened steel pin extending through both block and plate, locating the four faces of the brass 90 deg.

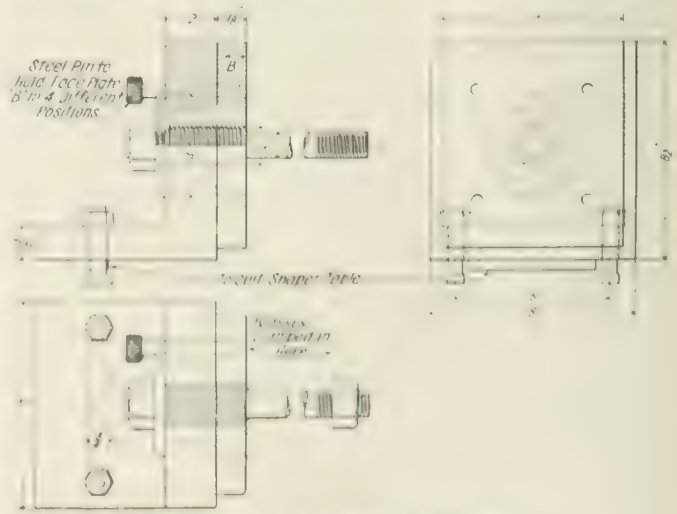


Fig. 4—Rod Brass Clamp for Shaper.

from each other. While the brass is being machined, it is clamped to the angle block by the 1-in. bolt as shown. With this device the brasses may be machined accurately on all sides with one clamping.

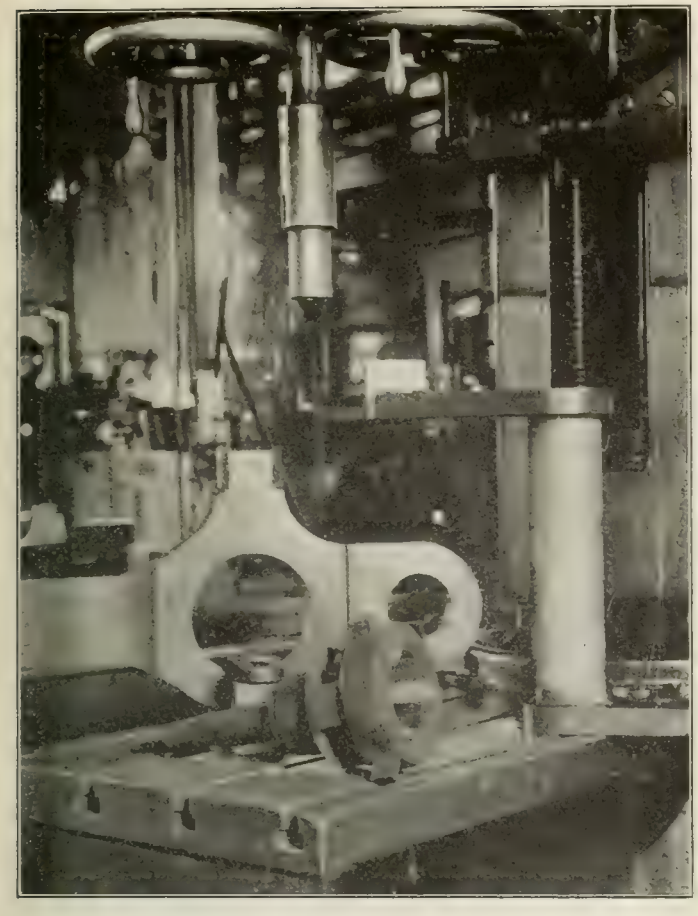


Fig. 5—Tool for Turning Ends of Rocker Arms.

GANG TOOL FOR ROCKER ARM BOSSES.

The tool shown in Figs. 5 and 6 may be used to advantage both for turning the ends of rocker arms and turning the solid grease cups on side rods. Its shank is made to fit the drill spindle.

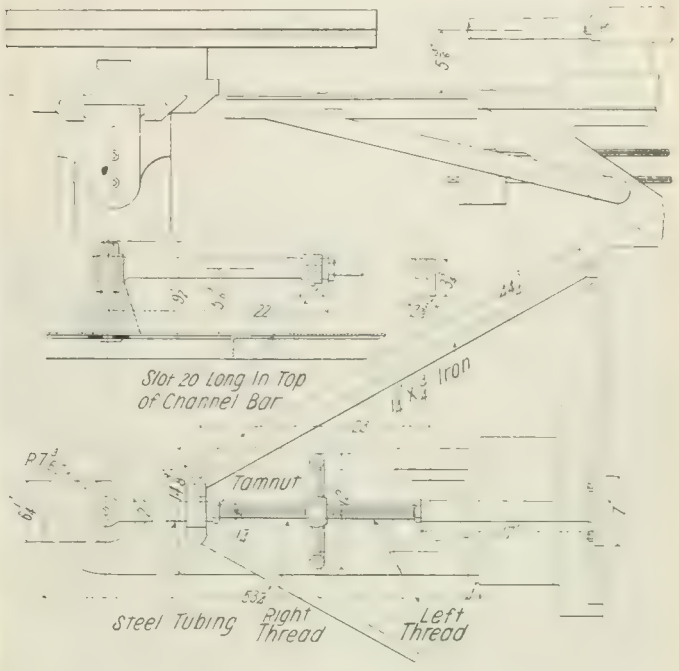


Fig. 7—Radial Attachment for Milling Machine.

The tools are placed in horizontal slots in the body and are clamped in position by a cover plate. This tool may also be used for various other purposes, such as finishing up certain

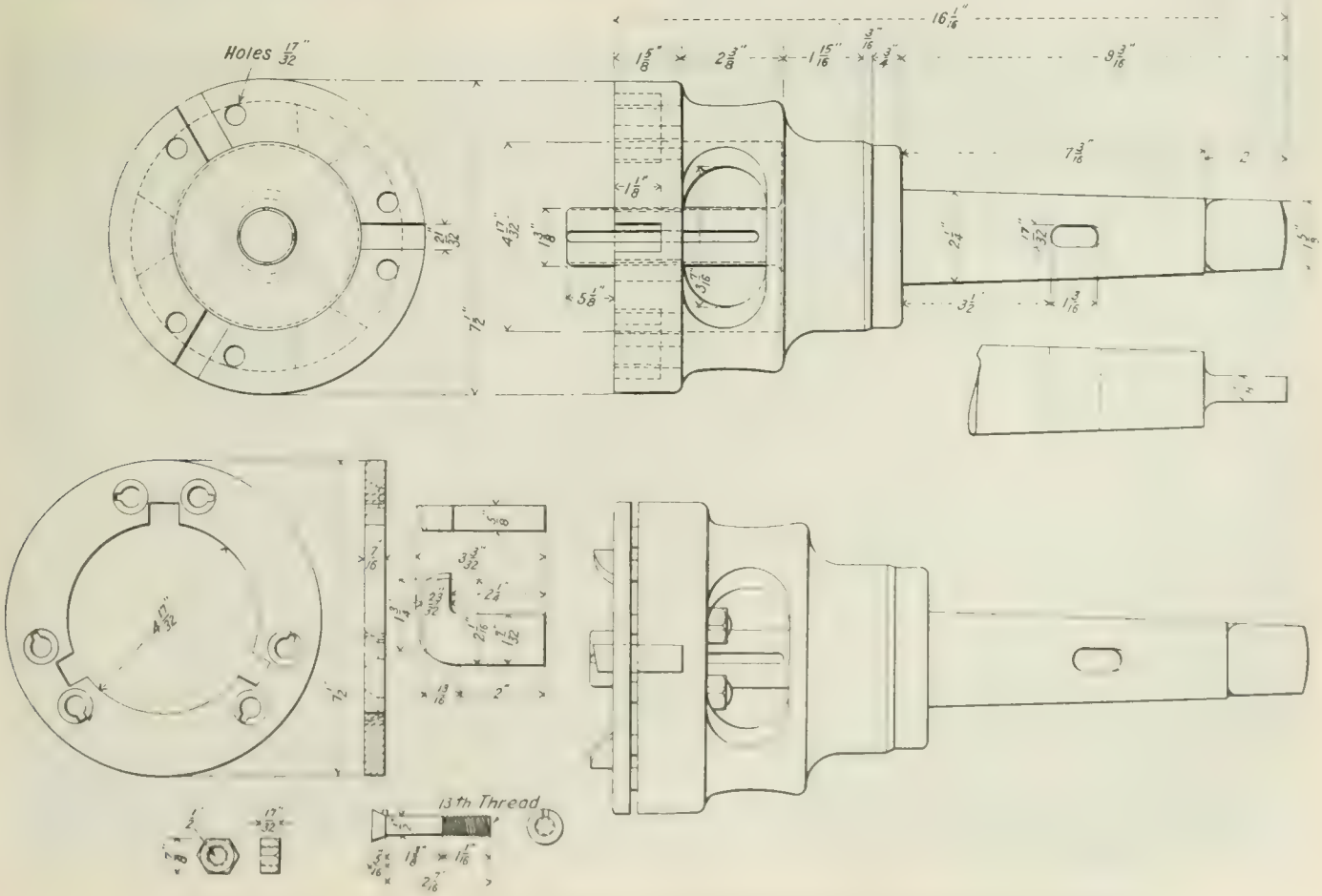


Fig. 6—Tool for Turning Ends of Rocker Arms and Outside of Solid Grease Cups on Rods.

classes of work on a horizontal boring mill. The old method of finishing rocker arms with a tool requiring four or five cuts is greatly improved by this arrangement, the same work being done in one half the time, as only two cuts are necessary for roughing and finishing.

RADIAL ATTACHMENT FOR MILLING LINKS.

A method of machining links on a milling machine is shown in Figs. 7 and 8. In this case the out-board center is fixed and the adjustments are made by the right and left threaded adjusting screw, operated by the 12-in. hand wheel. The adjustment is made more rigid by the arms extending out to each end of the table, clamped in the slots shown in Fig. 5. The table is made free to swing about the center by removing the transmission feed screw. With this device the entire width of the link face is milled to a finished surface in one cut.

IMPROVED LOCOMOTIVE DRIVING BOX.

An improved locomotive driving box is shown in Figs. 9, 10 and 11, the merits of which have been proved by practical use. Where it is used, the driving box, shoe and wedge can be removed from the locomotive without taking out or dropping the driving wheels, disturbing the brake rigging or taking down the frame binder. To remove the driving box from the locomotive, it is simply necessary to take the weight off the spring or equalizer, shift the saddle or equalizer to one side and lift out the key which holds the box in place, whereupon, since the box is unflanged at the outer end, it can be moved inward on the axle and taken out. Then the shoe and wedge may also be removed without disturbing the other parts.

The shoes and wedges are built out on the outside so as to take the lateral thrust and part of the wear of the driving wheel hub. The driving box, although having no outer flange, resists the lateral thrust of the driving wheel hub in the usual manner, transmitting the load through the previously mentioned key to the shoe and wedge. In the construction of this box

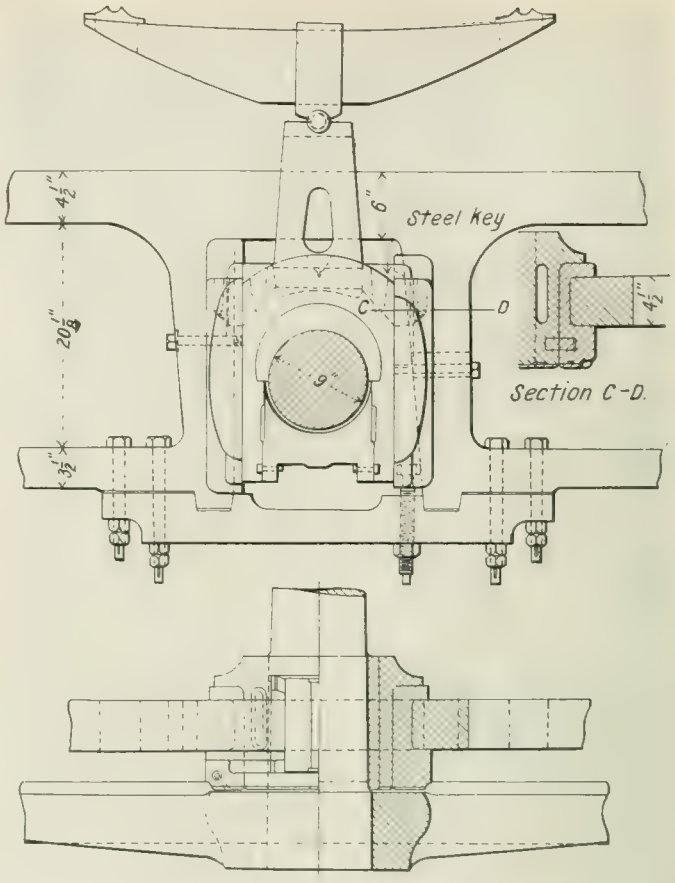


Fig. 9—Improved Locomotive Driving Box as Applied to a Locomotive.

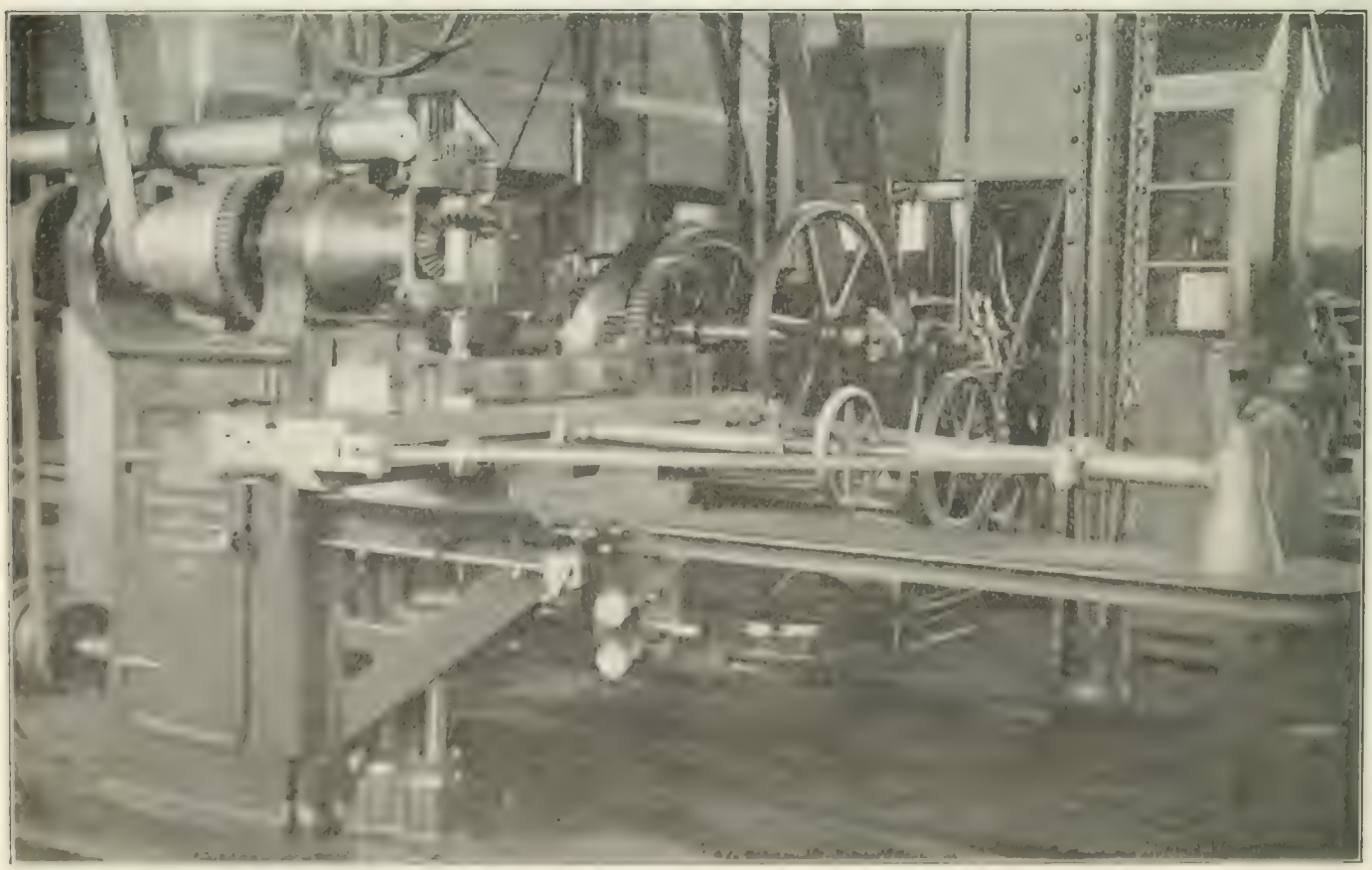


Fig. 8—Radius Attachment for Milling Machine.

the wearing surfaces on the sides of driving box have been increased nearly 50 per cent., and the shoe and wedge have been materially strengthened; it also permits of better lubrication. The

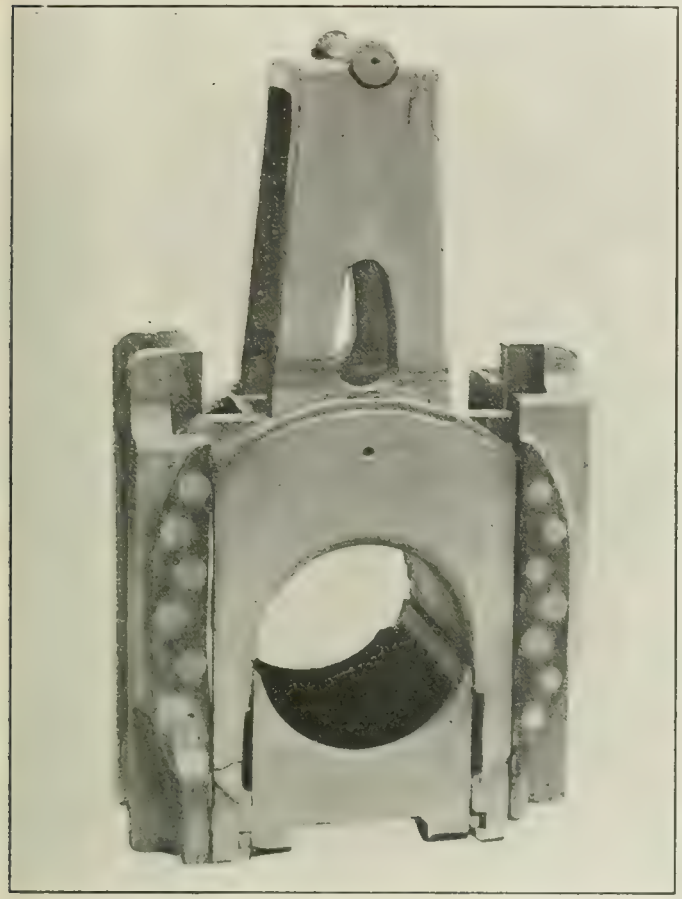


Fig. 10—Improved Locomotive Driving Box; Assembled.

wedges will not require adjustment as often as those ordinarily used, and frame failures will be materially reduced. A worn out, broken or loose journal brass, or driving box, can be taken out, repaired and replaced in a few hours without the use of a

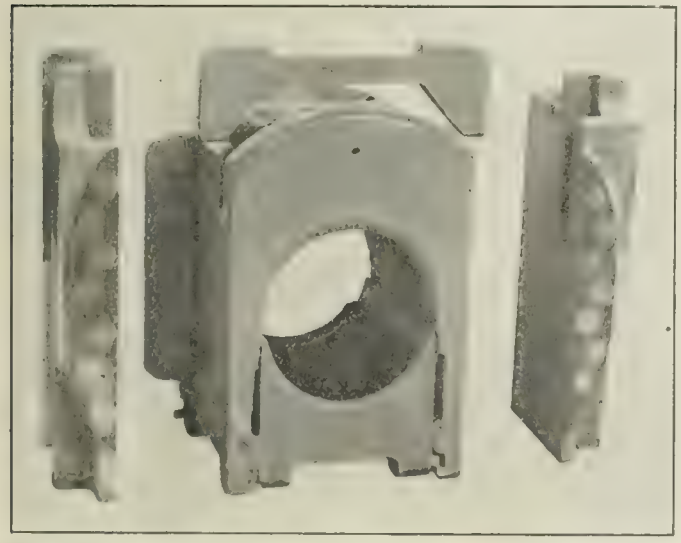


Fig. 11—Improved Locomotive Driving Box; Showing Its Construction.

drop pit or crane. The labor of taking down and setting up connecting rods, brake rigging, dropping wheels, etc., is saved and the locomotive is out of service only a few hours for such repairs.

This device is comparatively inexpensive to apply to locomotives going through shop. No new patterns are required; building out the old pattern for shoes and wedges and planing off the outside flange of the old driving box are the only changes necessary. This driving box construction is specially adapted for Mallets and locomotives with outside valve gear, and will greatly reduce the cost of running repairs and engine house expenses on any style of locomotive.

KEY SEATING MACHINE.

A machine for making keyways for eccentrics in driving axles is shown in Figs. 12 and 13. It is clamped to the axle

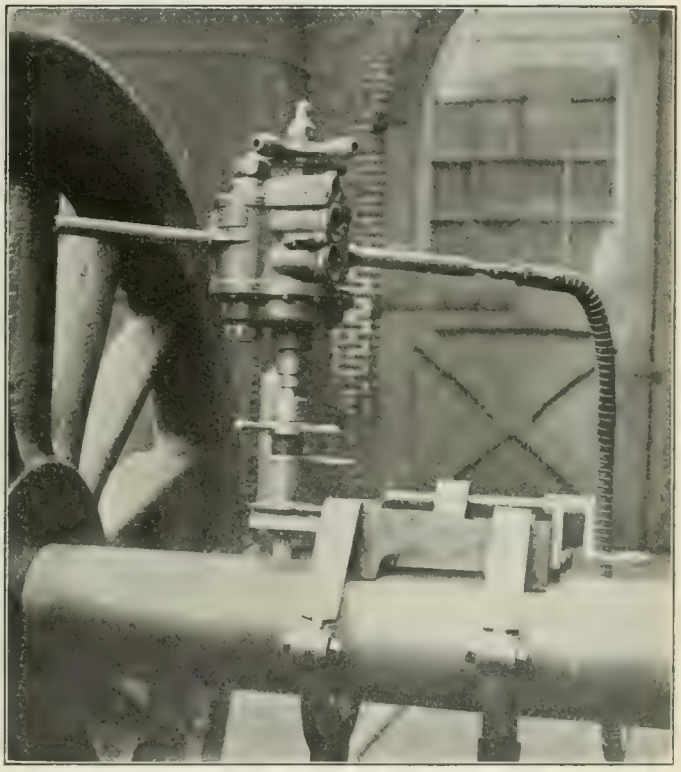


Fig. 12—Key-Way Cutting Machine.

by two forged steel jointed yokes as shown. The body of the machine is made V-shape to insure a good bearing on the axle. It contains a small carriage, operated by a lead screw, which

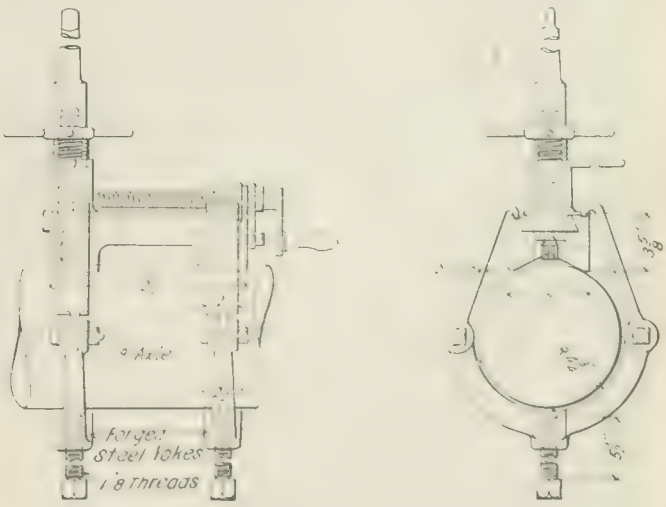


Fig. 13—Key Seat Cutter.

moves the cutter along the axle. The cutter is a small end milling tool driven by an air motor as shown in Fig. 12. With this machine better work is obtained, much time is saved and the valve man is saved considerable trouble.

ECCENTRIC MANDREL.

A mandrel for turning four eccentrics at a time is shown in Figs. 14 and 15. It is made of cast-iron 1½ in. thick, the inside being cored out to reduce the weight. Steel centers are in-

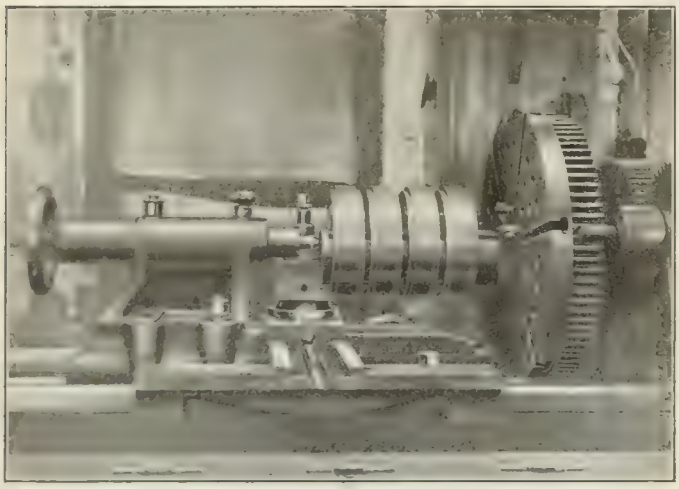


Fig. 14—Mandrel for Turning Eccentrics.

serted in the ends at a distance off-center to correspond to the required eccentricity, which in this case is 2½ in. for one set of centers and 2⅞ in. for the other set. These centers are provided to eliminate wear and to insure exactness. Suitable keys

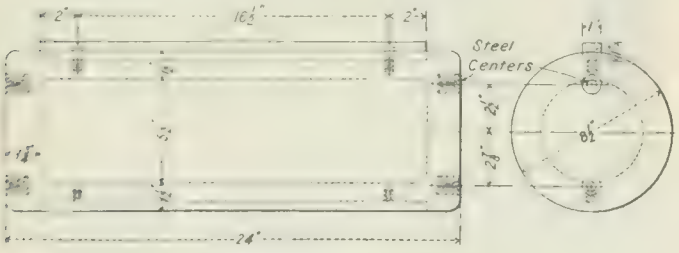


Fig. 15—Eccentric Mandrel.

are provided for the eccentrics and they are clamped to the mandrel by tie keys. These mandrels have proved their reliability for turning up new cast steel eccentrics or trueing up old ones. They will stand the strain of heavy cuts and the mandrel shown will handle two different throw eccentrics.

TRUCK FOR MOUNTED DRIVING WHEELS.

A four wheel truck whose loading floor is only 4¾ in. above the floor is shown in Figs. 16 and 17. It is made of 3 in. x 1¼ in. bar-iron, with 10-in. forward wheels and 14 in. rear wheels. Its construction is clearly shown in Fig. 17, and its usefulness as a truck for heavy material is apparent. The side rails are 13½ in. apart, which allows a pair of mounted driving wheels to ride

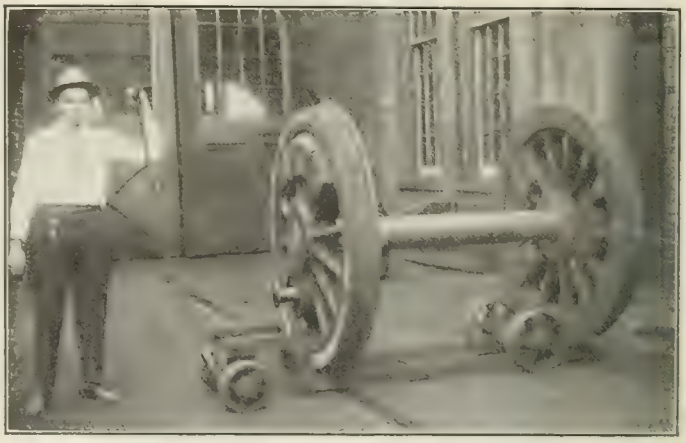


Fig. 16—Handy Truck for Driving Wheels.

easily without danger of rolling off. Several of these trucks are in use in the Southern Pacific shops at Houston, Tex.

ATTACHMENT FOR TURNING CROSSHEAD WRIST PINS.

A device for turning wrist pins on a four-bar crosshead is shown in Figs. 18 and 19. It is applied to the over-arm of a milling machine and clamped about the wrist pin. A gear is used on the spindle, in place of the milling cutter, which drives the split gear that holds the tools. Tools are placed on each face of the gear so that all the work on the wrist pin may be completed in one operation. The whole arrangement is split with the exception of the driving gear, and it is readily applied. The crosshead is clamped to the table of the milling machine and all the feeding is done by moving the work instead of the tool.

LATHE ATTACHMENT FOR TURNING REVERSE SHAFT.

A device for turning bearings on the ends of reverse shafts is shown in Figs. 20 and 21. A special lathe center, about 19 in. long, is required, which has a ½-in. keyway, as shown. The

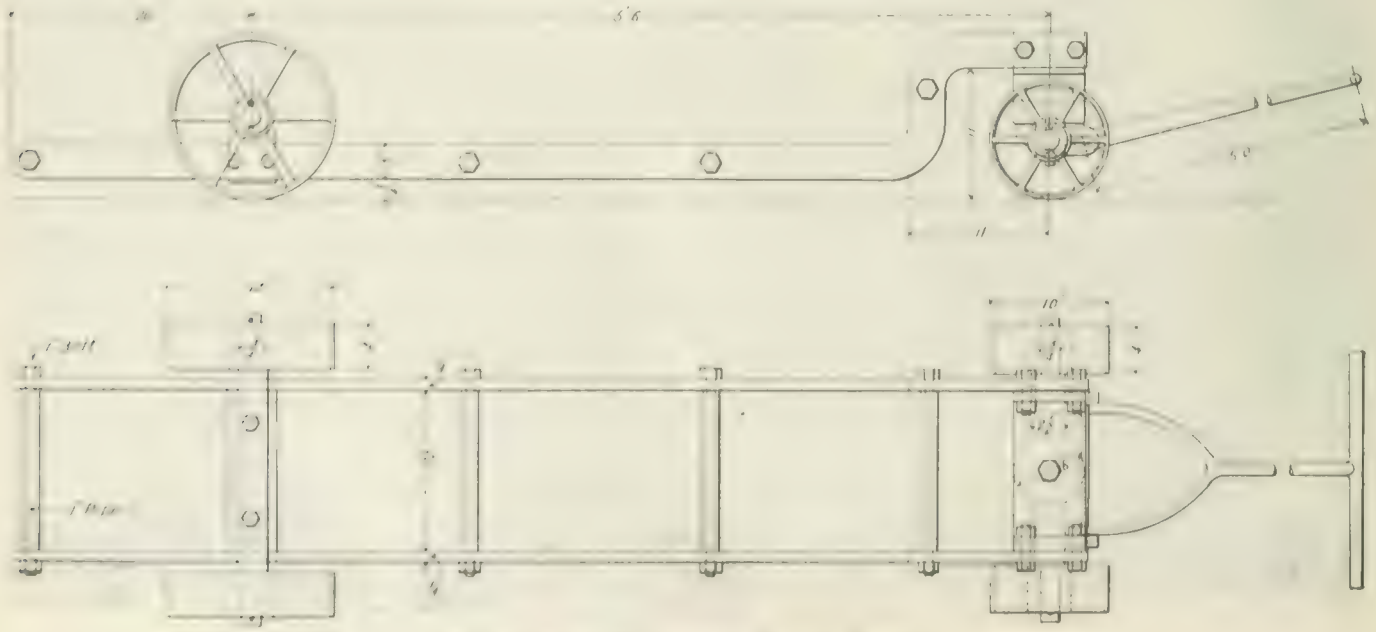


Fig. 17—Truck for Mounted Driving Wheels.

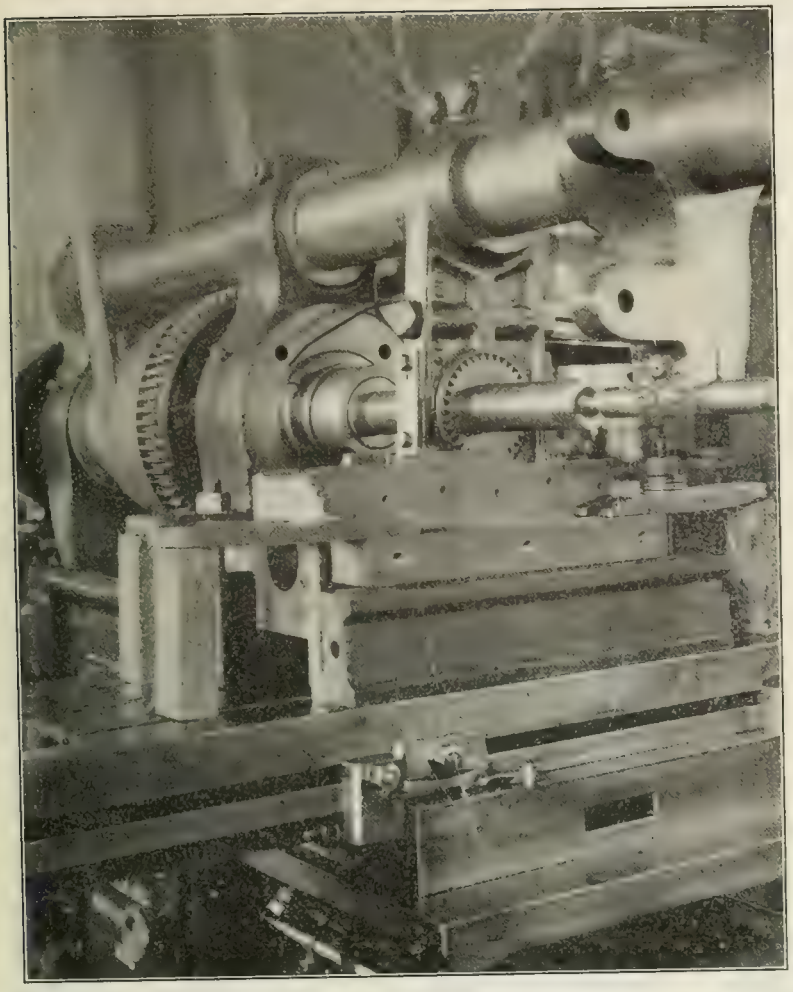


Fig. 18—Turning Wrist Pins on Crossheads.

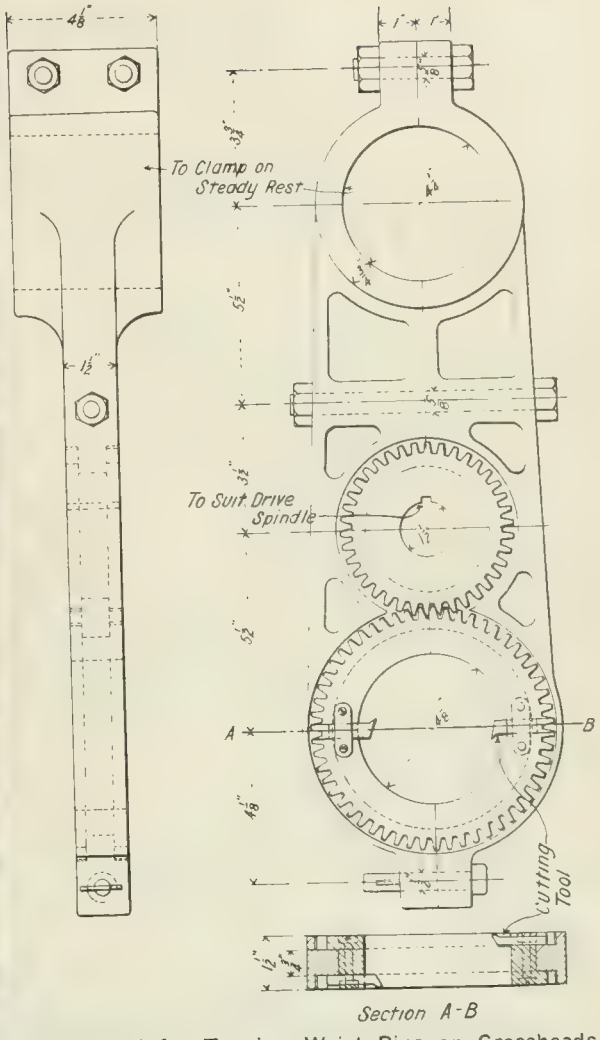


Fig. 19—Tool for Turning Wrist Pins on Crossheads.

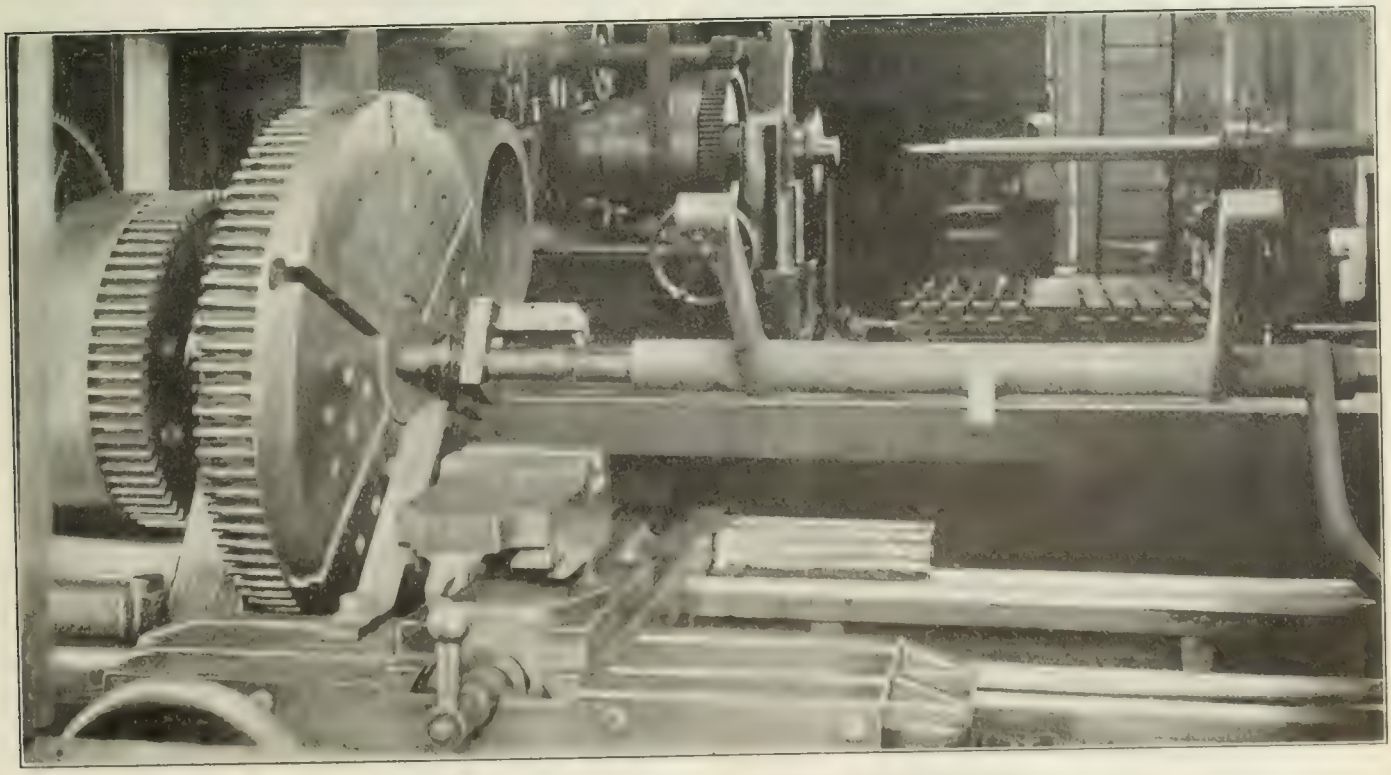


Fig. 20—Lathe Tool for Turning Reverse Shaft Bearings.

tool holder fits over this center and rotates with it, being driven by a key. This key is fast to the tool holder but free to slide in the lathe center, which allows the tool to be fed backward and forward on the lathe center. The tool is controlled from

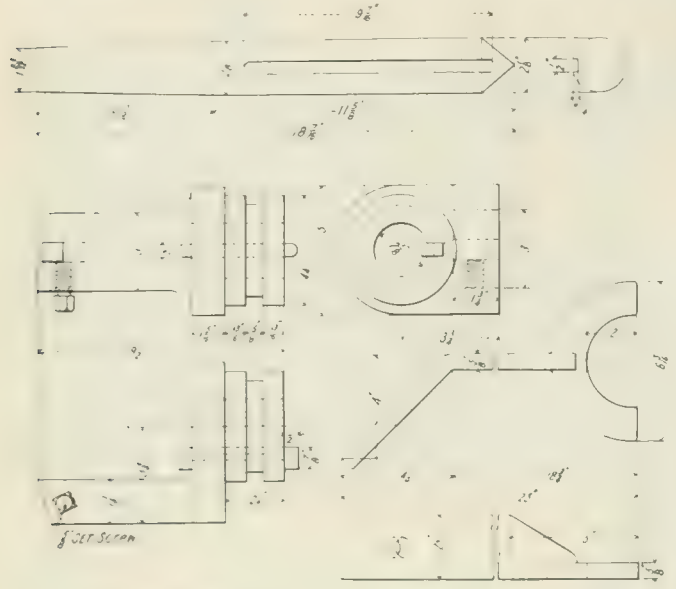


Fig. 21—Attachment for Turning Reverse Shaft Bearings.

the carriage by an arm on the end of which is a yoke fitting in a 5/8-in. slot in the holder.

REAMER FOR SIDE RODS.

A method of reaming holes for knuckle pins in side rods is shown in Figs. 22 and 23. The tool consists of a mandrel with a taper shank to fit a drill press and having an arbor 1¼ in. in diameter. With various sizes of shell reamers a combination may be formed, as shown in Fig. 22, to ream

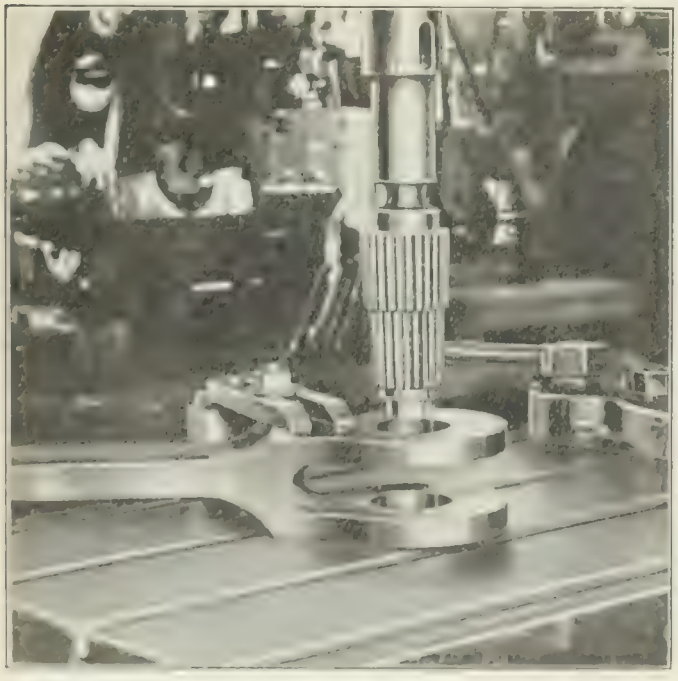


Fig. 22—Reamer for Side Rods.

out two different size holes, such as used for a knuckle-pin in a side rod, at the same time. The reamers are driven by a ¾ in. key and are held on the arbor by a washer and nut at the end.

A successful weld has been made by the Thermit welding process on the back of the cylinder on the frame of an Atlantic type locomotive is shown in Fig. 24. This process has been successfully used for welding locomotive frames at the Houston,

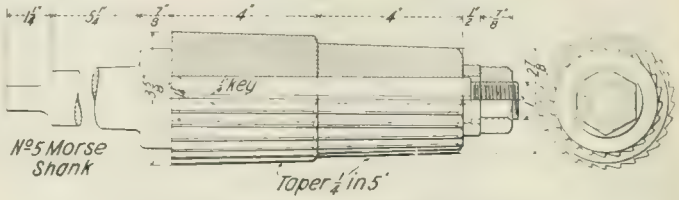


Fig. 23—Reamer for Knuckle Pin Holes.

Tex., engine house of the Texas & New Orleans for several years.

FIBER PLATE THRUST BEARING FOR DRIVING BOXES.

A fiber thrust bearing and its application to a locomotive driving box is shown in Figs. 25 and 26. The face of the driving box is counter bored 5/16 in. which, with a 5/8 in. fiber plate, allows for 5/16 in. wear. By its use the lateral play of the drivers may be taken up at any time without dropping the wheels. There are no bolts, nuts, clamps or other complicated parts to get loose, wear out, or require adjustment. When it becomes

Fig. 24—Making Thermit Weld on Locomotive Frame.

necessary to take up the lateral play in the driving boxes the work can be done by simply dropping the binders, shoes and wedge, and slipping the fiber plate in between the hub of driving wheel and the driving box. The counter bore in the box and the driving box cellar holds the plate securely in place. The amount of saving can be readily calculated by considering the length of time it usually takes to drop a pair of wheels. By this method the whole operation of taking up the play in a complete set of driving wheels on a ten-wheel locomotive only requires from five to seven hours. The work can be done on

branch lines where no drop pits are available, thereby eliminating the necessity of engines being sent to the shop for such

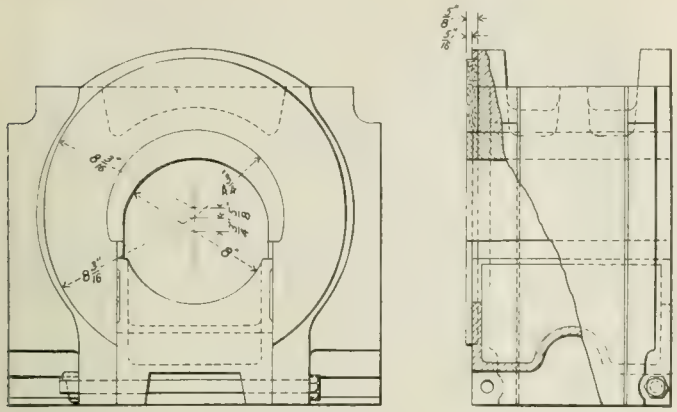


Fig. 25—Fiber Bearing Applied to Driving Box.

repairs. This type of box and plate have been given a three year test on heavy passenger engines, and the results were satisfactory in every respect.

RATCHET LEVER.

The ratchet lever shown in Fig. 27 is simple in construction and its service will be appreciated by all machinists when working in a tight corner reaming or tapping out holes. The

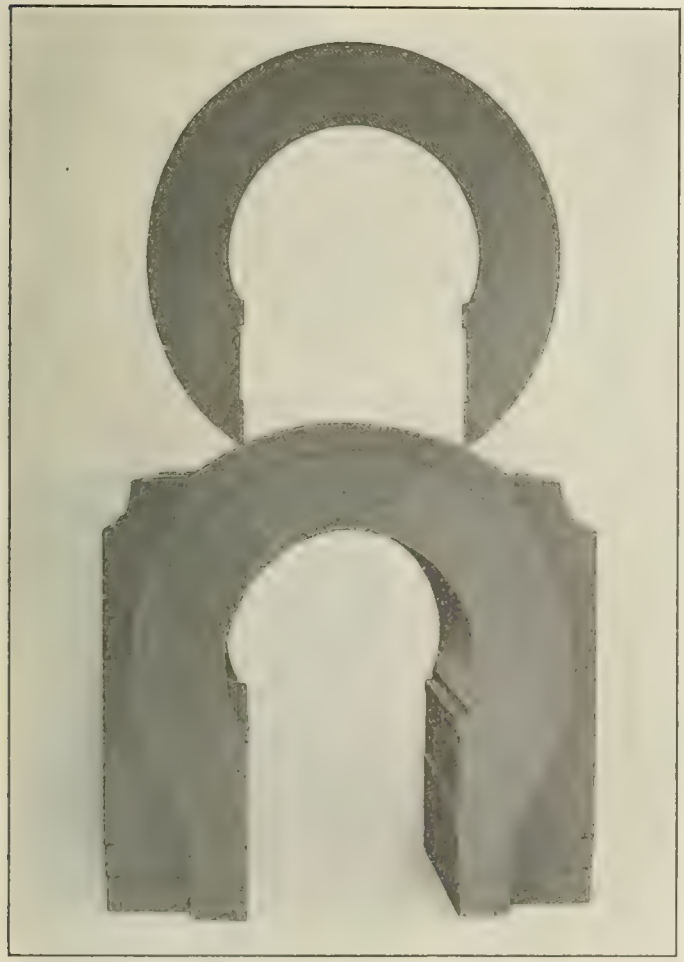


Fig. 26—Fiber Plate for Driving Boxes.

handle is made of a 1-in. iron rod upset at the ratchet end and shaped to 1¼ in. square. This end is cut away, as shown, to allow for the ratchet jaws. The ratchet wheel is 2½ in. diameter and the hole *D* is made to the required size. Various ratchet wheels may be made with different size holes to fit the different size taps and reamers. The steel spring holds the pawl in the ratchet wheel and by turning the lever over it can be made to work right or left handed. The effective pulling

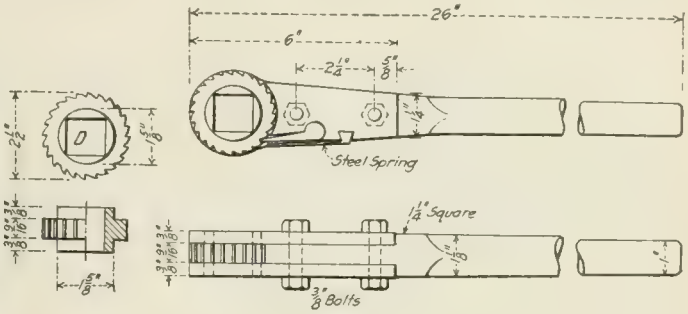


Fig. 27—Ratchet Lever.

arm of the lever shown is 24¾ in., but the arm may be made as long as desired.

RATCHET PIPE THREADER.

The ratchet pipe threader shown in Fig. 28 may be used to advantage in making repairs to pipe work on freight cars, oil tanks and any work where it is inconvenient to take the pipe from its place. Its construction is clearly shown in the illustration; it is made to turn in either direction by the double

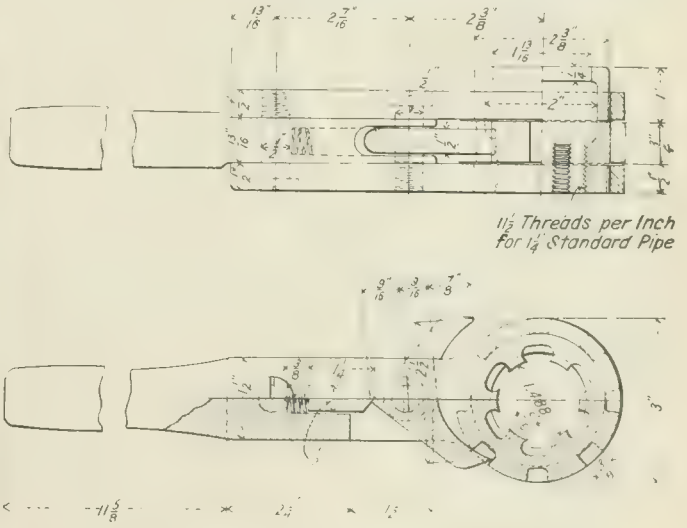


Fig. 28—Ratchet Die for Threading Pipes.

pawl which is held in contact by the ½-in. pin pressed out by a spring. The thickness of the whole arrangement is only 2¼ in. and the outside diameter is 3 in., making it possible to use it in close quarters. Dies of various pipe sizes may be made to fit the holder.

CRANE FOR LOCOMOTIVE FRONT END.

A convenient front end crane is shown in Figs. 29 and 30. It consists of a 6-in. I-beam, 10 ft. 4 in. long, supported at the smoke-box front ring by a Z-shape clamp, sliding on the top

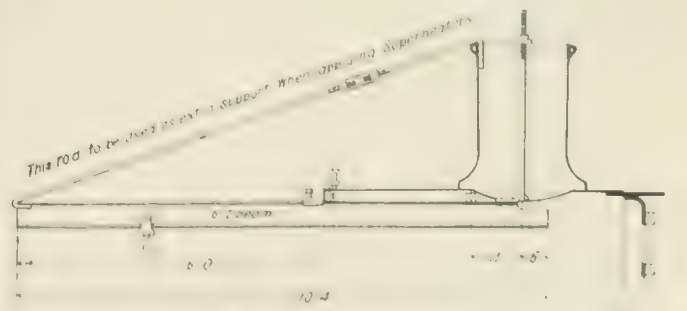


Fig. 29—Front End Crane.

flange of the I-beam and held to the ring by set screws, and at the stack by a rod extending down from a cross-piece at the top to the hook in the I-beam. When extra heavy work is to be handled, such as superheater headers, etc., a guy extending from the top of the stack to the outer end of the I-beam is used to take up the strain. A two-wheel trolley, provided with a hook, is used on the lower flange with which the material may be easily run in the smoke box. A complete set of detail sketches, shown in Fig. 30; clearly show its construction.

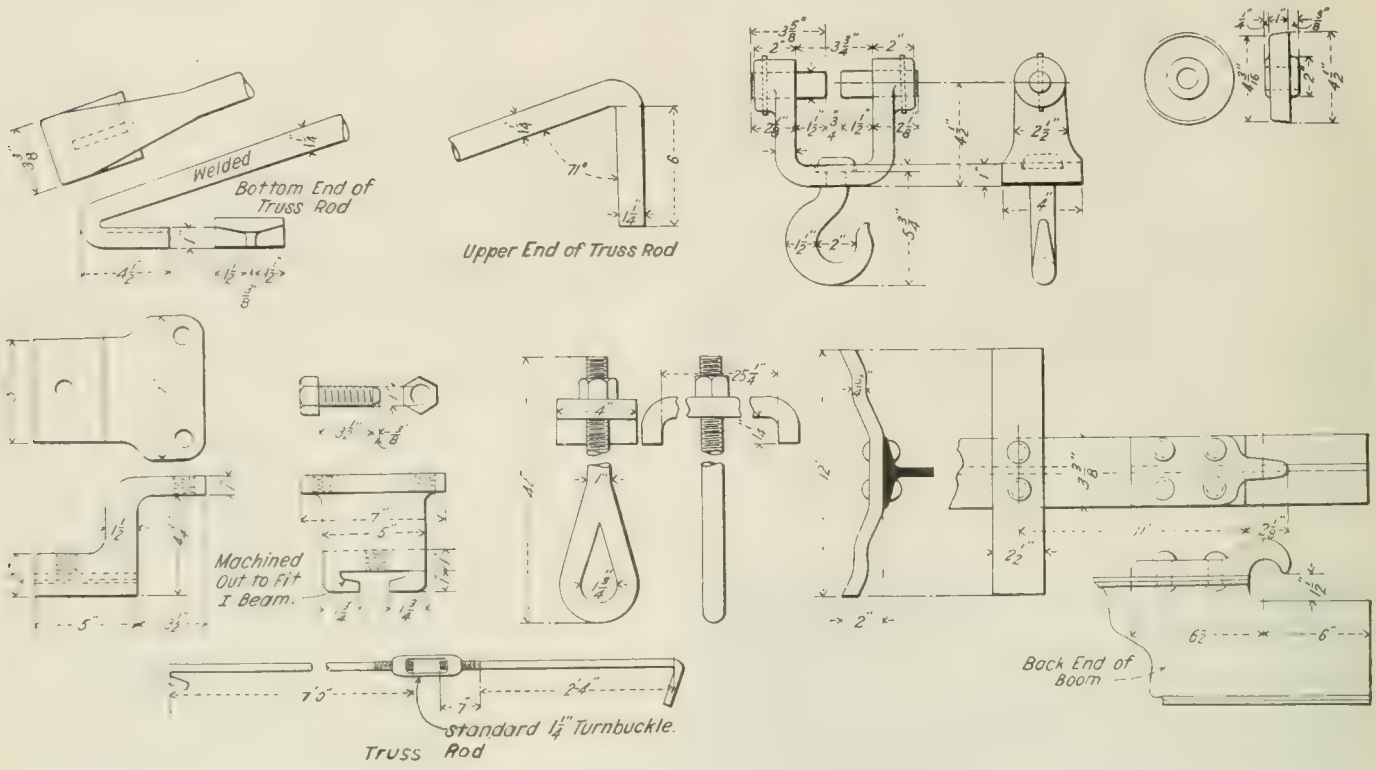


Fig. 30—Details of Front End Crane.

FLUE WELDING MACHINE.

A flue welding machine made of two long stroke pneumatic hammers is shown in Fig. 31. It is simple in construction and for 2-in. flues and the other for 2¼-in., both being separately operated by the foot levers shown. This machine can be used for both welding and swedging during the same heat. A machine of this kind has been in use for several years and records show that its maintenance cost is low.

BOILER REPAIR STAND.

A servicable boiler repair stand is shown in Figs. 32 and 33. It is controlled by hand power, and can be operated by two men. This stand permits the boiler to be rolled to any position when a firebox is being applied, thereby greatly facilitating the work. It consists of two trestles, the legs of which are built of 30 in. x 3 in. x 3 in. angles. Iron bed plates 1¼ in. x 6 in. are riveted across the top. Between these plates and on each

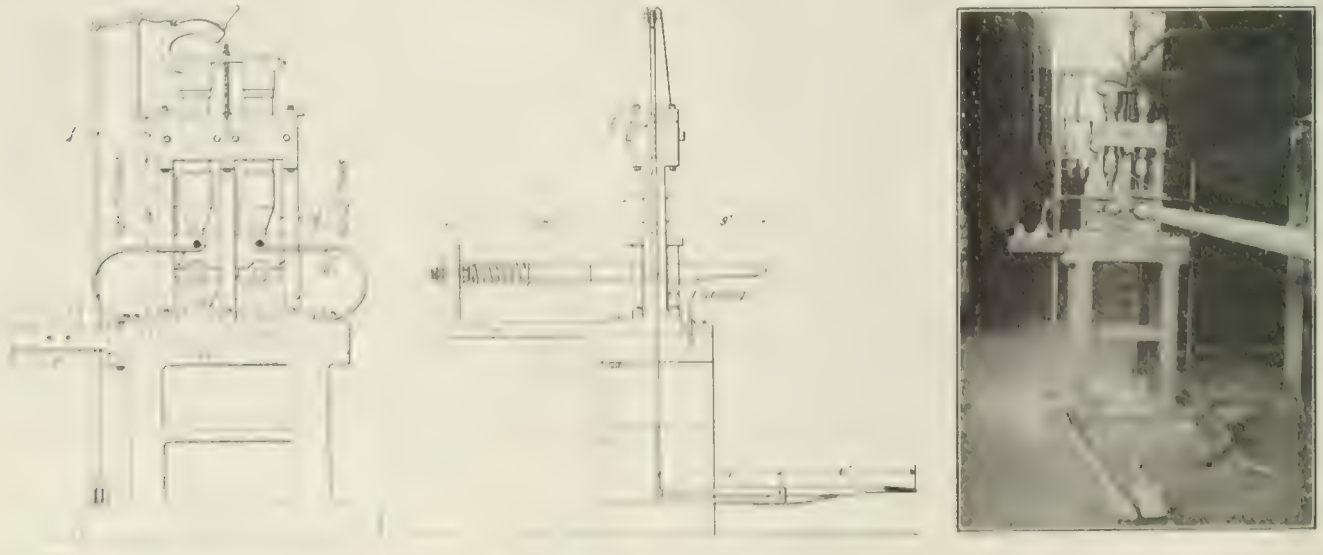


Fig. 31—Flue Welding Machine.

trestle are two cast iron rollers 12 in. thick x 12 in. in diameter, which are held in place by pins 1½ in. in diameter. These steel pins are keyed to the hub of the rollers, the pins extending

Fig. 32—Boiler Repair Stand.

out from the side of the bed plate several inches so a ratchet wrench can be applied for turning the boiler.

The outer edges of the rollers are notched to prevent slipping, and the top braces or bed plates have at least three holes drilled on each side of the center, so that the rollers may be adjusted to fit different classes of work. As will be noted in Fig. 33 a chain with 18 in. links, provided with 3 in. x 7 in. rollers at each joint, is swung over the front end of the boiler and fastened to the rails on the floor, which secures the boiler in its position. The trestle should be built high enough to allow the leg of the boiler to swing clear of the floor by about 12 in. It is only necessary to provide the ratchet attachment on the trestle just forward of the throat sheet, as two men can handle a large boiler with ease.

FLANGING CLAMP.

The flanging clamp shown in Figs. 34 and 35 consists of a cast steel bed plate 10⅝ in. thick x 8 in. wide; each end rests on an air cylinder placed below the floor. The piston rods work through 1⅞ in. holes in the bed plate, and are connected to the upper jaw or clamp. The upper portion of the piston

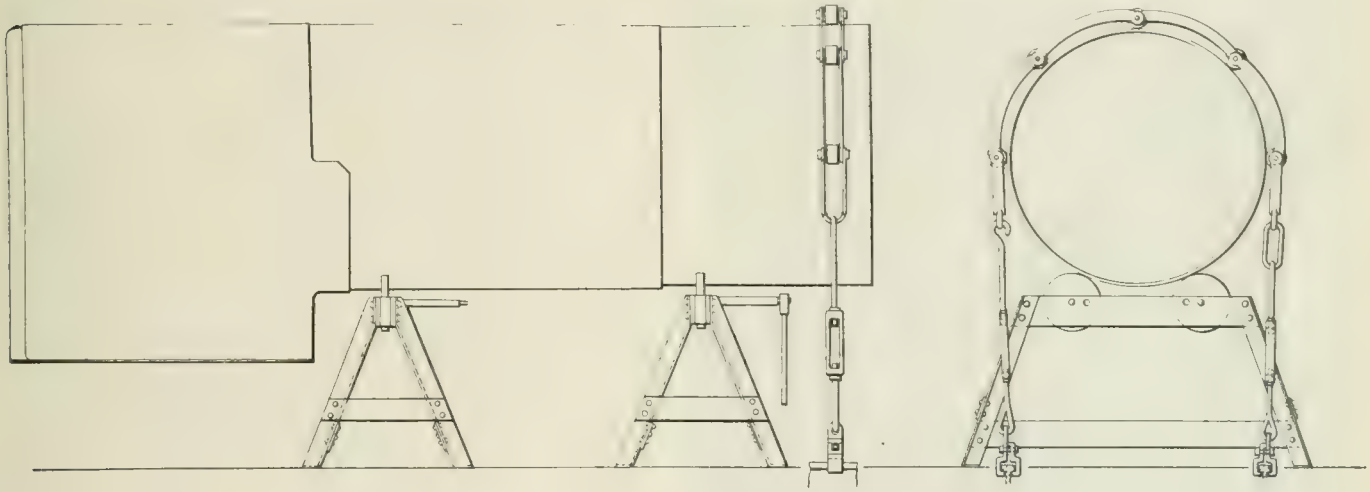


Fig. 33—Boiler Repair Stand.

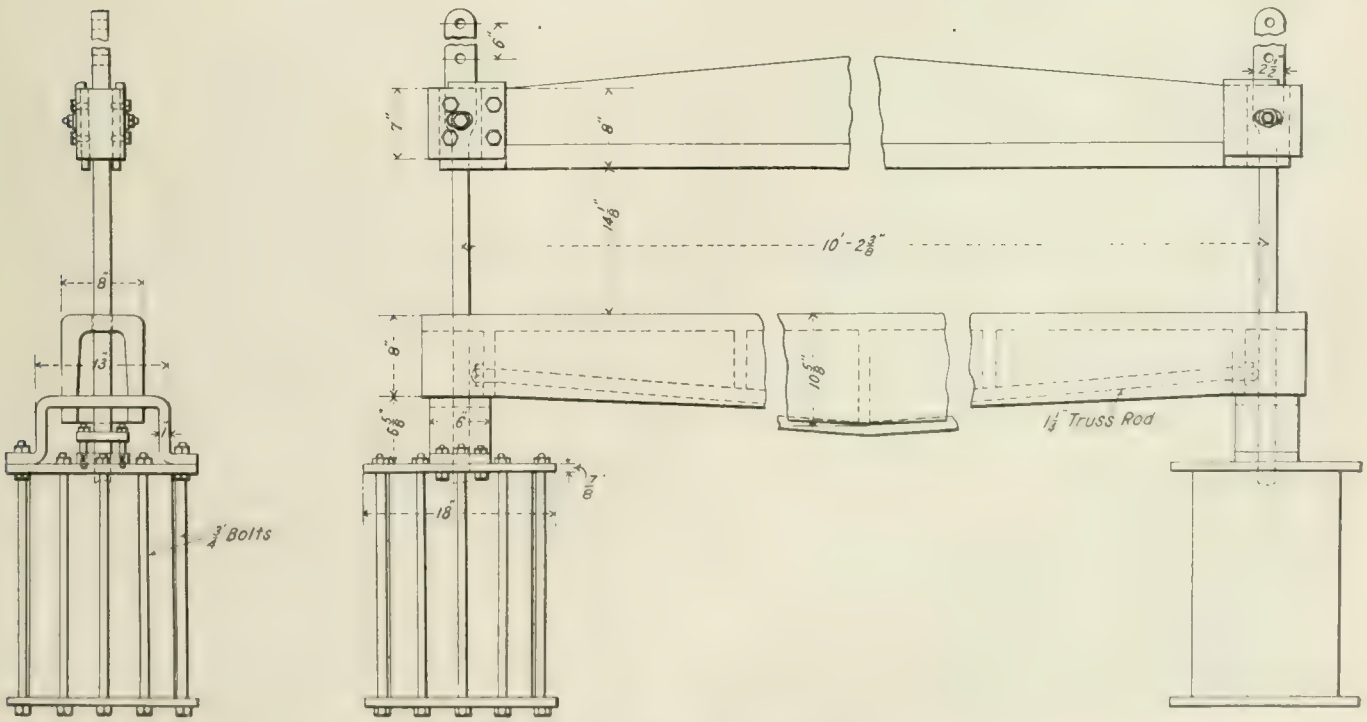


Fig. 34—Pneumatic Flanging Clamp.

rods are flattened and have three holes bored in them 6 in. apart to accommodate the pin which secures them to the moveable jaw. It will be readily seen from Fig. 34, that by changing the pins from one hole to another, the upper jaw can be adjusted to any desired height up to the piston rod limit. Air

Fig. 35—Flanging Clamp.

pressure is admitted at will to either end of the cylinders through a three-way cock, thereby permitting the upper jaw of the clamp to be readily raised or lowered. This device should be located where the flanging fire and crane are provided for the handling of sheets and other heavy work.

RECLAIMING SCRAP MATERIAL.*

BY W. H. WOLFGANG.

This is an important item in the car department, which is sometimes gravely overlooked simply because all the material that is thrown on the scrap heap is termed worthless material. Take, for instance, a car that is wrecked on the road; nearly all of the material is placed with the scrap, although some of it may have been applied just before the car was wrecked. First of all there should be a platform between two tracks where all cars loaded with scrap can be easily unloaded and the good and bad material sorted out. The bad material should be put in bins or into cars—if the scrap is shipped often, the latter. This saves considerable room. The foreman should know to what series of cars the castings and forgings belong and should have the good scrap sorted out and properly distributed. There will probably be considerable scrap from foreign roads; this should be sorted and all the castings and forgings of the same class should be kept together. Another system of caring for the second hand material would be to have all castings and forgings that are in good shape sent to the storehouse and used as second-hand material. When an order is received for a certain casting or forging it can be supplied from this stock, making a considerable saving in a year.

Truss Rods.—Truss rods can be straightened and used over again if the threads are still good, or they can be shortened and used for shorter cars, or can be cut to different lengths and

Brake Levers.—Brake levers, if the holes are worn large, can have the holes plugged and new ones drilled; the lever will be

Bolts.—Bolts that do not have rolled threads, if the threads

rolled threads they can be cut off and a new thread rolled on; a great saving can be made if the shop is equipped with a thread-rolling machine.

built to sorts nuts in; the second floor should be level with the scrap platform so a man can haul a wheelbarrow into the house and dump the nuts into a chute which leads to the first floor and discharges on top of a table which should be about 30 in. wide by 6 ft. long and about 30 in. high. The space underneath should be divided into bins about 12 in. wide. The top of the table should have holes about 4 in. in diameter, with tin chutes leading to the bins. The chutes can be made to lead into kegs, or portable boxes, if desired, which can be taken to the nut tapping machines. The nuts after re-tapping will be as good as new and a great saving will result.

Axles.—Axles can be forged into different classes of parts, such as follower plates, etc. A large steam hammer is necessary of about 1500 lbs. capacity; also dies, headers and formers for the forging and bulldozer machines, and for tools for use under the steam hammer. These tools, of course, will have to be properly hardened. Equalizing bars for passenger cars can also be made. Steel tires can be forged and used in the same way as axles.

Cast Steel Body Bolsters.—The majority of bolsters that come to the scrap dock have been only partially broken, mostly near the center. If an oxy-acetylene outfit is available a good welder and an assistant should weld from 3 to 6 bolsters per day. The bolsters should be preheated in a furnace or with a blow torch. Although the reclaimed bolsters only have from 60 to 75 per cent. of their original strength they stand the service very well after being reapplied.

Arch Bars.—These can be forged into coupler carry irons and draft timber ties.

Follower Plates.—Most of the damaged follower plates are only bent or have the lugs broken off; they can be straightened under a steam hammer and new lugs can be welded on and are practically as good as new.

Knuckle Pins.—Some are only badly bent or have the heads broken off. The former can easily be straightened under a steam hammer, and the pins that have the heads broken off can have new heads forged on if they are long enough.

King Bolts and Center Pins.—These can be repaired in the same way as the knuckle pins.

Hand Brake Wheels.—Different kinds of brake wheels accumulate; they should be kept together in a separate bin for they can nearly always be used over again for repairs.

Grab Irons or Hand Holds.—These are mostly bent and can be straightened and will be as good as new.

Brake Connection Rods.—These are usually bent or broken and can easily be straightened and welded.

Brake Connection Pins.—All that are in good condition should be sorted into a bin and be used over again.

Springs.—Helical springs of different sizes can be kept together in a bin, if there are not too many, and can be used again. Those that are broken can be uncoiled and forged into cold chisels and punches, or other tools. The elliptical springs can be forged into S wrenches, chisels and different tools; they can also be reworked for brake beam springs on passenger cars.

Brake Beams.—These are usually bent or have the forks and heads broken. They should be taken to the smith shop and straightened or repaired and then stored in bins ready for use.

Coupler Yokes.—These should be sorted and those that can be used over again should be stored in a separate pile. Those that are broken should be taken apart and straightened and put in an iron rack.

Cross Tie Rods.—These are ½ in., 5/8 in., and ¾ in., should be taken to the smith shop at the end of the scrap platform, and have the broken or battered ends sheared off, straightened and put into the iron rack. They can be forged into bolts, brake hangers and grab irons.

Uncoupling Levers.—These are usually bent out of shape and can be straightened and rebent to the desired shape and used again.

Pins, Spikes.—These can be straightened on an old anvil, dipped into crude oil, and used again.

Scrap Platform.—If the scrap platform is located far from the smith shop a shed should be built at the end of the platform containing an anvil, forge and small shear. The foreman of the platform should have all the material that is to be sheared and straightened placed near the shed and from there it can be distributed to the respective bins or iron rack. If the scrap platform is convenient to the smith shop, all bent material can be loaded on 4-wheel trucks and be taken to the smith shop and straightened under the steam hammer and then be placed in the iron rack.

Iron Rack.—There should be an iron rack located near the scrap platform and all iron that is in good shape and straightened should be put in it, so that when the smith wants a piece of second-hand material he will not have to sort over a whole pile of scrap to find what he wants. This saves the smith considerable time.

All the material, such as cast iron, wrought iron, steel, etc., that cannot be used again should be put in separate bins. From here it can be loaded in cars for shipment to the foundry to be melted over again.

RECLAIMING SCRAP MATERIAL.*

BY W. H. SNYDER,

Assistant General Foreman, New York, Susquehanna & Western, Stroudsburg, Pa.

There is an old saying that "a scrap pile is an engineer's grave yard," but if the proper care is exercised it will only claim such material as properly belongs to it. The system that has been in operation at our shop for some time is to have a committee which visits the scrap bins at least once a week and sorts out such material as can be used again. This committee makes a report of its findings to the general foreman.

Copper Steam Chest Joints.—In many shops the ¼in. copper wire used for steam chest joints is scrapped when an engine comes in for repairs, because it is flattened down. We anneal these joints and bend them edgeways, or at right angles to the former bend. This makes as good, if not a better joint then it was, when new. It requires about 5 lbs. of ¼ in. round copper wire to make a set of new joints. The old wire can be annealed and rebent for the same price that it would cost for making a new set.

Old Jacket Iron.—Old jacket iron that is not suitable for jacket use is cut to proper shape and used for tacking on pilots during the winter to prevent the snow from going through the pilot. This makes a saving over using thin boards or any other new material.

Scrap Lagging.—In the *Railway Age Gazette* of January 7, 1910, page 38, an asbestos grinder is shown, which is used very successfully for grinding old and broken section magnesia or asbestos boiler lagging into a pulp. This device may be very cheaply made, and is useful for grinding the scraps that are removed from a boiler. The cost of grinding sufficient old lagging to cover one engine is about $1.25. The cost of a new set of sectional lagging is about $50. A great saving can thus be affected by sweeping up all the scrap lagging, grinding it up and using it again. The ground asbestos is made into a mud, and the cost of application is the same as for a new set of lagging.

Damaged Steel Car Parts.—The handling of bent parts of steel cars is becoming an important matter in the car repair yard. We have a 4 ft. by 6 ft. forge located in the repair yard, which is equipped with a 4 in. blast pipe from the blacksmith shop fan. All bent parts are brought to this forge and straightened by two laborers. It is conveniently located and does away with carting the parts to the boiler shop.

Bolts, Nuts and Washers.—The laborer that sweeps the shop gathers up all the old bolts, nuts, washers, etc., and trucks them to a small building where they are sorted out. Old bolts suitable for service are straightened and when necessary are cut to a proper length and rethreaded. These are only a few of the numerous ways we have of reclaiming scrap material.

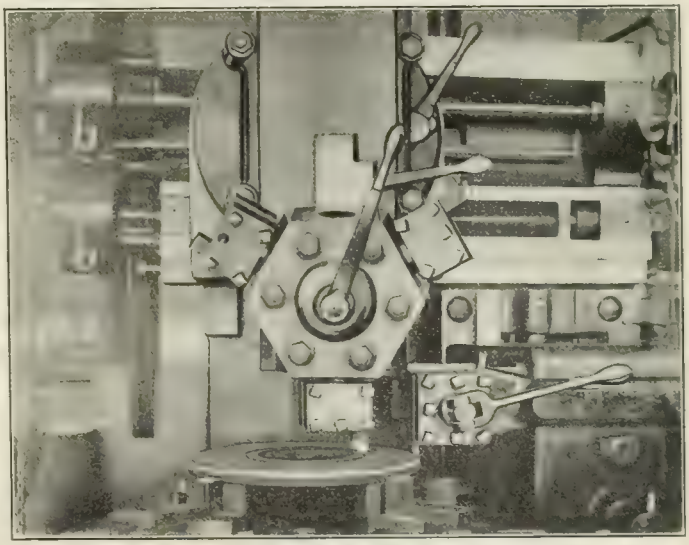
*Entered in a competition on this subject which closed July 15, 1911.

MACHINING HUB PLATES.

BY C. E. PATRICK.

A method of machining hub plates on a Bullard vertical turret lathe is shown in the accompanying illustration. With this machine all sizes of hub plates may be machined with the two tool heads, where on the boring mill only the larger sizes can be finished. Three tools are used in the vertical turret head, namely: a roughing tool, a finishing tool and a boring tool, while in the side turret a ⅜-in. parting tool is used. In this way both vertical and side turret may be used at the same time.

To machine the hub plate as shown, proceed as follows: Start a cut with the roughing tool facing the top of the hub plate; as soon as it has fed in about 1½ in., the ⅜-in. parting tool in the side head can be set to turn the outside to its proper diameter, using the fine feed. During the time this tool



Machining Hub Plates on a Vertical Turret Lathe.

is feeding down to the chuck, the top can be faced and the hole bored, after which the side turret may be turned half over to bevel the corner. The top is then finished with a finishing tool, thus completing one side of the hub plate. The plate is then turned over and a roughing finishing cut is taken on the other side. The boring tool is replaced by a tool to make a fillet on this side and with this operation the hub plate is completed.

When making several plates of one size the observation stops on the different feeds are of great value, for they readily show the limits to which the different feeds are to run. In the case where many plates are made from one block, the parting tool must not be allowed to cut through the block until the top face has been finished. It has been found advisable to keep the tools in good condition, especially the parting tool, as better work can be done, and in a shorter time.

According to the eighth semi-annual report of the South Manchuria Railway, covering the period ended September 30, 1910, the greatest increase in expenditure was for railway construction, the amount spent for that purpose being $3,434,870. It is probable that this sum was used chiefly on the Antung-Mukden line, where there is a stretch of about 60 miles still to be converted to broad gage, and in the construction of shops at Shahokou. When these shops are completed the company will be able to supply most of its own needs, even to locomotives.

MASTER BLACKSMITHS' ASSOCIATION

The nineteenth annual convention of the International Railroad Master Blacksmiths' Association met at the Boody House, Toledo, Ohio, July 15-17, John J. Connors, A. & W. P., Montgomery, Ala., presiding. Rev. Kinnane opened the meeting with prayer and an address in which he emphasized the necessity of striving toward high ideals. The mayor, Hon. Brand Whitlock, welcomed the convention to the city. B. A. Worthington, receiver and general manager of the Wheeling & Lake Erie, gave a most interesting address, in which he spoke in a witty manner of the development of the art of blacksmithing, and also touched on the problems of government regulation of railways and improved efficiency. Following the presidential address by J. J. Connors the meeting adjourned until the afternoon. The report of the secretary-treasurer, A. L. Woodworth, master blacksmith, C. H. & D., Lima, Ohio, showed an active membership of 277, associate members 27, and honorary members 10, making a total membership of 314. There is a balance of $565.96 in the treasury.

TOOLS AND FORMERS.

G. M. Stewart of the Pennsylvania Railroad, Altoona, Pa., presented a paper on this subject as follows: We have learned a great deal concerning the design of dies from the methods of those who use the cold forging process. We find that material will go so far at one operation without bending or doubling back, and to secure good results it should never be pressed beyond that point, as for instance in the making of ladder treads. The accompanying illustrations show the five operations which we use in making these treads. Three of these operations are

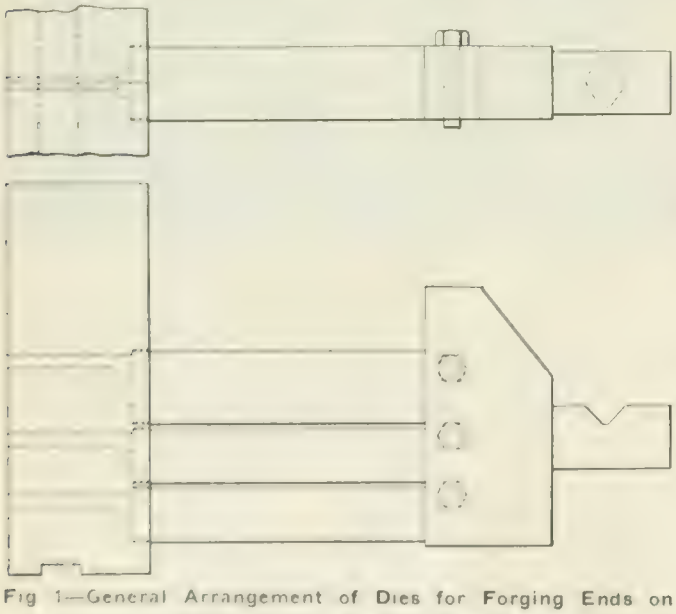


Fig 1—General Arrangement of Dies for Forging Ends on Handholds and Ladder Treads.

The two bends at each end are made in an air operated bending machine, the first bend being made by the dies shown in Fig. 3. The final operation of bending is made on the bending machine with the dies shown on Fig. 4. The dies for bending the two types of handholds which are used are quite similar,

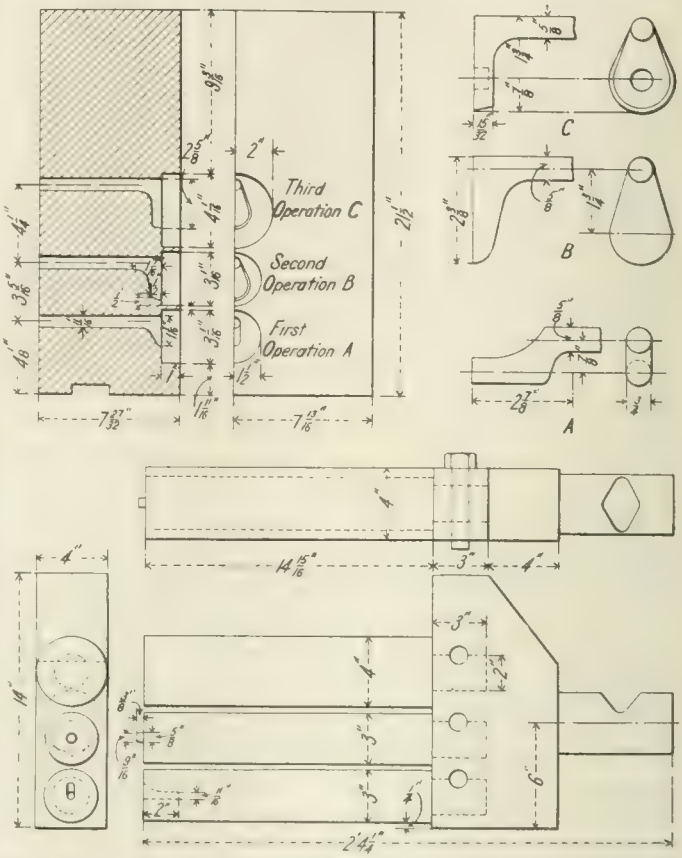


Fig. 2—Details of Dies and Formers for Forging Ends on Ladder Treads.

as indicated on the drawing. The upsetting dies were forged from scrap steel, a set weighing about 200 lbs. when completed. Very little machining is required. We have turned out more than 5,000 upsets on one set without dressing. The dies for bending are made in the same manner and of the same material,

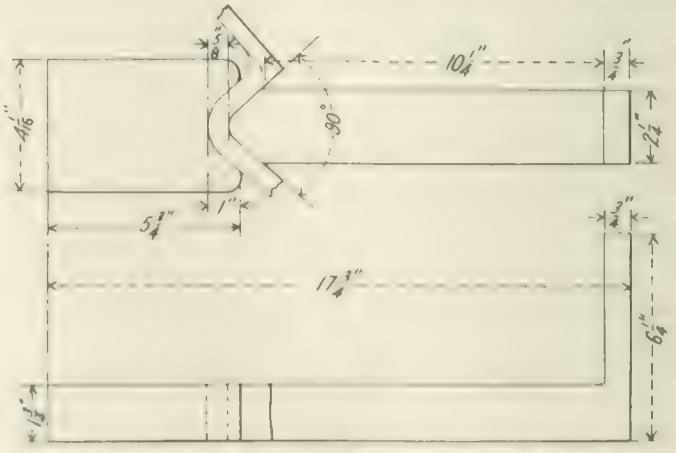


Fig. 3—Device for Bending Ends of Ladder Treads.

weighing about 60 lbs. per set and requiring very little machining.

Discussion. In an informal discussion of these dies, which took place while some of the members were looking over the

blueprint, after the meeting, it was suggested that the foot of the handhold could be formed by two upsetting operations instead of three, by making the first operation one of offsetting, rather than of offsetting and upsetting.

F. F. Hoeffle (L. & N., South Louisville, Ky.):—Success in this work depends largely on being able to design your own tools. Such knowledge is acquired only by years of close observation and experience. Great care and judgment should be used to avoid as far as possible having light and heavy sections in the same casting, as this will cause unequal shrinkage, throwing a strain on the lighter parts, and causing them to break when given a sudden jar. Cast and forged steel make the best dies for strength. I have had most excellent results with grey iron dies. The following chemical analysis of iron for hammer dies and forging machine dies and formers of all descriptions, ranging in weight from 500 lbs. to 5,000 lbs., to a great extent eliminates the fire cracks in that portion of the dies subjected to the intense heat. It was suggested by M. Dolan, general foundryman foreman, Louisville & Nashville:

Silicon	.80 to 1.25	Manganese	1.25 to 2.25
Sulphur	.06 to .10	Combined Carbon	.75 to 1.00
Phosphorus	.30 to .50	Graphitic Carbon.	2.25 to 2.75

For lighter dies and formers weighing less than 500 lbs. the silicon should be increased to 1.50 or 2.00.

With grey iron dies for the forging machine, I have found it to be the better plan to have all die sinking done by the pattern maker; such dies are good enough for any article that is to be made in a railway shop. The steel dies should range from .50 to .60 carbon, and the die sinking should be done in the machine shop, especially when the articles are for commercial hardware purposes. It has been found that when parts of the grey iron dies become worn, inserts of steel of about .40 carbon can be used to splendid advantage. Inserts made from high speed steel have been tried out and have failed to stand up, as they are damaged by the water. Fire cracks occur and the dies will not do good work under such conditions.

G. A. Hartline (L. S. & M. S., Collinwood, Ohio) also presented a paper on tools and formers of which the following is an abstract: We make the dies for our forging machines of scrap driving axle steel, especially where a large number of forgings are required. We have dies of this material which have made thousands of forgings and are still in good condition. If only a limited number of forgings are to be made, cast iron will answer, but we have had trouble due to the breakage of such dies under the tremendous pressures which are required. Steel gives the best service in the long run.

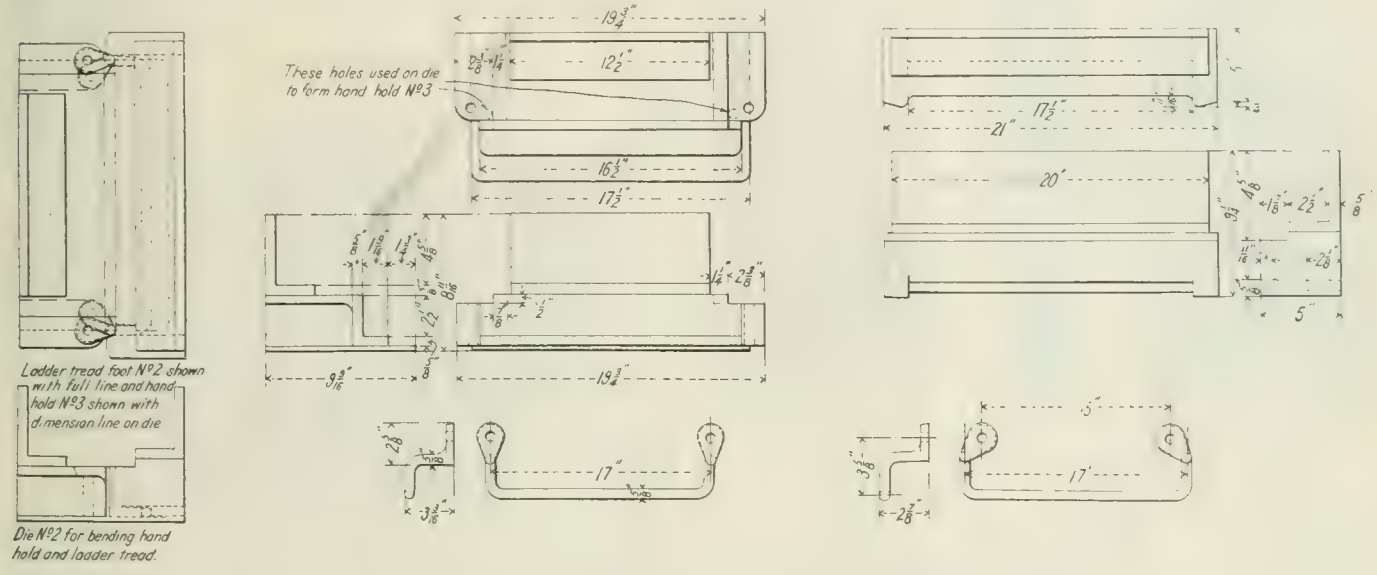

These holes used on die to form hand hold No 3
Ladder tread foot No 2 shown with full line and hand hold No 3 shown with dimension line on die
Die No 2 for bending hand hold and ladder tread.

Fig. 4—Dies for Final Bending of Handholds and Ladder Treads.

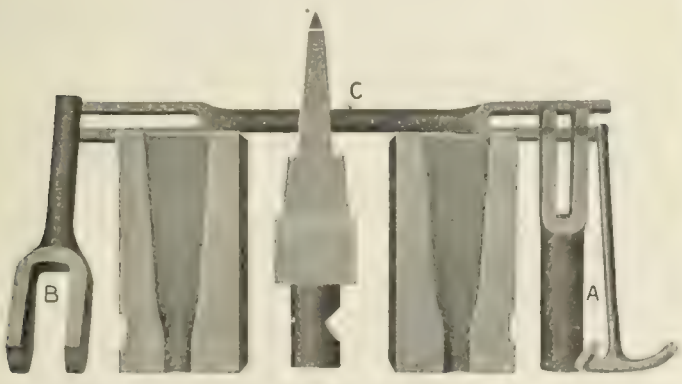


Fig. 5—Typical Dies and Former for Butt-Welding, With Examples of Such Work.

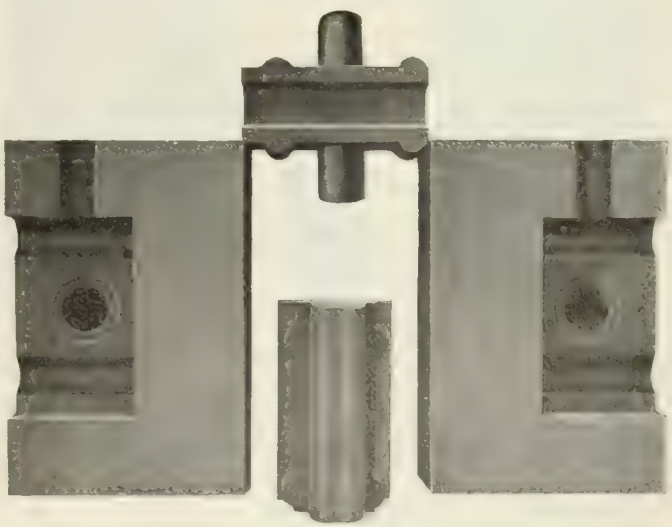


Fig. 6—Dies and Former for Radius Bar Lifting Blocks.

We butt-weld a number of forgings in our forging machines, such as slack adjusting rod forks, bottom connections, swing hangers for freight and passenger cars, and clinker hooks. The stock for the forked ends of these parts is sheared on a bulldozer and bent to a U shape. The two pieces are heated to a welding heat and butted together, after which they are placed in the forging machine with a small jet of compressed air playing on the parts which are to be welded. This not only keeps the metal welding hot, but blows out any dirt or scale which

might accumulate at this point. The plunger has a pointed end, as shown in Fig. 5, which forces itself through the fork into the round stock, thus intermingling the grain of the material and insuring a solid weld.

These bars have given splendid results when tested for tensile

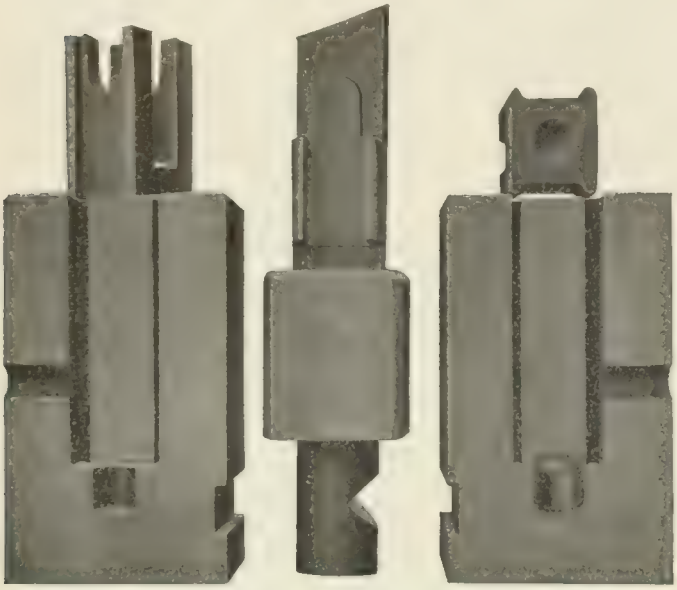


Fig. 7—Dies and Former for Slack Adjusting Rod Blocks.

strength. For instance a bottom connection rod for passenger cars (*A*, Fig. 5), consisting of a 2½ in. x ¾ in. bar iron fork butt-welded to a piece of 2¾ in. double extra wrought iron pipe in dies similar to those shown in the illustration, broke in the weld under a pull of 151,200 lbs. A slack adjusting rod fork (*B*, Fig. 5) made of a U of 2½ in. x 1 in. bar iron butt-welded

Fig. 8—Dies and Former for Passenger Car Truck Brake Hangers.

to 1¾ in. round iron broke in the weld under a stress of 106,000 lbs. A bottom connection rod for freight cars (*C*, Fig. 5) made from a U of 2½ in. x ¾ in. bar iron butt welded to 1¼ in. round steel broke in the weld under a pull of 74,000 lbs. We made about 12,000 of these connections last year.

Dies and fixtures for forming several intricate parts in forging machines are shown in Figs. 6, 7 and 8. Those in Fig. 6 are for bending round half lifting shackle steel bolts. Weitzel valve gears. Those in Fig. 7 are for making slack adjusting rod blocks, and those shown in Fig. 8 are for making brake hangers for passenger cars.

Dies for bending coupler pockets on a bulldozer are shown in Fig. 9. These dies can quickly be adjusted to suit any width of pocket by loosening the set screws. The ends of the dies are formed to provide plates that are clamped to the finished width. By removing these plates the plunger used for forming the round end yoke can be replaced by one for bending square ends. Of course the blocks against which the plunger works would also have to be changed. These changes may be made while the iron is heating in the furnace. The plunger for bending the square back pockets has a locking device on the end that works in a dove-tail groove on the bottom of the plunger. It is closed and locked by an eccentric which is operated by a small lever. The blank is placed

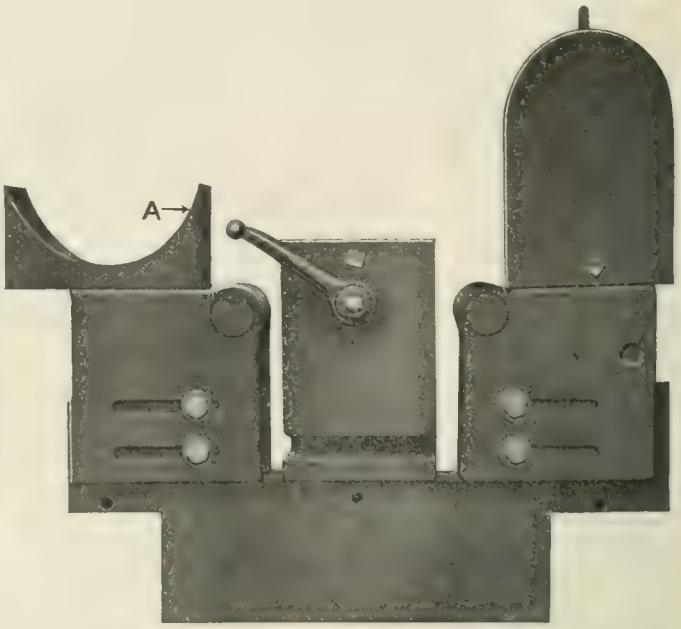


Fig. 9—Adjustable Dies for Bending Round and Square End Coupler Pockets.

between the jaws, and by operating the lever is held in a vise-like grip until released by the operator. The filler block *A* is used for bending the round end pockets.

A great deal depends on the skill of the operator and the heating capacity of the furnaces in the successful making of forgings. A study should be made to complete each article with the least number of operations and with a minimum amount of handling.

D. M. Dulin (N. & W., Portsmouth, Ohio):—An ingenious device for forming a Wagner door mast hook in one operation is shown in Fig. 10. The dotted lines show the initial position

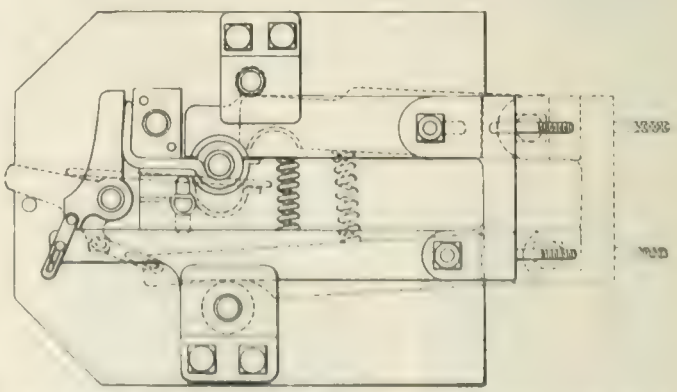


Fig. 10—Dies for Forming a Wagner Door Mast Hook on a Bulldozer in One Operation.

of the stock and the parts of the apparatus. The full lines show the finished shape of the material and the positions of the various parts of the device.

Discussion.—In commenting on the value of dies and formers used with the forging machine or steam hammer, H. L. Weitzel compared the anvil to the stage coach and the modern methods of forging to an observation parlor car.

DROP FORGING.

H. E. Gamble (P. R. R., Altoona, Pa.):—The dies should be made by men who are familiar with this class of work to produce the desired results, and the hammer should be of sufficient capacity for the work required of it. Some say that the rod breaks in the drop forge shops are too numerous. It may be true, but I believe that these breaks occur from over-taxing the hammer and from poor material in the rods. The drop-hammer cannot stand forever without some breaks caused by poor heating and the hammers not being heavy enough to produce the work put under them.

Care and judgment should be exercised by the foreman and the die-maker in using the proper amount of material to produce the forging, so that the dies will not be overcrowded with surplus material. This will keep down the cost of the article and reduce die repairs. Plenty of work, good experienced men, and up-to-date hammers and furnaces are necessary for the best results. We have in the Juniata smith shop of the Pennsylvania

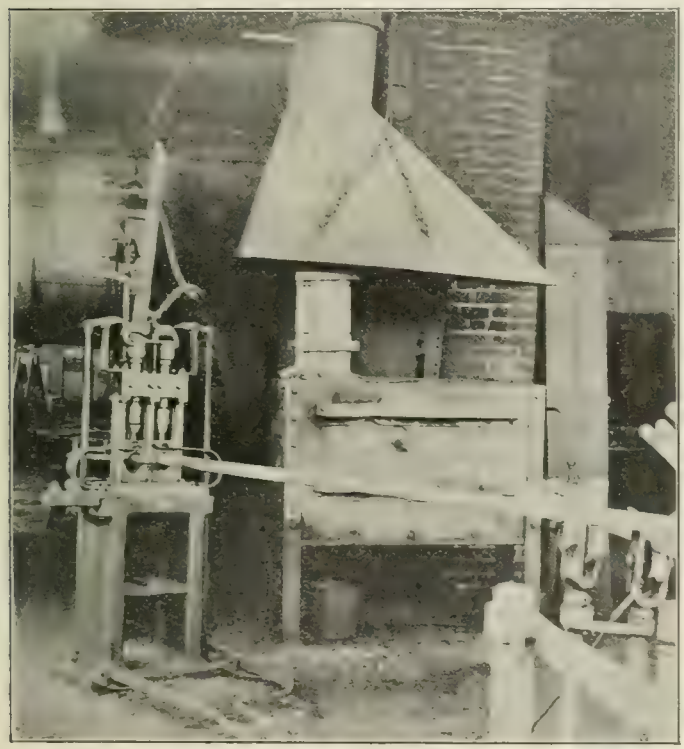


Fig. 11—Machine for Welding Safe Ends on Tubes.

Railroad one 6,000-lb., one 3,000-lb., and two 1,500-lb. drop-hammers, and they produce work ranging in weight from one-half ounce to 90 lbs., including locomotive and car parts.

Jas. T. McSweeney (B. & O., Baltimore, Md.):—There are a great many forgings that can be made on a drop hammer, that cannot be made on a forging machine. Very few railways have drop hammers, but it seems to me that if the commercial concerns can make money by selling drop forgings, the railways could save money by making their own drop forgings. We are trying to use one of our steam hammers to make such forgings, but it is not a success on account of the lower die being separate from the housing of the steam hammer, making it a hard matter to keep the top and bottom dies straight. Drop forgings save greatly in machine work, as the forging can be made so close that it needs no further work after coming from the hammer.

Discussion.—The grade of steel to be used for the dies depends entirely on the class of work which is to be done. The dies may sometimes be hardened to advantage, but only on the surface, and on that part of the surface which is subjected to wear.

FLUE WELDING.

C. A. Sensenback (P. R. R., Sunburg, Pa.):—We use but one man on welding flues, and his output will average thirty to thirty-five flues per hour. The various operations performed by him and considered as a part of the welding process are: Heat flue, bell out flue, put safe end in flue, weld flue, swaging.

J. Geo. Jordan (T. & N. O., Houston, Tex.):—The tools for the different operations should be close together. At our plant we have a shed roof connected to the boiler shop under which all the flue work is done. The flue rattler is muffled to deaden the noise. We put the flues in the rattler with a few pieces of old angle iron, and some old washers and nuts; it takes about three hours to get them clean. From there they go to the cutting off machine, which has two rollers at the bottom and a roller knife at the top, similar to a tool for cutting off pipe. The next operation is to scarf them; this is done in a machine that has three cutters set in a head. There is a foot lever which feeds the flues in when it is pressed down; when scarfed they are piled near the flue welder. The safe ends are scarfed on the same machine by taking off the head and putting on a tapered reamer in its place.

The next operation is to weld them, for which we have an air hammer of our own make; it is made from two very large air hammers that the bridge department had been using on bridge work. They were put in a frame as shown in Fig. 11, and the die is so constructed that when the flue is down to size, it will meet and cannot hurt the flue. The bottom die is stationary and the top one is held against the hammer. All the flue welder has to do is to turn the flue. We average 400 flues daily, the flue welder having one helper. We use oil for fuel, and the furnace is of our own make. It has two holes for heating, and will heat one flue per minute. I believe in scarfing the flues, as you get a clean weld with no scale between your scarf. We use steel safe ends; they weld about as well as iron. We test all our flues with water pressure before putting them in the boiler.

Discussion.—The problem of welding the large tubes used in superheaters was brought up in the discussion. Geo. W. Kelly (C. R. R. of N. J.) suggested that this could be done to advantage in a forging machine, and told of a special job which had been done in this way in his shop.

FROGS AND CROSSINGS.

Thomas F. Keane of the Ramapo Iron Works in a paper on this subject said, among other things, that: For the past six years our company has been furnishing manganese center intersection work in the form of frogs with manganese castings firmly held in place at the points of heavy wear, switch points reinforced with manganese steel at the point where side wear occurs and crossings protected with manganese steel. Cast manganese steel was the first in the field; and improved methods of pattern making, molding and heat treatment now produce such sound castings and tough metal that the cast product, at least at present, bids fair to hold its own against the newer rolled or forged manganese steel.

A common fault of manganese center frogs is that the heel rails work loose. As soon as this happens the rails, bolts and casting are subjected to greater stresses than they should take, and if nothing breaks, at least the wear due to pounding and working up and down is much greater than would otherwise occur. To prevent failure from this cause we have so designed our frogs that not only are the heel rails well protected by the castings, but they are secured by four bolts and two rivets. This may seem a simple remedy, but it has proved effective.

It is well known that the first 30 in. of the point, particularly a curved point, are subjected to the severest wear. By protecting these 30 in. so that the life will be equal to that of the rail at the heel of the switch we obtain a switch with a life equal to that of the adjacent running rail. If we increase the life beyond

this point we do so to no purpose, since when a new rail is laid new switches should also be put in. Consequently it is poor economy to make the manganese point any longer than enough to guard against side wear.

There is an erroneous opinion among many railway men that the point of a frog is the first to wear out. It is clear that if a frog be properly built the wing rail will always support the tread of the wheel until the wheel has advanced on the point, at least to where its width is equal to the width of a rail head. Beyond that place the point rails should be subjected to no greater wear than a straight running rail. With this in view we have made the wing rails of rolled manganese steel. This tough metal does not wear down rapidly, and the point will not go down any faster than the wings.

Discussion.—The use of manganese steel in frogs and crossings was very favorably commented on, but attention was also directed to the fact that it cannot be machined. It must be cast approximately to shape and then be ground, and even that is a difficult matter.

FRAME WELDING.

G. W. Kelly (C. R. R. of N. J.):—We use thermit for making repairs to frames under the engine. The accompanying sketch, Fig. 12, shows a difficult compound weld which we have recently made in the engine house at Elizabethport, N. J. The 1¼ in. hole is drilled through the top rail to give the

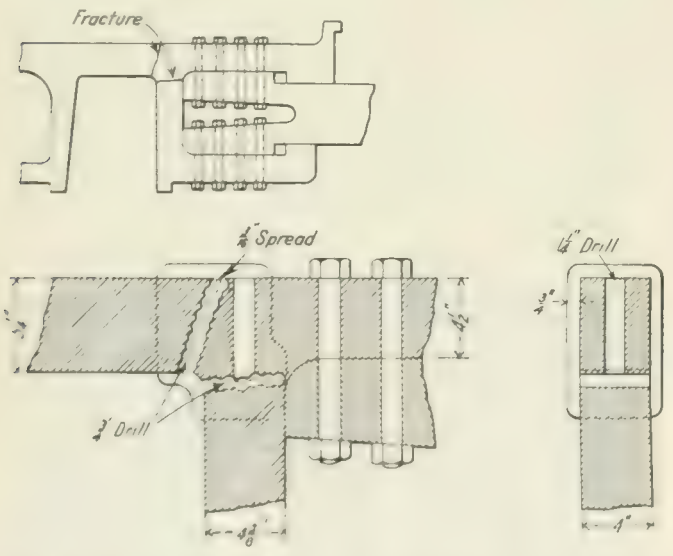


Fig. 12—Difficult Fracture in a Locomotive Frame Repaired by Thermit.

3/16 in. Formerly, when the leg was broken from the top rail [illegible] or three failures. However, since we have drilled the 1¼ in. hole through the frame into the break, allowing the thermit to circulate around the frame and through the hole we have had [illegible]

To prevent the frame from upsetting while preheating and [illegible] fire. When a frame is broken in two or more places in the [illegible]

The writer has been asked: "Do you consider thermit welding permanent, and will the weld hold during the life of the [illegible]

different classes of engines where it was necessary to apply new steel front pedestals. Of the above welds we have had but one failure, which was due to unequal contraction. During the last six years we have made many welds at various places on steel and wrought iron frames, driving wheel centers, and steel braces, etc., which have given us no trouble. We have found it very beneficial to keep a record of the welds made and the conditions at the time of making them, so that should a failure occur, by looking up the record we can generally locate the reason.

H. D. Wright (Big Four, Beech Grove, Ind.):—In making a frame the frame back is blocked out ready for the limbs and braces to be welded in place, as shown in Fig. 13. The lugs

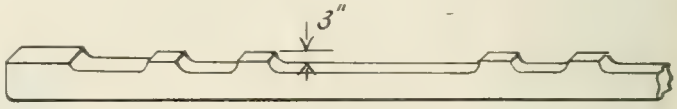


Fig. 13—Frame Back Blocked Out Ready for Limbs and Braces.

should not exceed 3 in. in height; by this method you will avoid having any cross grained iron in the frame legs when the limbs are welded on. Fig. 14 shows how the limbs should be forged and scarfed ready to weld on to the frame back. The boss that is left on the limb for the braces should not exceed 2½ in. in

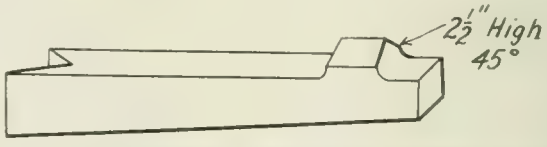


Fig. 14—Limb or Pedestal Ready to Be Welded to Frame Back.

height. Before these parts leave the forging hammer, they should be scarfed to an angle of 45 deg. by the use of a V block and fuller. Then weld the limbs to the frame back in one heat. I prefer to put the frame leg on in one heat, even though the outside scarf does show a little, rather than to have the second heat taken and the center of the iron loosened up by not heating through to the center. It does not do any good to weld up

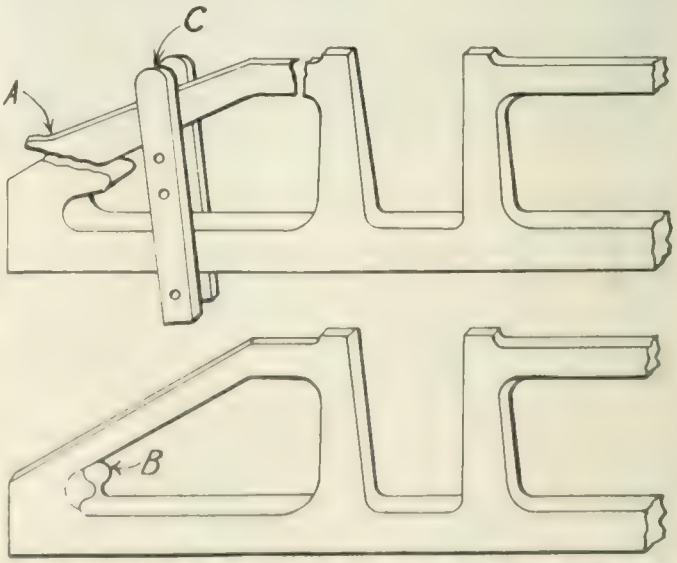


Fig. 15—Method of Putting in the Brace at the Rear End of the Frame.

the outside solid and then take it to the planer and plane it all away, and there are certain heats that open up a weld very easily while working. For example, take two pieces of 2 in. x ½ in. [illegible] to a good welding heat and lay them down. You will find it a difficult matter to pull them apart when cold.

Take the same two pieces of iron, if you have not pulled them apart, put them in the furnace and bring them up to a greasy heat and you will not have any trouble in separating them. The same condition is true in frame work, and while you may have trouble to get the men to make a weld in one heat in a day work shop, we have no trouble on this score from men working piece work.

The method of putting in the bracing, commencing at the back end of the frame, is shown in Fig. 15. *A* shows the position of the brace before the hammer makes the weld, and *B* is the finished weld. Cut away the extra metal between the frame brace and back as shown by dotted line with a gouge. This

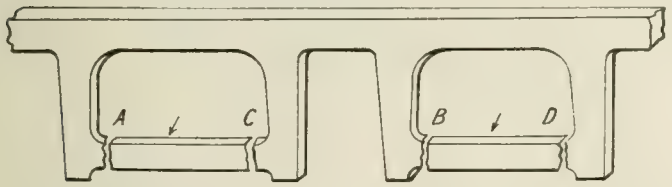


Fig. 16—Showing How the Lower Rails Should Be Welded On.

method will make a sound weld, but care should be exercised that the bevel on the frame back has the correct taper, so that when the hammer strikes it, it will be driven into place. The brace *C* is made of two pieces of 4 in. x 7/8 in. iron bolted fast to the back and the holes are spaced the correct distance to allow the brace to slide into place. When the brace is put in place ready for welding it will stand away some distance from the limb; as a rule we put a block of soft wood between the brace and the limb with the grain running the right way so that when the brace begins to draw the block will split, allowing the brace to come back into position.

Fig. 16 shows the lower rail pieces in place. They should be welded first at *A* and *B*, and then at *C* and *D*. By this method you reduce the strains that come on the legs and a few blows of the hammer on the braces after the weld is made will further remove them. The proper place to strike the braces is indicated by the arrow heads on the sketch.

The front end as used on some of our heavier engines is made in one piece under the hammer and is shown in Fig. 17.

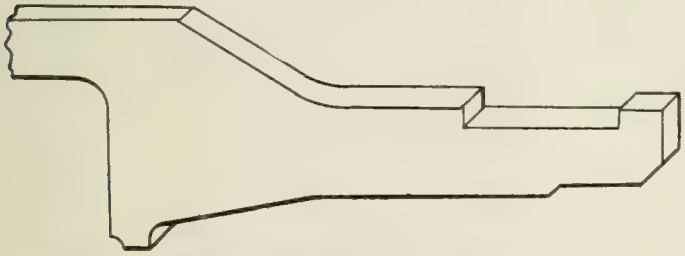


Fig. 17—Type of Front End Which is Machined and Drilled Before Welding to the Frame.

This type of front section is finished in the machine shop and drilled before it is welded to the frame.

The type of front limb that is ordinarily used is shown in Fig. 18, and *A* shows the part ready to weld in place. Weld a small stub on the frame back and then weld on the front limb. In making the offset frame shown in Fig. 19, the back is made in two pieces, and is then welded at *A*, after which the work is handled in the same way as if it were a straight back.

In repairing frames, I scarf all my work on a 45 deg. angle. The component forces are thus equal and the wedge will not take any more of the blow than the scarfed frame piece. The parts will thus weld thoroughly from the point to the outside of the frame.

Repairing Frames Under Engines.—We make all our own preparations and do not call on the machine shop for any help whatever. We have had only one frame that had to be sawed out by a machinist and that was due to the weld being right against the firebox. The type of weld which we use is shown in Fig. 20. In heating the frame member for the purpose of cutting out or welding, we build a brick furnace around the fracture and use fuel oil burners, one on either side. One burner is below the fracture and the other above it. This allows the

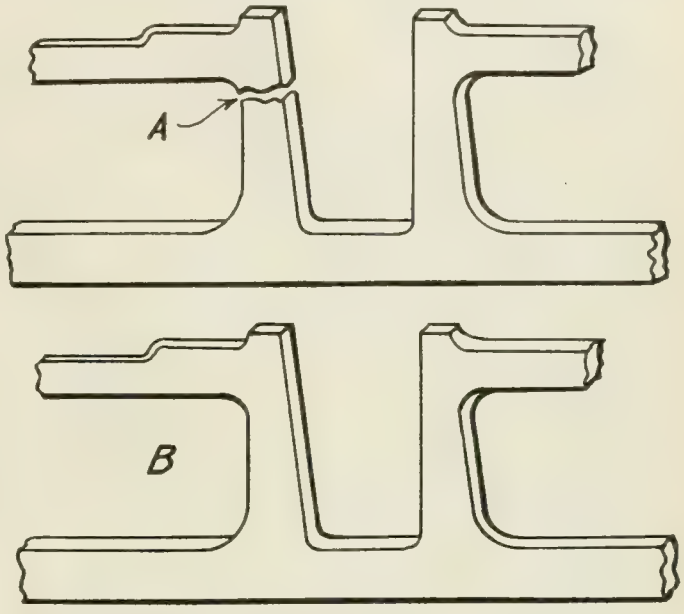


Fig. 18—Method of Welding Ordinary Front End to Frame.

flames to make a circuit around the frame and to heat it up evenly. In building the furnace we always leave two or three bricks on each side so they can be taken out without disturbing the rest of the bricks. This method often saves a great deal of time, for if the weld is not made perfectly on the first heat the bricks can be replaced and another heat taken.

In preparing the frame for welding, we cut it out on a 45 deg.

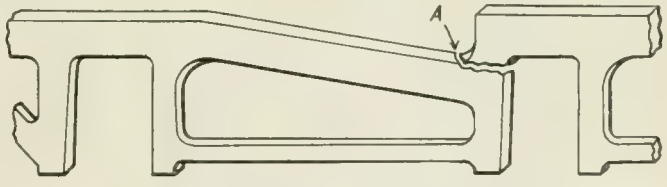


Fig. 19—Making an Off-set Frame.

angle and then warm up and spring it apart 5/16 in. or 3/8 in. We then cut in at point *A* and drive in four wedges to bring up the stock to allow for wasting in welding. The large wedge is then made and is driven into place making a tight fit. When the frame is brought to a welding heat the loose bricks are removed from each side of the furnace and the rams are used. I have successfully welded 136 frames under engines in this way during the past three years.

J. G. Jordan (T. & N. O., Houston, Tex.):—Repairing frames

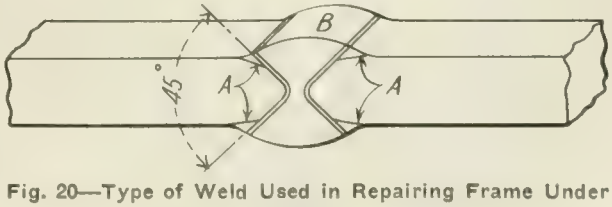


Fig. 20—Type of Weld Used in Repairing Frame Under Engine.

on engines in the roundhouse is a make-shift job, and always will be. You cannot get stock enough on each end of the weld, and the frame will waste away in making your heat no matter

what you heat with—gas, oil, or thermit. But we have to weld them in the roundhouse to keep the engines in service. At present we are welding with thermit. I think it is the best temporary job you can make. A molder is broken in for this class of work, and he makes his own mold and does all his own work, except when taking off the heat, at which time he is assisted by a helper. Of course there are many cases where the frames cannot be welded in the roundhouse; i. e., when they break under or near the firebox, or under the cylinders.

In repairing frames on the anvil we always make the V so that the grain of the iron is parallel with the frame, and we use good iron and coal, a good heater and plenty of stock.

D. N. Dulin (N. & W., Portsmouth, Ohio):—We seldom remove a frame from the engine unless it is badly out of line or broken in such a way that it must be removed. Since the first of the year we have repaired 43 frames with but three failures, and two of these were on the front jaw of a passenger engine. This frame had been removed at some time and a new back put in the front jaw; in the operation the height of the front limb was shortened ⅞ in., causing an excess of stock in the front corners of the jaw; this striking on the driving box caused the frame to break.

In welding the frames with oil we drill 1 in. holes through the fracture, making the holes as close together as possible. We chip out all of the burrs leaving the ends nice and square; then we wedge the frame apart a distance about equal to the amount of contraction. We do not figure on any upset but anchor the frame at this point and leave it until the heat is worked off, after which we release the wedge, which permits the frame to go back to the proper length. When the frame is wedged apart we forge a piece to fit in the fracture. This is cut from the end of a square block of tough hammered iron having the fibers running with the frame. It is fit in nicely, leaving about ½ in. above the frame and ½ in. below, and allowing the sides to come flush. We forge two more pieces, one for each side of the frame. These are 3 in. or 4 in. wide and of a length to suit the height of the fracture, leaving the fibers running with the frame. We drill one or two ⅝ in. stud holes through the plates and into the center piece; then tap out the center piece and screw in the studs, put on the plates and rivet over. This gives a good fiber and saves a mean job of forging T shaped pieces and getting them machined to fit. We then build the furnace by placing 1 in. square bars across the frame and having four small chains with rings in one end and hooks in the other; with these we get any desired height for the furnace. We have two short bars hanging in the lower ends of the chain, on which we place a piece of sheet iron, which forms the foundation of the furnace, which is 18 in. deep, and the length of two fire bricks, giving us about 2 in. above and below the frame. We find that a reasonably long heat will not waste as much as a heat that is crowded. The furnace is of large dimensions and is capable of containing a good deep heat, which is something to be appreciated.

On the inside of the frame the furnace is 9 in. deep and the length of one fire brick; this side is plugged. When all is in readiness we light the burner; this is placed on an iron trestle with adjustable legs giving any desired height. We have two rams; one is made from 1 in. bar soft steel, 10 ft. long and upset on one end the size of a backing hammer; the other made from 1½ in. steel is upset on one end about 3 in. We use the small bar to [illegible] and when it gets white and soft we use the larger ram. This is handled by three helpers [illegible] This operation is continued until we have sufficient proof that a good weld is accomplished, after which we turn off the burner and plug up the furnace and then we go to the other side which is treated in the same way, after which we take down the furnace and trim the [illegible]. The [illegible] the steel half way through from each side and effectually closes any open spaces [illegible]. A deep welding heat is [illegible]

the frame and the pads on the side of the frame furnish plenty of stock to work on.

We have done many jobs which have appeared as good as any that came from the anvil, and with much better heat and conditions on account of the superiority of the heat obtained from oil over that from inferior coal. We also have a large size air hammer for trimming up, and gouges and chisels of different

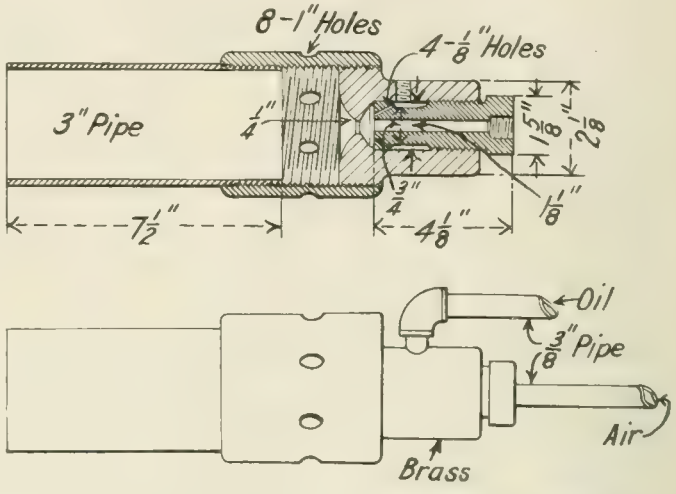


Fig. 21—Crude Oil Burner Used for Frame Welding.

lengths and designs which come very handy when you cannot swing a sledge. We always leave the frame a little thicker than the original frame and slightly higher, if we have room. The work is done by four men, and with despatch. The accompanying sketch, Fig. 21, shows the crude oil burner which we use.

Discussion.—Objection was taken to Mr. Jordan's statement that welds made with the frame in place were makeshifts. If the proper precautions are taken there is no good reason why such welds should not be a success. It is, of course, less convenient and more difficult than working on an anvil, but it is far more satisfactory from the standpoint of cost—both for the actual work done and the time of keeping the engine out of service. It is not necessary to use collars with the thermit weld. If the frame is properly heated before welding with thermit there should be no trouble in getting successful results. Mr. Gamble spoke of the advisability of rounding the edges on forgings and of annealing them before placing them in service. These features should be given more attention.

OXY-ACETYLENE WELDING AND CUTTING.

P. T. Lavender (N. & W., Roanoke, Va.):—Not only has the use of oxy-acetylene given splendid results for making repairs to parts of machinery, but repairs are now being made to worn out parts of locomotive and cars, thus recovering material heretofore consigned to scrap. The use of acetylene has become almost indispensable in the construction of steel passenger cars. In new car work an interesting field is presented in the welding of joints in long roof sheets and plates, cutting off beams, braces, etc. Besides this the joints at the door and window frames are being successfully made; this work is rather higher grade, because the workmanship must be the very best and the surface left smooth and in condition to receive the finish usually applied. Some remarkable work has been accomplished in the welding of steel drills to shanks as small as ¼ in., and many other tools have been similarly repaired, to say nothing of work on such parts as rocker boxes, pulleys, journal boxes, hydraulic jacks, air and water pump cylinders, wheel centers, electric machinery, generator bases, filling improperly drilled and enlarged holes in [illegible] and part of the machinery of a locomotive for the purpose of re-drilling and re-boring to size and thus recovering the worn

or damaged part, welding or adding material to piston rods for the purpose of reproducing the proper and standard crosshead fit, building up metal on feed screws for lathes, welding locomotive side and main rods and broken and cracked locomotive cylinders. In valve motion work alone, it has become almost indispensable in recovering worn and broken parts.

The apparatus is most valuable for filling blow holes at critical places in castings, large and small, and also for cutting off the gates of steel castings. The latter work can be done quite as readily and more economically under certain conditions than with the saw. Special emphasis should be given the very wide and useful range of work to which it has been put in the boiler shop, and particularly in cutting out firebox sheets and welding patches; if the work is properly handled the operation can be executed in such a way that no calking of joints, renewal of rivets, etc., is necessary. In cutting out sheets of fireboxes for renewals or for patches, the speed that can be obtained is remarkable. It has been demonstrated that an operator can, if skillful, do as much work in three hours as three or four boiler makers and helpers are able to accomplish in several days. It usually requires about an hour or an hour and a quarter for a skillful operator to cut out two full side sheets and a half door sheet of a large modern consolidation locomotive, whereas cutting it out by hand would require two or three men as much as ten hours to accomplish the same work. Not only is the process valuable in removing sheets, but it is equally valuable in welding patches in firebox sheets.

It is estimated that plates from ¼ in. to ¾ in. thick can be cut at the rate of about 30 ft. per hour. Tests have been made showing a cutting speed as high as 8 ft. per hour on very thick metal, and it appears that the composition of the steel or the treatment it has undergone has no effect whatever upon the cutting speed or the consumption of gas. There is practically no variation between rolled or forged iron, or cast, drop forged, tempered, hardened, carbonized or Harveyized steels. The statement has been made that the harder the material the more readily it can be cut on account of its density. The position has been taken that we should be able to successfully weld flues in locomotive boilers by the use of acetylene. The sooner we succeed in securing a substantial and more servicable joint between the flue and the flue sheet, and a joint less disturbed by expansion and contraction, corroding and the other influences, the sooner we will be able to have relief from leaking flues; but to be able to successfully handle this particular operation by welding, either by electricity, acetylene or otherwise, remains to be seen.

Some interesting experiments have been made at the University of Illinois, and the conclusions reached by Professor Whitmore, are as follows: It is important in manipulating oxy-acetylene in welding to have thorough fusion of the metal. Too much emphasis has been laid on the effect of the flame regulation, pure oxygen and acetylene, pre-heating and hammering the weld, etc. An efficiency of 85 per cent. is as high as can be expected in practice if the weld is the same thickness as the plate. In the same article the statement is made that if the metal is built up towards the operator, the procedure is comparatively easy, but upon this point there seems to be some question, as some very successful operators claim that better work can be accomplished by working in the opposite direction.

George Hutton (N. Y. C. & H. R. R., Albany, N. Y.):—There have been failures with oxy-acetylene welding, but we must not forget that there have been many failures with other methods of welding. Would any of us have the ordinary handy man make a weld at a forge on an important piece of work and expect something good? That is what we seemingly expect from any of the new methods of welding. Many of us are ready to condemn oxy-acetylene welding, because it looks like a soldered job, and many believe it cannot be hammered. This is wrong in many cases, as it can be hammered enough to give the proper laminitations for 75 per cent. of the jobs in the smith shop. For cutting up material, such as old frames, or other scrap it is ideal.

Discussion.—The value of the oxy-acetylene process in reclaiming worn and damaged parts was commented on. The general opinion seemed to be that while oxy-acetylene welding has certain limitations, there is no doubt but that it can be used advantageously for welding thin parts.

CASE HARDENING OR CARBONIZING.

William F. Stanton (J. A. Fay & Egan Company):—Steel containing from .012 to .015 per cent. of carbon is best where it is desired to have a hard shell outside for wear and a tough core or center to withstand the shock and strain. The factors that influence the final result of case hardening are: (1) the temperature of the furnace; (2) the time the piece is submitted to the carbonizing process; (3) the nature of the carbonizing material; (4) the heat treatment which follows carbonizing; (5) the nature of the steel. The table herewith may be of interest as giving the penetration of carbon per hour as commonly accepted for various elements when present in steel:

PENETRATION OF CARBON PER HOUR.

0.5 per cent. manganese	0.043 in.
1.0 per cent. "	0.047 in.
1.0 per cent. chromium	0.039 in.
2.0 per cent. "	0.043 in.
2.0 per cent. nickel	0.028 in.
5.0 per cent. "	0.020 in.
0.5 per cent. tungsten	0.035 in.
1.0 per cent. "	0.036 in.
2.0 per cent. "	0.047 in.
0.5 per cent. silicon	0.024 in.
1.0 per cent. "	0.020 in.
2.0 per cent. "	0.016 in.
2.0 per cent. "	0.000 in.
1.0 per cent. titanium	0.032 in.
2.0 per cent. "	0.028 in.
1.0 per cent. molybdenum	0.036 in.
2.0 per cent. "	0.043 in.
1.0 per cent. aluminum	0.016 in.
3.0 per cent. "	0.008 in.

The rate of penetration for ordinary steel would be about .035 in. per hour. It will be readily noticed that manganese, chromium, tungsten and molybdenum increase the rate of penetration slightly. Nickel, silicon, titanium and aluminum retard penetration. Most of the alloy steels are made in special grades for carbonizing, dependent to some extent on what use it is intended to put the parts to. To illustrate: Vanadium steel that gives the best results for crank shafts, connecting rods, and other moving engine parts is composed of .025 to .035 carbon, .040 to .050 manganese, 1 per cent. chromium, and 016 to .018 vanadium; while the best carbonizing steel has .012 to .015 carbon, .020 manganese, .030 chromium and .012 vanadium.

Good and even carbonizing depends on the degree of temperature maintained during the heating process. It is essential that the temperature be kept at a definite point as nearly as it is possible with the means at hand. If the temperature is too high, the metal will crystalize and the core will become brittle. The temperature to which the steel can be raised safely varies according to the kind of steel used. Ordinary carbonizing steel cannot be safely raised above 1,800 deg. Fahr. If the carbon content of the steel is high, even this temperature should not be reached. Several of the alloy steels, such as nickel-chrome, can be heated to a temperature of 2,000 deg. Fahr., without doing any appreciable harm, if the carbon content is extremely low; in this case the penetration of the carbon is high without resultant crystallization of the core. The temperature in carbonizing ranges between 1,300 and 1,800 deg., and should never be below, as saturation does not take place and the higher heat effects both the per cent. of carbon absorbed and the speed of penetration. The nature of the carbonizing material has an influence on both the speed of penetration and the per cent. of carbon absorbed, and the material used should be of known chemical composition.

Powdered bone, charcoal, charred leather, cyanide of potassium, bichromate of potassium and many other materials give good results, and we have tried a number of them on gears, slides, ball bearings, set screws, mandrels, etc., with excellent results. Hard charcoal and bone give good results on nickel-chrome steel by

packing in a box and raising the heat to 2,000 deg. Fahr., and maintaining it for about four hours, allowing it to cool slowly before taking the parts out of the box or uncovering it. There are several other methods, such as carbonizing in a gas furnace, but this is for small work only and requires expensive equipment. Harveyizing armor place with a bed of charcoal over the plates, and the gas turned on so the steel will be heated through, allowing the carbon to soak in from the top, is a successful process; it has the fault of distributing the carbon to unequal depths over different portions of the plate and is not satisfactory for small work.

The heat treatment after carbonizing should be carefully handled, owing to the fact that the piece should retain its hard outside surface to resist wear and have a non-brittle core to resist strain. Some methods of heat treating have a de-carbonizing effect, while some steels have a tendency to crack or warp; in many cases it is wise to anneal after carbonizing. This is done by leaving the pieces in the box with the cover fastened on and allowing it to cool gradually. If the carbonizing temperature has not been over 1,600 deg. Fahr., it can be allowed to cool to 750 deg., and then reheated to 1,400 deg., and quenched with good results. If the temperature in heating has been over 1,800 deg., the pieces should be allowed to cool to 1,650 deg., and be quenched and then reheated to 1,400 deg. and quenched. The reason for double quenching is that the pieces must be heated above transformation (1,650 deg.) to destroy the crystalization which the core would have, if quenched at a high temperature, thus leaving the case hardened surface layer not hard enough to resist wear; therefore quenching must take place the second time at 1,400 deg. Fahr.

Carbonizing with materials of the nature of powdered bone, charcoal, potash, etc., by means of a packing in a cast iron box, is considerably slower than when the gases are used in a gas furnace, owing to the necessity of the heat penetrating the cast iron box and carbonizing the materials before it can effect the work.

PIECE WORK.

Henry Mangeot (C. H. & D., Cincinnati, Ohio):—About 14 years ago only about 1 per cent. of the work in the railway smith shops throughout the country was being done by piece work. This has gradually increased until I think it would be safe to state that there is about 65 per cent. of the work being done on a piece work basis in these shops today. It has been demonstrated that not only is the employee benefited, but the employer also. I have in mind a certain shop that had sixteen fires in operation and was scarcely able to keep up with the average output of locomotives. Piece work was installed on a small scale. The men did not seem to exert themselves much harder than before, but they made every move count. It was unnecessary for the foreman to get after a man for taking two heats when one would answer the purpose. It was to the man's advantage to see to that part of the work himself and not make any unnecessary work for it would decrease his net earnings per day.

The hand tools which belong to the smith in a piece work shop are kept in a much better condition than those in a day-work shop. His tongs, cutters, punches, etc., are well looked after and cared for. The shop referred to above was working sixteen fires before installing piece work; today it has only eleven fires and produces more work than formerly. The same foreman is supervising the shop with practically the same class of men he had in the start. There were some lazy mechanics that could not keep up with the pace and were compelled to step down and out. There is no question but that piece work rids the shop of drones, as you will find the piece work[illegible] is a hustler.

When a man can work with his head as well as his hands and make more pay by spending two cents more a day by working [illegible] he will generally take to it. It has been my experience that when a man can get a better [illegible] working piece work you generally have trouble on your hands when you ask him to work day work. The piece work inspector should be a diplomat, a close observer and by all means fair and honest. A dishonest piece work inspector is a dangerous man to have around. This man generally fills a position of assistant foreman in a blacksmith shop and is among the men at all times, checking them up and inspecting their work and giving such orders as may be in his line.

I believe it can be more satisfactorily worked in a large shop that does a great deal of manufacturing, as one man can be assigned to making some particular line of forgings. It can, however, be handled in a shop no matter how small; you may have a variety of different classes of work each day, and it is of course a little more difficult to work piece work than in the larger shop. Piece work and shop kinks go hand in hand. Take a piece work shop with a nice collection of shop kinks, and it is surprising to see the output that can be turned out per smith. There should be a liberal appropriation set aside for the tool room for making shop kinks for blacksmith shops.

SPRING MAKING AND REPAIRS.

John Engels (C. C. C. & St. L., Bellefontaine, Ohio):—In handling the repairs of springs we use as much of the old steel as possible. If the springs are too low in set they are reset and tempered. If we find the set all right, and where there are not more than three or four plates broken, we put in new plates without resetting the spring. In setting springs we leave the first and second plate stand off 5/16 in. to ½ in., and give the plates a gradual taper to the top plate. Every precaution is taken to see that the plates fit to each other.

We draw out the plates with an oval tool under the steam hammer. We also weld pads on some of our main plates, trim, finish and punch the slot when necessary with the steam hammer while the steel is still hot. We also use a malleable clip on some of our main plates. For a tempering bath we use a tank about 6 ft. long and 24 in. wide with a depth of 18 in. This tank holds two barrels of fish oil and is placed in a tank of water with about 3 in. of space on all sides, including the bottom, to keep the oil as cool as possible.

Discussion.—The importance of knowing and understanding thoroughly the quality and properties of the steel used for the springs was emphasized. G. M. Steward (Pennsylvania) mentioned some experiments which were being made at Altoona to reduce the cost of manufacture and maintainence of springs. The leaves are being made on a bulldozer, only one set of dies being used for all the leaves in a spring. In this way the parts are all standard and the repairs will be much less expensive.

HIGH SPEED STEEL.

George Lindsay (C. & E. I., Evansville, Ind.):—It has been said that we should burn the point off a cutting tool in order to harden it, and only the very point. This works out fairly well on lathe and planer tools, because it is not hard to grind them 2 or 3 times until they are right. How often have you heard that such a tool was not any good until it was ground two or three times, but you cannot treat a milling cutter, a tap or reamer by that process. If you do not get the proper heat on the latter class the first time, the efficiency of the tool is, if heated too high, reduced permanently not only for wear, but also in output of work which may cost many times more than the tool. We have been told that 2,300 deg. Fahr., is the limit or critical point for a certain high speed steel, and that 100 per cent efficiency is obtained very close to this; also that a few degrees more will reduce the efficiency 50 per cent., and again that 2,150 deg. will be too low and also reduce the efficiency about 50 per cent. The only sure way is to have a pyrometer.

It is surprising how unconsciously some men will hammer high speed steel at a low heat as if they were refining carbon

steel before they were going to harden it. This is good practice for a chipping chisel, but bad practice on lathe tools. It is also important that high speed tools be so forged as to have a good backing of metal in order to carry away the heat by absorption into the heavy backing. As to hardening; wherever it is practical to use compressed air as the cooling medium I use it; true that oil can be used too on some such tools as cannot very well be evenly cooled with air. Salt hot water may be used in cases of emergency, but I do not like it.

J. L. Keller of Purdue University gave an interesting talk on the effect of heat on the structure of iron and steel.

W. V. Young of the Hoskins Manufacturing Company gave a most interesting illustrated lecture on the heat treatment of high speed steel.

SPECIAL WELDING AND THREADING STEEL.

V. S. Yarnall (Carnegie Steel Company) presented a paper on this subject of which the following is an abstract:

It has been the standard practice for some years to use high carbon steels for numerous parts of locomotives, such as axles, main and side rods, piston rods, motion work pins, etc. Low carbon steel suitable for general forgings is of a more recent development, and has put into the hands of mechanical men a material that is showing a high standard of excellence, as well as a reduction in the cost of working and maintenance.

It would have been possible, when introducing special steel for railway equipment, to have put on the market a steel that would weld, bend, and forge as well as machine, but it was found that steel made to have a good welding quality was made at the sacrifice of the machining and threading quality, and vice versa. Therefore, the conditions seemed to demand that two grades of material, instead of one, be available for railway work. The Carnegie special welding steel was designed to give the highest efficiency to parts that are to be welded, forged, or merely bent, and is being used for such parts as equalizer bars, arch bars, spring hangers, reverse shafts, mud rings, coupler pockets, brake connections—in fact is suitable for all classes of welded, forged or bent work. The Carnegie special threading steel was designed to have a free cutting quality, and is being successfully used for locomotive frame bolts, cylinder bolts, stud bolts, valve rod and transmission bar pins, special tapered and turned all over bolts, brill nuts, car bolts, etc., and is best suited for work that does not require welding but may require forging and subsequent machining or threading. Physical tests have shown that these steels possess an ultimate strength equal to the best grades of material now specified by the railways for general forgings intended for locomotive and car parts, with a relative high elastic limit and ductility beyond that of ordinary soft steel.

WELDING STEEL.

Heating for welding or forging is one of the most important operations in the working of material. While this fact is known by all good mechanics, still, for various reasons, it is too often overlooked. Overheating, or the application of heat too rapidly on parts that do not receive subsequent work or forging, frequently occurs, especially in shops where the operator is working on the piece work plan, resulting in the material being left in a weakened, brittle state. It is necessary to use at least ordinary care in heating.

The welding is as simple as welding refined iron, and requires as much care. Excellent results can be obtained with or without the use of flux, depending on the character of the work. Sand as flux is very effective. Numerous physical tests made of welded bars of this grade of steel show that the majority of them have a tensile strength of over 90 per cent. the strength of the original bar.

Forging:—The welding grade of steel offers many advantages for this class of work; being very ductile, it can readily be formed into the desired shape at any workable temperature, either in a forging machine or under the hammer, without injury to the metal. On account of its homogeneity, parts that are made of it will practically be of equal strength, both longitudinally or transversely.

Recovering or Refining the Grain:—There are forgings made at times, which, from the nature of the design or for other reasons, make it impossible to heat for welding without heating beyond the portions that will eventually receive work when being welded. This particular overheated, unworked portion will be left in a coarse granular state. It is often essential that the finished forging be in the best possible condition throughout. Where Carnegie special welding steel is used, such parts can be recovered or refined by reheating to the recalescent point, which is about 1,500 deg. Fahr., and allowing them to cool in the air. The overheated portion will then be found to be fine in grain and in good condition. This treatment will benefit any grade of commercial forging steel that has been overheated—of course, providing it has only been slightly overheated and not badly burned.

THREADING STEEL.

This grade of steel, whose qualifications have already been noted, will flow readily into the various forms usually made on a forging machine at an orange to bright orange heat, without injury to the metal. For all parts requiring hardened surfaces, such as motion work pins, the usual method of case hardening by immersing the hot part in cyanide of potassium, or packing in bone and subjecting to heat, has been found to be very efficient.

ELECTION OF OFFICERS.

F. F. Hoeffle of the Louisville & Nashville, Louisville, Ky., was elected president; J. T. McSweeney, Baltimore & Ohio, Mt. Clair shops, Baltimore, Md., first vice-president; Harry E. Gamble, Pennsylvania Railroad, Juniata shops, Altoona, Pa., second vice-president; A. L. Woodworth, C. H. & D., Lima, Ohio, secretary-treasurer, and G. H. Williams, Boston, Mass., chemist.

RECLAIMING SCRAP MATERIAL.*

BY T. S. SHEAFE,

Engineer of Tests, Illinois Central, Chicago, Ill.

Brake Beams.—Brake beams constitute one of the largest items of consumption in railway operation, and in freight equipment the beam of "I" section is almost a universal standard. These beams become bent in service and when heated and straightened lose 25 per cent. of their strength and are unfit to return to service, owing to their weakness. By reinforcing them with a 2 in. x 2½ in. angle iron, at a total cost for labor and material of 63 cents each, the result is a beam stronger than the original one. When the work is properly done the reinforced beam will not return for repairs because of being bent, but rather for a new head, or fulcrum. On the Illinois Central an average of over 500 such beams are thus repaired each month with a saving of about $1.25 each, or a total of $625. The reinforced beam is shown in Fig. 1, and the shop in which the work is done in Fig. 2. The shop contains a large oil furnace in which the beams are heated, a face plate on which they are approxi-

Fig. 1—Reinforced Brake Beam.

*Entered in the competition of this subject which closed July 15, 1911, and awarded the second prize of $20.

mately straightened and formers operated by twin air brake cylinders which form them to exact shape.

Rolling Mill.—Truss rods, heavy bolts, etc., when pitted and rusted are of no value other than for making slab iron or selling for No. 1 wrought scrap. A small 2-high, hand round rolling mill, Fig. 3, most primitive in its construction, and belt driven, will turn out an average of over 68 tons of rerolled

Fig. 2—Partial View of Shop in Which Brake Beams are Repaired.

scrap per month. The saving per ton is over $12, or a total for the month of over $800. Four men and one laborer are required to operate the mill, a part of the latter's time being put in on other work. The other equipment necessary is an oil furnace, shears (Fig. 4) and engine (or motor). A 3-high modern set of housings would enable the output to be greatly increased. The benefits other than the neat saving are, a further refining of the iron and the ability to reduce larger en-

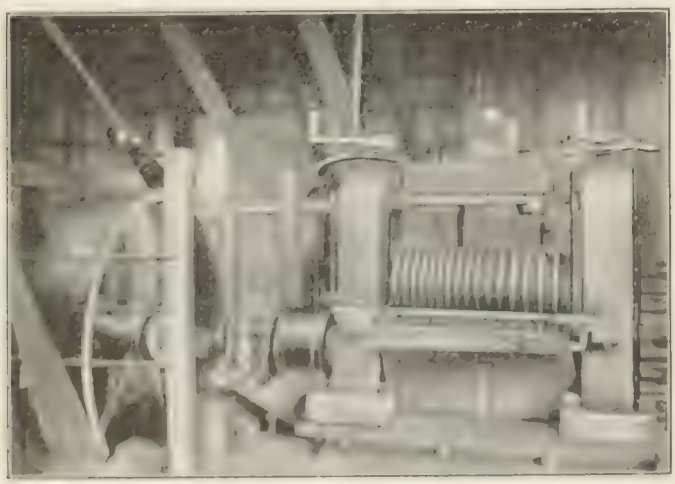


Fig. 3—A Small 2 High Hand Round Rolling Mill.

skins and pigment. The desired shade is matched and a first class paint is obtained at a fraction of the regular price. An average of 450 gals. per month is thus made at a cost of: labor,

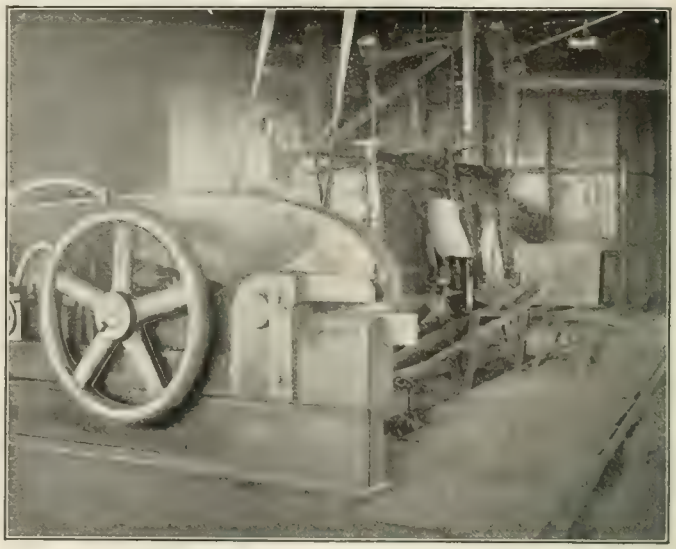


Fig. 4—Oil Furnace and Shears Used With Rolling Mill.

$14.50; material, $168; or a total cost of $40.55 per 100 gals. This is much superior to a paint costing 80 cents per gal. The saving is therefore 39½ cents per gal., or $177.75 per month.

Fig. 5—Hood Under Which Paint Skins and Slops are Boiled.

Fig. 5 illustrates the construction of the hood in which the boiling kettle is placed.

The Lagos Government Railway, Nigeria, is now being extended from Jebba to Zungeru, a distance of 123 miles, and from Zungeru it has been continued for about 37 miles by the Northern Nigeria Government to Minna, where a junction with the Baro-Kano line has been effected. The latter portion of this extension is completed, and it is expected that the first part from Jebba to Zungeru, will be finished by the end of this year. In this section the line has to cross the river Kaduna, and for this purpose a large bridge has been constructed.

General News Section.

The Panama Railroad is to build at Colon Beach a hotel to cost $500,000.

The Illinois Central has ordered the discontinuance of the use of green flags as tail-end markers on passenger trains.

In the shops of the Missouri, Kansas & Texas at Sedalia, Mo., employing 700 men, the work day has been reduced from ten hours to nine.

The Canadian Pacific Railway has made an increase of eight per cent. in the pay of 15,000 mechanics employed in Western Canada.

The legislature of Connecticut has acted favorably on a bill making $10,000 instead of $5,000 the limit of damages recoverable for death due to negligence.

Suit has been brought against the New York, New Haven & Hartford in the Federal court at New Haven, for violation of the 28-hour law in the transportation of cattle.

Governor Colquitt of Texas has sent a special message to the legislature, recommending the enactment of a law making more liberal the statutes authorizing railway companies to issue bonds.

The Wells-Fargo Express is to move its accounting department from New York to Chicago, and about 200 employees will have to change their residences. It is said that the company will pay the employees' moving expenses.

The strike at the Baldwin Locomotive Works, Philadelphia, which was begun on June 8, has been abandoned. The newspapers say that 12,000 men struck and that about 10,000 of them had returned to work before this order was given.

The educational bureau of the Illinois Central had received 3,745 applications from employees of the road for membership up to July 31. The number of applications received up to July 8 was 394, the establishment of the bureau having been announced in June.

The tax assessment of second class railway property in the state of New Jersey this year is based on a valuation of $99,978,394, which is $26,393,936 greater than last year. The larger valuation is that made by Special Commissioner Charles Hansel, as revised by the state board of assessors.

The telephone is now used exclusively on the main line of the Pennsylvania Railroad between Philadelphia and Altoona for all wire communications, except messages passing from one division point to another or farther. Between Philadelphia and Harrisburg even the time signals are sent by telephone.

The shops of the Seaboard Air Line at Savannah, Ga., were destroyed by fire on the night of August 18; loss $100,000. The fire started in the blacksmith's shop and spread throughout the machine shops and roundhouses, though the locomotives in the roundhouse were saved. Four hundred men were thrown out of employment.

The Merchants' Protective Association of Lewistown, Pa., has complained to the Pennsylvania that the annual passes which the company gives to its old employees have damaged business, as these employees take advantage of bargain sales in the larger cities. Some of the employees say that if the merchants do not withdraw their complaint, a community store will be opened.

The Pennsylvania railway has notified connections that henceforth it will refuse box cars designed to carry 20 tons or less, except ventilated cars from the south carrying perishable freight. Light cars are now an element of danger in many trains, because of the great preponderance of heavy cars. When its own cars are taken out of service, because of low capacity, the Pennsylvania destroys the bodies by burning them, for it has found that, when sold to other roads, they frequently reappear on the Pennsylvania.

In its investigation into the express rate and service situation in Indiana the railway commission of that state has prepared a list of 37 questions for the companies to answer, with the view of getting complete information. Numerous inquiries are made regarding earnings, ownership and agreements of all kinds. The commission also wishes to know the number of men employed, how many are employed in offices, and how many outside; the amount of pay received by express agents; the number of men employed as division superintendents, route agents, messengers, transfer men, clerks, drivers, helpers and stablemen. A complete list of the points in Indiana where express collections and deliveries are made is asked, with information as to how a delivery limit is established. The total mileage in Indiana and the roads over which this is operated furnish the basis for other questions.

Around the World in Forty Days.

Andre Jager-Schmidt, representing a Paris newspaper, arrived in that city on August 26, after having traveled around the world in about 4 hours less than forty days. Mr. Jager-Schmidt left Paris July 17, at 1:45 p. m., and traveled by way of Moscow Vladivostock, Yokohama, Vancouver, Montreal, New York and Cherbourg. The best previous record around the world is said to be 63 days. Mr. Jager-Schmidt traveled about 19,500 miles, or an average of 487½ miles a day. From Cherbourg to Paris he used an automobile.

Retrenchment on the New Haven.

President Mellen, of the New York, New Haven & Hartford, has issued a statement in which he says: "Business is of such a character at the present time and the outlook for the future is such as to require the strictest economy in the handling of the railway. Every one will be laid off that can be. Nothing will be started, and only such work will be continued as will cost more to leave uncompleted than to finish." The road has laid off about thirty enginemen since the middle of August. The following improvements will not be delayed: the proposed railway across Hell Gate to connect with the Long Island and the Pennsylvania, and the New York, Westchester & Boston, money for which has already been provided. The following will be considerably delayed: the Westchester Northern, from White Plains to Danbury; further electrification east of Stamford; construction of a station at New Haven; electrification in and near Boston, and other minor improvements. The comprehensive projects for improving the Boston & Maine and the Maine Central are held in abeyance, and the same may be said of the station-connecting tunnel project at Boston, and of the Springfield station and river-front projects.

St. Louis to New York in a Flying Machine.

Harry N. Atwood, flying in a Burgess-Wright aeroplane, arrived in New York City August 25, in 11 days, 6 hours, 30 minutes from St. Louis, Mo., having flown in the same machine all the way. The journey was made by way of Chicago, Elkhart, Toledo, Cleveland and Buffalo, thence following pretty closely the line of the New York Central. Stops were made over night and some delays were necessary to repair the aeroplane; and the time actually used in flying 1,369 miles is reported as 28 hours, 27 minutes, or at an average rate of nearly 48 miles an hour. The journey, by days, is given as follows, but there were eight other stops not mentioned in this record:

	Arrived.	Departed.	Distance, Miles.
St. Louis		August 14, 8:05 a. m.	...
Chicago	August 14, 6:19 p. m.	August 15, 3:31 p. m.	286
Elkhart	August 15, 5:47 p. m.	August 16, 8:06 a. m.	101
Toledo	August 16, 3:57 p. m.	August 17, 10:29 a. m.	133
Cleveland	August 17, 4:41 p. m.	August 18, 4:50 p. m.	123
Swanville, Pa.	August 18, 7:10 p. m.	August 19, 11:54 a. m.	84
Buffalo	August 19, 7:02 p. m.	August 20, 3:20 p. m.	99
Lyons, N. Y.	August 20, 5:31 p. m.	August 21, 4:24 p. m.	104
Belle Isle	August 21, 7:17 p. m.	August 22, 4:55 p. m.	40
Fort Plain	August 22, 7:05 p. m.	August 23, 7:15 a. m.	95
Castleton	August 23, 9:20 a. m.	August 24, 7:40 a. m.	67
Nyack	August 24, 11:30 a. m.	August 25, 1:53 p. m.	109
New York	August 25, 2:35 p. m.	...	28

The distance from St. Louis by way of Chicago, Buffalo and Albany to New York is calculated at 1,265 miles; to which should be added about 4 miles from the railway station at Forty-second street, to Governor's island, where Atwood landed; but Mr. Atwood estimates that, including a few detours, he tra-

veled 1,369 miles. For this flight, which is 101 miles longer than any similar previous feat, Mr. Atwood received a prize of $10,000, paid by Victor J. Evans, a patent lawyer of Washington. His expenses on the trip are said to have been over $5,000. His manager and helpers traveled by railway and automobile.

Missouri Pacific Improvements.

B. F. Bush, president of the Missouri Pacific, says that for the second and third weeks of August the local business of the road was the heaviest in its history for any like period. Although traffic was heavy, the business was handled without congestion, as the track and equipment have been considerably improved in the past few months. When Mr. Bush took charge of the road about 30 per cent. of the locomotives were in bad order. Now 4,500 of these cars have been put in standard condition, and the percentage of engines needing repairs has been reduced to 13. Since May 1, 3,600,000 new ties have also been laid, making total replacements since January 1, 4,500,000. About 380 miles of track is being laid with new 85-lb. rails, and 500 miles of line is being ballasted.

Demands of Shop Employees on Western Roads.

The demands of railway shop men employed on the Harriman Lines and various other western roads for recognition by the roads of the recently organized federation of all railway shop employees continue to be the cause of conferences between officers of the roads and representatives of the employees. A conference was held in Chicago on August 24 between J. Kruttschnitt, director of maintenance and operation of the Harriman Lines, and J. W. Kline, president of the International Brotherhood of Blacksmiths. Mr. Kruttschnitt left Chicago for San Francisco after the conference, having stated to Mr. Kline that he would be willing to confer with a delegation of union officers. On August 26 Mr. Kline made an appeal to Robert S. Lovett, president of the Harriman Lines, to grant a conference to representatives of the unions in order that peace might be established. Mr. Lovett replied that he did not care to interfere, and that he approved the stand taken by Mr. Kruttschnitt in refusing to treat with the federation of mechanical trades. Mr. Kline then wired to Mr. Kruttschnitt asking where he would meet officials of the brotherhoods, and also sent messages to the heads of the other unions urging them to keep the workers from quitting their posts until a final effort toward adjusting the controversy could be made. Mr. Kruttschnitt, who continued on his way to San Francisco, referring to the demands of the shop men, declared that acquiescence in them would mean chaos and inability of the roads to meet the public's requirements. He made public the following analysis of the employees' demands:

"These are the reasons why we decline to surrender to an irresponsible committee of federated employees, representing a very small portion of the public, trusts confided to us by the entire public and why we will not concede to such a committee the right to dictate whether we shall or shall not fulfill for twenty millions of people in seventeen states the duties clearly prescribed by law.

"The employees' demands are substantially as follows:

"First—Recognition of the shop employees' federation. Heretofore issues arising with a machinist, boilermaker, blacksmith, or sheet metal worker were taken up with his associates of that craft. When not successfully adjusted, strikes of that craft have followed, but they were not serious enough to prevent the roads performing the public services for which they were created. Under the change proposed an issue of a small system road in Louisiana might tie up all shop work throughout the system by requiring members to strike in California, Oregon, Washington, or Nebraska.

"Second—All present or future employees will join the federated association within thirty days. This means the discharge of all employees who will not join, or an absolutely closed shop.

"Third—That the company agree that the final settlement of differences shall rest with a federated committee representing all the crafts. This would place the employees of all crafts [illegible] would by one craft and would encourage [illegible] which is likely to be made by individual crafts.

"Fourth—The restriction of the number of apprentices. This would deny to American boys the opportunity to learn trades.

"Fifth—[illegible] of 7 cents an hour for all mechanics, [illegible] and helpers, an average for the entire shop forces of 23 per cent.; and a reduction of hours and other demands averaging 13 per cent. additional [or 36 per cent. in all]. The Southern Pacific is now paying higher wages than any other railway in the United States, and has increased the pay of all shop crafts 12½ per cent. in the last five years.

"Sixth—The abolishing of piece premium, or bonus systems, shop foremanship to be filled by promotion from federation employees. This is in direct conflict with the public, recently expressed, that increased expense of carriers should be met with increased efficiency of operation and not by increase of freight rates.

"Seventh—That no form of physical examination or personal record shall be required. This denies to the company the right of every citizen to require of persons offering service evidences of competency, good character and health, and deprives the companies of all protection under the fellow servant laws of many states.

"Eighth—That if forces are reduced, employees are to indicate who should be laid off. This would embarrass the company in efforts to increase efficiency by ridding the service of inefficient employees.

"Ninth—That no employee belonging to the federation be discharged without consent from the employees committee. This would require the company involved to meet a committee representing all its craftsmen, which committee would owe allegiance to a general committee composed of allied crafts, men of the Harriman system."

It is announced that shop men employed by the Chicago & Northwestern have given notice to the management that a raise in pay will be demanded next month, when the present agreement expires.

A step which seemed to indicate that a peaceful settlement of affairs on the Illinois Central is probable was made when the executive board of the federated shop employees on that road decided to leave the strike question in the hands of the presidents of the various unions.

The demands above summarized by Mr. Kruttschnitt were printed in full in the *Railway Age Gazette* in its issue of August 25.

Mails by Freight Train.

The post office department announces that the transportation of second class mail matter (monthly magazines) by freight trains will be begun September 1. This means of economizing in the cost of transportation of the enormous quantities of monthly magazines sent out from New York City was proposed several months ago, and was to have been introduced on July 1, but was postponed until September 1 in order to begin the new arrangement coincidently with a new basis of payment, as calculated on a new weighing of the mails. On the roads where freight trains are to be used all mails will be weighed for the next three months. The magazines will be carried as usual in the mail trains to Buffalo and Pittsburgh, and thence on the fastest regular freight trains to Cincinnati, Chicago, St. Louis, Kansas City, Omaha and St. Paul. Mails going beyond those cities will there resume their places in the regular passenger-train mail-cars.

The publishers are to be permitted to print on the wrapper of each copy or bundle of their publications as a part of the address instructions as to the date on which delivery is to be made. In accordance with this arrangement, postmasters have been directed to carry out the instructions with respect to the delivery of fast freight mail. Publishers have assured the postmaster-general that they will be satisfied with the arrangements.

Twenty-Nine Passengers Killed at Manchester, N. Y.

In the derailment of eastbound passenger train No. 4, of the Lehigh Valley, at Manchester, N. Y., on the 25th, 29 persons were killed, all said to be passengers, and 70 or more were injured. The train is said to have been running at about 25 miles an hour, the speed being limited by rule at this point, which is in or near a yard. The train consisted of two engines, two baggage cars, one parlor car, one dining car, and 10 coaches. The derailment was due to the breaking of a rail, weighing 90 lbs. per yard. The engine and the first five cars passed over in safety, but the next two cars ran off the track, and after running about 200 ft., came to a deck girder bridge over a stream,

and both fell off at the right hand side of the bridge, one being broken in two and crushed, and the other lodging nearly in a perpendicular position, with one end resting against the side of the bridge. Nearly all of the persons fatally injured were in these two cars, and the majority in the first one, which was forced with great momentum against the east abutment of the bridge. The stream, about 40 ft. below the track, was shallow, and no persons were drowned.

An officer of the road gave out the following statement:

"The wreck was caused by a broken rail. The composition of the rail was according to the specifications of the company's experts, both chemists and engineers; and the rail was inspected with the usual care in process of manufacture and was subjected to the usual severe physical test after it was made. The rail was of the unusually high class for which a premium is paid.

"The defect consisted of a 'pipe'—an air hole—in the center of the web of the rail, extending for about 14 in. The defect was such that it could not be detected by inspection. There were also hard spots about 1½ in. in diameter in the ball of the rail in two different sections. The rail was made [at Bethlehem] in December, 1909."

The inspector of the New York State Public Service Commission reported that the rail broke into 17 pieces; and that no defects were found in cars or engines.

The report of a hearing by the coroner at Rochester August 29 says that Robert Job, chemist, put on the stand by the railway, believed that the "pipe" in the web of the rail was not what caused the breaking of the steel, but that it was caused by a flaw in the ball of the rail above the web.

George L. Moore, engineer of maintenance of way, said that usually a pipe in a rail causes the development of a flat spot on the tread, but that in this case no such spot appeared. He showed records from which it appeared that this rail was one of a very expensive lot. The broken rail was open hearth, 20 per cent. cut.

Cost of Public Ownership.

A review of government ownership of the telegraph in Great Britain was recently published in the London *Spectator*. The investigation of the English newspaper shows that public ownership of the telegraph lines has been a costly financial failure. It says:

Forty-five years ago, in 1866, the proposal for the purchase by the government of the British telegraph lines was first advanced, and an allegedly conservative estimate set the cost at $11,500,000. It took nearly three years to complete the negotiations, and in 1869 Parliament appropriated $35,000,000 for making the purchase—nearly three times the original estimate; but in addition to that the government was called upon to pay the railway companies for their freehold interest in the telegraph equipment running along their lines, the right of way having been only leased by the telegraph companies; that meant another $20,000,000—so the acquisition of the business stood the British government $55,000,000. It was still predicted that within twenty years the net revenues would materially reduce the tax rates on the properties of the people. The disillusionment came quickly. For the first two years of government operation there was a small net revenue, but after that the returns could not be made to meet the interest on the capital investment, and for thirty-nine years this enormous interest has been paid out of the exchequer—the pockets of the people. Then telegraph rates were reduced under the popular cry that reduced rates would increase the business and that increase would produce profits—but just the reverse was the result. The cost of maintenance and operation increased enormously under government ownership; and, the revenues falling far below this and the upkeep and necessary improvements constantly calling for more money, the drain on the exchequer became increasingly heavy.

When all these facts are taken into account—namely, the original capital which has never been repaid, the advances from Parliament upon which no interest is charged, and the annual deficiencies on working expenses—it will be found that the aggregate commercial loss to the country by the state purchase of the telegraphs is not less than $175,000,000. Nor can we console ourselves with the reflection that for this $175,000,000 the state has a valuable asset, for that asset, such as it is, involves every year on its working an additional loss of over $5,000,000. From a commercial point of view the purchase has been an unmitigated failure. To reply, as the advocates of state action invariably do, that the public has received compensation in the shape of a more efficient and a cheaper service, is plausible but unconvincing. For even if we make the large assumption that the service is better and cheaper than it would have been if it had remained in private hands, we are entitled to ask by what right the taxpayer is deprived of his money in order to subsidize persons who send telegraphic messages? The latter are a minority of the population; they are mostly well-to-do, and they are principally represented by two classes—purely commercial men, who look upon telegraphing as a business expenditure; and the racing fraternity, who certainly have no special claim to the charity of the taxpayer.

The working cost per one thousand words telegraphed in Great Britain today is actually more than it was thirty years ago. The fatal incapacity of the British government to conduct a business enterprise has here been demonstrated beyond all question or cavil. It is to an experience like this that thousands of well-meaning reformers are seriously inviting the people of the United States today. Is it to be wondered at that conservative and far-sighted business men have little patience with these theorists?

Traveling Engineers' Association.

The program of the annual meeting of the Traveling Engineers' Association, which was held at the Hotel Sherman, Chicago, August 29-September 1, was given in the *Railway Age Gazette* of August 25. This announcement did not give the title of the opening address by Robert Quayle, general superintendent of motive power of the Chicago & North Western; he spoke on The Duties of the Traveling Engineer. The secretary's report showed that there are now 812 members of the association. The treasurer's report showed a balance of $1,328. The attendance was large. A full report of the meeting will be given in our next issue.

Two large rooms adjoining the convention hall, with a total of nearly 8,000 sq. ft. of space, were completely occupied by the exhibits. Sixty companies showed their wares to the railway men, and it was significant as showing the good work of the executive committee that on Tuesday morning when the convention was declared open the exhibits were all in place and the representatives present. The exhibit halls were tastefully decorated in yellow and presented a most attractive appearance.

Among the exhibitors were the following:

Adreon Manufacturing Company, St. Louis, Mo. Campbell graphite lubricating system, American gravity tank hose couplings, D. & L. throttle rod stuffing box and plunger, plaster packing, Security bell ringer, Hanlon locomotive sander, Security back-up valve. Represented by Wm. Miller.

American Arch Company, New York. Security sectional brick arch for locomotives, latest designs. Represented by Le Grand Parrish, C. B. Moore, J. L. Nicholson, J. P. Neff, M. C. Beymer, F. C. Boomer, Chas. A. Coons, L. S. Allen, Charles Pfeffer and Charles Miller.

American Locomotive Company, New York. Photographs of C. & O. Mallet locomotives, B. & O. pusher Mallet locomotive, C. & O. Mountain type passenger locomotive, N. Y. C. new K 3 Pacific type locomotive, C. & A. Mikado type freight locomotive; all of these are equipped with fire tube; superheater and brick arch, rotary snow shovel. Represented by W. P. Steele, Mr. Griffiths and H. K. Trask.

American Steel Foundries, Chicago. Large picture showing one step in manufacture of Davis cast steel wheel, models of Simplex coupler, model complete truck with Andrews side frame Davis wheel and Simplex bolsters, model Hercules brake beam. Represented by W. G. Wallace and J. D. Taylor.

Boss Nut Company, Chicago. Complete line of samples of Boss nuts, showing applications for various kinds of service; literature, etc. Represented by B. M. Osbun, J. A. MacLean and J. T. Benedict.

Bowser & Co., S. F., Fort Wayne, Ind. Oil handling and storage outfits; descriptive literature. Represented by W. C. Simpson.

Buck, W. F., Chicago. Device and chart demonstrating the effect of different grades on water level in locomotive boilers. Represented by George Austin.

Chicago Car Heating Company, Chicago. Engine equipment for steam heating passenger cars, locomotive stop valve, locomotive pressure reducing valve, locomotive steam gages, hose coupler with positive lock. Represented by E. A. Schrieber, E. E. Smith and C. B. Benson.

Commercial Acetylene Company, New York. Acetylene headlights and equipment. Represented by L. F. Durand.

Crane Company, The, Chicago. Locomotive safety valves, locomotive blow-off and ash pan valves, complete line of locomotive regrinding cab valves, extra heavy valves for locomotive and power plant service; also full line of railway unions, and union ells and tees for air brake equipment. Represented by F. D. Fenn and G. S. Turner.

Dearborn Drug & Chemical Works, Chicago. Water treatment for locomotives and stationary engines. Represented by Robert F. Carr, J. D. Purcell, J. H. Bowen, W. S. Reid, A. W. Cooley, J. F. Roddy, C. H.

Everett, I. H. Case, C. Murry, A. W. Crouch, F. C. Fosdick, Paul T. Payne and Otto Fluegel.

Detroit Lubricator Company, Detroit, Mich. Full line locomotive lubricators illustrating the oil control valve transfer system of filling lubricator No. 42, lubricator working under atmospheric hydrostatic pressure. Represented by W. D. Howard.

Dickerson Manufacturing & Supply Company, Clinton, Ill. Two improved safety water gages for steam boilers. Represented by C. L. Dickerson and R. R. Porterfield.

Elgin Watch Company, Chicago. Elgin railway watches. Represented by [illegible] Wylie.

Emery Pneumatic Lubricator Company, St. Louis, Mo. Brake cylinder lubricant; automatic lubricator for air brake equipment. Represented by N. J. McAloney.

Franklin Railway Supply Company, Franklin, Pa. Franklin pneumatic fire-door, vertically and horizontally opening types, grate shaker, McLaughlin flexible conduit, Franklin driving box lubricator, Franklin flexible metallic roof. Represented by W. L. Allison, R. G. Coburn, W. H. Coyle and Joseph Sinkler.

Galena Signal Oil Company, Franklin, Pa. Apparatus to show behavior of valves and cylinder oils in saturated and superheated steam at various temperatures in actual practice. Represented by P. H. Stack, W. Brumble, J. Graham, C. B. Royal, W. W. Lemon, L. H. Palmer, J. Eubank, M. M. Meham, L. Gleason, Robert McVicker, Edward McVicker, J. S. Brown, J. Linthen, W. J. Vance, J. Ferguson, J. A. Roosevelt, E. W. Hayes, J. A. Haher, R. E. Webb, George Barnes, Dr. P. H. Conradson, B. P. Corey, William Walsh and William Holmes.

Garlock Packing Company, Palmyra, N. Y. Complete line of the company's products, showing throttle valve and air pump packing; ring, spiral and coil packings for stationary power engines and for general use; sheet packing; special gaskets. Represented by J. P. Landreth, M. E. Hamilton and Phil Arnold.

Green-Tweed Company, New York. Palmetto and Manhattan packings, favorite reversible ratchet wrench and throttle packing. Represented by F. E. Ransley.

Hammett, G. H., Troy, N. Y. Showing Trojan metallic packing, Trojan bell ringers, triple valve bushing. Represented by E. C. Sawyer.

Hobart-Allfree Company, Chicago. Photographs and literature showing the Allfree locomotive valve gear. Represented by E. H. Allfree and W. H. England.

Hunt-Spiller Manufacturing Corporation, Boston, Mass. Gun iron for locomotive castings, cylinder packing and valve packing for saturated and superheated engines, rod bushings, cross-head shoes, eccentric and straps, air pump bushing and knuckle joint bushing. Represented by [illegible] W. Fillet.

Interlocking Nut and Bolt Company, Pittsburgh, Pa. Samples of bolts for track, locomotives, cars, automobiles and block signals. Represented by [illegible].

Jacobs-Shupert Firebox Company, New York. Working model one-tenth size of Jacobs-Shupert sectional firebox, also ruptured segment removed from Santa Fe engine, type 3000, which went through case of low water, proving firebox could not be blown up; cross section full size of firebox. Represented by A. W. Whiteford.

Jenkins Bros., New York. J. B. Globe angle and check valves, special features of standard and extra heavy valves, Overland sheet packing, medium and extra heavy gate valves. Represented by B. J. Neeley.

Johns-Mansville Company, H. W., New York. Samples of packing and J.-M. air brake cylinder packing expanding ring. Represented by [illegible].

Leslie Company, The, Lyndhurst, N. J. Leslie steam heat regulator, Leslie electric headlight pressure regulator. Represented by S. Inglis Leslie and J. J. Cizek.

Liberty Manufacturing Company, Pittsburgh, Pa. Twin strainer for suction water lines, tube cleaners for stationary boilers and locomotive arch tubes, combined tube cutters and expanders. Represented by W. M. [illegible].

Locomotive Improvement Company, Clinton, Iowa. Markels removable driving box brass, lateral motion plates, flangeless shoes and wedges, [illegible]. Represented by J. W. Barker.

Locomotive Superheater Company, New York. Type A top header superheater. Represented by Geo. L. Bourne, W. G. Lawse, W. A. Buckbee, H. E. Culley and S. H. Stone.

McCord & Company, Chicago. Three-feed force-feed lubricator in operation, one-feed pumping against more than 1,000 lbs. pressure, one-feed [illegible] showing how, showing process of actually lifting box off journal and making it run in oil. Represented by R. L. McIntosh and W. J. Schlacks.

[illegible] Manufacturing Company, New York. Injectors, pop valves, steam gages, Hancock oil cups, boiler check valves, automatic cylinder cocks, [illegible]. Represented by Joseph H. Buch and C. L. [illegible].

[illegible] Manufacturing Company, Chicago. Photographs of rail[illegible] literature and catalogs. Represented by C. W. [illegible].

[illegible] Regulating valves. Represented by [illegible].

[illegible] Chicago. Andrews draft gear, full size [illegible]. Represented by D. D. W[illegible].

[illegible] Company, Chicago. Electric headlight in operation. [illegible]. Represented by H. L. [illegible].

[illegible] Company, New York. Injectors, [illegible] pop valves, [illegible] water gages, [illegible] Hancock oil cups, boiler check valves, automatic cylinder cocks, [illegible]. Represented by Joseph H. Buch and C. L. [illegible].

[illegible] Company, Chicago. Photographs of the various [illegible] and a description [illegible]. Represented [illegible].

[illegible] Company, Chicago. Pyrometer for [illegible]. Represented by E. E. Pratt, L. W. [illegible].

[illegible] Company, Chicago. Graphite [illegible]. Represented by

AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W., Chicago; Oct. 17-19, 1911, St. Louis, Mo.
AMERICAN RAILWAY ENGINEERING ASSOCIATION.—E. H. Fritch, Monadnock Block, Chicago; annual convention, March 19-21, 1912, Chicago.
AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago.
AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—O. T. Harroun, Bloomington, Ill.
AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.
AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.
AMERICAN SOCIETY OF ENGINEERING CONTRACTORS.—D. J. Haner, 13 Park Row, New York; 3d Tuesday of each month, New York.
AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York.
ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.
ASSOCIATION OF RAILWAY CLAIM AGENTS.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 22, 1912, Los Angeles, Cal.
ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago; annual, November 6-10, Chicago.
ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.
ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 75 Church St., New York; December 12-13, Louisville, Ky.
CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk Ry., Montreal, Que.; 1st Tuesday in month, except June, July and Aug., Montreal.
CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLead, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.
CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.
CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.
CIVIL ENGINEERS' SOCIETY OF ST. PAUL.—D. F. Jurgensen, 116 Winter St., St. Paul, Minn.; 2d Monday, except June, July and Aug., St. Paul.
ENGINEERS' SOCIETY OF PENNSYLVANIA.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.
ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.
FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Richmond, Va.; annual Buffalo, N. Y.
GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.
INTERNATIONAL RAILWAY CONGRESS.—Executive Committee, rue de Louvain, 11 Brussels; 1915, Berlin.
INTERNATIONAL RAILWAY FUEL ASSOCIATION.—D. B. Sebastian, La Salle St. Station, Chicago.
INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—L. H. Bryan, D. & I. R. Ry., Two Harbors, Minn.
INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, Lima, Ohio.
IOWA RAILWAY CLUB.—W. B. Harrison, Union Station, Des Moines, Ia.; 2d Friday in month, except July and August, Des Moines.
MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York.
MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago.
MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOCIATION, OF UNITED STATES AND CANADA.—A. P. Dane, B. & M., Reading, Mass.; Sept. 12-15, 1911, Atlantic City, N. J.
NEW ENGLAND RAILROAD CLUB.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.
NEW YORK RAILROAD CLUB.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.
NORTHERN RAILWAY CLUB.—C. L. Kennedy, C., M. & St. P., Duluth, Minn; 4th Saturday, Duluth.
OMAHA RAILWAY CLUB.—H. H. Maulick, Barker Block, Omaha, Neb.; second Wednesday.
RAILROAD CLUB OF KANSAS CITY.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.
RAILWAY CLUB OF PITTSBURGH.—C. W. Alleman, P. & L. E., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.
RAILWAY INDUSTRIAL ASSOCIATION.—G. L. Stewart, St. L. S. W. Ry., St. Louis, Mo.; annual, May 12, 1912, Kansas City, Mo.
RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Bethlehem, Pa.; annual, Oct. 10, Colorado Springs, Colo.
RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, Box C, Collinwood, Ohio.
RICHMOND RAILROAD CLUB.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.
ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—Walter E. Emery, P. & P. U Ry., Peoria, Ill.; September 12-15, St. Louis, Mo.
ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.
SOCIETY OF RAILWAY FINANCIAL OFFICERS.—C. Nyquist, La Salle St. Station, Chicago; Sept. 12-14, St. Paul, Minn.
SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.; annual, October 20, Atlanta, Ga.
SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.
TOLEDO TRANSPORTATION CLUB.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.
TRAFFIC CLUB OF CHICAGO.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.
TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.
TRAFFIC CLUB OF PITTSBURGH.—T. J. Walters, Oliver building, Pittsburgh, Pa.; meetings monthly, Pittsburgh.
TRAIN DESPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.
TRANSPORTATION CLUB OF BUFFALO.—J. M. Sells, Buffalo; first Saturday after first Wednesday.
TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.
TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.
WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.
WESTERN RAILWAY CLUB.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.
WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Wednesday in month except July and August, Chicago.
WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, First National Bank bldg., Chicago; annual, January 16-18, Chicago.

Traffic News.

At New Orleans, according to the *Picayune*, there is actually a serious shortage of freight cars.

The Southern Pacific now runs steamers twice each way daily between San Francisco, Cal., and Sacramento, on the Sacramento river.

The Long Island Railroad announces its fall time-table to go into effect September 8, but also announces that the fast summer trains from New York to the more important seashore resorts will be kept running until the middle of October.

It is expected that by September 6 the Illinois Railway Commission will have reached a decision in the express rate case, and that it will issue an order making reductions of from 20 to 25 per cent. in the express companies' charges in that state.

The Southern Railway, which is running a "Road improvement train" in Georgia, has announced a schedule by which the train will keep up its travel until the end of October, visiting all important sections of the southern part of the state. A few days will be spent in the northern part of Florida.

Announcement has been made by the San Pedro, Los Angeles & Salt Lake and the Southern Pacific that on all transcontinental freight to points between the Los Angeles and San Pedro terminals of these lines, they will make terminal rates, that is, the same rates as they now make on transcontinental freight to Los Angeles and San Pedro.

The Pennsylvania has announced reductions in season tickets from points in New Jersey to New York City, in compliance with the recent order of the Interstate Commerce Commission. None of the changes apply to the Pennsylvania station in Manhattan, but only to the downtown or ferry terminals. Between Newark and New York, 9 miles, monthly tickets are reduced from $6 to $5.65. From New Brunswick the rate is reduced from $12 to $10. It is expected that in accordance with the terms of the order of the commission, the Erie, the Lackawanna and the New York Central (West Shore) will soon have to make similar reductions.

The industrial department of the Terminal Railroad Association of St. Louis has sent out a booklet for general distribution, calling attention to the advantages offered by St. Louis, in the way of cheap fuel and railway facilities, to those seeking desirable factory sites. As an index of the growth of the city during the ten years from 1900 to 1910, it is noted that bank clearings increased from $1,688,849,494 to $3,727,949,379; that the total inbound and outbound freight increased from 25,313,330 tons to 51,918,100 tons, and that, according to government reports, the value of the city's factory products increased from $193,733,000 to $327,676,000.

The Atchison, Topeka & Santa Fe announces that on December 1 it will put on a new fast, "extra-fare" train, the "Santa Fe-de-Luxe," to run between Chicago and Los Angeles, Cal. The extra fare on this train, which will be run once a week during the winter between Chicago and Los Angeles, via Kansas City and Albuquerque, will be $25, and it will be the first "extra fare" train to be run to California. Westbound it will leave Chicago at 8 p. m., Kansas City at 8 o'clock the following morning and arrive at Los Angeles at 9 a. m. of the third morning. Eastbound it will leave Los Angeles at 6 p. m., arrive in Kansas City at 11 p. m. of the second day and reach Chicago at 11 a. m. the third morning. It will make the trip to Los Angeles from Chicago in 63 hours, and from Kansas City in 51 hours. This will reduce by 5 hours and 30 minutes the fastest present schedule from Chicago to Los Angeles, and by 7 hours and 45 minutes, the fastest schedule from Los Angeles to Chicago. The new train will have compartment, drawing-room and observation sleeping cars, a club car and a dining car, all new cars, and will carry a barber, a ladies' maid and stenographer. The cars are all steel underframe with wood interior. Bathing facilities will be provided, and market reports and daily bulletins of important events will be telegraphed to the train en route. New cars will also be built for the "California Limited," which will continue on its present schedule.

Cotton Bills of Lading Bureau.

The Liverpool Cotton Merchants' Committee, following discussions and negotiations extending over many months, has established a bureau in New York City to receive and record bills of lading for cotton shipped to Europe. The office of the bureau will be at 51 Wall street, and the manager will be Charles E. Mather, an insurance agent. The office begins operations September 1. This bureau is established for the purpose of guarding against fraud in the issuance of bills of lading and to reassure English consignees who suffered severe losses last year by the issuance of bills of lading when no cotton was shipped. It is said that the principal railways of the Southern States have agreed to send copies of bills of lading to the Bureau and to co-operate with it. There was some objection, on the ground that shippers' rights would be infringed, but the objections seem to have been overcome.

The railways have promulgated strict regulations for the guidance of agents in the making of bills of lading. Every such bill must have the autograph signature of the agent. Copies must be marked "Copy—not negotiable." One copy is to be sent to the steamship agent and one to the bureau in New York. The original bill of lading must be filled out with pen and ink and must be free from additions, erasures or changes. On every bill of lading there will be pasted a certificate from some officer of the railway company that the signature of the station agent is genuine. These certificates are to be numbered and guarded the same as tickets or other valuable papers.

The New York *Journal of Commerce* finds large numbers of banks in New York City which intend to ignore the bureau, some of these being banks which are represented on the committee of the American Bankers' Association, which approved the plan.

Car Surpluses and Shortages.

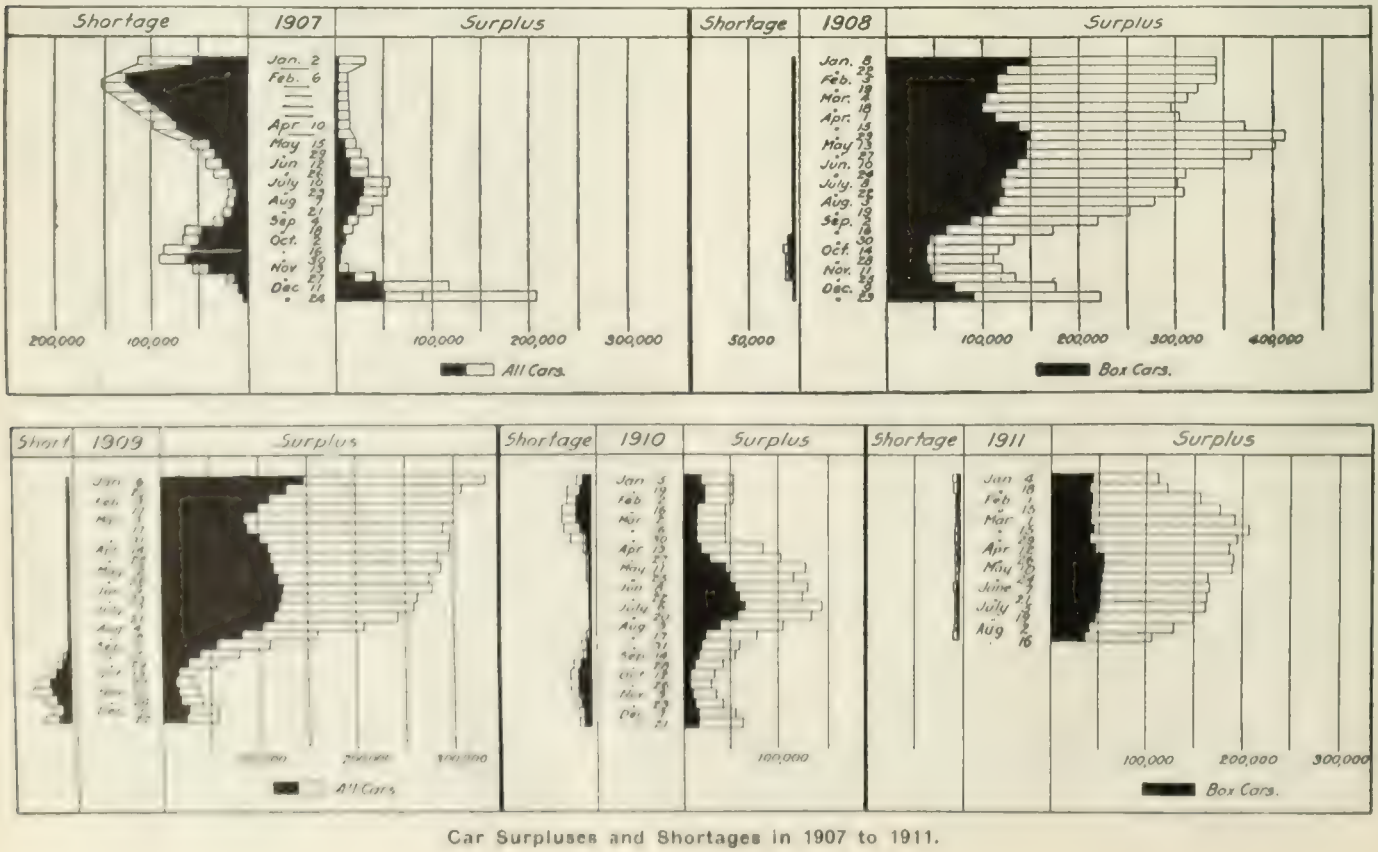
Arthur Hale, chairman of the committee on relations between railways of the American Railway Association, in presenting statistical bulletin No. 101-A, giving a summary of shortages and surpluses by groups from April 27, 1910, to August 16, 1911, says:

"There is a decrease in the surplus of all classes, the total decrease being 22,136 cars, bringing the total surplus down to 108,000, the lowest figure since the report for December 21, 1910. The decrease is principally in coal cars in Group 3 (middle), although box cars show a reduction of 5,692, principally in Group 3 (middle), and Group 8 (middle western),

Car Surpluses and Shortages.

Date.	No. of roads.	Surpluses					Shortages				
		Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.	Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.
Group *1.—August 16, 1911	7	1,323	607	1,882	308	4,120	0	146	307	0	453
" 2.— " 16, 1911	25	2,499	53	3,818	3,096	9,466	15	13	826	0	854
" 3.— " 16, 1911	26	2,837	375	17,597	3,862	24,671	67	1	0	26	94
" 4.— " 16, 1911	10	1,258	137	521	1,291	3,207	65	13	300	60	438
" 5.— " 16, 1911	19	3,047	297	2,494	1,756	7,594	90	22	421	0	533
" 6.— " 16, 1911	24	13,302	767	2,689	6,556	23,314	15	0	2	8	25
" 7.— " 16, 1911	3	1,237	61	727	698	2,723	0	0	0	0	0
" 8.— " 16, 1911	17	4,309	817	1,992	4,005	11,123	0	0	0	0	0
" 9.— " 16, 1911	11	1,356	145	288	517	2,306	0	0	0	0	0
" 10.— " 16, 1911	19	5,809	787	2,164	9,628	18,388	74	0	10	0	84
" 11.— " 16, 1911	5	935	115	18	20	1,088	993	222	0	134	1,349
Total	166	37,912	4,161	34,190	31,737	108,000	1,319	417	1,866	228	3,830

*Group 1 is composed of New England lines; Group 2—New York, New Jersey, Delaware, Maryland, and Eastern Pennsylvania lines; Group 3—Ohio, Indiana, Michigan and Western Pennsylvania lines; Group 4—West Virginia, Virginia, North and South Carolina lines; Group 5—Kentucky, Tennessee, Mississippi, Alabama, Georgia and Florida lines; Group 6—Iowa, Illinois, Wisconsin, Minnesota and the Dakotas lines; Group 7—Montana, Wyoming and Nebraska lines; Group 8—Kansas, Colorado, Missouri, Arkansas and Oklahoma lines; Group 9—Texas, Louisiana and New Mexico lines; Group 10—Oregon, Idaho, California and Arizona lines; Group 11—Canadian lines.



Car Surpluses and Shortages in 1907 to 1911.

and miscellaneous cars 1,257. Car shortage shows a slight increase, the total being 3,830."

The accompanying table gives surpluses and shortages by groups in the last period covered by the report and the chart shows total bi-weekly figures in 1907 to 1911.

INTERSTATE COMMERCE COMMISSION.

The Commission has issued a notice, suspending until December 29, a proposed advance in rates on staves and other articles on the Missouri Pacific and the St. Louis Iron Mountain & Southern. The Commission also suspended until December 29 a proposed advance in rates on milk over the Delaware & Hudson.

STATE COMMISSIONS.

R. A. Thompson, hitherto chief engineer of the Wichita Falls & Northwestern, Wichita Falls, Tex., has been appointed engineer of the California State Railway Commission. Mr. Thompson was formerly for nine years engineer of the Texas Railway Commission.

The Public Utilities Commission of Kansas has complained to the Interstate Commerce Commission of the readjustment of freight rates from eastern cities recently ordered by the federal commission. It is charged that the change in these rates between the Mississippi river and the Missouri has given an undue preference to the commercial centers on the Missouri river, to the disadvantage of towns in Kansas.

The Indiana commission, in its decision refusing to allow the railways to raise from 25 cents to 35 cents their minimum charge for a freight shipment, gave as its principal reasons the absence of evidence to show that the lower rate is not remunerative, and that a great hardship would be worked on the small merchant. One shipper of drugs presented evidence that he sent by freight 900 shipments a month of such light weight as to be affected by the proposed increase. Shippers of bread and confectionery made similar claims.

COURT NEWS.

The Louisville & Nashville has appealed to the Commerce Court from the decision of the Interstate Commerce Commission, which put a stop to the rebilling at Nashville of grain from the northwest to southeastern states. The Nashville board of trade and the Nashville Grain Exchange join in the appeal. Over 2,000,000 bushels of grain are now stored in Nashville elevators awaiting reshipment to southeastern points.

Judge R. E. Lewis of the Federal Court at Denver, Colo., has given an opinion as to what should be considered to be adjacent lands to the Denver & Rio Grande, in a case brought by the government and pending for several years against that road and several other small railways and lumber companies. Under an agreement with the government, made in 1872, the Denver & Rio Grande acquired a strip of land wide enough for five track lines, on condition that it would push its road through to Santa Fé within the next five years, and a clause in this agreement gave the road the right to cut and use timber from the public lands adjoining its right-of-way. An extension of time was afterward given to the road, and subsequent agreements made between the Rio Grande and other large roads in that territory prevented the construction of the line to Santa Fé. The object of the suit brought by the government was to determine how far distant from its right-of-way the road was privileged to take timber for its use, it having been found that at times during construction it had taken it from points as much as 19 miles distant; and the present effectiveness of the grant itself was questioned, in view of the fact that the road was never completed as agreed. Judge Lewis decided that a strip three miles in width on each side of the right-of-way was the only land from which timber could be taken by the road. He also held, with the railway, that agreements made by it with other roads had no bearing on the matter. Decisions on several of the ten questions in equity discussed in the suit were favorable to the railway.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

C. S. Albert has been appointed attorney for the Great Northern, with office at Spokane, Wash., succeeding L. F. Chester, resigned.

A. A. Maxwell, commissioner of the real estate department of the New York, New Haven & Hartford, at New Haven, Conn., has been appointed also in charge of the real estate department of the Boston & Maine, with office at Boston, Mass.

Henry G. Herbel, interstate commerce attorney of the Missouri Pacific-Iron Mountain System, at St. Louis, Mo., has been appointed also interstate commerce attorney of the Texas & Pacific and the International & Great Northern, with office at St. Louis.

Sir William Whyte, vice-president of the Canadian Pacific at Winnipeg, Man., is to be retired on account of advanced age on September 30, and will at that time be elected a director. G. Bury, general manager at Winnipeg, is to succeed Sir William as vice-president.

S. W. Tracy, superintendent of car service of the Chicago, Indiana & Southern, and the Indiana Harbor Belt, at Gibson, Lake county, Ind., has been appointed auditor of the Indiana Harbor Belt, with office at Gibson, succeeding G. M. Glazier, who had his office at Cleveland, Ohio.

The general offices of the Tonopah & Tidewater Company, the Tonopah & Tidewater Railroad Company, and the Bullfrog Goldfield Railroad Company, consisting of the traffic, auditing, car accounting and local treasury departments, were transferred on September 1, from Los Angeles, Cal., to Oakland, Cal.

Operating Officers.

W. C. Ashcraft, trainmaster of the Atchison, Topeka & Santa Fe at Pueblo, Colo., has been transferred to Dodge City, Kan., succeeding J. D. Coffey, and G. W. Thompson succeeds Mr. Ashcraft.

G. T. Rooke has been appointed inspector of transportation of the Canadian Pacific; and J. B. Smith has been appointed assistant inspector of transportation; both with offices at Montreal, Que.

J. F. Russ, superintendent of the Northern Kansas division of the Missouri Pacific at Atchison, Kan., has been appointed superintendent of the Omaha division, with office at Falls City, Neb., succeeding A. De Bernardi, promoted. R. G. Carden, trainmaster at Jefferson City, Mo., succeeds Mr. Russ.

W. B. Cronk has been appointed superintendent of the Grand Trunk Pacific, with jurisdiction over the Melville-Regina, Regina-Boundary and Regina-Moose Jaw lines, with office at Regina, Sask., and I. A. MacPherson has been appointed assistant to general superintendent, with office at Winnipeg, Man., succeeding R. D. Thomas.

Albert De Bernardi, who has been appointed general superintendent of the Missouri Pacific, with office at Kansas City, Mo., as has been announced in these columns, was born in 1865 at Independence, Mo. He received a common school education, and began railway work in 1882 with the Missouri Pacific as a track laborer. He was then consecutively, from 1885 to 1893, section foreman, foreman of an extra gang, brakeman and foreman of a construction train. He was appointed division roadmaster at Nevada, Mo., in 1893, where he remained for six years, being promoted at the same place to trainmaster in 1899. In 1900 he was appointed divsion superintendent of the Central branch at Concordia, Mo., and a year later was transferred to Osawatomie, Kan., where he remained for four years. He was then appointed general superintendent of the General district at Coffeyville, Kan., and the next year was transferred to the Southern district at Little Rock, Ark. In March, 1908, when the Central district was abolished and other changes were made in the operating organization, he was appointed superintendent of the Omaha and North Kansas divisions, with office at Atchi-

son, Kan., from which position he has just been promoted to general superintendent of the Western district, as above.

The Hine system of organization has been extended to include the Southern Pacific Railroad of Mexico, the Sonora Railway and the Arizona Eastern Railroad. R. H. Ingram, general manager of the Southern Pacific Railroad Company of Mexico, and assistant general manager of the Sonora Railway, at Empalme, Sonora, Mex., L. H. Long, chief engineer of both the above companies and assistant chief engineer of the Arizona Eastern at Tucson, Ariz., P. J. Archer, assistant treasurer and purchasing agent of the Southern Pacific of Mexico, purchasing agent and cashier of the Sonora Railway, and treasurer and purchasing agent of the Arizona Eastern, at Tucson, Ariz., and J. C. McClure, engineer maintenance of way of the Arizona Eastern at Tucson, Ariz., will hereafter be designated as assistant general managers. All will be assistants to Vice-president and General Manager Epes Randolph, with headquarters at Tucson, Ariz. They will continue in charge of the duties heretofore devolving upon them, and in addition assume such other duties as may be assigned to them. H. J. Temple, superintendent of the Southern Pacific Railway Company of Mexico and the Sonora Railway at Empalme, Sonora, Mex., has been appointed general superintendent of the lines in Mexico with headquarters at Empalme. M. J. Kingsbury, assistant superintendent at Empalme, succeeds Mr. Temple. E. N. Brown, superintendent of the Sinaloa division of the Southern Pacific Railway Company of Mexico at Mazatlan, and J. B. Finley, general storekeeper of the Southern Pacific of Mexico and the Sonora Railway at Empalme, have been appointed assistant general superintendents of these two companies, with office at Empalme. J. W. Williams succeeds Mr. Brown, and F. Thomas has been appointed chief special agent with office at Empalme. See item under Engineering and Rolling Stock Officers.

Traffic Officers.

H. Bromley, general coal and ore agent of the New York Central Lines, west of Buffalo, at Cleveland, Ohio, has been retired under the pension rules of the company.

J. A. Martin, assistant general eastern agent of the Chicago, Burlington & Quincy, at New York, has been appointed general agent, freight department, with office at New York.

H. B. Sperry, commercial agent of the Fort Worth & Denver City at Fort Worth, Tex., has been appointed general freight and passenger agent of the Texas Central, with office at Waco, Tex.

L. L. Tanner, ticket agent of the Chicago, Burlington & Quincy, at Chillocothe, Mo., has been appointed traveling passenger agent, with office at Cincinnati, Ohio, succeeding J. V. Clayman resigned to engage in other business.

J. H. Andrews has been appointed a commercial agent of the Southern Railway, with office at Raleigh, N. C., and H. B. Rogers has been appointed a soliciting agent, with office at Norfolk, Va., succeeding William J. Oliver, resigned to go to another company.

J. W. Bennett has been appointed commercial agent of the Missouri & North Arkansas, with office at Helena, Ark., succeeding L. A. Patterson, promoted, and L. D. Bell has been appointed traveling freight agent, with headquarters at Eureka Springs, Ark.

H. E. Schlerf, traveling freight agent of the Chicago, Indianapolis & Louisville, at Milwaukee, Wis., has been appointed commercial agent, with office at Milwaukee, succeeding [illegible] connected with another company. F. W. Ludwig succeeds Mr. Schlerf.

C. E. Norton, commercial agent of the Trinity & Brazos Valley [illegible] has been appointed commercial agent, with office at Fort Worth, Texas, succeeding W. A. Scrivner, resigned. [illegible] Fort Worth, [illegible] with office at Oklahoma City.

[illegible] general freight agent of the Chicago, Minneapolis & Puget Sound, at Chicago, has been appointed general freight agent, with office at Seattle, and J. R. Veitch, district freight and passenger agent at Portland, Ore., succeeds Mr. Burroughs.

James Fitzsimons, general agent freight department of the Delaware & Hudson at Chicago, has been promoted to general eastern freight agent at Albany, N. Y., succeeding H. C. McCullough, deceased. G. I. Israel, traveling freight agent at Buffalo, N. Y., succeeds Mr. Fitzsimons, and O. R. Eytel, traveling freight agent at Pittsburgh, succeeds Mr. Israel. C. N. Bartel, succeeds Mr. Eytel.

Incident to the reorganization of the freight soliciting forces of the Chicago agency of the Delaware, Lackawanna & Western, the following appointments have been made: A. S. Hindman, eastbound freight agent; R. F. Locke, westbound freight agent; H. L. Cole, traveling freight agent, and C. H. Drinkwater, contracting freight agent. T. J. McGeoy, assistant general western freight agent, will have supervision over the solicitation of business, reporting to the general western freight agent.

C. S. Wight, general traffic manager of the Baltimore & Ohio at Baltimore, Md., has been appointed general freight traffic manager, with office at Baltimore, and O. P. McCarty, general passenger agent of the Baltimore & Ohio Southwestern, and the Cincinnati, Hamilton & Dayton at Cincinnati, Ohio, has been appointed passenger traffic manager of the Baltimore & Ohio, succeeding to part of the duties of Mr. Wight. W. B. Calloway, assistant general passenger agent at Cincinnati, succeeds Mr. McCarty, and W. G. Brown, assistant to the general passenger agent, succeeds Mr. Calloway. C. W. Bassett, general passenger agent of the Baltimore & Ohio at Baltimore, Md., has been appointed assistant to the passenger traffic manager, with office at Baltimore. George W. Squiggins, assistant general passenger agent, succeeds Mr. Bassett, and his former position has been abolished.

W. M. Kirkpatrick, general freight agent of the Canadian Pacific at Montreal, Que., has been appointed assistant freight traffic manager, in charge of eastern lines, with office at Montreal, succeeding W. B. Bulling, who has retired temporarily from active service on account of ill health. H. E. Macdonell, division freight agent at Montreal, succeeds Mr. Kirkpatrick, and E. N. Todd, export freight agent, succeeds Mr. Macdonell. In addition to the above offices, the organization of the freight traffic department of the eastern lines includes the following officials: W. B. Bamford, division freight agent, Atlantic division, St. John, N. B.; H. A. Plow, district freight agent, Eastern division, Ottawa, Ont. On the Ontario division M. H. Brown, division freight agent, Toronto; J. H. Griffin, district freight agent, Toronto; W. J. Grant, district freight agent, Hamilton, Ont., and L. Mulkern, district freight agent, London, Ont.; W. S. Elliott, is division freight agent of the Lake Superior division, at North Bay, Ont.

Oren M. Ellsworth, whose appointment as general eastern freight agent of the Rock Island Lines, with office at New York City, has been announced in these columns, was born at Bayfield, Ont., and was educated at the Collegiate Institute, Peterboro, and at the college at Toronto. He began railway work in October, 1886, in the freight auditor's office of the Chicago, Rock Island & Pacific, and then went to the Frisco Lines, where he remainder about four years. He was then traveling auditor and agent for four years on the St. Louis, Iron Mountain & Southern. His next position was on the Chicago, Oklahoma & Gulf. He has been connected with the freight traffic department of the Rock Island Lines since that company took over the C. O. & G., as traveling freight agent, commercial agent, and for the past six years as general agent at Pittsburgh, which position he held at the time of his recent appointment as general eastern freight agent. Mr. Ellsworth was also for four years a member of the board of governors, and for one year chairman of the board of the Pittsburgh Traffic Club, and later was president of that organization.

Engineering and Rolling Stock Officers.

[illegible] item under State Commissions regarding the Wichita Falls & Northwestern.

J. Beaumont has been appointed signal engineer of the Chicago Great Western, with office at Chicago.

B. Herman, principal assistant engineer of the Southern Railway at Washington, D. C., has been appointed chief engineer maintenance of way and structures of the Southern Railway, the Northern Alabama and the Virginia & Southwestern, with office at Washington.

Walter H. Donely, whose appointment as master mechanic of the Illinois Central, with office at East St. Louis, Ill., has been announced in these columns, was born July 10, 1876, at Champaign, Ill. He received a high school education, and began railway work in June, 1891, as a call boy on the Illinois Central. For three and one-half years from January, 1893, he was a machinist apprentice, after which he worked as a journeyman until 1898. He was then promoted to roundhouse foreman, which position he held until February 1, 1907. From the latter date until the time of his promotion as above, he was general foreman, with office at Champaign.

H. Weitzel, superintendent of shops of the Southern Pacific Railroad Company of Mexico, at Empalme, Sonora, Mex., has been appointed master mechanic of the Empalme general shops of the Southern Pacific of Mexico and the Sonora Railway, and his former position has been abolished. Under the Hine system the head of a general shop detached from an operating division is called master mechanic, while mechanical officers with road jurisdiction have the title assistant superintendent, assistant general superintendent, or assistant general manager as the case may be. The head of a division shop is called general foreman. The Hine system, for over two years past in operation on the divisions of the lines mentioned, now covers five general offices and twenty-five operating divisions of the Harriman lines. See item under Operating Officers.

Joseph J. Shaw, whose appointment as master mechanic of the St. Louis & San Francisco, with office at Enid, Okla., has been announced in these columns, was born November 2, 1869, at Amboy, Ill. He received a high school education, and began railway work in October, 1886, as a machinist apprentice with the Illinois Central at Amboy. He was then consecutively machinist for the Chicago & Alton at Bloomington, Ill.; for the Illinois Central at Freeport, Ill.; and for the Baltimore & Ohio at South Chicago, Ill. He went with the St. Louis & San Francisco at Fort Smith, Ark., in February, 1897, as a machinist, and in 1903 was appointed division foreman, with office at Sapulpa, Okla. He was later transferred with the same title to Neodosha, Kan., and then to Enid, Okla., which position he held at the time of his recent appointment as master mechanic.

Joseph J. Shaw.

Purchasing Officers.

W. S. Atkinson has been appointed purchasing agent of the Kansas City Southern, with office at Kansas City, Mo., succeeding L. F. Jordan, resigned to go to another company. R. G. Lowry, general storekeeper at Pittsburg, Kan., will hereafter report to the vice-president and general manager.

Special Officers.

Victor J. Bradley, superintendent of the second division of the United States Railway Mail Service with headquarters at New York City, has resigned, to become mail agent of the Pennsylvania Railroad. E. M. Norris, hitherto in charge of the Cincinnati division of post office inspectors, succeeds Mr. Bradley in the Railway Mail Service.

OBITUARY.

Thomas T. Morford, formerly manager of the Union Steamboat Line and Lehigh Valley Transportation Company, and later general agent for the Erie Railroad, died on August 28, at his home in Buffalo, N. Y., at the age of 73.

Walter Oakes, formerly engaged in railway work in the West, and later general manager of the steamship lines of the Northern Pacific Railroad Company at Tacoma, Wash., and president of the Alaska Steamship Company, died on August 24, in Seattle, Wash., at the age of 46 years. Mr. Oakes was the son of T. F. Oakes, formerly—1888-1893—president of the Northern Pacific.

John Bowdish Dutcher, formerly and for many years until 1910, livestock agent of the New York Central, and also a director of the New York & Harlem, died at his home at Pawling, N. Y., on August 27, at the age of 75 years. Mr. Dutcher had been connected with the Harlem since 1864 and with the New York Central since its organization. He had been a member of the Union League and Transportation Clubs and the St. Nicholas Society of New York. He had served for two years as president of the New York State Agricultural Society, and between 1861 and 1865 was a member of the state assembly and the state senate.

John S. Wilson, formerly general freight traffic agent of the Pennsylvania Railroad, died at his summer home at Bass Rocks, near Gloucester, Mass., on August 21. Mr. Wilson began railway work as a solicitor for the Baltimore & Ohio in 1862, and was general freight agent of the Philadelphia, Wilmington & Baltimore from 1870 to 1882. In 1882 that road was taken over by the Pennsylvania Railroad, and he was appointed general freight agent of the Pennsylvania. He was promoted to general freight traffic agent in July, 1885, from which position he resigned in October, 1888. Mr. Wilson was elected president of the Central New England & Western (the Poughkeepsie Bridge Route) in 1889, from which position he resigned in February, 1892, when the road became a part of the Philadelphia, Reading & New England. He was elected president of the Baltimore, Chesapeake & Atlantic in May, 1897, and remained in this position until the road was sold to the Pennsylvania in 1899.

William Dana Taylor, chief engineer of the Chicago & Alton and the Toledo, St. Louis & Western, with office at Chicago, died at Chicago on August 26. Mr. Taylor was born January 22, 1859, at Montgomery, Ala., and graduated from the Alabama Polytechnic Institute as a civil engineer in 1881. He later did post-graduate and laboratory work at Johns Hopkins and Cornell universities and at the University of Chicago, and received honorary degrees at the two last-named institutions. In 1882 and 1883 he was with the Mexican Central as topographer, transitman, resident engineer and division engineer on the construction of the Tampico branch. He was engineer of construction of the Montgomery & Florida, now part of the Atlantic Coast Line, for two years from 1886, and was then for three years successively resident engineer, engineer of construction and chief engineer of the Alabama Mineral and Birmingham Mineral lines of the Louisville & Nashville. In November, 1898, he was made chief engineer of the St. Louis, Peoria & Northern, now the Illinois Central and the Chicago & Alton, and in June, 1899, was appointed assistant engineer of the Alton, in charge of reconstruction of the Missouri river bridge and surveys for various improvements, including track elevation work at Chicago. In 1901 he made an appraisal of the physical properties of the Duluth & Iron Range and the Duluth, Missabe & Northern for the Minnesota Railroad and Warehouse Commission, and from March to October, 1902, was chief engineer on construction of the Knoxville, Lafollette & Jellico, a branch of the Louisville & Nashville. In June, 1903, was appointed engineer expert for the State Tax Commission of Wisconsin, in charge of the appraisal of the physical properties of the railways in that state. He was appointed chief engineer of the Chicago & Alton in January, 1906. Mr. Taylor held the chair of civil engineering at the University of Louisiana for seven years from 1891, and that of railway engineering at the University of Wisconsin for a number of years from 1901. In 1898 he was also appointed captain of the Third United States Engineers by President McKinley. He was a member of the Western Society of Engineers, of the American Society of Civil Engineers and of the American Railway Engineering Association.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Kansas City Southern has ordered 12 Mallet locomotives and eight Pacific type locomotives from the American Locomotive Company. This road is still in the market for 10 consolidation locomotives.

The Mobile & Ohio has ordered four mikado locomotives from the Baldwin Locomotive Works. The dimensions of the cylinders will be 27 in. x 30 in., the diameter of the driving wheels will be 63 in., and the total weight in working order will be 239,000 lbs.

The Thornton & Alexandria has ordered one consolidation locomotive from the Baldwin Locomotive Works. The dimensions of the cylinders will be 16 in. x 24 in., the diameter of the driving wheels will be 44 in., and the total weight in working order will be 100,000 lbs.

The Algoma Steel Company, Sault Ste. Marie, Mich., has ordered two six-wheel switching locomotives from the Montreal Locomotive Works. The dimensions of the cylinders will be 19 in. x 24 in., the diameter of the driving wheels will be 50 in., and the total weight in working order will be 123,000 lbs.

CAR BUILDING.

The Erie is in the market for 200 refrigerator cars and for 250 automobile cars.

The Kansas City Southern is taking prices on 12 chair cars, 9 baggage cars and 3 combination cars.

The Pennsylvania Lines West have ordered 690 gondola cars and 26 flat cars from the Pressed Steel Car Company.

The Buffalo Creek & Gauley, mentioned in the *Railway Age Gazette* of April 7 as being in the market for 100 hopper cars, has ordered this equipment from the Pressed Steel Car Company.

The Atlantic Seaboard Dispatch, mentioned in the *Railway Age Gazette* of August 4 as being in the market for 100 refrigerator cars, has ordered this equipment from the Haskel & Barker Company.

The Havana Central has ordered 185 flat cars and 100 general service gondola cars. The Standard Steel Car Company will build the flat cars, and the Pressed Steel Car Company will build the gondola cars.

The St. Louis & San Francisco, mentioned in an unconfirmed item in the *Railway Age Gazette* of August 25 as having ordered 250 flat cars from the American Car & Foundry Company, has ordered this equipment from this company.

IRON AND STEEL.

The Grand Trunk is in the market for 10,000 tons of rails.

The Boston & Maine is taking prices on 5,000 tons of bridge material.

The Chesapeake & Ohio has ordered 4,500 tons of rails from the United States Steel Corporation.

The [illegible] Central has ordered 9,400 tons of open hearth rails from the Tennessee Coal, Iron & Railroad Company.

The George A. Fuller Company, Chicago, has ordered 14,000 tons of structural material for the new Kansas City Union Terminal from the American Bridge Company.

The New York Central has placed an order for 5,000 tons of structural steel with the American Bridge Company, and 1,500 tons of structural steel from the Buffalo Structural Steel [illegible]

[illegible] Men in the steel industry are satisfied with the fundamental conditions, although they admit [illegible] disturbing [illegible] consume 40 per cent of all the steel produced. Business in structural steel [illegible] has exceeded the high record [illegible] and the Steel Corporation reports that more [illegible] has been received so far this year than in the corresponding period of 1909.

Supply Trade News.

Alonzo C. Shults has been made general Eastern sales agent of the Bass Nut Company, Chicago, with office in the Grand Central Terminal building, New York.

W. H. Latshaw, a former vice-president of the National Tube Company, Pittsburgh, Pa., died at his home in Pittsburgh, on August 29. Mr. Latshaw was 56 years old.

R. T. Miller has been made acting manager of the Chicago office of the Pittsburgh Testing Laboratory, Pittsburgh, Pa., succeeding to the duties of James A. Lister, resigned.

The Crocker-Wheeler Company, Ampere, N. J., will on September 1 open offices in the First National Bank building, San Francisco, Cal. A supply of motors, generators and transformers of various sizes will be carried in stock for immediate coast deliveries. John S. Baker will be in charge.

James Christie, president of the Engineers' Club, Philadelphia, Pa., and vice-president of the Franklin Institute, died of apoplexy at his summer home in Atlantic City, N. J., on August 24. Mr. Christie was born in 1840, near Ottawa, Can., and was educated in the public schools of that city. After some experience in locomotive works, he spent a year in a railway engineering corps. He then worked for five years as machinist and mechanical draftsman of the I. P. Morris Company, Philadelphia, Pa. In 1865 he went to Pittsburgh, Pa., and entered the Cyclops Iron Works, which has since become the Thirty-third street mill of the Carnegie Steel Company. After 1870 he worked in several bridge companies, and in 1905 resigned his position as chief engineer of the American Bridge Company, New York, to devote his time to private business.

Walter H. Brimson, formerly general superintendent of the Baltimore & Ohio Southwestern at Cincinnati, Ohio, has been made vice-president of the Economy Separable Switch Point Company, Louisville, Ky., with headquarters in that city. Mr. Brimson has been in the railway business since 1862, starting as a messenger boy for the Cleveland & Toledo. Among the more important positions he has held are the following: Superintendent of the Duluth & Iron Range; assistant superintendent of the Pacific division of the Northern Pacific, and superintendent of the Rocky Mountain division of the same road; superintendent of the Branierd & Northern Minnesota; superintendent of the Ohio division of the Baltimore & Ohio Southwestern, and general superintendent of the same road until his recent resignation.

The Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., has received an order from the Cincinnati Traction Company for an equipment for a generating station and three substations, consisting of one 6,000-kva., 1,500 r. p. m., 25-cycle; 13,200-6,600 v., three-phase turbo generator, with direct connected exciter; five 1,500-kw., 25-cycle, six-phase, 600-v., direct current, 250 r. p. m., rotary converters, sixteen 500-kva., 25-cycle, 13,200-6,600 v., self-cooled transformers; also four switchboards for control of the above apparatus. This company has also received an order from the Groton & Stonington Street Railway, Mystic, Conn., for three quadruple, direct-current motors with K-6 controllers, and one from the Connecticut Valley Street Railway, Gainesville, Mass., for five quadruple, direct-current motors and a K-28-B controller. The Indianapolis Traction & Terminal Company has recently placed an order with the Westinghouse company for two direct-current motors, and the Savannah Electric Company has ordered three double-equipment, interpole railway motors with a 36-F controller from the same company.

TRADE PUBLICATIONS.

[illegible] The Western Electric Company, Chicago, has devoted bulletin No. 1105 to the selection, installation and wiring of inter-phone systems. This bulletin was noticed in our last issue, but was erroneously credited to the General Electric Company, Schenectady, N. Y.

Railway Construction.

New Incorporations, Surveys, Etc.

Canadian Northern.—Contracts have been let for building the last link between Winnipeg, Man., and the Pacific coast, covering a 250 mile section between Yellow Head Pass, B. C., and Kamloops. The work is to be carried out jointly by the Northern Construction Company, and the Cowan Construction Company, and is to be started at both ends at the same time. (July 28, p. 198.)

A contract is said to have been given to Rene A. Girouard, Smith's Falls, Ont., for building a section of the Canadian Northern, from Jones' Locks, Smith's Falls, to Otter Lake, 9 miles.

Charleston & North Western.—An officer writes that contracts will be let some time next spring to build from Mt. Pleasant, S. C., northeast to McClellansville, 32 miles; Bonneau to Guerrins Bridge, 30 miles, and Cainhoy to Guerrins Bridge, 6 miles. There will be one short steel bridge, also a number of terminal stations and way stations. A. C. Tuxbury, president, Montclair, N. J.

Chicago, Milwaukee & Puget Sound.—An officer writes that contracts have been given to the Bates & Rogers Construction Company, for the grading work, also for constructing subways and bridges required for the construction of lines and terminals in the city of Spokane, Wash.

Chicago & Northwestern.—An officer writes that it is expected to have work finished this season, from Milwaukee northwest to Sparta, and that the extension from Colome, S. Dak., west to Winner, has been finished; 10.97 miles.

Denver & Rio Grande.—An officer is quoted as saying that the improvements contemplated will be deferred until financial conditions are more favorable. The company is now laying about 4,000 tons of new 85-lb. rail. Double tracking work was recently completed on 10 miles west of Pueblo, Colo. The new low grade line being constructed in conjunction with the Colorado & Southern between Pueblo and Walsenburg, will cost each company about $1,900,000, and will be finished about December 1. The Salt Lake shops are being enlarged at a cost of $50,000, and considerable strengthening of the narrow gage lines is being carried out with heavy rail taken up on the main line.

El Paso Southwestern.—A sub-contract has been let to Blumencranz & Weyser, for bridge and culvert work on the first four miles west of Fairbanks, Ariz. MacArthur Bros. Company, New York, has the general contract to build an extension from Fairbanks to Tucson, 67 miles. (August 11, p. 304.)

Gould Southwestern.—An officer writes that the company expects to let contracts within ninety days for building extensions. The road is now in operation from Gould, Ark., west to Star City, 19 miles. The plans call for an extension from Gould east to Pendleton, 6 miles, and from the western terminus at Star City, southwest to Fordyce, about 33 miles. The work will involve handling 15,000 cu. yds. a mile. Maximum grade will be 7/10 per cent. Maximum curvature 4 deg. There will be one 60-ft. steel bridge and about 7,000 ft. of other bridge work. The extensions are to be built to carry lumber, cotton, merchandise, etc.

Great Northern.—According to press reports, this company is planning to build about 200 miles of feeder lines in the eastern part of the state of Washington. A line is to be built from Republic, south along the San Poil river to Hell Gate, thence following the Columbia river to Peach, and from that point to a connection with the main line at Bluestem, about 100 miles. A line is also to be built north up the east bank of the Columbia river from Peach to Marcus—90 miles.

Knoxville, Sevierville & Eastern.—See this company under Railway Financial News.

Manatawney Railroad.—An officer writes that this company expects to let contracts soon to build from a point near Douglassville, Pa., north to Spansville, 10 miles. The approximate fill per mile is 15,000 cu. yds., and approximate cut per mile is 10,000 cu. yds. The maximum grade will be about 1 per cent. There is to be one 125-ft. steel bridge. The company will use steam for motive power, but will also arrange for the use of electric cars on the line. It is being built to carry iron ore, limestone and miscellaneous freight and passenger traffic. M. J. Person, president, Bethlehem; S. Robinson, Jr., treasurer, and A. Lehman, chief engineer, 506 Walnut street, Philadelphia. (August 18, p. 356.)

Middle Tennessee Traction Company.—An officer writes that a contract has been given to McLaughlin & Co., and grading work is now under way from Franklin, Tenn., southeast to College Grove, 16 miles. The work involves handling about 10,000 cu. yds. a mile. Maximum grade will be between 2 and 3 per cent.; maximum curvature 10 deg. There will be one 50 ft. steel bridge, and probably a power house when the road has been built. P. E. Cox, president, Franklin, Tenn., John Wilkes, chief engineer, Nashville.

Missouri Pacific.—See an item in General News regarding improvements on this road.

New York, New Haven & Hartford.—See an iem under General News, regulating retrenchments.

Pennsylvania Roads (Electric).—Plans are being made by residents of Pittsburgh and Washington, Pa., to build an interurban line from Washington, north to West Middletown, 12 miles.

Raleigh & Charleston.—An officer writes that this company is building a mile or two of lumber roads from Marion, S. C., towards Libby.

Randolph & Cumberland.—An officer writes that this company, which operates an 18-mile line from Carthage, N. C., to Hallison, is building an extension towards Winston-Salem.

Santiago, El Paso & St. Louis.—According to press reports, work is to be started at once on this line. The projected route is from Artesia west via Hope to El Paso, about 525 miles. The McCarthy Engineering Corporation, of Houston, Tex., has the general contract, and a sub-contract was recently let to Mahoney & McNeil for work on a 25 mile section from Artesia to Hope. It is understood that the Frisco interests are back of the project. A. Courchesne, president, El Paso, Tex., and P. A. McCarthy, chief engineer, Houston.

Southern Railway & Navigation Company.—An officer writes that this company is building an extension from Cooksville, La., southwest towards Alexandria. The company is carrying out the work with its own men and has 10 miles of track laid. There will be one 750 ft. steel bridge. The line is being built to carry lumber, live stock, grain and general merchandise. (April 14, p. 926.)

Tacoma Eastern.—Surveys have been made it is said from Morton, Wash., to a point near Mayfield via Tilton river, also for a line easterly to a point near the head waters of the Cowlitz river.

Timpson & Henderson.—Plans are being made by this company to build an extension from the present western terminus at Henderson, Tex., west to Tyler, about 35 miles.

RAILWAY STRUCTURES.

Aberdeen, S. Dak.—See Milwaukee, Wis.

Arbuckle, Cal.—Extensive improvements are being made by the Southern Pacific to the station at Arbuckle.

Argo, Wash.—The Oregon-Washington R. R. & Navigation Company has completed plans for building a steel and concrete machine shop and boiler house 88 ft. x 180 ft., and will probably let the contract in a short time.

Baltimore, Md.—An officer writes that the Baltimore & Ohio will make an important addition to the export terminals at Baltimore, Md. The plans call for putting up a freight warehouse, with a steel superstructure 34 ft. 9 in. x 230 ft., at Henderson's wharf. The contract for the superstructure has been let to the Baltimore Bridge Company, Baltimore.

Bloomington, Ind.—The Chicago, Indianapolis & Louisville has completed plans and let the contract for building a two-

story, fireproof passenger station 90 ft. x 34 ft. The structure will be built of Bedford limestone and will have a red tile roof and tiled floors. The waiting room will be trimmed with brick and stone, with an arched ceiling and will be illuminated by concealed linolite lamps. The cost is estimated at $25,000. Lowe & Bollenbacher, Chicago, are the architects.

Bozman, Mont.—The Gallatin Valley Railway has given a contract to R. E. Stone for putting up a station at Bozman. (July 21, p. 159.)

Coalinga, Cal.—The Southern Pacific, it is understood, will put up a station at Coalinga.

Cooksville, La.—See Southern Railway & Navigation Company, under Railway Construction.

Decatur, Ill.—The Wabash has let the contract for building a machine shop 75 ft. x 168 ft., of steel and concrete fireproof construction, to replace the one that was burned last fall.

Laurel, Miss.—The New Orleans, Mobile & Chicago has secured land as a site for terminals and repair shops in the southern part of the city of Laurel.

Milwaukee, Wis.—The Chicago, Milwaukee & St. Paul has let the contract to the Wisconsin Bridge Company for two 90-ft. turntables to be installed at Milwaukee, Wis., and Aberdeen, S. Dak.

Montreal, Que.—An officer writes that the improvements to be carried out at the Sortin yard, Montreal terminals, includes putting up a boarding house, an ice house, a coaling plant, a 24-stall engine house, machine shop, and boiler house, sand house, turntable, ash pits, store and oil house, and car checkers' and yard office building. Most of these buildings are now under contract to C. E. Deakin, Montreal.

New York, N. Y.—The Baltimore & Ohio has bought land bounded by Eleventh and Thirteenth avenues and Twenty-fifth and Twenty-sixth streets, New York City. Plans are being made to put up a freight station and storage warehouse on the site, for which bids are wanted up to September 10.

Owosso, Mich.—The Ann Arbor is preparing plans for a modern, two-story, fireproof passenger station to be built at Owosso this fall.

Rainy River, Ont.—The Canadian Northern is said to be making extensive improvements at Rainy River, Ont., to include putting up a new brick station.

St. Clare, Pa.—The Philadelphia & Reading has given a contract to the C. P. Bower Construction Company, and the work will be started at once on a reinforced concrete roundhouse at the St. Clare yard. The structure is to have 52 stalls and an 85-ft. turntable.

Salt Lake City, Utah.—See Denver & Rio Grande under Railway Construction.

Savannah, Ga.—The Central of Georgia is preparing plans for a gravity system for handling freight between the docks and warehouses at Savannah.

Toledo, Ohio.—The Lake Shore & Michigan Southern has [illegible] Lime Junction, and will probably rebuild its freight yard there.

Vancouver, B. C.—The Canadian Pacific has given a contract [illegible] for putting up 13 concrete bridges, 8 culverts and one arch, also for concrete [illegible] and Westminster Junctions.

[illegible] contract has been given to T. J. Crowell [illegible] Canadian Pacific at Vernon. The [illegible] be started at once.

West Weber, Utah.—The Southern Pacific has started work [illegible] the Weber river near this place.

[illegible] Ohio, has sold all the Pittsburg & Lake Erie and the [illegible] and the Erie are to be changed [illegible] to eliminate the [illegible] crossings at Conneaut. The improvements include putting up a new station at that point. (May 26, p. 1227.)

Railway Financial News.

Canadian Pacific.—Sir William Whyte, who will retire from the vice-presidency of the Lines West on September 30, will at that time be elected a director.

Chicago, Milwaukee & St. Paul.—The Chicago, Milwaukee & Puget Sound has declared a dividend of 2.3 per cent. out of the earnings of the last fiscal year. The dividend is payable as of June 30, 1911, so as to be included in that year's revenue of the Chicago, Milwaukee & St. Paul, which owns all the $100,000,000 Puget Sound stock. The initial Puget Sound dividend, 2 per cent., was declared in February, 1911.

Chicago, Milwaukee & Puget Sound.—See Chicago, Milwaukee & St. Paul.

Chicago & Eastern Illinois.—The New York Stock Exchange has listed $864,000 additional 4 per cent. refunding and improvement bonds of 1955, making the total listed $15,966,000. (July 28, p. 200.)

Denver, Northwestern & Pacific.—The rumors that the Union Pacific has purchased this property are denied.

Delaware & Eastern.—This property has been sold under foreclosure to representatives of the bondholders. (June 30, p. 1715; April 7, p. 879.)

Eustis Railroad.—See Maine Central.

Illinois Southern.—A special meeting of the stockholders has been called for November 6 to authorize the issue of $3,000,000 first mortgage bonds and $1,380,000 income bonds. They will be used for refunding.

Knoxville, Sevierville & Eastern.—An agreement has been reached by which this property, which has been in the hands of a receiver because of a suit involving its stock, is to be taken over by W. J. Oliver, as sole owner of all its stock. Mr. Oliver has been the receiver. The road runs from a connection with the Southern Railway at Vestal, Tenn., to Sevierville, 28 miles. It is expected that extensions will be built. (April 14, p. 926.)

Maine Central.—The Eustis Railroad, 16 miles long, running from Eustis Junction, Me., to Greene's Farm, has been sold at auction by the receiver to the Sandy River & Rangeley Lakes, a subsidiary of the Maine Central. The Eustis Railroad is narrow gage and has been operated for some time by the Sandy River & Rangeley Lakes. (August 11, p. 306.)

Pennsylvania Railroad.—On August 5, the date of record of the August dividend, there were 69,760 stockholders, the total outstanding stock being $450,974,000. This is the largest number of stockholders in the history of the company, being an increase of 3,714 since April 12, 1911. Of the entire capital stock, 15.7 per cent. is held abroad by 10,000 stockholders.

Sandy River & Rangeley Lakes.—See Maine Central.

Union Pacific.—See Denver, Northwestern & Pacific.

Wabash.—This company has sold to Blair & Co. $1,000,000 5 per cent. equipment notes.

The Chinese government has definitely decided to construct a railway between Kalgan and the city of Urga, capital of Outer Mongolia, to be completed within three years. Kalgan is now connected with Peking by a railway, 124 miles in length. The Kalgan-Urga line is considered a far more important one than the Chinchow-Aigun recently proposed, and will form an important link in the defense program as planned by Yin Chang, the Chinese minister of war. The construction of this line has been talked of for many years past, but the project was never carried out because of the lack of the necessary funds. In view of the recent developments of the relations between China and Russia, however, the Chinese military authorities have concluded that this railway is badly needed for the preserving of Mongolia to China. Engineers of the department of posts and telegraphs estimate the cost of construction at about $30,000,000, and it has been decided to begin work at once.

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FUEL economy is attracting a great deal of attention. The method adopted by the Erie Railroad of having supervisors of locomotive operation on each division to see that the enginemen are given practical instructions in fuel economy, has given remarkable results, as shown by Mr. Randolph's paper which was presented before the Traveling Engineers' Association and is published on another page. The work was started on the Allegheny division in January, 1910, and in the first year a saving of over $30,000 was made, the only expense incurred being Mr. Randolph's salary and expenses. In the first three months of this year there was a saving of $28,600, as compared with the corresponding months of last year.

MR. MELCHER has written, at the request of the *Railway Age Gazette,* a letter on proposed federal legislation to promote railway safety. The letter is given elsewhere. As the chairman of the Special Committee on the Relations of Railway Operation to Legislation Mr. Melcher speaks with exceptional authority. His attitude illustrates that of railway managers in general. He concedes that the carriers should do everything practicable to promote safety. But he points out that the public should be informed not only about the improvements railways should make to increase safety, but also about what they would cost. He makes an estimate, based mainly on data secured by the special committee on the Relations of Railway Operation to Legislation, that to comply with the proposed legislation on the three subjects mentioned would cost $1,361,000,000. The interest on this at 4 per cent. would be about $55,000,000. The roads would have to get somewhere money to pay a return on the added investment. It is not at all probable that the payments for personal injuries would be reduced more than 25 per cent., which would amount to only $5,000,000 a year. Mr. Melcher might have added that if payments for a loss and damage to freight and baggage were also reduced 25 per cent., the total cash on account of injuries to both persons and property would be only $11,000,000 a year. This would leave $44,000,000 of the necessary return on the increased investment that would have to be secured from increased net earnings. The problem, therefore, is not merely related to operation, but it is also related to an important financial problem. Mr. Melcher has done well to direct the public's attention toward these facts. They are not an argument against safety legislation. They are simply that legislation be not considered without full knowledge of, or regard for, the conditions to which it is to be applied.

THE tone of newspaper comment on the demands of the shop employees of western railways should make the leaders of the labor unions think very carefully before they take the final plunge into a strike. The press, as a whole, is a pretty good barometer of public opinion. Nobody would say that its attitude toward the railways in recent years has been very friendly. Whether the issue has been one between the roads and the shippers, or between the roads and their employees, a large majority of the newspapers have taken the side of the railways' opponents. Therefore, the fact that the attitude of the press in general toward the demands of the western shop employees is hostile is significant. We have not seen a single newspaper editorial which defended them. We have seen many in which the demands and the threats to strike are condemned, or even roundly denounced. The Chicago *Tribune* is regarded by railway men—and this much to their regret, because of its great prestige and influence—as distinctly hostile to the railways. Yet the *Tribune* said editorially on August 30:

"It cannot be understood [illegible] men in many industries were reduced after the panic of 1907, theirs were not. Since then there have been general increases. The roads have not fared so well. They have not been allowed to raise rates and have had to [illegible] peremptorily on material concessions. If they were working for a manufacturing company they would not."

The Kansas City *Journal* said on the same day:

"Conditions are rapidly growing from bad to worse and it must be settled sooner or later whether the owners of railways, bound by stringent

laws to give the public a maximum efficiency of service at minimum rates, shall be permitted to manage their property and give that service in conformity to the law; whether, in short, the people's and the owners' interests should be regarded as subordinate to the interests of employees."

On September 2 the Chicago *Record-Herald* said, after reviewing the demands of the shop employees:

"If, as we are often told, strikes are a symptom of increased business and an upward trend, railway strikes at this conjuncture would puzzle, offend and alienate the 'third party,' the general public. Strikes for higher pay, or shorter hours, or redress of wrongs may at times be 'unavoidable,' in the superficial sense of the term. But when business is not normal, when men are dismissed and forced to live on their savings, even strikes for material, direct, palpable benefits are extremely ill advised. What will the general public think of strikes over recognition of a new federation at such a time? Finally, as the last evident proposition, strikes—like lockouts—condemned by the public are foredoomed to failure.'

The New York *Tribune* on August 30 also analyzed the demands of the shop employees, and after condemning them seriatim added:

"Railways are public utilities, operated for the convenience and use of the people, and the people are directy interested in the manner in which they are managed. It would be a monstrous injustice to hold responsible for their management corporations or individuals who had no real authority over it, and it would be absurd to try to hold responsible an organization which expressly disclaims responsibility, or to invest such an organization with authority. It is not by the making of such illogical and extravagant demands as these that labor organizations will win public sympathy in whatever legitimate and reasonable demands they may also make."

The Denver *Republican* also on the same day used the following vigorous language:

"Demands made by the leaders of the 'federation of shop employees' on the Harriman lines are the *reductio ad absurdum* of pinheaded unionism. As well turn the management of the properties over to the walking delegate junta and reverse at one stroke the regular order of business. If the demands made upon the management were granted the union bosses would be running all the roads. The Harriman lines would be conducted for the advantage of the union bosses, not for the good of the public."

More significant, perhaps, than any of these utterances is the following from *The Railroad Employee,* of Newark, N. J., for August, 1911:

"The railway owners, directors and managers of America are at present standing with their backs against the wall, and while the industry remains in its present unsatisfactory state conciliatory and reciprocal, rather than radical and red-flag, means and methods on the part of its servants will unquestionably be productive of the more satisfactory and lasting benefits to every one concerned."

These utterances are typical of what is being generally said. There are no particular demands of the employees that are disapproved. All of them are mercilessly condemned. There can be no question but that these utterances of the press reflect public opinion. With the backing of public sentiment, and with other conditions as favorable to the roads as they could well be, they would be almost certain to win a strike at this time. Victory would give them more complete control of their shops and would warn other organizations against making and pressing such indefensible claims.

THE BRITISH RAILWAY STRIKE.

IT is doubtful whether there is any new lesson to be learned by American railway officers from the recent railway strike in England. Politically, the strike has been worked for all it was worth. It was really an interesting exhibition of opportunism. It would appear that the railway directors and managers have proved better opportunists than the leaders of the men's unions.

The last great agitation among the employees of British railways was in 1907. A "national programme" was drawn up demanding more pay and shorter hours for all grades of workers and recognition of unions. The railways replied that they would [illegible] from their own staff, but firmly refused to negotiate with intermediary societies whose total membership formed but a small percentage of the total staff. The 1907 agitation was most skilfully conducted by Richard Bell, then secretary of the Amalgamated Society of Railway Servants. Mass meetings were held all over the country and, with the assistance of the daily press, [illegible] emergency time tables and making other preparations for breaking the strike should it occur. The unions' ballot resulted in a large majority in favor of a strike, but at the eleventh hour the [illegible] Board of Trade, had most to do with the negotiations and succeeded in getting the railway companies and the men's unions to agree to a scheme of conciliation and arbitration. This consisted of the formation of local conciliation boards for different grades of employees, such as enginemen, signalmen, trackmen and train and station staffs. Under this scheme any grievances that cannot be settled by the local boards are referred to a central conciliation board. If that also fails to effect an agreement, the railway and the employees select some impartial arbitrator of repute, whose decision shall be binding for a term of years, to settle the points in dispute. But this scheme did not give recognition to the unions, and the leaders have chafed under a falling membership during the past three years. Most of the arbitrators' decisions are binding on both parties till the end of 1913, and it was confidently thought that there was no possibility of a general railway strike in England until then at least. Mr. Bell subsequently retired from the secretaryship of the Amalgamated Society of Railway Servants and was given a government appointment. His successors, however, greeted all decisions under the arbitration scheme with loud complaints that they did not give the men enough. But in nearly all cases substantial improvements have been granted in hours, wages and payment of overtime; although these increases are small compared with the percentage of increase of pay voluntarily granted during recent years by some American roads. Complaints were also made, whether justly or not remains to be seen, that the railways have been too slow in adopting the arbitration awards; and it was even alleged that various subterfuges have been resorted to in order to carry out the awards in the letter but not in the spirit. Nevertheless, it is part of the business of trade union leaders to agitate, nobody took these complaints very seriously or thought that the union leaders would break the 1907 agreement instituting the conciliation and arbitration scheme.

During the past summer there have been a long series of labor disturbances and strikes in England. There was a big strike of coal miners in South Wales, followed by the seamen's strike and a strike of dock laborers at Liverpool and London. The London dock strike had no sooner been settled, by giving the men everything they asked, when the street cartage men of several railways running into London struck. In England the railways do, themselves, nearly all the street cartage work that in America is performed by express and local transfer companies. Partial strikes of railway and other transport workers also took place in various cities throughout the country. So far the discontented railway men were acting largely on their own initiative, but the executive committees of the Amalgamated Society of Railway Servants, the Associated Society of Locomotive Engineers and Firemen, the General Railway Workers' Union and the Signalmen and Pointsmen's Union apparently thought that the time was opportune to make a bold bid for recognition of the unions by the railway companies. So, after a joint meeting, they issued an ultimatum giving the railway companies 24 hours to decide whether or not they were prepared immediately to meet the representatives of the men's societies and negotiate the basis of settlement on the matters in dispute affecting the various grades. After this the government had a long series of negotiations with the companies and the trades unions. But the trades union officials refused the government's offer of the immediate appointment of a royal commission to investigate the whole working of the conciliation boards and grievances in connection therewith, although this offer was accepted unconditionally by the railways. The government, while very sympathetically inclined towards the trades unions, for fear of losing the labor vote at the next general election, nevertheless promised the companies that in the event of a strike the railway's property and non-strikers would be adequately protected by the army and the police. As the chancellor of the exchequer said, the government owed a duty to the public in this matter and would protect the railways at whatever cost, as the whole food supply and the life of the community depended on the railways being kept running.

The men were called out on Thursday night, August 17, and the strike continued for two days, but at no period was it general in the sense of paralyzing the railway service as the men's leaders had threatened. Nevertheless it affected about every large railway in England, with the exception of the London & South Western. Viewed as a whole, the strikers' attempt at holding up communication was a pronounced failure, due to the large number of employees who remained at their posts and the extent to which adequate protection to the right of way lines and stations was afforded by the military and the police. The traffic returns for the week which includes the two days of strike show that for the 52 principal railways of the United Kingdom there was a decrease of over $2,400,000, or 19 per cent., in receipts as compared with the corresponding week last year. By the evening of the second day the strike leaders appear to have realized that there was no immediate prospect of their "paralyzing" the trade and communication of the country to the extent which they had threatened, while it was evident that in the main public opinion was against the strike. Therefore, it was suddenly called off at midnight on the Saturday. In effect the terms of settlement have given the men no more than was originally offered them. There was at first some misunderstanding regarding the government's offer of a royal commission, which the men's executives understood to mean an inquiry of a dilatory and academic nature. It was also agreed that all the strikers should be reinstated by the companies, and that no one should be sued for breach of contract or otherwise penalized.

But to American railway officers, with the recent decisions of the Interstate Commerce Commission, disallowing the proposed freight rate increases which the railways contended were justified by wage increases, fresh in their minds, the most interesting feature of the situation is the opportunism of the British railways in obtaining from the government an assurance that legislation shall be introduced next session to the effect that in future increase in the cost of labor is to be considered a valid justification for a reasonable general increase of rates within the legal maxima. By giving this assurance the government has promised to bring the law relating to railway rates into something like a logical order, which has been wholly absent since the passing of the Railway and Canal Traffic Act of 1894.

The circumstances leading up to the passing of that act were briefly these: The Railway and Canal Traffic Act of 1888 provided that every railway company should submit to the Board of Trade a revised classification of merchandise traffic and a revised schedule of maximum rates and charges applicable thereto. This was the first attempt at a general classification ordered by Parliament, though many of the companies had previously had in use for several years a clearing house classification, which was amended from time to time. In consequence of this new statutory requirement, the companies framed a new classification and schedule of maximum rates, which were lodged with the Board of Trade early in 1889. This was the subject of an exhaustive Parliamentary inquiry leading to the passing of Provisional Order Confirmation Acts of the several companies in 1891 and 1892. In most cases the new maxima were below the former, but these maxima were in many instances above the rates actually in operation at the end of 1892. When the new acts came into operation, in January, 1893, such rates as were below the new maxima were put up to the highest legal level. This caused such irritation among the traders that they succeeded in getting an act passed in 1894 which provided that any increase of rates above the level of 1892, even if below the legal maximum, would have to be justified before the Railway and Canal Commission. In other words, the companies were forbidden to charge rates which Parliament, after most exhaustive inquiry, had only two years before decided that they might charge. The result has been satisfactory to neither the shippers nor the railways, and has, in fact, prevented any experimental lowering of rates quite as much as any increase.

Under the legislation now promised by the government, the companies will be relieved of the difficult task of distinguishing before the Railway and Canal Commission the increase in the cost of carrying each particular article. It will also prevent the objector from raising the point that the chief increase in cost has been in the passenger traffic, and not in freight traffic. Another point worthy of consideration is that the law in its present form discourages attempts to cheapen the cost of transit. The government has guarded itself by the use of the word "reasonable" from any too sweeping attempt to increase the rates on freight, though the companies, in their own interests, might have been trusted not to seek to place any undue burden on the trade of the country. From the careful wording of the paragraphs it is clear that it has no reference to passenger fares. Within the legal maxima, which are now generally 3d. a mile for first class, 2d. a mile for second, and 1d. for third, the companies at present have full legal power to alter their fares as they choose.

TRAVELING ENGINEERS' CONVENTION.

THE Traveling Engineers' Association held last week the most successful convention in its history. The attendance at the meetings was very large, the papers were splendidly prepared and the discussions were lively and to the point. Two sessions were held each day, the first session usually beginning about 9:30 a. m. and extending to 1 p. m.; the second session beginning at 2:30 p. m and adjourning anywhere from 5 p. m. to 6:15 p. m. In spite of these long sessions it was necessary to limit the length of time for the discussion of most of the papers, because the subjects were ones in which the members were vitally interested and which they were well fitted to discuss, and also because there were too many subjects on the programme. The latter condition is to be remedied next year, for the executive committee has been instructed to select a limited number of subjects from those suggested by the committee on subjects.

An address was provided for each of the morning sessions, and unlike most of the special addresses which have been made before the smaller mechanical associations this year, each one of the four speakers had a real message to deliver. On the first day Mr. Quayle, superintendent motive power of the Chicago & North Western, spoke on the duties of the traveling engineer. On the second day Mr. Melcher, vice-president of the Chicago, Rock Island & Pacific, expressed his appreciation of the value of the work of the traveling engineer—he is an official who comes in direct contact with the men who actually operate the locomotive. He also told the railway supplymen how they could assist the railways by helping to prevent unwise legislation. On the third day Mr. Foque, superintendent motive power of the Soo Line, outlined in detail a number of ways in which the traveling engineer could increase his efficiency. On the last day of the convention Mr. Dunn, editorial director of the *Railway Age Gazette*, spoke of true scientific management and the part which the Traveling Engineers' Association had in it. All four of the addresses were practical and inspiring.

The association is to be congratulated upon selecting W. C. Hayes, superintendent of locomotive operation of the Erie Railroad, as its president for the coming year. Mr. Hayes made a splendid record as president of the International Railway Fuel Association this year, and is not only a capable presiding officer, but understands thoroughly how to push the work of the association during the year. He is surrounded by a set of enthusiastic and able officers, and next year's convention should be even more successful than this year's.

About 400 members registered and, including the wives and daughters of the members, the invited guests and the supplymen, there must have been at least 1,200 people in attendance at the convention. The banquet hall of the Hotel Sherman and the adjourning rooms were used for the 59 exhibits, which were most attractively arranged. Many southern members were present, and at the last session of the convention they made a strong plea for the 1912 convention. The association has never held

a meeting in the South, and the southern members feel that not only is it due them, but that a great amount of good could be done if the convention took place in the heart of the South where it could be conveniently reached by a large number of members who are now unable to attend the conventions. While August might seem to be an unsuitable time to hold the convention in the South, the records show that the temperature in the southern cities has in many cases been lower than that in the large cities of the North during the past summer. Atlanta, Ga., received by far the largest number of votes, with Chicago second. There seemed to be a strong feeling on the part of many that it would be a mistake to hold the next convention anywhere but in Chicago, since this year's convention has shown conclusively that not only is it possible to get out a larger representation of the members there, but it is most fortunately situated as concerns hotel accommodations and facilities for taking care of the exhibits. The matter is in the hands of the executive committee.

The members of the Traveling Engineers' Association seem to be able to express themselves better while talking in convention than do the members of any of the other mechanical associations, the Master Mechanics' and Master Car Builders' Associations not excepted. This is probably because these men are continually instructing the engineer and fireman in more or less complicated matters, and because they are successful in their work only to the degree to which they are able to express themselves clearly and intelligently. Most of them talk not only logically, but loud enough to be plainly heard throughout the room. This adds much to the value and life of the meetings.

THE UNIFORM CLASSIFICATION COMMITTEE AND ITS WORK

THERE has been more or less demand from shippers and the Interstate Commerce Commission for a uniform classification of freight ever since the commission was created. The railways about three years ago organized a Uniform Classification Committee to do the work necessarily preliminary to the making of uniform classes. Whether they are acting in good faith has been questioned recently. A shippers' paper has intimated that the committee, while making a show of activity, has been doing little. It apparently proceeds under the false assumption, that there can be nothing done in the direction of classification uniformity until a complete classification is submitted for use all over the country. The Official Classification Committee, having issued and widely distributed a public docket of changes proposed in an effort to bring the different classifications nearer together, is represented as having been guilty of some mysterious underhand work. "This sort of manipulation," it says, "has been going on for more than 20 years. It should no longer be tolerated without a protest to the Interstate Commerce Commission."

A month later the Western Classification Committee docketed the changes that had been docketed by the Official Classification Committee, and the traffic men of several commercial organizations appeared before it at Milwaukee, making representations implying that the committee was expecting too much in proposing the immediate consideration of so many items. Their spokesman, [illegible] C. Wilcox, of the Commercial Club of Kansas City, where the shippers' paper referred to is published. Mr. Wilcox read to the Western Classification Committee a resolution stating that the shippers "urgently requested that, in view of the voluminous subjects in part 2" (of the docket of the Western Committee) "being not in the hands of the public in time for proper consideration, and in the interests of harmony and [illegible] the Classification Committee set a date [illegible] hearing on all matters in part 2 of the docket." The "voluminous subjects" mentioned were docketed by the Western Classification Committee by the Uniform Classification Committee. That the Uniform Classification Committee has [illegible] for consideration so many changes that the traffic experts of the commercial organizations [illegible] months in which to digest them, perhaps answers the criticism that it has not been doing anything. As a matter of fact, part 2 of the docket of the Western Committee contained 2,300 items.

Although the number of items up for consideration is large, the number of proposed changes that would affect any particular industry is small, and, therefore, while the representative of a large commercial association might find it hard to inform himself regarding all proposed changes that would affect all the members of his organization within a month, or possibly a year, the traffic representative of any individual concern could familiarize himself with the changes that would affect his concern in a few hours at most.

The *Railway Age Gazette* in 1909 (beginning with the issue of September 3) published articles defining the work for which the Uniform Classification Committee was formed. That committee has nothing directly to do with deciding the classes in which commodities shall be placed, or the rates that shall be charged. Its instructions from the committee of railway executive officers supervising its labors were to frame rules, descriptions of articles, requirements regarding packing, and minimum weights, which could be used throughout the United States. This was a large assignment. It had been ascertained that in the Southern Classification there were 3,503 l. c. l. ratings and 703 c. l. ratings; in the Western Classification 5,729 l. c. l. ratings and 1,690 c. l. ratings; in the Official Classification 5,852 l. c. l. ratings and 4,235 c. l. ratings. These figures partially indicate the extent of the differences between the classifications, and also the very large number of specific descriptions of articles which the committee has undertaken to unify. When it is considered that, in addition to trying to frame for all articles of commerce descriptions that would be accurate, intelligible and of universal application under all the varying conditions of the country, it had to undertake a revision of all the classification rules in effect and to decide on minimum carload weights which could be fairly applied everywhere, it will be seen that the committee was given, and has been engaged on, a very large task. It is a task comparable to, but very much larger than, that which Congress has turned over to the government tariff commission.

About 40 per cent. of the work delegated to the committee has been done. More of it would have been finished but for the fact that the procedure outlined for it was changed. The original plan was for it to proceed continuously with the revision of rules, descriptions and minimum weights until it was ready to propose a complete uniform scheme. But some time ago Commissioner Clark of the Interstate Commerce Commission, who is chairman of the committee on uniform classification of the National Association of Railway Commissioners, made a suggestion, the wisdom of which at once appealed to the railway traffic executives. This was that the committee from time to time during the progress of its work suggest to the territorial classification committees such changes as it had already decided to be desirable in the interest of uniformity. It was pointed out that if the committee's recommendations were adopted from time to time it would be only a short while after it finished its work until uniformity in rules, descriptions and minimum weights would be brought about. Meantime, the benefits of partial and increasing uniformity would be enjoyed by the railways and shippers. For some months, therefore, the committee has been holding conferences with the territorial classification committees, stating, explaining and advocating the changes it has already decided to recommend. It has been charged that the steps toward incorporating the committee's recommendations in the classifications have been taken secretly. They have been docketed by the territorial committees and their dockets have been given the usual circulation before meetings. The Official Classification Committee had been going over the changes suggested by the Uniform Classification Committee for months. The shippers have known this, and all who have made any special effort to find out how their interests might be affected have done so. Many have appeared before the committee. The Official Classification

Committee, to notify commercial organizations of the uniform classification changes proposed in its territory, made an extensive free distribution of its June meeting docket. It is customary for the classification committees to set a date for hearing petitioners who are interested in docketed subjects, whether the subject was docketed by the railway or the shipper. When all have been heard the hearing is closed and the classification committee proceeds with its deliberations. While at its last session in Milwaukee the Western Classification Committee declined to accede to the request of the representatives of the commercial organizations, that consideration of part 2 of its docket be deferred from three to six months, it departed from the usual custom and has kept an open door for nearly two months, considering and hearing all interests regarding the items in that part of its docket.

Many of the objections made to changes suggested by the Uniform Classification Committee have been blanket protests, investigation of which showed that their makers had not used the information available to everyone to ascertain just what was and what was not proposed. The traffic manager of a large organization of shippers handling one line of goods objected before the Western Classification Committee to 48 items in part 2 of its docket. The classification committee showed him that many of the supposed changes to which he objected were not changes at all, and that his arguments concerning other items were based on erroneous assumptions regarding the conditions under which his own traffic was handled. The result was that he withdrew his objections to 45 items.

One thing that has taken a great deal of the time of the Uniform Classification Committee has been the investigation of the conditions under which traffic is handled in different parts of the country, for the purpose of reaching an intelligent conclusion as to what uniform minimum weights should be fixed. Many objections have been raised to the minimum weights proposed by it, but conference has often shown that the shippers making the objections were not so well informed as the committee as to the conditions to be dealt with. In one case the committee suggested advances in the minimum weights applied to certain commodities in western territory. The representative of one large interest protested that the minimums proposed were unreasonable. It was then pointed out that the minimums in question were already in effect in the East, that the largest movement of the commodity was in eastern territory, and that the shipper's own concerns were moving large quantities of goods under the official classification.

The Uniform Classification Committee will continue to submit from time to time to the other classification committees the changes that it favors in the interest of uniformity. It seems probable that in future they will be placed for consideration on each semi-annual docket of the territorial committees.

While the existing Uniform Classification Committee has nothing directly to do with ratings, its recommendations do affect them indirectly. A large shipper of a certain class of goods represented to the committee that he could reasonably load 30,000 lbs. of his goods in a car. The Official and Western Classification Committees, therefore, docketed for consideration, the matter of giving him a uniform carload minimum of 30,000 lbs. He went before the Official Committee, and protested that he could not be reasonably required to load more than 24,000 lbs. That committee fixed the carload minimum on his goods at this amount. The Western Classification Committee then proposed, in the interest of uniformity, to fix his minimum at 24,000 lbs. instead of 30,000 lbs.; this, however, involved raising his rate in proportion to the reduction in minimum. He then appeared before the Western Committee and objected to a change in the rating, contending that he could load 30,000 lbs. in a car. This is illustrative of the position of not a few shippers.

The Uniform Classification Committee in making recommendations regarding carload minimums has acted on the theory that these should be fixed with reference to the physical and commercial conditions under which a commodity is handled. Naturally, the commodity should be given a rating bearing some relation to the carload minimum, the rate per 100 lbs. being higher, of course, when the minimum is low and lower when it is high. As already stated, the committee's present work is merely preliminary to an attempt to fix uniform ratings; and the protests that some of the changes it is now advocating are calling forth doubtless will seem like a tempest in a teapot compared with the storm that will be raised when a serious effort is made to arrange articles in uniform classes throughout the country. Under present conditions a commodity may be in one class in Official, in another in Western, and in still another in Southern territory. Eventually Uniform Classification will necessarily result in reductions of ratings to some shippers and advances in rating to others. Those who, in consequence, have to pay less for transportation will regard the matter philosophically. Those who have to pay more will be dissatisfied, and will make their dissatisfaction known through vigorous protests. There will be ground for the discontent expressed by many of them, for there is not the slightest question that uniform classification, while it may on the whole be beneficial, will result in injury to numerous shippers. That this will be the case cannot be stated too strongly, nor pointed out too often by railway men; for otherwise they will be the object of attack then, just as the Uniform Classification Committee is now the target for criticism for doing things that it must do if the work it has been assigned is to be successfully accomplished.

The railways did not start the movement for uniform classification. They have undertaken to bring it about in response to demands of the Interstate Commerce Commission, of the National Association of Railway Commissioners, and of many shippers. In accepting the committee's work the railway must and will try to protect their own interests by offsetting changes that will reduce their revenues by changes that will increase them. If shippers do not want such disturbance of business conditions as will inevitably result, their proper course is to oppose a uniform classification at all, rather than to wait until the railways have gone to the trouble and expense of framing it and then denounce them for proposing such changes as they must propose if they are to propose a true uniform classification at all. It is greatly to be feared that shippers in general cannot be prevailed on to inform themselves now as to what classification uniformity really will mean.

NEW BOOKS.

Annual Statistical Report of the American Iron and Steel Association. Statistics of the American and foreign iron trades for 1910. Philadelphia, Pa.: The American Iron and Steel Association. Paper, 6 in. x 9 in., 120 pages.

This report is even more full than in former years. It includes complete statistics of the iron and steel industries of the United States for 1910 and the immediately preceding years; also statistics of the coal, coke and shipbuilding industries of the United States. Immigration statistics are given, and also the statistics of the iron and steel industries of all foreign countries

Explosives and Other Dangerous Articles. Bureau of Explosives, 30 Vesey street, New York. Pamphlet 4¼ in. x 6 in., 45 pages. Price, single copies, postpaid, 25 cents; 100 copies, 10 cents each, delivered at New York; 101 to 500 copies, 8 cents each; over 500 copies, 5 cents each.

This little pamphlet has been issued by Col. B. W. Dunn, chief inspector of the Bureau for the Safe Transportation of Explosives and Other Dangerous Articles, in response to a demand from railway officers and others for a non-technical description of the numerous and frequently mysterious substances mentioned in the regulations which have been issued by the bureau for the safe transportation of explosives. It contains much interesting matter. The portion devoted to explosives fills only seven pages, much the larger part of the work being taken up with inflammable articles, oxidizing materials, and corrosive liquids.

Letters to the Editor.

SOME FACTS ON THE PROPOSED FEDERAL LEGISLATION FOR PROMOTING RAILWAY SAFETY.

Chicago, September 2, 1911.

To the Editor of the Railway Age Gazette:

A recent derailment of a train composed of steel cars has been the subject of editorial comment in newspapers throughout the country. It has been said that the loss of life would have been frightful if the train had been composed of wooden cars.

The accident has therefore been cited as a forcible argument for the use of steel passenger equipment.

A bill to prohibit railways from using, after January 1, 1918, passenger train cars which are not made of steel has been introduced in Congress. It has been stated that the railways oppose such legislation on the sole ground of expense, and that they are less solicitous about the safety of their passengers and employees than they are about money.

Such statements naturally strike a responsive chord in the hearts of many users of railway trains. They suggest to railway officers the need of a more thorough understanding by the public of the problems of safety and of the attitude of the railways thereto.

There is not a railway officer in the country who puts money above human life. That the accident record of American railways is not better is not because railway managers have not striven hard and intelligently to devise and adopt means to reduce accidents. There has been much of legislation to promote safety, and writers on the subject credit such legislation with very salutary results. But such legislation as has been beneficial has been that which has required all of the railways to do what some or many were already doing. The original safety appliances law required the use of train brakes and automatic couplers which the railways for a long time had been developing. These appliances are now in universal use. This is not solely due to legislation. The legislation was suggested by the fact that they already had been widely adopted; and if it had not been passed they might have been in almost as general use as they now are. Most of the legislation proposed is suggested by methods and appliances that the managers of the numerous lines have adopted. The idea of the use of block signals did not originate with the authors of the bills to require their installation. It came from the railway managers who have voluntarily installed them. The railway managers who are criticized as not being properly solicitous about safety have been the pioneers in devising and adopting every existing method that tends to promote it.

Railway managers know better than any other persons the conditions to be dealt with in the matter of safe operation. Conditions vary, and for that reason railway managers differ as to [illegible]. The management of one road considers it advisable to use its available funds in the building of steel equipment before improving its track. The management of another railway differs and believes that its road bed, track and bridges should be strengthened and improved so that all trains can be operated at a fair rate of speed with safety before it invests the money of the company in heavy steel equipment. Still another management believes it better to use available funds for the purpose of installing automatic block signals with which to increase safety of operation and consequent safety of human life. From each viewpoint each one may be right.

There is no unanimity of opinion among experts as to the action of steel equipment in wrecks, and some railway managers may contend that it is safer to operate trains of well constructed [illegible] on good track protected by automatic block [illegible] to expend other funds [illegible] for the purpose of purchasing steel equipment.

The forces entering into a collision are indeterminate and the results are unexpected. There may be as many injuries from the overturning of a steel car as from the same accident to a wooden car. If the platforms of the cars remain in line there will be no telescoping, and scarcely any more danger from such an accident to a well designed and constructed wooden car than to a steel car; whereas, if the platforms are not in line, even the steel cars may suffer in a collision with an attendant loss of life.

The steel car, of course, presents less danger from the standpoint of the fire hazard, and it may be fairly stated that there exists no material difference of opinion among railway men that steel equipment will tend to reduce the hazard of operation; but inasmuch as the art of constructing and designing steel equipment is still in the process of development there is no substantial unanimity of opinion as to the best type of steel equipment or the best design through which safety from its use may be accomplished.

Since the opportunity to increase safety is not confined to any one method, and since there are many methods by which safety may be increased, should not each one of the railways be permitted to adopt such of the methods as in its opinion best fits its conditions to arrive at the proper means of safeguarding its operation?

It is manifestly impossible that all railways be required to adopt all means that tend to promote safety at one time for the reasons that will be explained later.

Bills now pending in Congress contemplate that all roads shall use no cars, except steel cars, after January 1, 1918; that the railways shall enlarge their clearances; that the railways shall install block signals.

These things are desirable, and railway managers will concede that all of these subjects are important and relate to matters to which it is the duty of the railway companies to give serious and intelligent consideration. Notwithstanding the attitude of the railway companies, however, and their desire to create a perfect machine in respect to human life, the serious problem is presented as to the manner in which the money can be obtained for the improvements. Before the public imposes upon the railways such duties it should take into consideration the cost, for the cost is so great as to be a matter of public importance.

The Special Committee on Relations of Railway Operation to Legislation has investigated these matters, and reports made to it by its constituent railways indicate that the approximate expense would be as follows:

Substitution of steel equipment for wood	$630,000,000
To enlarge clearances	344,000,000
To equip with block signals	387,000,000
Total	$1,361,000,000

The estimate of the cost of enlarging clearances is based on reports received from 109 operating railway companies. The estimate of the cost of substituting steel equipment for wood is based on reports made by 193 roads, aggregating 234,834 miles, and covers a total of 54,609 passenger train cars in service on December 31, 1910, and 4,074 put in service after that date or contracted for. The reports showed, among other things, that of the 4,074 cars put in service or ordered in 1911, 62 per cent. were of steel, 14 per cent. had steel underframes, and 24 per cent. were of wood. The estimate of the cost of installing block signals was based on the assumption that it would cost $1,200 per mile of single track thus to equip all lines which have not block signals at present. The committee is making a thorough investigation to ascertain how many miles of line are now operated under block protection, and what it would cost to provide signals for the rest of the country's mileage.

It is probable that the figures given are too small. Some roads reported that it is perfectly useless to attempt even to estimate the cost of enlarging certain clearances, as it would involve so heavy an outlay that it would be practically an impossible task. In many cases millions have been spent, in obedience to state laws and city ordinances, for track elevation, elimination of grade

crossings, etc. Compliance with the proposed clearance law might make it necessary to do much of this work over at an enormous expense.

Assuming that the figures are approximately correct, and to get a better idea of their significance, compare them with some other railway statistics. The compliance with the proposed legislation on these subjects would cost not less than a total of $1,361,000,000. This would be 10 per cent. as great as the net capitalization of the railways of the United States, which amounted on June 30, 1910, according to the Interstate Commerce Commission, to $14,338,575,940. It would be almost one-half as great as the total operating revenue for all the railways in the fiscal year 1910, which amounted to $2,750,667,435. It would be over four and one-half times as great as the net dividends paid by all the railways in that year, which amounted to $293,000,000. The interest at 4 per cent. on the estimated expenditures which it is proposed to require would be at least $55,000,000 per year.

Do not these figures show that the problem is really financial, not operating? If legislation requiring such an enormous increase in the investment in railways is to be passed, there ought to be considered while it is pending the related problem of how the capital for making the increased investment is to be raised, and how a return on it is to be paid. The return must be paid from net earnings; and the necessary capital can be raised only if there is assurance that rates will be such that the necessary net earnings will be secured.

It may be claimed that the railways will get their return on money thus expended by the saving in amounts paid for injuries to persons; but the fact would still remain that the railways would be obliged to raise this amount of money in order to accomplish whatever saving might be effected.

As to the saving to be effected, the reports of the Interstate Commerce Commission show that in the year ending June 30, 1909, the payments for injuries to persons upon both large and small roads amounted to about $20,600,000.

Considering that this amount paid for injuries to persons includes casualties from all causes, a large percentage of which are in no way involved with the subjects which it is proposed to cover by legislation, and assuming that a quarter of this amount would be saved by the operation of the proposed laws, it will be seen that even from this aspect the net results would be an interest return of less than three-quarters of one per cent. on the amount estimated to be expended.

It follows that if the government is to require the railways to make such expenditures in the interest of safety, the authority which regulates the rates and earnings of the railways must take that fact into consideration. How, with a tendency toward reduction of earnings and its undoubted effect on the ability of the railways to borrow money, can such expenditures be made?

It may be that the railways in the past have not presented with sufficient clearness to the Interstate Commerce Commission and the public the facts regarding the conditions with which they have to deal in trying to increase safety. Where measures for increased safety involve such tremendous expenditures the railway officer *must* consider how they are to be paid for; and if the public is to require the adoption of safety measures involving such enormous expenditures, it must put itself in the position of the railway manager and consider what measures it shall adopt in order to enable him to find the necessary capital. The people at large must thoroughly understand the situation in which the railways find themselves; and it is the duty of the railways to assist in a candid discussion of what these bills actually mean, and to secure a free expression of opinion by those qualified to speak as to the ways and means of meeting inevitable expenditures of this magnitude. Such a procedure will be exceedingly helpful in the present state of public opinion.

The Interstate Commission in the rate advance cases held that the present rates are reasonable. If the present rates are reasonable, and with them the railways cannot earn money enough to make the vast expenditures which these measures contemplate what process must the railways follow in order to provide the capital necessary to the ultimate consummation of "safety" legislation?

It appears essential that the commission should have knowledge of prospective as well as current expenditures, for the reason that the commission controls the income of the railways and should know of the prospective outlay which the railways may be required to make for the benefit of the public. It would seem within the bounds of common sense that before congress acts upon proposed legislation it should refer it to the Interstate Commerce Commission for a thorough investigation and recommendation; or the procedure should be so directed that congress will require the Interstate Commerce Commission to submit and recommend in specific terms legislation covering such subjects.

The commission was created to regulate the railways on the correct theory that an expert body in continuous session could do this work better than a law-making body, and, to be consistent, this should be extended to matters affecting operating legislation. The commission should be more competent than any other public body to say what can and should be required of the railways, and yet it is constantly having added to its duties the responsibility of administering laws the enactment of which it has not recommended, and with which, it may not always be in sympathy. With congress passing laws increasing the expenses of the railways without regard to their income, and the commission regulating their income without knowledge of the burdens to be imposed upon them by congress, is it not inevitable that injury will be done to both the railways and the public which they serve?

F. O. MELCHER.

FOREIGN RAILWAY NOTES.

The Imperial Taiwan Railway of Formosa is to be changed to standard gage, and that part of the line running from Taihoku to Keelung, 18.2 miles, is to be double-tracked this year. In the Arisan timber area now being opened up in the lower part of the island, 43 miles of railway are being built. In this section there are about 27,000 acres of timber, the principal varieties being oak, elm, and camphor, with a little ebony. None of the timber is exported, but railway development along with water transportation is expected to change present conditions in the timber trade.

It is said on very good authority that the report of the Swiss commission which has been investigating the question of the electrification of the Swiss national railways will recommend the adoption of the overhead system. This decision has been arrived at after a most careful comparison with the third-rail system as adopted upon the underground railways of London and other electric railways in England. The importance of electric railway working was fully recognized by the Swiss state authorities as far back as 1904, when a commission of 22 experts was appointed to study the matter. Up to the present time three reports have been issued by this commission. The first deals with the probable power requirements of the whole federal system, consisting of 1,830 miles; the second concerns the nature of the traffic; and the third deals with the most suitable system—that is, continuous current or alternating current. The report about to be issued will recommend the adoption of a single-phase alternating-current system, with a pressure of 15,000 v. in the overhead wires. The first work to be taken in hand will be the conversion of the St. Gothard Railway, and comparative estimates have shown that the adoption of the third-rail continuous-current system would involve a capital expenditure of about 8 per cent. more than the overhead system. The total cost of conversion to electric traction upon the overhead system is estimated at $13,140,000, while the running costs are estimated at about 10 per cent. less than the present cost with steam traction. Although no specific sums were mentioned in the Swiss budget for 1911 for the electrical equipment of railways, certain amounts were included for the acquisition of water power for the generation of the necessary electrical energy, and also for further preliminary calculations.

STATION AND TERMINAL YARDS OF CANADIAN NORTHERN AND GRAND TRUNK PACIFIC AT WINNIPEG.

BY J. SCHOFIELD,
Assistant Architect, Canadian Northern.

The Fort Garry station and terminal yards of the Canadian Northern and the Grand Trunk Pacific at Winnipeg are now nearly completed and will be opened for service soon. They occupy about 75 acres of ground, which is entirely covered by the necessary terminal facilities, including train shed, passenger station, passenger tracks, team tracks, freight tracks and sheds. The accompanying plans show these facilities in detail, and also indicate the difficulties which were met in getting a practical layout adapted to a through station, in a limited area, bounded, as it is, on two sides by the Red and Assiniboine rivers, and on another side by the main street of the city. The location is the best that could have been secured in Winnipeg, the station building being located on Main street centrally facing up Broadway, and within a few blocks of the intersection of Main street and Portage avenue, the hotel and business center of the city; while the freight sheds are near the wholesale district. On this site was originally situated Fort Garry, which was built in the [illegible] to protect the old trading post of Winnipeg.

Rear View of Station and Train Shed During Construction.

THE PASSENGER STATION.

The passenger station, which is now practically completed, is a massive four-story structure, with basement. The most prominent feature is the central portion with its great arched windows on all four sides, surmounted by a massive dome 90 ft. in diameter and rising 93 ft. above the level of Main street. The building is 352 ft. long, with a width of 140 ft., and covers a ground area of about 50,000 sq. ft. The front and two ends are faced with cut stone and the track side with white brick. The principal entrance is from Main street beneath a great stone arch, which has massive stone columns on either side projecting 10 ft. beyond the building walls. Beyond this the main vestibule opens into the circular ticket lobby, which is 90 ft. in diameter, and is entirely unobstructed by columns or seats. It is exceptionally well lighted by the arched windows from all four sides. On the east and west sides the windows open directly out, while on the north and south sides they open out on large open courts. Opening off the ticket lobby on the ground floor of the south wing are the ticket offices, baggage checking counters and baggage and express rooms, while the north wing is devoted to the general waiting room, with women's and men's waiting rooms on the side next the tracks, and the restaurant and lunch room on the street side. The central portion of the waiting room and the baggage room are covered over with arched sky-

View of Winnipeg Station from Main Street.

lights 40 ft. x 100 ft., over which are open courts providing light to the inside offices on the upper floors of the building.

The interior decorations of the ticket lobby give the effect of stone construction from the top of the marble wainscoating to the summit of the dome. The walls of the waiting room are embellished with the coat of arms of each of the provinces comprising the dominion executed in gold leaf and colors. The entrances to the offices are directly off the front vestibule with iron and marble stairs and three passenger elevators on each

Waiting Room.

side. The building is finished throughout with oak. The floors of the ticket lobby, waiting rooms and toilets are of terrazo, and the remaining floors of maple.

The basement floor is 15 ft. below the level of Main street, and is devoted to the boiler room, storage, immigrants' waiting rooms and bath rooms, barber shop, laundry, dining and sleeping car supplies and mail rooms. The second, third and fourth floors are entirely occupied by the local and general offices of the two roads, the Canadian Northern in the north wing, and the Grand Trunk Pacific in the south wing. The building is heated by steam and has mechanical ventilation. It is designed so that no artificial light will be necessary, all the space having direct light and ventilation. Owing to the nature of the Winnipeg soil, and to the fact that the high water level of Assiniboine river, 1,000 ft. distant, is only 3 ft. below the level of the basement floor, great care had to be exercised in placing the foundations. All the basement walls and foundations had to be thoroughly waterproofed and drained. The soil at this point is the blue clay common to Winnipeg, the supporting power of which cannot be relied on to sustain a load greater than 2,500 lbs. per sq. ft. The use of piles was necessary, and, concrete piles were abandoned in favor of wooden piles, which were driven beneath the footings 35 ft. to rock. A test was made on a single wooden pile, on which a load of 70 tons was placed after being driven. This load was carried for a period of two weeks without any settlement. Provision has been made in designing these foundations and the steel framework so that four additional stories may be added, as found necessary.

The framework throughout is of steel. The columns are all built up I-beams. The maximum column load is 1,292,000 lbs., and the corresponding cross sectional area is built up with 6 in. x 4 in. x 11/16 in. flange angles, one 12 in. x ½ in. web plate and eight 14 in. x 11/16 in. flange cover plates. The lower sections of the columns are about 37 ft. long, and extend through the basement and first story, while the second sections, which extend through the second, third and fourth stories, each of which are 12 ft. 8 in. high, are about 38 ft. long, excepting under the dome, where some are 50 ft. long. Those columns with heavy loads have widely extended bases distributing the loads across the full width of I-beam grillages seated on concrete footings which are supported on piles. The base plates are 1 in. thick, and project considerably beyond the column flanges. They are reinforced by extended wing plates riveted to the column flanges and by stiffener angles on the wing plates. The grillage beams are entirely encased in concrete, which is extended up to cover the base plates of the columns. The grillages for the heaviest loads are made with four 36-in. I-beams and those for smaller loads are made with three 24-in. I-beams. They are set on rectangular concrete footings reinforced with old rails placed horizontally above the top of the piles. The heaviest column load required 16 piles for the foundation; the 24-in. grillage beams have nine piles and the lightest column loads have only two piles. About 3,000 wooden piles 35 ft. long and about 14 in. in diameter at the top were driven to bed rock for the foundations. With the exception of a few wall columns and some columns in the dome construction, the columns are located at the intersection of longitudinal and transverse lines from 18 ft. 7 in. to 23 ft. apart, and with few exceptions all the girders are

At the second floor level the offices on both sides of the rotunda are connected by a balcony 5 ft. wide around the dome. The second floor box girders are designed for a maximum column load of 632,000 lbs. 2 ft. 10 in. from the end, and have two 25 in. x ⅜ in. web plates in the planes of the angles of the supporting frames. There are also eight 6 in. x 6 in. x ⅞ in. flange angles and two 26 in. x 15/16 in. cover plates besides four 7/16 in. web reinforcement plates under the second story columns.

The dome framing is made with 12 radial trusses, which are supported on columns at the lower ends and are connected at their upper ends to an octagonal framework of vertical trusses which transmit the balanced reaction across the 30 ft. open space in the center. The intermediate trusses are similar to the

Interior, Looking Toward Waiting Room.

main trusses, except they are shorter and of lighter construction, and are supported at their lower ends on horizontal trusses, which connect the columns supporting the dome. The radial trusses have skeleton framework extensions above their top chords to carry the rafters and curved purlins about 6 ft. apart to support a reinforced concrete roof slab 3 in. thick, which is waterproofed and covered with tiles. The arched window which is seen in the front wall of the building is made with a riveted box girder casing which forms a full centered arch rib 38½ ft. in diameter and 15 in. deep. This is divided into five panels by four intermediate riveted columns which are connected

by riveted transverse girders forming window heads and sills.

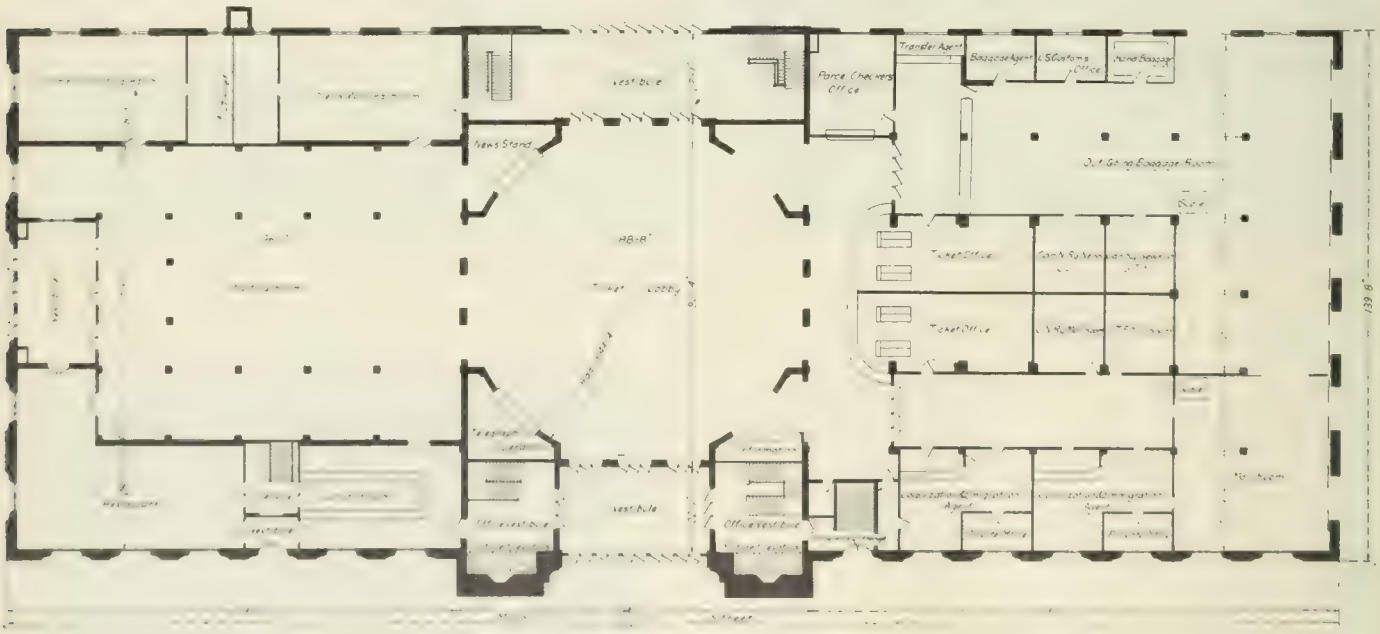
TRAIN SHED AND PASSENGER TRACKS.

A through station layout was adopted, and the approach tracks from the east and west are elevated over the intersecting streets so that they are sufficiently high above the main floor of the station building to allow a passenger subway 50 ft. wide with three sets of distributing stairways each 7 ft. wide on each side beneath. This type is the first of its kind in western Canada. There are eight through passenger tracks, with platforms 20 ft. wide, which will be 1,650 ft. long, and two open running tracks at the rear for through freight trains. By the use of double crossovers each track is capable of handling two trains of 11 cars each during periods of heavy traffic. The total platform capacity will be 200 70-ft. cars. The platforms are constructed of reinforced concrete covered with asphalt and the top is 12 in. above the base of rail. Between each pair of tracks pipe lines for water, steam and gas will be laid. The subway has a headroom of 10 ft., and is so arranged that there will be no interference between passengers going to and coming from trains. The elevation of tracks over the subway, which has a slight ramp, is 10 ft. above the level of the main floor of the station. Underneath the passenger tracks are located the baggage, express and mail rooms. They are approached from Main street by a 50-ft. driveway, on a 4 per cent. grade, along the south end of the building. On each side of this driveway is a row of electric elevators, one for each platform, in this way avoiding all trucking on the platforms, and affording passengers the entire use of them. The subway and the foundations under the train shed are of steel carried on concrete abutments with pile and grillage foundations. The train [illegible] top of the rail to the underside of the steel trusses. Each bay has [illegible] lights and ventilators.

The west approach to the passenger tracks starts from the [illegible] over Main street on a double track plate girder bridge allowing an under clearance of 14 ft. 6 in. for the street. It crosses the Assiniboine river on a double track steel bridge 400 ft. in length, one span of which is of the Strauss trunion bascule type, and [illegible] approach crosses the Red river on a double track steel truss bridge about 900 ft. long, one span being a rolling lift. It crosses Mill street, Notre Dame avenue east and Water street on steel plate girders; the portion of the track between these crossings being carried on a concrete viaduct constructed of reinforced concrete walls tied together with steel tie rods and filled between with ballast. These walls and the bottom are supported on wooden piles driven to rock. The base of rail at this section is from 19 to 22 ft. above the ground level. The track from Water street to the 20 ft. trucking driveway is carried on earth supported by retaining walls. All track is of 80-lb. rail on gravel ballast.

FREIGHT TERMINALS.

The freight yard and sheds are reached from Water street at the east end, from Main street, near the Assiniboine river, at the west, and from York avenue in the center. The team yard will contain 42 tracks of a total capacity of 830 40-ft. cars. It will have three distinct leads connected with crossovers, which will be switched with a minimum of operating expenses. The team tracks are arranged in pairs at 12-ft. centers with 30-ft. driveways between. The driveways are paved with sandstone blocks on a 6-in. concrete foundation. The main driveway, 70 ft. wide, starts at Water street and runs the entire length of the yard to Main street near the Assiniboine river, being connected with Main street by subways at York avenue. The elevation of the team tracks at the main driveway is 750 ft., while the passenger yard is 767 ft. The tracks slope from the lead to the ends on an 0.3 per cent. grade and are drained to a 20-in. main sewer discharging into the river.

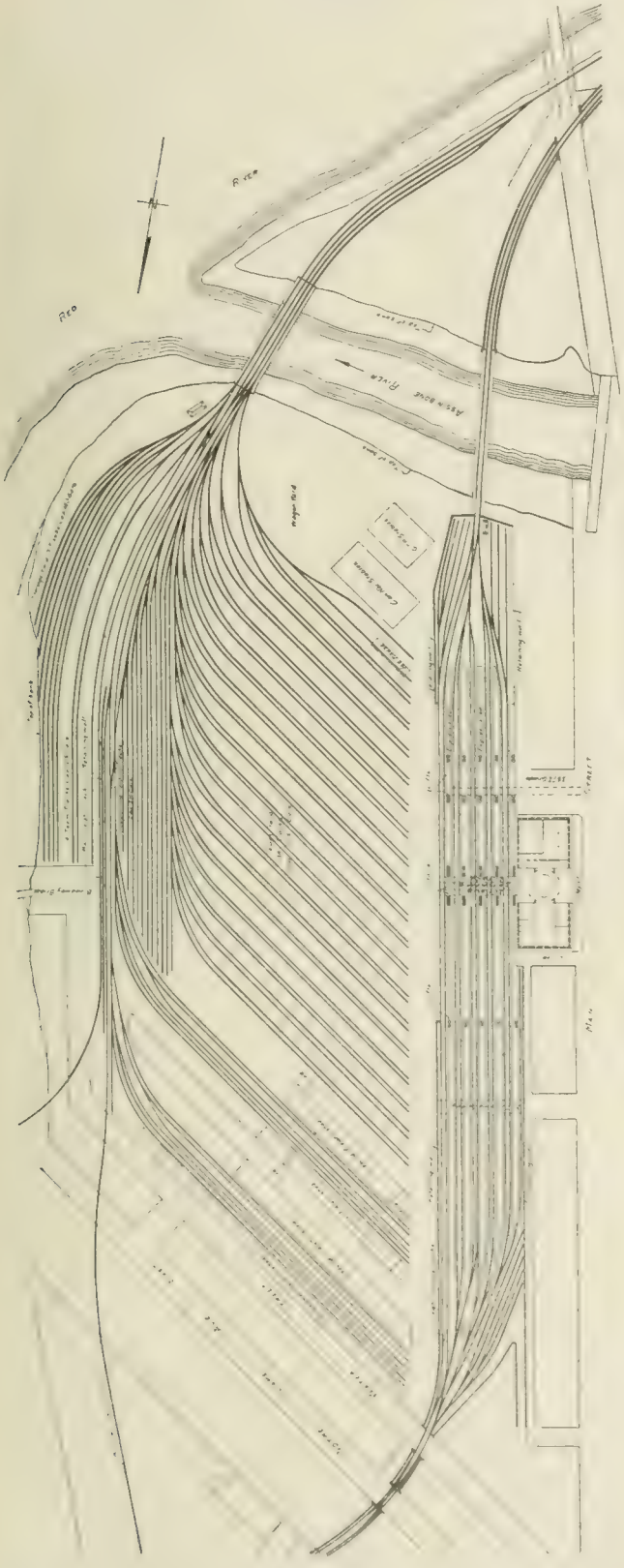


Floor Plan of Winnipeg Station.

The freight shed facilities, of which three sheds are completed, will compare four sheds, two inbound 40 ft. x 900 ft., and two outbound 60 ft. x 1,000 ft. Each shed has a two-story and basement brick portion for offices, along the main driveway, while the remainder of the shed is of steel frame construction, covered with tar and gravel roof. The floors are finished with No. 2 maple on account of heavy trucking, and the buildings are equipped with automatic scales. The footings under these sheds are of concrete with a spread sufficient to reduce the loads to 2,500 lbs. per sq. ft. The supporting yard for the freight shed and team tracks is situated to the east of the freight track leads, and has a capacity of 385 cars. This yard is also connected by a transfer track with the C. P. R. The sharpest curves placed [illegible] so far have been 13 deg., and a No. 7 frog is the standard adopted. For passenger tracks 6 deg. 10 min. will be the sharpest curve with a No. 10 frog.

INTERLOCKING.

The layout requires two towers, one at the north end of the yard near the passenger bridge, and the other at the south end near Water street. They are both electric plants, with the power houses located in the basement of each tower. The north



Track Layout at Fort Garry Terminal Yard; Winnipeg.

tower has 29 working levers in a 72-lever frame and operates 30 functions, while the south tower has 37 working levers in an 80-lever frame operating 40 functions. The south tower also contains controlling apparatus for the lift span of the Assiniboine river bridge.

All the work described is about finished, excepting the team tracks, which are about 75 per cent. completed, and the train shed which is about 85 per cent. done.

This work has been done under the direct supervision of M. H. MacLeod, chief engineer and general manager of the Canadian Northern.

WASHINGTON WORKMEN'S COMPENSATION.

The employers' liability bill of the State of Washington passed by the last legislature, is known as the Workmen's Compensation Act; and it becomes a law October 1. It covers employers' liability to workmen in all lines of industry, employees being divided into classes. Premiums have to be paid to the state at a special rate fixed for each class.

The law provides that each industry in the state shall contribute a percentage of its total pay-roll into the state treasury for the creation of an accident fund, from which the claims allowed for death, total or part disability of employee are to be paid.

Three months' premiums become payable October 1, to cover the remainder of the present year; thereafter the amount is to be paid monthly, except in instances where an industry keeps a sufficient amount on deposit with the state to provide for its accidents; in such case the monthly settlement is waived. All rates are subject to revision, this to be governed by the demands upon the fund, which is to be managed by the state at its own expense.

There shall be no recovery by law where the workman intentionally inflicts self-injury; and the employer, having contributed to this state fund, is not liable at law to employees, their families or dependents, except where injury occurs through intent of employer, in which the recovery may not only be such sums as stated under this law, but suit is permissable for an excess of damage over this amount. The employer is liable to 50 per cent. over the prescribed sum where he has neglected to provide the safeguards and regulations which are required by law.

The law requires that employers report all accidents promptly, and that their records, books and pay-rolls be open at all times to inspection by the commission. Where an employer makes misrepresentation in a pay-roll he is liable to ten times the difference between correct and incorrect figures; refusal to permit inspection of records is held a misdemeanor, with penalty fixed at $100 for each offense. Failure by employer to contribute a monthly assessment makes him liable to a damage suit by an injured employee in his service, with the abolishment of defenses "fellow servant," "assumption of risk" and "contributory negligence." Premiums cannot be deducted from the wages of workmen, and violation is held to be a gross misdemeanor, punishable by one year's imprisonment or a fine of $1,000, or both.

A schedule of payments for death, and for total or partial injury is prescribed. This is a sliding scale of monthly or lump sum amounts, ranging from burial expenses, $75 up to $4,000. Their is provision for monthly payments to widow, or invalid widower, of $20 while unmarried, and lump sum of $240 upon remarriage of the widow. In case of partial disability, a loss of foot, leg, hand, arm or the like, a cash lump sum of $1,500 is to be paid to the workman. Where an injured workman resides or moves out of the state, lump sum payments may be awarded by the commission, not to exceed the amount of $4,000, and based on the table of American mortality.

Any decision rendered by the commission is subject to appeal in superior courts. The commission is composed of three members appointed by the governor; G. A. Lee, Spokane; G. A. Pratt, Tacoma; and J. H. Wallace, Seattle, representing the legal profession, manufacturers and employers, and employees, respectively. The sum of $150,000 has been appropriated by the legislature to put this act into effect.

TRAVELING ENGINEERS' ASSOCIATION

The nineteenth annual convention of the Traveling Engineers' Association was held at the Hotel Sherman, Chicago, August 29 to September 1. F. C. Thayer, of the Southern Railway, Atlanta, Ga., presided and, after an opening prayer by Rev. W. S. Abernethy, made an address in which he directed attention to the importance of the traveling engineer in increasing the efficiency of and reducing the cost of operation; in securing the more economical use of coal, oil and other supplies; in introducing proper tonnage ratings, and in securing higher standards of efficiency for both the engines and the enginemen. The report of the secretary, W. O. Thompson, showed a membership of 812, an increase of 5.4 per cent. during the past year. He has a balance of $384 on hand, with no liabilities, and a considerable amount still due for membership dues, advertising and for examination books. The report of the treasurer, C. B. Conger, showed a balance on hand of $1,328.

THE DUTIES OF THE TRAVELING ENGINEER.

Robert Quayle, superintendent motive power of the Chicago & North Western, made a characteristic extemporaneous address on the duties of the traveling engineer. An abstract of his address follows: Unlike the old adage, "Man works from sun to sun, but woman's work is never done," the traveling engineer must have the responsibility of his position on his mind at all times. Thinking makes the man, and the man who keeps his thought fixed on the thing in hand will steadily but surely rise to the top. If the minutes are taken care of in this way the hours will take care of themselves. The accomplishment of tasks today makes possible the doing of more difficult things tomorrow.

You must have certain ideals fixed before you toward which you are striving. If not, you would not hold your present position or else someone has made a mistake in appointing you to it and you will eventually be found wanting. "You can catch more flies with molasses than with vinegar." Kindly treatment begets kindly treatment, and you must use it to get the best results from the men under you.

The traveling engineer's duties are twofold—he must stand for the men, and he must stand for the company. Get the men with you and stand with them. They will pull for you, and thus for the company which you represent. Be honest! If you believe an engineman is not doing his best, ask him what is wrong with his fireman, and if he replies, "Nothing," ask him about his engine. He cannot blame it on the engine if you are on it and can see for yourself that it is all right. Then you can put it up to him. Tell him you can afford to give him $1,000 or $1,200 a year to stay at home and put some one else in his place. It will touch his pride, for he will not want to be classed below the average. It will make him think, and there will soon be something doing, for the truth pinches and squeezes hard.

The traveling engineer should keep things stirred up, not alone with the enginemen, as suggested above, but with the roundhouse foreman, the master mechanic and the superintendent motive power. If the roundhouse foreman allows work reported by the engineer to go out unattended to, it will make the engineer careless in reporting work. Ask the foreman why it was not attended to, and if he [illegible] who he did not get [illegible]. Keep after the master mechanic and superintendent motive power for the betterment of conditions which you cannot [illegible]. Do not [illegible] as a device [illegible] you succeed in it, [illegible] or other [illegible]. You don't [illegible] the road alone if

[illegible] don't [illegible] of [illegible] get [illegible] to [illegible]. When you get a good [illegible] on one of the [illegible] of being too big to develop it. If you have [illegible] and [illegible] will be [illegible] glad to [illegible] you up.

ACTUAL DEMONSTRATION VERSUS ORAL INSTRUCTION IN AIR BRAKE OPERATION.

Committee:—John P. Kelly, chairman; W. V. Turner (W. A. B. Co.), Wm. Owens (Lehigh), F. E. Evans (D. L. & W.), Malon LaQuay (N. Y. A. B. Co.).

Experience in air brake matters has demonstrated that the man who has a clear and comprehensive grasp of the fundamentals, and at the same time possesses ordinary judgment, meets with greater success in the practical affairs of service than he who possesses a large detail knowledge of the apparatus, but is lacking in the understanding of the necessary principles and in judgment.

Answers to the circular of inquiry with but one exception stated that an actual demonstration on the road of how brakes should be handled was considered of greater comparative value than oral instruction telling how they should be operated, and all replies were unanimous in considering that whatever oral instructions were given should deal more with the essentials of the brake equipment and should treat largely of the fundamental principles on which it is based; emphasis was also placed on the importance of instructing how to detect and remedy serious defects that may arise. The experience of those sending in replies indicated that whenever a road foreman took hold of the brake and made a successful exhibition of skill in handling it, where before the engineman was unable to do this, he not only usually succeeded in improving the work of that man but afterward had his entire confidence, and the demonstration made for much better subsequent service and better mutual understanding all around.

Our greatest trouble at present is in handling smoothly long freight trains, and without breaking them in two. It is evident that the rules in vogue some few years ago will not answer the purpose today. This is because the greater number of cars equipped with air brakes hauled in a single train, the uneven distribution of braking power due to the make-up of the train, and the heavier locomotives used in hauling them, make it almost impossible to find two trains that will handle just alike, and therefore no fixed and unalterable method of braking will apply in every case. It is therefore necessary to formulate a method that will make it reasonably certain that a service stop can be made in the large majority of cases without breaking the train in two, and without severe shock. It is in such cases that the practical demonstration is of great utility, and makes for improved service; in fact, it seems to be the only thing that will bring success, for where no two trains brake just alike it is evident that oral instruction cannot be made to apply except in the most limited manner, for here the individual must rely largely on his own judgment and experience.

DISCUSSION.

The engineman should thoroughly understand the fundamental principles, and the more he knows about the details of construction and operation the better, for it will enable him to more readily locate and remedy any troubles which may arise. The advisability of the traveling engineer attempting to give actual demonstration in the handling of air brakes was discussed at some length. On one hand it was stated that the traveling engineer, with his manifold duties, and especially where his district was of considerable extent, could not possibly handle the air brakes as well as the engineer who made the run daily and was thoroughly familiar with all the conditions. On the other hand it was stated that the instruction in the air brake car was actually comprehended by only about 3 out of 10 men, and that someone, preferably the road foreman, must give practical demonstrations on the road to the other 7. The conditions in the air brake instruction cars are uniform, while on the road the engineman

has to contend with air leaks, variable loading, the physical characteristics of the division, weather conditions, etc. The handling of the brakes under these variable conditions must be practically demonstrated to 7 out of every 10 men.

The engineer should not be blamed for the bad results due to defective equipment, and yet he is partly to blame if he is not able to demonstrate that it was not his fault. One road foreman said that in cases where men did not seem to understand how to handle the brakes properly on a certain run, he had them make the run with men who were handling their trains exceptionally well. It was suggested that practical demonstration was specially valuable on mountain roads because of the serious consequences which might follow a misunderstanding of instructions as to the proper method of handling the air brake.

On the Lake Shore & Michigan Southern the enginemen are instructed to carefully study the effect of the first brake application on a long train. If there is a high braking power at the rear end of the train keep the train stretched and keep air blowing from the brake pipe exhaust after the train comes to a stop. If the heavier braking power is near the front end, shut off in ample time to allow the train to bunch. Tests of a large number of station stops had shown a reduction of from 50 to 75 to from 35 to 40 seconds in the time of stopping by making a reduction of from 20 to 25 lbs. before shutting off.

In closing the discussion Mr. Kelly said that we must be more efficient and economical in educating the men. Instead of teaching them a lot of things of little actual value we should concentrate on the vital things and use practical demonstrations where necessary.

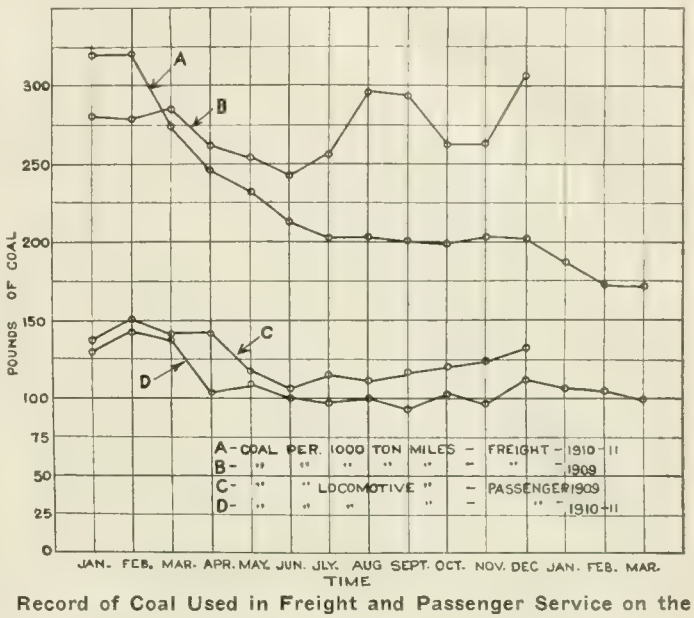
JACOBS-SHUPERT FIREBOX.

A. W. Whiteford, mechanical engineer of the Jacobs-Shupert Firebox Company, New York, gave an illustrated address, describing in detail the construction and methods of manufacture of this box and explaining why it was considered superior to the ordinary type. There were a number of questions asked at the close of the lecture, but no discussion took place. A description of this box will be found in the *Railway Age Gazette* of May 28, 1909, page 1123 and November 18, 1910, page 965.

PRACTICAL INSTRUCTION IN FUEL ECONOMY.

V. C. Randolph, supervisor of locomotive operation, Erie Railroad, read a valuable paper on this subject, of which the following is an abstract: It is not the intention to theorize as to what might or could be done, but to narrate what has been accomplished in actual practice on a railway, where on several divisions supervisors of locomotive operation were appointed who have charge of all locomotives in service, for the purpose of improving economies in the use of fuel, lubricating material, tools and other supplies. In the beginning, it was thought advisable to first try it out on one division. The writer was accordingly assigned to inaugurate the work on the Allegheny division in January, 1910.

The accompanying chart shows graphically the saving that was made on freight and passenger locomotives during 1910, as compared to 1909; also the record for the first 3 months in 1911.



Record of Coal Used in Freight and Passenger Service on the Allegheny Division of the Erie During 1909, 1910 and First 3 Months of 1911.

The curves for the passenger locomotives are based on the pounds of coal used per locomotive mile, while those for freight service are on the basis of the coal used per 1,000 ton-miles. It will be noted that the savings during the first 3 months of 1911 were nearly as great as for the whole of 1910.

Coal Saved on Allegheny Division of Erie Railroad for First 3 Months of 1911 as Compared to Same Months in 1910

January	Passenger	512.67	$748.50
February	Passenger	723.38	1,063.37
March	Passenger	794.29	1,016.69
			$2,828.56
January	Freight	5,988.42	$8,743.09
February	Freight	6,431.56	9,454.39
March	Freight	4,512.74	5,776.31
			$23,973.79
January	Work	143.63	$209.70
February	Work	326.48	479.93
March	Work	47.07	60.25
			$749.88
January	Switching	334.47	$487.35
February	Switching	122.11	179.50
March	Switching	302.15	386.75
			$1,053.60
Total saving			$[illegible]

Coal Saved by Months on Allegheny Division of Erie Railroad, 1910-1909.

	Passenger Service.		Freight Service.				Work Trains.				Switching Service.			
			Tons Coal.		Money.		Tons Coal.		Money.		Tons Coal.		Money.	
Month.	Tons Coal Saved.	Money Saved.	Saved.	Lost.	Saved.	Lost.	Saved.	Lost.	Saved.	Lost.	Saved.	Lost.	Saved.	Lost.
January	193.10	$235.58	.....	1,470.17	.....	$1,793.61	126.50	.....	$154.33	.....	.....	285.69	.....	$348.54
February	170.76	218.56	.....	1,396.94	.....	1,788.08	281.32	.....	360.09	.....	.....	221.08	.....	282.98
March	52.83	65.51	484.27	.....	$600.50	.....	.....	42.79	.....	$53.06	.....	238.11	.....	295.26
April	810.35	1,142.59	537.43	.....	757.78	.....	.....	426.57	.....	601.46	.....	76.30	.....	107.58
May	246.52	322.80	756.90	.....	991.50	.....	54.15	.....	71.00	.....	.....	21.74	.....	28.47
June	163.35	206.00	1,020.37	.....	1,287.70	.....	307.15	.....	287.20	.....	.....	85.53	.....	107.84
July	393.51	499.00	1,881.34	.....	2,389.90	.....	243.71	.....	309.80	.....	51.25	.....	$65.10	.....
August	290.95	374.10	1,450.42	.....	1,872.00	.....	312.81	.....	403.80	.....	121.32	.....	156.60	.....
September	524.61	676.30	1,852.32	.....	2,390.00	.....	203.64	.....	262.30	.....	10.34	.....	13.35	.....
October	446.52	554.00	4,991.30	.....	6,199.10	.....	256.62	.....	318.30	.....	270.28	.....	[illegible]	.....
November	644.00	824.00	3,728.50	.....	4,770.00	.....	.....	22.26	.....	28.50	46.26	.....	59.20	.....
December	603.87	730.00	4,675.30	.....	5,659.00	.....	24.18	.....	30.93	.....	.....	111.57	.....	135.00
	4,540.37	$5,848.44	21,378.15	2,867.11	$26,917.48	$3,581.69	1,810.08	491.62	$2,196.05	$683.02	499.45	[illegible]	$[illegible]	$1,305.67
	Net Saving = $5,848.44		Net Saving = $23,335.79				Net Saving = $1,513.03				Net Loss = $676.4			

Total Net Saving—all classes service—1910 as compared to 1909 $[illegible]

Note.—Apparent discrepancy between tons of fuel saved and its money value is due to the fact that the price per ton was [illegible] the entire period considered.

The author then went on to tell in detail just how these savings were accomplished, and, as developed during the discussion, the only cost to the railway to offset these savings was his salary and expenses. He said in part: Beginning in the middle of a hard winter when traffic was congested, with consequent long hours on the road, with several new engineers and firemen and other adverse conditions that had an influence toward increasing the consumption, and which are familiar to all, it could hardly be expected that very much of a showing in fuel economy could be effected from the start. Also, it required a little time to grasp the situation and become familiar with the proposition. To first attract attention to the importance of economy in the use of fuel and reach as many at a time as possible, instruction classes were held weekly for several months, where engineers, firemen, hostlers, engine preparers, fire cleaners, and, in fact, all having to do with the use of fuel, were thoroughly instructed in its use, after which the meetings were held periodically, or often enough to help keep all concerned interested. As a drawing card other subjects pertaining to locomotive operation, air brakes, etc., were occasionally taken up and discussed, a large blackboard being used for the purpose of illustrating the importance of saving every pound of coal possible. A shovelful of coal saved for each locomotive mile on the Allegheny division would amount to $19,314.24 for the year; for the entire system it would amount to $330,514.56 for the year. The loss through the pops, on the basis of 15 lbs. of coal per minute while one of them is open, would amount to $177,390 a year on the Erie Railroad on a conservative basis.

Other wasteful practices are: Overloading tenders, allowing coal to work out and rattle off, shaking good fire into the ash-pan, firing too heavily and bringing engines into terminals with heavy and very dirty fires. However, these losses are small, compared with what the engineer may waste by leaving the reverse lever in the corner too long in starting, and not working steam as expansively as possible when running; also by not taking advantage of supplying water to the boiler at the proper time; running too fast between stations, especially on local trains, and then waiting for time; also working steam longer than necessary and then checking speed with the brakes.

A number of drawings were made showing sections through the firebox and the effect on the temperature of the gases due to wrong methods of firing, and also demonstrating the advantages of cross firing. The method of cross firing recommended is as follows: (1) Shovel to left front corner, (2) right back corner, (3) right front corner, (4) left back corner, (5) left side two-thirds distance from back end of box, (6) right side one-third distance from back, (7) right side two-thirds distance from back, (8) left side one-third distance from back. This method tends to keep the fire nearly level, except that it is a little heavier next to the sheets to prevent too much air entering at these points, as the air will not be heated to the igniting point until it gets near the middle of the firebox on account of the temperature near the sheets being held down by the heat absorbed by the water on the opposite side of the sheets. We have also found it very convenient and instructive to draw on the blackboard views of the boiler and firebox, and explain how the draft is created and equalized evenly over the fire, the effect of steam or air leaks [illegible] work with less fuel.

[illegible] and the quicker he can get satisfactory results. After explaining that three things are always necessary for combustion, i. e., the fuel or substance to be burned, the oxygen with which to burn it, and the igniting temperature, some simple illustration should be made to prove it. In the absence of something better a common match may be used, explaining that different substances burn at different temperatures, but that it is always the same for the same substance. For example, phosphorus combines with oxygen at a temperature of only 150 deg. Fahr., which is generated by friction when the match is struck on any rough surface; its burning brings the temperature up to 500 deg. Fahr., at which the sulphur burns, with the result of raising the temperature of the wood next to the burning sulphur to its igniting point, which is 1,000 deg. Fahr., when it also burns. However, not all at once, but only as the required temperature is reached.

To burn coal successfully, the firebox temperature must be maintained above 1,800 deg. Fahr. This explanation and some little object lesson to prove that air is necessary for combustion, should convince all of the necessity of feeding the fire lightly and often, with the required amount of air entering the firebox. The fireman should be taught that heavy firing is wasteful and should be avoided. The quantity of coal to be fired at a time depends on its quality, the size of the engine and the amount of work performed. When firing, the firebox door should be closed after each shovelful, and the coal scattered over as much of the fire, where needed, as possible.

By having the coal broken into small pieces of uniform size it presents a greater burning surface and causes quicker ignition than when large lumps are thrown into the firebox; it also allows the air to enter the fire in small streams and furnish the necessary amount of oxygen to create a higher and more uniform temperature. The engineer should be taught to treat the fire as lightly as possible in starting and afterwards to work steam as expansively as possible consistent with the running time. As the proper handling of the injector is one of the most important points in fuel economy, he should take advantage of the most favorable times to supply water to the boiler, considering it as a storage plant, and instead of allowing the pops to blow, utilizing the space to store energy as long as dry steam can be used, even though the water level is above its customary height.

In starting, the supply should always be shut off until the train is brought to a fair speed at least and the fire nicely burning, after which, if on a through train, the supply should about equal the demand, i. e., keep water uniformly level; if a local train, a little water should be lost between stations and regained while drifting into, standing, or switching at stations. By supplying a little less water than is being used between stations, it requires less coal when using steam and leaves space in the boiler so the injector can be worked to avoid the pops opening when the throttle is closed.

The cleaning and keeping of fires at terminals is a very important question. A great saving in coal can be effected in cleaning fires by leaving them in proper condition and plenty of water in the boiler when they arrive on the ash-pit. This requires the co-operation of the engine crews and hostlers. The fire should be burned comparatively low, especially at the back end of the firebox, as about the first thing the fire cleaner does is to drop the back dump grate. As a protection to the flues the fireman or hostler should, before leaving the engine on the arriving track, throw a few shovelfuls of coal into the forward end of the firebox. In cleaning the fire, any unburned coal or live fire in the back end should be pushed ahead, the back section of grates shaken, then the dump grate dropped (when the dump is next to door sheet), and any clinkers broken up and disposed of. The [illegible] clinkers pulled back and forced through the dump. After this operation the grates should be leveled and the dump grate closed. If the engine is to lay over several hours, the fire should be pushed ahead, leaving the dump and one or two grates bare, then covered over as the condition of the fire warrants, in all cases sufficiently to prevent the pops opening. When the engine is ordered, the fire should not be broken up until shortly before

leaving time, unless necessary on account of poor fire. The excessive use of the blower should be guarded against at all times and especially when cleaning the fire. The roundhouse foreman and staff should understand the importance of keeping the draft appliances, grates and flues in proper condition.

The condition of the locomotives is the governing factor in effecting fuel economy, and it would be poor policy to neglect repairs that would cost a few dollars and by so doing consume perhaps a hundred dollars' worth of coal per month or even more. The location of the steam gage should be given more attention, particularly on the large locomotives, as close firing requires close observation of the pressure. If a swing door, the latch should hold it positively open when putting in coal; when practical, a small chain should be provided, hung from some convenient point and only slack enough to allow it to drop into place. The deck sheet should be closely fitted, leaving no holes for coal to drop through. By looking after these apparently small points it helps to get and keep the co-operation of the engineer and fireman, and in this way a greater reduction in fuel may be made than by any device which can be applied to a locomotive.

The benefits derived by educating firemen in the art of handling fuel and the savings effected thereby have resulted in issuing a book called "Good Firing," which is given to each fireman when entering the service; a book of elementary questions also is furnished at the same time. At the expiration of his first year's service he is required to pass a written examination, which is verified by an oral one conducted by the road foreman of engines or other persons appointed by the proper authority, necessary knowledge being obtained from the book furnished, attendance at instruction classes held by the road foreman or supervisor of locomotive operation; also from information received and instructions given him by either, when on the engine or otherwise.

At the end of the first year and after passing the examination, the first year's question book is returned and the list of questions on the second series is given him. At the expiration of the second year, another examination follows, which is progressive in form, it being a little harder to obtain the answers. The third year's series consists of his final mechanical examination, which, if satisfactorily passed, qualifies him as a locomotive engineer.

Individual Performance Sheet.—To create interest in a competitive way among all engineers, an individual performance sheet is issued monthly on each division, which shows the name of each engineer, the number of his engine (when regularly assigned), the engine mileage made by each enginer, the amount of lubricating material used and cost per 1,000 locomotive miles, also the miles made per pint of oil. It also shows the number tons of coal used and cost per 1,000 ton miles in freight service, and the number tons of coal used and cost per 1,000 locomotive miles in freight, switching and passenger service, respectively. In freight service the total ton-miles moved are also shown. The cost of tools and other supplies is shown on the 1,000 locomotive mile basis for all classes of service. A percentage column relates entirely to each of the three sub-divisions, the percentage being based on the lowest performance, i. e., the lowest in cost will be classed as 100 per cent., all others being of a corresponding ratio. While costing considerable time and money to prepare a report of this kind, it has proved itself to be a good investment to the company, for as a rule each engineer and fireman takes pride in trying to reach the 100 per cent. mark.

DISCUSSION.

The discussion developed the fact that the only expense incurred by the railway in securing the large savings mentioned, except for the performance sheet which had previously been in use, was in Mr. Randolph's salary and expenses. Also that the greater part of the instruction was by means of practical demonstration on the locomotive. One grade revision was made in the early part of 1910, but very few trains were run over the cut-off until October, 1910. All other conditions, physical and operating, were the same as for the previous year. One speaker said that engineers and firemen soon lost interest in fuel saving if accurate means were not at hand for keeping a close check on the amount of fuel used. It was also suggested that a fuel performance sheet, to be effective, must take the varying conditions of operation, etc., into consideration. That is why the ordinary performance sheet does not accomplish its purpose. The men should be grouped in classes, so that they can be compared.

The enginemen cannot be expected to make great efforts to save fuel by the scoopfull, if they see it wasted in innumerable ways before it gets on the tender; therefore the importance of fuel saving should be appreciated by the entire organization from the top down. Smoke is not due to a low temperature in the firebox for the hydro-carbon gases are colorless until they are split up at a temperature of 1,800 deg. Fahr. It is rather because there is not sufficient oxygen in the air to combine with the carbon as it is released from the hydrogen. Opening the fire door cools the fire and allows the hydrocarbon gases to escape in a colorless form and without being consumed. Proper banking of fires at terminals is most important. If banked at the front flue sheet they keep the flues uniformly heated; if banked at the rear, hot gases rise and pass through the upper flues, but cold air comes up through the grates and passes through the lower ones causing leaky flues. Reach rods are too long on most engines. They were shortened on the Erie with splendid results.

The performance sheets mentioned in Mr. Randolph's paper were in use before his work was started on the Allegheny division. The engineer when taking coal gives a ticket to the men in charge of the coaling station.

On the high capacity locomotives where the fireman is forced to work near his limit, the problem of closing the fire door after each shovelfull becomes a serious one. Several of the members spoke very favorably of the use of automatic fire doors under these circumstances. An instance was also cited where the heat prostrations during the summer months were greatly reduced, due to the application of such doors. The company should do its part in making the work of the men easier. Undoubtedly the engineer would just as soon hook the lever up a little higher, if he was sure that it would not interfere with the lubrication of the valves and cylinders, and if the lever could be easily handled, so as not to threaten to jerk him off the seat box.

Mr. Randolph said in reply to a question that in riding the engines he checked the work of the fireman carefully. By means of a counter in his pocket he kept track of the number of shovelsfull fired. Of course the different firemen vary as to the amount they carry on the shovel, but by watching closely this could be estimated with a fair degree of accuracy. The figures at the end of the run were checked against the amount of coal remaining on the tender. In this way it is possible to get a good line on the men, especially when a number of records have been taken for different men on the same run and under similar conditions.

Where a man's record is poor, as shown by the monthly performance sheets, the matter is taken up with him privately; letters are used only under extreme conditions. The transportation department has assisted in the work where matters have been called to its attention which could easily be remedied. On the Allegheny division of the road the coaling stations are such that a fairly accurate estimate of the coal given to each engine is possible.

One speaker said that the first place to begin fuel economy was in improving the condition of the engines. He also experiences a great deal of trouble in securing firemen and believes that the only solution of the problem is in the introduction of mechanical stokers. The best results in obtaining fuel economy are only possible with the hearty co-operation of the higher officials; the road foreman must have their backing to enforce his orders. The discussion of this subject was only closed because it had taken so much time that it promised to interfere with the other

MR. MELCHER'S ADDRESS.

F. O. Melcher, vice-president of the Chicago, Rock Island & Pacific, made an address Wednesday morning in which he commented on the value and importance of the work of the traveling engineer, and then, speaking more especially to the supplymen present, told how they might assist in securing fair and square treatment of the railways in matters of legislation. Following is an abstract of the address: The traveling engineers are the points of contact of the operating organizations through which the effort for mechanical efficiency and operating economy is conveyed to the men who physically move the traffic. They supervise directly and personally "the man behind the gun." The concentrated authority in the matter of instructing the engineer and fireman in the economical and efficient method of handling his engine is mainly with the traveling engineer. It may be due to the personality of the traveling engineer that the engineers and firemen under his direction are good and loyal servants; or it may be due to his lack of tact and proper comprehension of his duties that the employee may misunderstand the attitude of his employer in many things. I wish to express the appreciation of an operating official of the responsibilities of the traveling engineers, and of my friendship and my willingness at all times to give them the proper co-operation and support—and proper support is particularly needed by our subordinate officers in these days.

There was a time when the engineer was the master and the fireman the apprentice; when the fireman learned his trade from the engineer; when the engineer hired the fireman and the fireman had a feeling of obligation to the engineer; when the result was a close and intimate relation between the men on opposite sides of the engine; when there was no conflict of jurisdiction. In the evolution of things the relationship between the fireman and the engineer naturally became changed. The engineer's trade is one thing and the fireman's trade another. The engineer may belong to one organization and the fireman to a rival organization embracing the same class of employees. The system of apprenticeship that formerly existed to a large extent, is now gone. Where the attitude of both the engineer and the fireman is right there is no reason why that relationship should not exist today. Where there is indifference of either side to the other the situation is changed and the problem of instructing the fireman in the duties of an engineer becomes more difficult. The responsibility for the working out of this problem largely rests upon the shoulders of the traveling engineer. He has a knowledge of the local situation, a knowledge of men, and a knowledge of results that should place him in the front ranks of the advisers of the operating officers. It is with his loyalty, his intelligence and through the proper administration of his duties that a railway can be considered well or poorly operated.

Speaking more especially to the supplymen present Mr. Mecher said: "The railways are constantly confronted with the likelihood of a multitude of laws being placed upon the statute books which will affect their physical operation. Numbers of bills have been introduced into Congress and state legislatures having this in view. Some of these bills were introduced in such form [illegible] by some one, as drawn, they were wholly impractical, and in others wholly and unreasonably man[illegible] on the statute, were unassailable as to the [illegible] but constructed in such form as to [illegible] Some two years ago the [illegible] a committee to [illegible] an effort to shape better [illegible] so as to show [illegible] bills would and what effect they should have in modifying or changing existing [illegible]

The name which was chosen for this committee—The Special [illegible] on Relations to Railway Companies to Legislation—is a most significant one, and points toward [illegible] of railway supplies that is to [illegible] and practical business, but of [illegible] its work frank and open, and its progress marks the passing of old time methods. The sole purpose of this committee is to place the facts fully and correctly, and by experienced railway officers and employees, in the possession of those charged with responsibility for legislation.

In the prosecution of its work, the committee encountered activities of all kinds, both those of individuals and those of various associations; but in only two ways has it come into touch with such activities on the part of associations or of individuals engaged in the railway supply trade. The first of these was with relation to the Railway Business Association, of which George A. Post is the very able and active president. Without in any way sacrificing the interests of its members; nor those of the general public, that association has found it possible to strongly reinforce the protest against unscientific and unsound legislation, and contribute materially to a sane working out of the real problems presenting themselves.

The second point of contact was less agreeable, and I trust that you will not object to a frank expression in relation to one form of over zealous business enterprise, which at times makes it very difficult for all who are concerned in any way with the effects and results of legislation. We all admire a good salesman, but it is a serious question whether it is any part of good salesmanship to favor legislation for the purpose of making obligatory the use of a certain appliance, or even of a certain type of appliance, and it is regretted that there is evidence of a number of instances of legislation, fundamentally unsound, which as proposed provided an exclusive market for one device and deprived all competitors of that device of that market. Such cases naturally divide themselves into two classes: (1), where the appliances sought to be specified have not yet been thoroughly approved by the consensus of engineering opinion, and (2), those where the device may be standard, and is satisfactory, but presents no material advantages over other devices to accomplish the same result.

When the first class presents itself there is an opportunity for sympathy with the inventor who has such a thorough belief in his own invention that he feels that if the railways do not adopt it of their own accord that its use should be brought about by legislation. Support of this type of legislation is a commercial crime. Support of the second is open to objection that in the opinion of your customers such a course of procedure is poor business policy. There is little difficulty in meeting proposed legislation embraced in the first class, for no intelligent and conscientious legislator will stultify himself by voting for a measure after he has been shown by acknowledged experts on the subject that its efficiency is rather doubtful.

As to the legislation embraced in the second class: Opposition to it must rest upon the fundamental fact that as between two or more appliances, satisfactorily accomplishing the same purpose, the definite prescription of one must necessarily result in the gift of monopoly to its proprietor. This is a subject with which the various associations of supply men should deal themselves. They can deal with it to far better advantage than anyone else. Where such legislation is introduced it should be the duty of all supplymen to oppose it as far as consistent with good citizenship.

I have in mind an instance of a broad minded action in this matter by a large concern. When legislation was introduced in a certain state legislature, which would result in the adoption of its device, it published to the people of the state in the most public manner its frank opinion that railways should not be burdened by unnecessary and burdensome legislation, and should be permitted to work out their own problems in respect to these matters, and publicly announced its deprecation of methods tending to compel the use of a device against the judgment and ability of the railways. It frankly relied upon the merit of its device to make it attractive to the railways and to find a market therefor.

MALLET COMPOUND IN ROAD SERVICE.

J. B. Daugherty (B. & O.) presented a paper on this subject of which the following is an abstract:

Baltimore & Ohio.—The Baltimore & Ohio Mallet locomotive No. 2400 was put into regular helper service on the Connellsville division. From January 6, 1905, to and including September, 1909, the locomotive made 113,956 miles, the major portion of which was in helping service between Rockwood and Sand Patch. During this period it received classified repairs as follows: Class 4, F. T., Connellsville, February 15, 1906; class 3, Connellsville, June 7, 1907; class 4, F. T., Connellsville, June 11, 1908. Shortly after September 30, 1909, it was shopped at the Riverside shop for class 3 repairs. During the period referred to above the locomotive was available for transportation use 33,499 hours, and unavailable 6,405 hours, or it was available for transportation use 84 per cent. of the time. The cost per 100 miles run for repairs, including running and classified, averaged $9.04. The cost of operating this locomotive from the time it was put into service up to and including September 30, 1909, including repairs, fuel, supplies and in fact every item of expense entering into the operation and maintenance of the locomotive per 100 miles run, amounted to $46.96, based on the actual mileage made by the locomotive during this period.

On February 20, 1906, it was used in road service with a view of making a test against two Class E-27 locomotives, with the same tonnage as handled by locomotive 2400. The results of the test were as follows:

	Two E-27	No. 2400
Number of cars	38	35
Tons	2,473	2,435
Actual running time	2 hrs. 45 min.	3 hrs. 43 min.
Coal consumed	30,000 lbs.	20,000 lbs.
Pounds of coal per locomotive mile.	698	465
Pounds of coal per car mile	18,334	13,280
Pounds of coal per ton mile	.282	.191
Water consumed	19,200	15,700
Water evaporated per pound of coal	8 lbs.	6.05 lbs.

Locomotive 2400 used 25 per cent. more coal than one of the Class E-27 locomotives and 33⅓ per cent. less fuel than two E-27 locomotives. The lubrication of the Mallet locomotive compared with other locomotives in the same service for twelve hours was: Locomotive 2400, three pints valve oil, five pints car oil, one-half cup grease; cost, 32 cents. Two E-27 locomotives three pints valve oil, three pints car oil, one-fourth cup grease; cost, 27 cents.

We have experienced no trouble keeping firemen on locomotive 2400, as they are paid 25 cents per day more on this engine than on consolidation engines in the same service. Locomotive 2400 decreases rail and tie strain since it has but 11 ft. rigid wheel base, and can be handled over track where the heavy consolidation locomotives cannot be used. We have experienced no difficulty in keeping the flexible joints tight in the low pressure steam and exhaust pipe joints.

Chesapeake & Ohio.—The consumption of fuel by the Mallet compound locomotive equipped with a superheater is about one ton of coal less per trip than for an ordinary consolidation locomotive. The Mallet locomotive not equipped with a superheater consumed about one ton of fuel more than the consolidation locomotive. The average cost of lubrication on the Mallet, as compared with all other classes of locomotives, is about 50 per cent. greater on account of the large wearing surfaces. The average speed of the Mallet is about the same as that of consolidation locomotives; they are able to attain a speed of forty-five miles per hour. Firemen consider it less exertion to fire a Mallet locomotive than other classes of locomotives. Judging by the work that has been performed by Mallet locomotive 751, it will make the same mileage and handle 50 per cent. more tonnage than the consolidation locomotive between classified repairs.

Great Northern.—Tests were made on the Great Northern, where Mallet locomotives are in regular through freight service, between Minot and Williston, N. Dak. The division is 122 miles between terminals. Going west from Minot there is a grade of .72 per cent. for a distance of thirteen miles, then a lighter grade of .5 per cent. for a distance of eight miles. The road from that point for a distance of seventy-five miles is what might be termed a rolling prairie with gradual ascending and descending grades; the last eighteen miles of the division have an ascending grade of .72 per cent. into Williston. The Mallets have 20 in. x 31 in. x 30 in. cylinders, 55 in. driving wheels, carry 210 lbs. steam pressure and are of the 2-6-6-2 type. During the summer months these locomotives are rated at 2,200 tons over this division.

The heaviest tonnage handled by the Mallet locomotive during the time of these tests was 1,615 tons in forty-four cars. With this tonnage it consumed one hour and 30 minutes in covering the first thirteen miles of .72 per cent. grade. From that point the grade is somewhat lighter, and the train arrived at Berthold, twenty-two and a half miles from Minot, in two hours and twenty minutes. From this point, as previously stated, the road is a gradual rolling prairie and the next twenty-four miles were covered in one hour and thirty minutes, arriving at Williston in eleven hours and twenty minutes from the time the train departed from Minot, including delays by meeting train and taking water and coal. The Mallet handled this tonnage over heavy grades with considerable less shock to draft rigging than the consolidation locomotive, because both units of the Mallet never slip at the same time and the slack of the train does not run up as in the case of a consolidation locomotive when slipping on a heavy grade. For this reason the Mallet is considered more reliable to handle tonnage over hard pulls than a consolidation locomotive. The speed of the Mallet will be materially reduced as soon as it strikes a slightly ascending grade, while the consolidation locomotive will go over the same grade at quite a high rate of speed. For this reason the consolidation locomotive will make considerably better time on a road which has broken grades. I am unable to give an accurate report as to the amount of coal consumed by the Mallet as compared with the consolidation, but from what I was able to observe while riding these engines I have come to the conclusion that the Mallet type will burn a little more coal per engine mile than the consolidation, but figuring on a 1,000-ton-mile basis, the Mallet will show considerable saving. The Mallet uses about again as much lubrication as the consolidation.

DISCUSSION.

On the Santa Fe, Mallets are being used in through freight service, and rather fast service at that. There is no reason why they cannot meet these conditions if properly designed for such service. The Santa Fe locomotives are of the 2-6-6-2 type and have 69-in. drivers. Any new type of locomotive is expensive to maintain until the men become familiar with maintaining and repairing the details.

Mr. Roesch spent 30 days on the division of the Santa Fe upon which they are used. He had been badly prejudiced against them, but was thoroughly converted. In one instance he was on a Mallet pulling 60 loads with a tonnage of 2300. It went over the division of 102 miles, and as no locomotive was available was forced to go right on over the next devision of 98 miles, and then the next one of 108 miles. In all 308 miles were covered in less than 15 hrs., all delays included. The average speed of these locomotives over a division of .6 per cent. is from 25 to 29 miles per hour, although much higher speeds are attained—as high as 45 miles per hour. Every convenience is provided for the enginemen, including air operated fire doors, bell ringers, reverse levers and cylinder cocks; also coal passers. No trouble is experienced with break-in-twos and the trains get under headway quickly.

W. F. Walsh (C. & O.) was enthusiastic over the results being obtained from the Mallets in road service. They are handling all classes of freight and are of the 2-6-6-2 type with 56-in. drivers and 22 in. x 32 in. x 35 in. cylinders. There are economical both in fuel and maintainance as compared to the consolidation locomotives. A train of 2961 tons was hauled over a

77-mile division in 3 hr. 8 mins. The first 32 miles had a rise of 22 ft. to the mile; the next 17 miles 30 ft. to the mile; the next 17 miles a down grade of 60 ft. to the mile; the remaining 11 miles were rolling.

The opinion seemed to be that Mallets could be used to splendid advantage in road service if specially designed for it.

LUBRICATION OF LOCOMOTIVES USING SUPERHEATED STEAM.

Committee:—M. H. Haig (Santa Fe), chairman; W. O. Taylor (Gal. Sig. Oil); F. W. Edwards (Ohio Inj.); A. Maynes (Can. Pac.); S. Beidelman (C. R. I. & P.).

The effect of superheat upon lubrication depends on the temperature of the superheated steam. The smoke-box type provides for superheating from 30 to 80 or 90 deg. Fahr. above the temperature of the saturated steam, while smoke-tube superheaters have in some cases produced over 300 deg. Fahr. of superheat. Conditions attending the use of low and high superheat will be considered separately.

LOW SUPERHEAT.

Steam temperatures reported to the committee by the roads using smoke-box supreheaters do not exceed 490 deg. Fahr. At the temperature obtained with smoke-box superheaters little trouble has been experienced from the use of the same methods of lubrication as employed on saturated steam locomotives and practically no changes have been made. Oil is being delivered to the center of the steam chest for slide valves and inside admission piston valves. Where outside admission piston valves are used the oil is introduced into the ends of the valve chamber. In some cases the cylinders have been tapped to receive direct lubrication at a point in the middle of the bore and near the top. Experience with this method, however, in some instances has led to the belief that as good results would be obtained by the usual method of feeding all the oil to the steam chest. All roads report having found it unnecessary to change the quality of oil with the application of low degree superheat. The oil in use has a flash point of about 520 deg. Fahr. There has been but little increase in oil allowance attributable to low superheat. Very little data has been received showing the effect of low degree superheat on the wear of valve and cylinder packing rings. No case has been brought to the attention of the committee where any change of material from that used with saturated steam has been found necessary. In some cases the wear appears to be a little more rapid. No change in the material of the rod packing has been made.

HIGH SUPERHEAT.

Eight roads have reported the use of smoke-tube superheaters, the superheat obtained varying from 100 to 200 deg. Fahr., with corresponding steam temperatures of 490 to 580 deg. Fahr. Other than increasing the quantity of oil used with either saturated or superheated steam, high boiler pressure has no effect upon lubrication.

Methods of Lubrication.—There are several methods of introducing oil to the valves and cylinders. Two roads consider it necessary to introduce part of the oil directly into the cylinders. Others have equipped but found it unnecessary to use the cylinder feed continuously, but retain it as a precaution against cutting cylinders in emergency. This is deemed desirable, as oil will reach the piston rings with less delay than when introduced through the valve chamber, especially when the engine is starting. In providing for direct lubrication of the cylinders, it is the practice of the roads reporting to introduce oil in the middle of the piston travel and as near to the top center [illegible] the cylinder as the construction will permit.

Satisfactory results are obtained by the use of the following methods of feeding oil to the steam chest. They all apply to [illegible] piston valves. (a) Two feeds per steam chest, one discharging at each admission port, preferably a little toward the center of steam chest from the ports. This is effected in two ways: by a lubricator feed for each point of delivery, or by two lubricator feeds and oil pipes branched near the steam chests. (b) The customary one feed per steam chest, introducing the oil into the center of steam chamber. (c) One feed per steam chest, introducing oil into the steam channel at a point near the steam chest. (d) Three feeds per steam chest, one in the center of the steam chamber and one at each end near the admission ports. Each point of delivery has an individual lubricator feed. The road using this method makes no provision for direct lubrication of the cylinders. The use of graphite is reported by one road. In addition to valve chamber and cylinder oil pipes, Campbell graphite cups are piped to the relief valves of a number of engines.

To insure proper lubrication at all times, it is recommended by some that steam be admitted to the cylinders when drifting It has been found that even though proper lubrication is obtained while working steam, the valves and cylinder walls become dry after drifting for some time. A drifting valve will let sufficient steam into the valve chambers and cylinders, if properly handled by the engineer. It is reported that by proper care on the part of the engineer in always opening the drifting valve before closing the throttle it is possible to obtain a material increase in life of packing rings. One road connects the drifting valve to the superheater, passing the steam through the superheater before delivering it to the cylinders and reports very satisfactory results. Several roads have made use of mechanical feed lubricators with superheated steam, but it has not proved as satisfactory as the hydrostatic type and its use has been abandoned for the latter.

D. R. McBain, superintendent of motive power, Lake Shore & Michigan Southern, has devised and patented a means of insuring uniform delivery of oil to the steam chest of engines using superheated steam. It is used in connection with the hydrostatic lubricator. Dry steam is led from the boiler through a 1¼-in. pipe to a valve which is so arranged as to be opened by the throttle lever. When open, steam passes through two ⅜-in. copper pipes directly into the steam chest oil pipes, just ahead of the choke plugs at the lubricator end of the pipes. The steam-chest choke plugs are drilled out to the full size of the oil pipes, ⅜ in. in diameter. By this means there is a constant flow of steam through the oil pipes to the steam chest, insuring a constant and uniform delivery of the oil.

Lubricant.—Several grades of valve oil are used on locomotives equipped with high degree superheaters. Flash points of 550 to 600 deg. Fahr. have been reported, but in most cases the same quality is provided for saturated steam locomotives that is now used with superheated steam.

High superheat has increased the quantity of oil used on valves and cylinders. The amount of this increase varies in different cases from 10 and 20 to 100 per cent. The larger percentages reported are due to the delivery of oil directly to the cylinders without a reduction in the quantity fed to the steam chest. In these cases the question of minimum oil consumption has not been extensively considered. The purpose has been to use a liberal amount of oil rather than to risk trouble from insufficient lubrication. The following statement was made by one who has had wide experience with highly superheated steam: "We are running about the same mileage on superheated steam engines as on saturated steam for valve oil, but I consider that the superheated steam engine should be given 10 to 20 per cent. more oil than the saturated.

Packing Rings.—The wear of cylinder packing rings is increased by the use of highly superheater steam. Introducing oil directly into the cylinders has not overcome this condition. The use of special material for packing rings has been attended with good results. The difference in wear of valve packing rings and valve chambers bushings is less noticeable. Piston rod packing has been very little affected by the use of superheated steam.

General.—A few precautions should be observed in connection

with the installing and operation of hydrostatic lubricators. Oil pipes from the lubricator to the valve chambers should be absolutely steam tight to insure the delivery of oil to the proper place. Care should be taken that the lubricator pipes slope toward the cylinders on an even incline throughout their entire length. To prevent the pipes being distorted they should be protected by placing them under the boiler jacket. The steam pipe from the boiler to the lubricator should be of ample size to insure full boiler pressure at the lubricator. It is desirable to start the lubricator from fifteen to twenty minutes before leaving time. It is reasonably certain where this is done that the valves and cylinders will be receiving oil when the engine is started.

Conclusions.—All information on lubrication of locomotives received from various sources agrees so closely on the principal points, that the committee feels justified in the following conclusions:

1. The conditions affecting lubrication are practically unchanged by the degree of superheat commonly obtained from smoke-box superheaters.

2. The flash point of valve oil should be higher than the temperature to which it will be subjected at the point where lubrication is to be effected. Oils now available fulfill this condition, and if delivered to the proper surfaces will lubricate satisfactorily.

3. The hydrostatic lubricator meets the requirements of proper oil delivery. It is considered more satisfactory than the mechanical feed lubricator because of absence of moving parts to wear and get out of order.

4. The life of common gray iron packing rings is too short to commend this material for use with high degree superheat.

DISCUSSION.

F. P. Roesch (El Paso & S. W.) thought that too much attention was paid to having the flash point of the oil above that of the temperature of the superheated steam. The oil cannot burn in the presence of steam, but vaporizes and thoroughly mingles with the steam. As the steam expands and the temperature goes down the oil will condense on the coolest spot in the cylinder, which will be the walls, or just where it is needed. The hydrostatic lubricator must be properly applied and maintained to be effective—too often it is unjustly blamed because of carelessness in its installation and operation.

H. Bentley (C. R. I. & P.) thought that the trouble experienced with the packing was due to the physical characteristics of the division on which the superheater engines were used. It had been his observation that on a level division where there was little opportunity of easing off on the throttle the trouble was far greater than on rolling divisions. A representative of the New York Central stated, however, that on a 135 mile run with a heavy train and a schedule of 60 miles an hour no trouble had been experienced with the packing rings, although there was practically no opportunity of the throttle being eased off, as the division was practically level.

Incidents were cited where a change in the material of the cylinder packing rings produced good results. The Pittsburgh & Lake Erie has a high degree superheater with slide valves. D. J. Redding, assistant superintendent motive power, believed that the lubrication difficulties were due to sudden shutting off the steam; he had found evidences of the oil being burnt when the engine came into the terminal station. He suggested an auxiliary steam line to the cylinders so that a small amount of steam could be introduced in the cylinders after the throttle had been closed, or else the application of larger relief valves. The discussion developed the fact that it is necessary to use a drifting valve when drifting, this valve being opened before the throttle is closed. It allows a small supply of steam to enter the cylinders through auxiliary pipes. The packing troubles can usually be traced to drifting or suddenly shutting off at high speed. Not much trouble, for instance, is experienced with low speed superheater freight engines.

It was stated that the Union Pacific had a superheater engine with slide valves, and that successful results were being gained by the use of bronze valves and valve seats. The C. & O. has 24 superheater Mallets which are used in through fast freight service. The oil is introduced directly into the steam pipe and also directly to the low pressure receiver. Schmidt superheaters are used and Galena superheater oil. The packing has not given any trouble. These engines have no drifting valves and drift down a 17 mile 1.3 per cent. grade at a speed limit of 20 miles per hour.

There seemed to be a more or less well defined opinion in the minds of some of the speakers that entirely too much oil is being used on superheater engines. The men in charge are not yet thoroughly acquainted with the performance of these engines and are afraid to take too many chances with them. As they become more familiar with them they will find it possible to get just as good results with much less oil than many are using at present. There seemed also to be a feeling that the oil pipe direct to the cylinder could be dispensed with. The tallow pipe connected directly to the steam passage in the cylinder saddle was very favorably spoken of.

THE TRAVELING ENGINEER AND HIS DUTIES.

T. A. Foque, general mechanical superintendent, Minneapolis, St. Paul & Sault Ste. Marie made an address at the Thursday morning session in which he emphasized the importance of the work of the traveling engineer. He must be a man of superior qualifications in order to get the men under his direction to secure the highest possible efficiency from the locomotives which they operate. While important improvements have been made in locomotive design, all tending to increase the efficiency, there are still a great many of the older locomotives in service and the traveling engineer is looked to to see that the maximum efficiency is obtained from them and that proper use is made of the improvements on the newer locomotives.

One of the greatest problems before the traveling engineer is fuel economy, and also in some districts the elimination of black smoke. These go hand in hand, for a clear stack usually indicates good combustion, and it should be obtained as far as possible in the interests of economy, as well as for the prevention of smoke. The man factor is of course the most important one, but in addition close attention should be paid to the mechanical appliances. For instance, in many cases the draft appliances are poorly adapted not only to the local conditions, but to successful running as well. The traveling engineer is responsible for this condition.

Lubrication should not be stinted and more oil is required as the capacity of the locomotive increases, but this should not excuse carelessness on the part of the enginemen, or the use of improperly constructed oil cans. The hiring of wipers should be watched closely with the idea in mind that they must make the future engineers and special attention should be made to start the firemen in right from the very beginning. First impressions count for a great deal. The traveling engineer can be an important factor in assisting in the determination of the most economical tonnage ratings because of his knowledge and study of the locomotives in service.

He should instruct the men in the proper manner of making accurate work reports. The engine house foreman will be far more interested in seeing that the repairs are properly made if their reports are accurate and specific. It is not to be wondered at if he becomes disgusted when, after pulling a heavy piston rod, he finds that the trouble is with the valve. The traveling engineer should supplement his reports to his superiors with any good suggestion which may occur to him for the good of the service, even if not strictly in the line of his duties. The financial outlay due to providing and maintaining air brakes is surprisingly large, and to secure the most effective results from

their use the work of the air brake instructor should be ably seconded by the traveling engineer.

An improvement of from 7,000 to 60,000 miles per engine failure on Mr. Foque's road during the past few years has been due to the work of the traveling engineers, and care has been taken not to hamper them in their work in any way. The engineers must be carefully trained and instructed to take advantage of improvements which are being introduced.

EFFICIENT HANDLING OF ELECTRIC LOCOMOTIVES.

S. A. Bickford, of the New York Central & Hudson River, presented a paper on this subject, of which the following is an abstract:

It will take the same average type of man to successfully handle the electric locomotive that we find in steam service, and when electric locomotives displace steam, good results may be obtained by placing the steam locomotive engineers under competent instructors and educating them to handle the electric equipment. Their practical training in handling trains, coupled with previous knowledge of the physical characteristics of the territory over which the trains are to be moved, make them the best available material to educate for the new conditions. The study of the electric locomotive opens up as wide a field of investigation as does the steam locomotive, although we are perhaps safe in conceding that some fields of investigation are not so essential or necessary to make him proficient in his profession, since the generating of power on the steam locomotive comes directly under the supervision of the engineer in charge, which is not true with electric traction. Efficiency in handling locomotives means the ability to handle trains safely with a minimum of cost and delay.

It is not necessary to say anything here about stopping trains handled by electric locomotives since the same devices are used that are standard on steam road equipment. The starting devices, however, are different and certain economies have a direct relation to the method of handling these devices. On steam locomotives the throttle permits of a gradual opening of steam passages from boiler to cylinder when starting, and all the energy taken from the boiler passes through the cylinders. On electric locomotives, "rheostats" or resistance grids are placed in the motor circuit when starting to give the throttling effect above referred to. These rheostats prevent a sudden rush of power to the motors, but at the same time dissipate or give off energy in the form of heat. This is a direct loss. The control of speed of electric locomotives is by means of a controller, which turns on or shuts off the power; by closing or opening some form of switch usually called a contractor, it makes the various motor combinations and cuts the resistance either in or out of the motor circuit. These controllers are semi-automatic and will permit of improper handling on the part of the engineer. A large percentage of failures, resulting in train delays and damage to equipment, are "man failures," due to improper handling of controllers and failure to observe definite instructions.

In accelerating, several things must be kept in mind by the engineer. He must start without damaging the trailing load or [illegible] wasteful dissipation of power. To do this, if schedules will permit, the controller handle should be left in the first running position until such speed has been attained as will permit of [illegible] the motor combinations and stepping out of resistance [illegible] due to overheating, and the highest [illegible] motor.

[illegible] the controller [illegible] the [illegible] of current from the [illegible] [illegible] [illegible]

on the various roads and it is so plainly evident that each case needs special and expert attention that it is difficult to draw any definite conclusions from the data received from the different roads.

Discussion.—There was considerable discussion, largely due to a request on the part of some members for information as to the merits of treating plants vs. treatment in the tender tank. Nothing conclusive was developed.

THE BRICK ARCH.

Committee:—W. G. Tawse (Loco. Sup. Co.), J. A. Cooper (Erie), J. J. Butler (C. & A.), S. D. Wright (C. of Ga.), and V. C. Randolph (Erie).

The design and construction of the brick arch today is the result of several years of close study, painstaking investigations and experiments by men of large experience in locomotive operation, resulting in eliminating the objections that have heretofore existed against the brick arch. The most noticeable improvement in brick arch construction is the sectional arch, the brick being made of small units, so that certain sections can be removed for flue work and staybolt inspection, without interfering with the other portions of the arch, resulting in the saving of the arch and of time due to installing a new arch.

Other things being equal, the brick arch adds to the boiler capacity by making each square foot of heating surface count for more steam. This because of the fact that the firebox temperatures are always found to be increased by the installation of the brick arch. The brick arch adds to the firebox capacity and the fireman's capacity, because the more complete combustion forces each pound of coal to yield a higher percentage of its total heat units. It saves coal because of the better combustion and because of the baffling and retaining effect on the gases and on the fine and light combustible matter, which otherwise would be drawn through the flues in the form of sparks or partly consumed coal.

The brick arch abates the smoke and cinder nuisance by more thorough combustion, due (1) to the better mixing effect of the gases and oxygen of the air drawn into the furnace chamber, and (2) that the longer flame travel gives more time for combustion to be completed before the gases pass into the tubes and are lost. The baffling effect on the cinders is a thing that can be determined, and numerous tests carefully conducted show a very marked decrease in cinder throwing due to it.

The brick arch affords a protection to the flues. This statement can be verified by inquiring of almost any one responsible for the up-keep of flues who has had opportunity to observe the difference in this respect between arch engines and no-arch engines. The result is due, no doubt, to the fact that wide and sudden variations in flue temperatures are prevented by the presence of the arch.

The reasons for a growing demand for brick arches are many, the principal ones being:

1. The growing demand for boiler capacity and fuel economy. This was met in years gone by with larger designs. There was plenty of room for growth in size and weight of boiler and plenty of margin in fireman capacity or endurance. Not so now. These limits are reached, hence the requirements such as brick arches, superheaters and other devices to further extend the capacity of the boiler.

2. The growing public sentiment and demand for economy in railway operation. The consumers of transportation are putting forth arguments for properly enforced methods of economy, hence any accessory that will yield a net saving of even 5 per cent. of a railway fuel bill cannot longer be ignored. A brick arch will give a net saving of from 5 to 15 per cent., depending upon the conditions of operation.

3. The growing public sentiment against the smoke and cinder nuisance. The time is drawing near when the public will demand either the suppression of the smoke and cinder nuisance, or the suppression of the steam locomotives. The arch is recognized as one of the best smoke preventers and as one of the most efficient devices for reducing the quantity of sparks thrown from the stack, and on this account it becomes directly valuable as a fuel saver.

From the replies received it is quite evident that the nozzle tips can be opened up with the application of the brick arch. This is accounted for by a greater percentage of the gases from the coal being consumed; as the function of the brick arch is that of a mixer it brings about a more complete mingling of the gases, thereby aiding combustion, resulting in higher temperatures in the firebox. These claims have been fully sustained by many experiments made on different roads. Many of the replies are very flattering on the benefits derived from the use of the brick arch where water conditions are considered bad, the steam failures having been reduced from 50 to 75 per cent. Instances have been cited where locomotives arrived at terminals with flues leaking each trip without the arch (all are familiar with the excessive loss of fuel with leaking flues) and since the arch has been applied the same locomotives are now making several trips before flues need attention. These favorable results are due to the uniform degree of heat maintained in the firebox, and elimination of the cold air passing through the firebox door, being deflected by striking the arch before reaching the flues.

We do believe, that theoretically there should be no opening next to the flue sheet and that all the gases should be made to pass over the rear of the arch. In actual practice, however, there are localities in which conditions are such as to require clearance at the front, and our only recommendation in this regard would be to experiment with the arch tight to the flue sheet, bringing the drafting of the smoke box to favor it as much as possible, and if, after a thorough trial has been made, success is not met with, use a small spacer block on the tubes. A compromise may be effected by having the middle section tight to the sheet to protect the lower central flues, and the side courses set back to give clearance through which accumulations may be discharged to the grate. This is a question which will no doubt bring out some good discussion on the results of the location of the arch.

The hollow brick wall used on the Central of Georgia was also described (see *Railway Age Gazette,* August 5, 1910, page 225, for results which are being given by this device).

A test was recently made on the New York Central Lines with a wide firebox type of boiler to ascertain the efficiency of the brick arch and arch tubes. The boiler was equipped with four water bars 3 in. in diameter; 458 tubes, 15 ft. 6 in. x 2 in.; firebox length, 105 in.; width 75¼ in.; steam pressure 200 lbs. The evaporative power of the boiler is increased 14.9 per cent. by using the brick arch in the firebox. One-third of this increase is accredited to the water bars, while the remaining two-thirds must be due to the brick arch itself. The reason for this increase is perhaps the storage of heat in the brick arch at an advantageous place near the back flue sheet; the forcing of the path of the flame upward to the crown sheet and on through the upper flues, which are the best heating surfaces of the boiler, and keeping the flues clear of fuel. Without the brick arch, fuel is often thrown or carried by the draft into the lower flues, plugging them and thereby rendering these flues useless. It is very noticeable that there is a saving to the flues caused by the brick arch; for when the firebox doors are opened the in-rushing air must first come in contact with the hot arch and thereby become heated before reaching the flue sheet.

DISCUSSION.

The large switch engines on the Erie at Cleveland, Ohio, are fitted with brick arches which fit tight against the flue sheet and the side sheets. They have 4 arch tubes and 20 brick. Practically no trouble occurs from flues plugging up, although some ashes gather on the front end of the arch. Steam jets, induction tubes and small smoke doors in the fire doors have been used to prevent smoke, but the brick arch has done more to

eliminate it than all the other devices put together. According to the method of measuring smoke in Cleveland no objection is made if it amounts to less than 9 per cent. Switching locomotives with the brick arch average about 2½ to 3 per cent. The arch also saves coal.

Tests on the Santa Fe show a fuel saving of from 11 to 14 per cent., with the brick arch. On the Atlantic Coast Line it was found possible to lengthen a run due to the introduction of the brick arch. George M. Carpenter (N. C. & St. L.), who has so strenuously opposed the Games hollow brick construction is now equally enthusiastic in favor of it.

The discussion brought out clearly that the proper location and arrangement of the brick arch depends largely on the quality of the fuel and the design of the firebox. Theoretically the arch should be against the flue sheet; in some cases it is possible to put it there; in other cases the brick can be placed against it at the center and openings can be left at the corners; in still other cases the arch must be kept entirely away from the flue sheet. The tendancy of the gases is to follow the path of least resistance and when an arch is not used the back sheet and the back end of the side and crown sheets are not as effective as they might be. The brick arch, deflecting the gases, makes these parts more effective and thus makes it possible to secure maximum efficiency from every square foot of firebox heating surface. Tests of different length brick arches show that the elimination of black smoke and the decrease in flue troubles is directly proportional to the length of the arch.

EFFICIENT MANAGEMENT.

Samuel O. Dunn, editorial director of the *Railway Age Gazette* made an address at the Friday morning session in which he said:

Your association exists, and you are met here, for a serious and important purpose. That purpose is the exchange of ideas and experience, and the inspection of the fine exhibit our railway supply friends have provided, with the object of better enabling yourselves to aid in keeping down or reducing the cost and improving the quality of the transportation rendered by the railways of the United States to the public. In other words, you are here to help increase the scientific management of railways. These words recently have been much used in a different sense. They have been employed to designate a special way of training, directing and compensating labor, which is believed by its advocates to promote economy. Now, I have no quarrel with the efficiency engineers. Many of them have done, are doing, and will do good work. But the use of the words "scientific management" is inaccurate, unfair, objectionable. It incorrectly implies that there is no scientific management where the particular principles and methods advocated by certain efficiency engineers do not obtain. Scientific management is the skillful adaptation of means to ends. It is any method by which the best results are secured from the use of money, men, materials, equipment, or structures. Mr. Brandeis said [illegible] in 1910 over $30,000 in fuel, and in three months in 1911 over $28,000. Any means by which such results are secured are scientific, whether so called or not. Year by year the cost of materials and labor on our railways have increased. In spite of that the service rendered has increased and the cost to the public has declined. Mr. Brandeis has been [illegible] the fifteen years from 1894 to 1909 the price of commodities and the wages of labor increased on average 30 per cent, while railway rates remained stationary, and that during the fifteen years railway management prevented the rates on transportation from rising in proportion to the cost of labor and commodities, the people of the United States were saved [illegible] $7,111,433,000 on transportation charges. [illegible] It is high time that the real [illegible] of our railways [illegible] were obtained by the increasingly efficient use of money, men, materials, equipment and structures; in other words, by scientific management, using those words in their broad and proper sense.

It is largely through the work of such organizations as yours that the operation of American railways has been so improved. Your association is one of the answers to the charge that our railways are not operated with sufficient regard to efficiency. Other similar answers are the American Railway Association, the Master Mechanics' Association, the Master Car Builders' Association, the American Railway Engineering Association, the Association of Transportation and Car Accounting Officers, the Railway Signal Association, the Bridge and Building Association, etc. These organizations exist to study means of making each dollar of operating expenses do more and better work, or of getting the same results with fewer dollars. That so many railway officers are active in their labors shows there is no want of zeal among them for economy and efficiency. That the executive officers give their subordinates time and encouragement to do committee work and to attend these conventions shows both their interest in the increase of efficiency and their appreciation of the value of organized effort. There are more active hard-working organizations that exist solely to promote efficiency connected with the railway business of the United States than have ever been associated with any other industry in the world. Many persons who question if the railways are well run, would not do so if they knew something of the untiring, splendid labors of this and other like associations. The railways of America are not operated with 100 per cent. efficiency; no class of concerns is; but largely through the work of your and similar organizations they have been, and are, contrary to an impression now prevalent, probably the most scientifically and efficiently conducted large enterprise in any country on earth.

It was because railway men knew how much they had been doing as individuals and organizations to effect economy, and at the same time give the public better service that they so warmly resented the imputation that they did not know and were not properly conducting their business. When they thought of the grades that had been reduced, of the curvature that had been eliminated, of the additions that had been made to the tractive power of engines and the capacity of cars, of the increases in the average car and train load, of the improvements in the speed and comfort of passenger service, they naturally were indignant. Subsequent developments illustrate the character of those who manage our railways. They have usually been willing to listen to anyone who thought he could suggest a way to make ninety-nine cents do work that previously had required a dollar, or to make two passengers or two tons of freight grow where one grew before. They have not cared much whether the suggestion came from a hostile or a friendly critic, if it was good. So in this case the railway managers at once energetically set about to find how much truth there might be in Mr. Brandeis' accusation, and what further economies could be effected without impairing the service to the public. The past two decades have been a period of big things in American railways. When attention is fixed on big things the smaller ones are apt to be neglected. Government regulation of railways and an adverse money market having put the soft pedal on big things for a while, railway men have had more time to give attention to these smaller things; and they have found there are opportunities for effecting numerous small economies which amount in the aggregate to large sums. They are not saving a million dollars a day yet. It will be a long time before they can do it without heavy reductions in wages, or serious deterioration of the properties, or serious impairment of their public service. But in consequence of the increased attention that is being paid to the little things it is probable our railways are now being more economically run than ever before.

There remain many further economies, some of them large ones, that may be effected, not only in the handling of labor, but in the use of fuel, in the use of the telegraph, in the disposition

of scrap, in the handling of freight to reduce loss and damage, and in a hundred other ways; and the future well-being of our transportation lines and all connected with them will depend much on the practice of reasonable economy in small as well as large things. To the men composing such organizations as yours the managers must look to devise means for doing many of these things. The efficiency engineers have their place. They can offer many useful criticisms and suggestions. But to the men who have had the hard experience of practical work, and who are having it now, the roads must look for practical results.

When the many efficiency methods that are being worked out by individual railway officers and by your and other organizations, shall result in lower costs of operation in future, as they have in the past, who is to get the benefits? The theory of many is that railway net earnings should be limited to a certain arbitrary percentage, and that if, by increasing the efficiency of its operations, a road succeeds in earning more, its profits should be curtailed by reducing its freight and passenger rates. But can there be any justice or consistency in saying to the railways, as the Interstate Commerce Commission did, that they must get such additional money as they need by increasing the efficiency of their operations, and then adding that if they do thus increase their net revenues they will be partially or wholly deprived of the increase by reductions in their rates? The man who made efficiency famous, Mr. Brandeis, recognized the injustice and inconsistency of that. I will read to you a statement that he made not long since while testifying before the Railroad Securities Commission. It has not been as widely quoted as his statement that the railways could save $1,000,000 per day; but it contains more truth.

"Today efficiency in management is in danger," said Mr. Brandeis, "of being punished, whereas it should be rewarded. Efficiency is naturally reflected in large net earnings; and as no ready means exist for determining whether greater net earnings are due to greater efficiency in management, or to higher rates, large earnings are frequently accepted as evidence that rates are too high, and invite a demand for reduction; whereas, in fact, the large earnings may be due wholly to better judgment, greater efficiency, and economy in administration. To take from railway corporations the natural fruits of efficiency—that is, greater money rewards—must create a sense of injustice suffered, which paralyzes effort, invites inefficiency, and produces slipshod management."

Why this policy must have these results is plain. As Mr. Melcher said, the other day, "The traveling engineers are the points of contact of the operating organizations through which the effort for mechanical efficiency and operating economy is conveyed to the men who physically move the traffic. They supervise personally and directly the man behind the gun." Now, you strive constantly to increase the efficiency and economy with which engines are run, not only because you are loyal to your employers, but because you hope and expect by doing so to earn recognition and advancement for yourselves. Your superior officers press you to do your work better, because they hope and expect thereby to secure recognition and promotion for themselves. The owners of the railways similarly take the risks of investment and improvements and extensions, because they hope thereby to get larger profits. But if the owners did not profit by the results of their enterprise, they would have no incentive to insist upon better and better management. In that case they would have no incentive to reward the managers in proportion to the results they got, and the managers would have no incentive to reward you in proportion to the results you got. No one would then have any incentive to strive to promote efficiency. It would be banished from the railway world. There is no efficiency where there are no rewards for efficiency.

The railways in certain sections of the country are now in process of being partially deprived of what Mr. Brandeis called the "natural fruits of efficiency—that is, greater money rewards." To that is due to no small degree certain unfavorable business conditions which persist. I believe, however, that these conditions are but temporary. The public better understands now than it has in the past the conditions and the needs of the railways. It is coming to recognize the fact that the laborer in the transportation vineyard as well as elsewhere is worthy of his hire, and must get it if he is to continue to do good work. There remains yet a good deal of educating—educating in which not only all who are connected with the railways, but in which all who are connected with the supply concerns which have provided the splendid exhibits that we see outside, may wisely participate. If this be well done, public opinion will become more tolerant of railway shortcomings, more appreciative of the good qualities of railway management and more disposed to see all those who are entitled to them receive what Mr. Brandeis truly called "the natural fruits of efficiency—that is, greater money rewards."

AUTOMATIC STOKERS.

J. R. Luckey presented an extensive report on this subject from which the following is taken:

There is now a most gratifying prospect confronting us. Three stokers are what we might term "making good." The large number of replies received from members not having stokers on their roads, and the comparatively few able to tell anything regarding the three machines now under discussion, is an indication that experiments as yet are still confined to a narrow scope; but the building of a few more of the same kind for each road is a most healthy indication, and the extension to a wider field is but a question of time. One stoker of the underfeed type and two of the steam-blast principle will be discussed in this paper.

Crawford Under-Feed Stoker.—In response to the circular I received the following from D. F. Crawford, general superintendent of motive power, Pennsylvania Lines West of Pittsburgh: "We have in use an under-feed type of locomotive stoker and conveyor. The locomotives equipped with stokers have been daily hauling their full capacity and full tonnage, no exception being made between a locomotive equipped with a stoker and one of the same class without. The subject of fuel economy is now under investigation; complete data is not at hand. None of the locomotives equipped with stokers have been provided with brick arches. We have not experienced any trouble with blowing fuel into the flues. We have no record showing that there has been any increase or decrease in flue work due to the use of the stoker. Smoke has been abated to the extent that it has been practically eliminated. Average readings made at the locomotive testing plant show the smoke to be about .4 to .5 of the Ringelman No. 1 chart. This would be about 10 per cent. of total blackness—this being the average reading for a long run. When the stoker is operating the combustion is practically smokeless, but when work is being done on the fire, such as hooking or shaking the grates, smoke of the No. 1 and No. 2 chart is produced for about 20 to 30 seconds. Tests are now being made on the reduction in sparks discharged from the stack. When the stokers were first put on the road, a regular crew followed them up. Now the locomotives equipped with stokers are in the pool, with a fireman instructor to instruct the various crews in the operation of the stoker. With the design of stoker we have in use, stoker and hand-firing may be done at the same time, as there is nothing in the cab to interfere with firing directly through the fire-door. After an operation covering over one year, we have not had any serious delays to trains. As the stoker and conveyor handle all the fuel, the labor of handling coal on the part of the fireman is entirely eliminated. The stoker is built into the locomotive, and does not in any way interfere with the employees. Accurate tests are being made at the locomotive testing plant at this time on the evaporative efficiency. We are using run-of-mine coal, which is being used by all locomotives on our lines. About the same depth of fire

is carried with the stoker as with hand-firing; the depth increases with the length of time the locomotive is on the road. It is not necessary either with hand or stoker-fired locomotives to remove clinkers in the middle of any division."

Then follows a detail description of the Crawford stoker (*Railway Age Gazette,* June 10, 1911, page 1411). A record of seven engines, making 773 separate trips with a total of about 50,000 train mileage, gives an average percentage of stoker work of 92.1 and 67 per cent. perfect trips.

Discussion.—Unfortunately there seemed to be no one present who had had any experience with the Crawford stoker. A letter was read from Mr. Crawford, calling attention to an erroneous statement made by the writer of the paper and stating that the stoker handled successfully any grade of run-of-mine coal, although some difficulty had been experienced with coking coals. Tests of a 4-6-2 locomotive on the Pennsylvania Lines West equipped with one of these stokers showed that it consumed less coal per unit of work than when the most skillful hand-firing was used.

Hanna Stoker.—The Hanna locomotive stoker has been developed during tests covering a period of six or seven years, mostly on the Queen & Crescent. During the past year the workings of this machine have been so satisfactory, both on simple consolidation and Mallet compound locomotives as to awaken deep interest. Results of a series of comparative fuel tests for the C. N. O. & T. P., made by the college of mechanical and electrical engineering, State University of Kentucky, Lexington, show that using coal without the stoker at $1.35 per ton, and coal with the stoker at 90 cents per ton, the cost per 100 ton-miles without the stoker is $1.26 and with stoker 88 cents. Saving, 30.3 per cent. Then follows a detailed description of the construction and operation of the Hanna stoker (*Railway Age Gazette,* July 14, 1911, page 85).

Discussion.—F. P. Roesch (El Paso & S. W.) stated that he had investigated the work of this stoker on the Santa Fe, but that he did not find it satisfactory, although he frankly admitted that the conditions were very much against it. In the first place the coal was not satisfactory. On the early part of the run it had to be broken up before it could be used; on the latter part slack was furnished, but of a peculiar grade with which the representative of the stoker company was not familiar. It is difficult to draft the Mallets to get an equal distribution of the draft, and this means careful handling of the stoker. His objections to the stoker were that all of the grate could not be seen without disconnecting the upper part of the hopper or conveyor, which takes time. He believed, however, that this objection could be eliminated. The deck had been cut away to install the stoker, making it awkward for the enginemen, although this could probably have been avoided. The fuel consumption per unit of work was considerably higher than the average for the month of all hand-fired locomotives on the division. When necessary to resort to hand firing the top of the hopper is removed, but although the remaining portion is not very high, still it is directly in front of the fire door, and therefore in the way [illegible]

G. F. Meredith (C. C. & O.) stated that a Hanna stoker on one of their Mallet locomotives in pool service had given splendid satisfaction, being far more economical, as concerns fuel consumption, than the best hand firing. Black smoke is also reduced. A light fire is carried and the rake is seldom used. The stoker can fire up successfully at the engine house.

[illegible] had tried a Hanna stoker, but had had to discard it because of [illegible] used on that road. He also criticised the small peep hole, which does not allow the entire grate to be seen. This latter objection [illegible]

[illegible] most of the coal is burned on the front half of the grate. With the stoker the coal should be burned evenly over the entire grate area. The use of the stoker cuts down the flue troubles.

Street Stoker.—D. R. McBain, superintendent motive power, L. S. & M. S., in replying to the circular of inquiry said: "The Lake Shore has made a very thorough test of the Strouse and Street stokers on class G-46 engines. The performance of the Strouse stoker was not satisfactory and it has been taken out of service. The Street stoker was designed to handle run-of-mine or slack coal in any proportion from the tender to the firebox, crushing and distributing it uniformly over the grate surface; also to permit free access to fire doors for putting in coal with the shovel, using the rake, or getting into the firebox at terminals without removing any of the parts. Its design permits of 100 per cent. firing with the stoker or part firing by hand, if so desired. The first Street stoker was applied to engine 5883, class G-46, consolidation, 23 x 30 in., April 14, 1909. Expected mechanical weaknesses were found in the first experimental stoker. The principle was so satisfactory as to justify the building of an improved machine, which was applied to the same engine May 27, 1910. This latter stoker has been in regular pool service up to the present time, between Ashtabula and Youngstown, and pusher service on the hill from Ashtabula to Carson.

"The improved design of the Street stoker was later applied to three of our G-5, 23 x 32 in. consolidation locomotives. These are in regular pool service on slow and fast freight between Collinwood and West Seneca. It is possible to work the locomotives to their full capacity with the stoker. Have not been able to effect any definite economy in fuel. No trouble from honeycomb. There is no noticeable difference in the saving of work on flues and side sheets. The amount of black smoke emitted is constant for heavy firing, though it is possible to over load the firebox with this stoker as with hand firing; where ordinary judgment is exercised it is possible to get results equal to hand firing. As the coal is crushed to small particles, the sparks and cinders are about the same with the stoker as without. In installing the stoker we assigned a regular crew and a certain machinist, in most cases, to look after the repairs. There was also a special representative of the stoker company with the engine.

"As this stoker is designed to permit of part hand firing, if necessary, and the doors are also unobstructed, the fireman may immediately proceed to hand fire. In case of a stoker break down, it is only necessary to shut off one throttle valve each for the elevator engine and the stoker engine. We have had no delay to trains due to the Street stoker, but have had to hand fire. While the fireman is required to feed coal into the crusher constantly when the locomotive is working to maximum capacity, his labor is reduced to scraping coal into the crusher opening. In my opinion the fireman's labor is reduced perhaps 25 per cent. It is not necessary to disconnect any part of the stoker for the work mentioned, or ordinary work at terminals. No tests have been conducted to determine evaporative efficiency. The cost of preparing the coal is the same as for hand firing, except for the cost of the crusher which is provided with the stoker and is an auxiliary equipment. Somewhat lighter fire might be carried with the stoker, but we have no data regarding this. We have not noticed any difference in clinkering, etc."

Then follows a detail description of the construction and operation of the Street stoker (*Railway Age Gazette,* May 26, 1911, page 1196).

Discussion.—F. P. Roesch had also investigated the work of this stoker on the Santa Fe. He did not find it as economical as hand firing. In his opinion it reduced the work of the fireman 75 per cent. instead of 25 per cent., as suggested by Mr. McBain; the tendency on the part of the fireman was therefore to fire too heavy and waste the coal. The stoker did not appear to have absolute control of the distribution, although this could undoubtedly be remedied. The fire door was not disturbed

by the application of the stoker and the entire grate surface could therefore be seen and the fire could be raked or hand fired without loss of time. He also criticised the amount of space occupied by the stoker, the large number of parts due to the addition of the crusher and the conveyor and the noise made by the operation of the stoker. The stoker will handle any kind of coal and a fireman should be able to learn to operate it in one trip. Mr. Street said in reply he had never considered the stoker on the Santa Fe a success, because of the difficulty in securing a representative to see to its proper installation.

A representative of the L. E. A. & W., said that a Street stoker had been in successful operation on that road for 1½ years. Four breakdowns had occurred to the conveyor, but there had been no delay to the trains.

The C. & O. has two of these stokers in service, and is buying two more. It permits the locomotives to be worked to their full capacity. The engines are in pool service and are used in either freight or passenger service. After a fireman has made two or three trips with the stoker he is able to spend from 50 to 75 per cent. of his time on the seat box.

J. R. Scott (St. L. & S. F.) said that one of their Mallets was equipped with a Street stoker. It was assigned to a regular crew and gave excellent service. If however, it was necessary to change crews trouble usually occurred on the first trip and it became necessary to clean the fire on the road. The reason was that a crew unfamiliar with its operation pushed the fire too hard. To get the best results it was necessary to practically starve the fire, i. e., to keep it so thin that the grates could be seen. The crusher had given trouble a couple of times by getting a block of wood or iron in it. It did not break, but it was a little difficult to remove the obstruction. The stoker made considerable noise. When standing still it was best to hand fire, as the stoker was not properly adjusted for such work. On long curves the tendency was to distribute the coal more heavily on one side than on the other.

Clement F. Street said that changes were being made to overcome the unequal distribution on curves. Excellent results are being obtained from the stoker on the Pennsylvania. The engineer is held responsible for its care on that road with beneficial results. Of 125 runs between Harrisburg and Altoona all but 3 were 100 per cent. stoker fired. Changes in design are being made which will largely eliminate the noise. It is easy to design a stoker for high speed service; the difficult problem is to handle the slow drag service. It is hardly fair to judge the stoker by comparison with expert hand firing. Rather should it be compared with the average hand firing. The stoker fired engine gets no mercy and the locomotive can be worked to its full capacity.

Strouse Stoker.—J. J. Hannahan, a representative of the Strouse stoker, said that two of their stokers were in pool service on the C. & A., one on a Mikado superheater locomotive. They are giving good results. This type of stoker is being perfected and will shortly be heard from in no uncertain terms.

OTHER BUSINESS.

Subjects for 1912.—The committee on subjects suggested eleven subjects for 1912. These were referred to the executive committee with the recommendation that a selection be made from them and that fewer reports be arranged for next year. In almost every case this year the discussions had to be "choked off," in order to get through the work of the convention in four days.

Report of Delegate to M. M. Association.—C. F. Richardson, the retiring president in 1910, was unable to represent the association at the Master Mechanics' convention at Atlantic City last June, and W. C. Hayes (Erie) was delegated to do so. He presented a detailed report of the proceedings, emphasizing those features which are of special interest to the traveling engineers.

Election of Officers.—The following officers were elected for 1911-12: President, W. C. Hayes, Erie; first vice-president, W. H. Corbett, Erie; second vice-president, F. P. Roesch, El Paso & Southwestern; third vice-president, John McManamy, Pere Marquette; secretary, W. O. Thompson, N. Y. C. & H. R. R.; treasurer, C. B. Conger, Wm. Sellers & Co.; executive committee, F. C. Thayer, Southern; V. C. Randolph, Erie, and J. C. Petty, N. C. & St. L.; executive committee, short term, Robert Collett, Frisco.

Place of Meeting.—The southern members made a strong plea for the 1912 meeting. As a result Atlanta, Ga., received 71 votes, Chicago 53, and Washington, D. C., 10. There seemed to be a strong feeling on the part of many that Chicago being more central and having had the most successful meeting in the history of the association should be again selected. The executive committee will select one of the three cities, Atlanta, being given the preference if conditions will warrant.

Changes in Constitution.—The fiscal year will close August 1 instead of August 15. An associate member of one year's standing can make application for active membership. The president must be selected from a man in active railway service and holding the position of road foreman of engines, or a position ranking above it. The secretary can pass on the applications for associate membership.

Examination Questions.—A standing committee will be appointed to revise these, as it may become necessary.

Supplymen's Election.—The Traveling Engineer's Supplymen's Association elected the following officers: President, J. Will Johnson, Pyle National Headlight Company, Chicago; secretary, W. L. Allison, Franklin Railway Supply Company, Chicago; treasurer, Frank D. Fenn, Crane Company, Chicago; executive committee: W. J. Schlacks, McCord & Company, Chicago; Frank H. Clark, The Watson-Stillman Company, New York; P. H. Stack, Galena Signal Oil Company, St. Paul, Minn.

FOREIGN RAILWAY NOTES.

The Prussian state railways for the first four months of their fiscal year, show an increase of 5.2 per cent. in passenger earnings and of 8.4 per cent. in freight earnings. The expenses are not reported till the end of the year.

The employees of the Hungarian state railways had their pay raised on May 1, after years of struggling, which at times was pretty near fighting. They are divided into nine classes. The president now receives $3,000 a year; six directors, $2,400 each; 7 vice-directors, $2,000; 8 superintendents, $1,800; 115 engineers, $1,000; 430 other engineers, $760; 559 engineers of a still lower class, $580; the three lowest classes, designated only as "employees," $400, $360 and $320. The total number of all classes is 6,039. These are the permanent staff. Probably as many more are employed as laborers, etc., who may be discharged when not needed.

On the island of Formosa there are now 273 miles of government lines, 360 miles of private lines, and 450 miles of push-car lines, a total of 1,083 miles. The western side of the island, from Tamsui in the north to Takow near the south end, has a good railway service, with many private lines connecting with the government road. The latter it is proposed to extend to Nanwan. The opening up of the eastern side, which is very mountainous and inhabited by savages in the northern part, has necessarily been slow. The government line runs south from Keelung through Taihoku, the capital, as does the Tamsui branch from the northwestern port. There are also push-car, or hand-car, lines on the east side, and the government proposes building from Tui to So-o and thence to Kwarenko. From Kwarenko south the government now operates 11 miles, and for 91 miles farther south traffic is handled on push-car lines. The government expects to have a standard-gage road built to Pinan by 1914 and will later build to the southern end of the island and connect up with the line along the western side.

CONCRETE PILES FOR BRIDGE FOUNDATIONS

One pier and one abutment of the new Kentucky & Indiana bridge over the Ohio river at Louisville, Ky. (*Railway Age Gazette,* August 4, page 208), are supported on concrete piles. The other foundations for this bridge are carried down to rock, but in these two cases the depth to rock was too great to permit this. The soil is a hard clay and when dry has sufficient bearing power to support the loads for which the footings of the mass piers and abutments were designed. At high water the soil under the shore pier on the Kentucky side and under the abutment on the Indiana side is kept wet, with the result that its bearing power is greatly reduced. In order to prevent any

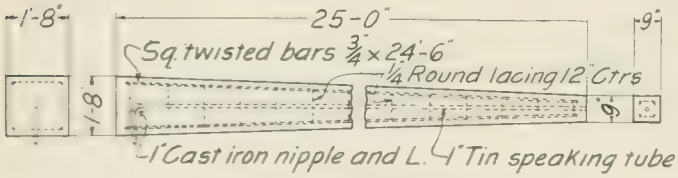


Fig. 1—Piles Arranged for Jetting to Place.

chance of failure under these conditions, and in accordance with the general policy of making every part of the structure as permanent as possible, it was decided to support these two footings on concrete piles.

The shore pier on the Kentucky side is at a point near which borings had shown the soil to be sandy and rock to be at a depth of about 65 ft. The pier footing is about 21 ft. x 62 ft., and 83 piles were used, spaced 3 ft. center to center in both directions. On the assumption that the driving was to be through sandy soil, a 1-in. tin speaking tube was imbedded in the concrete longitudinally through the center of the pile for use in jetting the piles to place. The upper end of this tube was connected by a nipple to a cast iron angle extending outside the pile, as shown in Fig. 1. The lower end of the pile was made square to insure straight driving. The reinforcement was four ¾-in. twisted bars tied with ¼-in. bars on 12-in. centers. The piles were 25 ft. long, 20 in. square at the top and 9 in. square at the bottom. In driving piles for this pier it was found that a pocket of clay underlay the site and it was impossible to use the jet on account of the rapidity with which the tube was stopped with clay. They were driven to place by a Warrington steam hammer having a 3,000-lb. striking weight and a stroke of 30 in. After driving several piles the adjacent clay became so compacted that in some cases it required 5,000 blows to drive 20 ft. The piles stood this extreme treatment remarkably well,

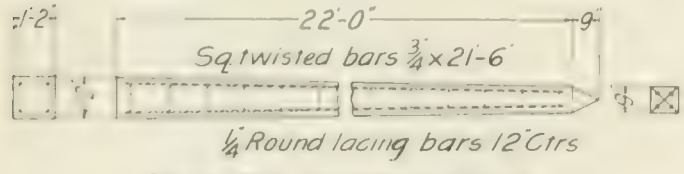


Fig. 2—Piles Arranged for Driving.

only [illegible] being broken, and in all these cases the crushing extended only about 18 in. below the top. Ordinary steam hammer leads were used for directing the driving, and a wrought iron hood was arranged to travel on the leads and contain the necessary cushion over the head of the pile. This hood was made in two pieces bolted together through the flanges, as shown in Fig. 3. Guides were applied on the outside of this hood, providing the necessary clearance to allow it to travel in the channels on the front side of the leads. A number of experiments were made on cushions for these piles, and the type which was finally developed proved much better than anything else that was tried. Three cement bags full of coarse sawdust were placed directly on the head of the pile, which was allowed to extend several inches up into the hood. Over these bags of sawdust was placed a block of beechwood 24 in. long, which extended above the upper end of the hood and received the blows of the hammer. Beech proved better than any other wood for this purpose, as it satisfactorily cushioned the blow, yet was not seriously injured by the treatment. The bags of sawdust proved effective in preventing shattering of the heads of the piles, and were necessary, as in some cases where the bags were not used or were filled with a fine grade of sawdust considerable shattering was noticed, which was apparently due to this cause alone. Driving the square-ended piles through the hard clay was so difficult that the last batch of piles for the pier footing was made with a pyramid point, which increased the number driven per day from three to nine.

The soil under the abutment was known to be stiff clay, and the design of the pile was altered somewhat in the light of the experience gained on the previous work. The depth to rock under the abutment was only a little over 20 ft., so it was decided to make the length of the piles 22 ft. and drive them to solid rock. All piles for this work were made with the 9-in. point, which was in addition to the 22 ft. of length. The batter of the piles was also reduced, using 14 in.. square at the upper end and 9 in. square at the lower, as shown in Fig. 1. The same reinforcement was used as described above. This reinforcement was apparently ample, for there were no breakages that could be traced to a lack of reinforcement. Even better results might have been obtained, however, if a greater depth of concrete had been provided over the upper end of the reinforcing bars. If the concrete

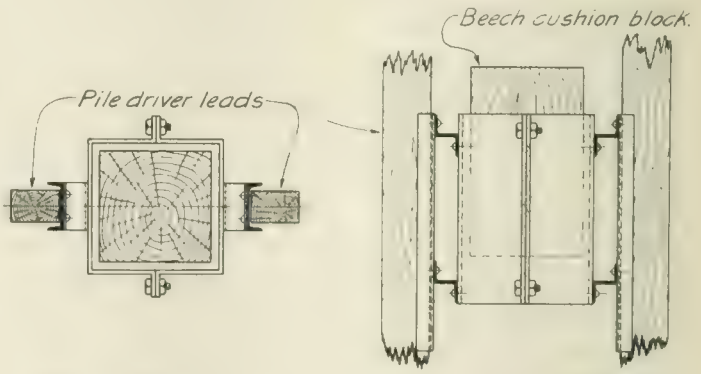


Fig. 3—Cast Iron Hood Used on Head of Concrete Piles.

above the bars is shattered off, the vibrations due to the driving are carried down through the pile and may result in serious damage. The progress in driving through the clay had been so slow that it was thought necessary to adopt some method of decreasing the time required for this work. After numerous suggestions had been tried, the following method was adopted and used with good results. Three men with a post hole augur bored 12-in. holes from 16 to 19 ft. deep in which to start the driving. Six men using two augurs were able to dig about 20 holes a day and keep ahead of the driving gang. A heavier steam hammer, having a striking weight of 6,000 lbs. with a stroke of 30 in., was substituted. In driving piles in augur holes, the pile was placed in the hole and the weight of the hammer allowed to rest on it before driving was started. This weight was usually sufficient to push the pile down from 8 to 11 ft. The leads were then shifted until the hood came over the top of the pile, and it was found necessary to have the leads exactly in line with the hole, for if the pile was strained to the leads the top was likely to crack badly. Out of 125 piles driven in this manner, only one was shattered enough to condemn it, and on only three was it necessary to cast new heads after driving. It was found that the driving had to be stopped at intervals to allow air and water in the augur holes to escape through the gravel which overlay the rock. If this was not done tremendous pressure was exerted by this compressed air and water. The depth to rock had been determined by soundings before the driving was begun, with the intention of stopping as soon as

piles struck the rock, but it proved very easy to tell when rock was reached by the sound of the hammer blow. The last few blows were usually light ones, as there was great danger of injuring the piles if many blows were struck after the rock was reached. It was possible to drive 15 to 18 piles a day in the augur holes under the body of the abutment, where they were spaced 3 ft. center to center on lines perpendicular to the face of the abutment. By taking advantage of the experience gained in this work, it was possible to drive fully 90 per cent. of the piles without a crack, and the 10 per cent. were cracked only about 12 in. from the top.

The piles were cast on molding boards convenient to the point where they were to be driven, and allowed to cure on these boards for 30 days before driving. The concrete used was a 1:2:4 mixture, using 1½-in. stone. The cost of making the piles averaged about 50 cents a lineal foot, and of driving about 30 cents, making the total cost of the piles in place about 80 cents a lineal foot. This work was done under the direction of W. M. Mitchell, general manager and chief engineer of the Kentucky & Indiana Terminal Railroad. The Foster Creighton Gould Company was the contractor, Wilbur Creighton being superintendent in charge.

LETTERS FROM AN OLD RAILWAY OFFICIAL TO HIS SON, A GENERAL MANAGER.*

XV.

Los Angeles, Cal., July 15, 1911.

My Dear Boy:—How many miles of road should one division superintendent handle? Like the old lady's recipe for pie crust, it all depends. Some superintendents in the east with two hundred miles handle as much business as do their western brothers with a thousand. As a matter of fact, mileage has little to do with the question. On the ideal division the superintendent is in the middle with territory extending one freight district in each direction. If he happens to be at a hub he can comfortably handle several freight district spokes, which will increase his mileage accordingly. Under such a condition the advantages of a seemingly large mileage are numerous. The superintendent can run his power wherever most needed. He can hold back at the farther end of one district cars that he knows the connecting district cannot possibly load or unload for several days. He can preserve a balance which is impossible when jurisdictions divide at the hub. In the latter case each superintendent hurries freight to the end of the division to avoid a paper record showing delay on his territory. The result is that the next man has terminal indigestion because he has been fed too fast. Therefore, divisional jurisdiction should, when possible, change at an outlying district terminal away from a large city. This avoids the added complication due to industrial switching, suburban trains, restricted area, etc., etc. A congestion of cars is often caused by a congestion of jurisdictions. You may avoid the one by diffusing the other. Several roads in the country could have saved heavy expenditures for larger terminal facilities by more scientific organizations.

The amount of mileage a superintendent can economically handle depends, then, for the most part upon the location of his headquarters. Such location in turn admits of no hard and fast rule. Cities and towns spring up and industries develop quite regardless of the limits of a hundred-mile freight district and a speed of ten miles per hour on the ruling grade. A railway usually begins and ends at a large city which is either a seaport or a gateway. It is normally better to locate a division superintendent at such beginning and ending city. He can then handle its terminals and the one or more diverging freight districts. His division should include the terminal at the farther end of such districts, to afford him opportunity both to hold back stuff whose inopportune arrival might congest the more complicated terminals at headquarters and to relieve such terminals promptly by movement outward. In other words, owing to his important terminals this superintendent should have less mileage than his country brother who would be in the middle between the second and third districts.

Some roads try to solve the problem by giving the superintendent the first and second districts with headquarters in the middle. If in such case the general offices happen to be at the initial point they soon ignore the superintendent and do business direct with his terminal subordinates. When this condition becomes intolerable, one of two things usually happens. Perhaps the superintendent's office is moved to the first terminal where it really belongs. Thereupon he loses full touch with his freight crews on the second district, which is left out in the air. The other attempted remedy is to appoint a superintendent of terminals reporting direct to the general offices. The difference in viewpoint thus legalized may cost the stockholders much money. To the terminal superintendent the trains are always made up on time and the power and road crews are seldom ready. To the division superintendent the trains are seldom made up on time and the power and road crews are always ready. Much energy of both officials and their offices as well as that of the general superintendent and his office is then directed to holding useless post mortems and negotiating unnecessary treaties of peace. Remember, my boy, that typewriters exert no tractive power and explanations move no cars. Self-preservation is the first law of nature. We must so organize that this law will operate to keep the company into clear, not to put some other fellow in the hole. All of these questions are largely matters of opinion. After working with every kind of terminal organization all over the country, your old Dad believes that the best is to have a division superintendent at the big terminal with an assistant superintendent in direct charge of and responsible for such terminal, the superintendent controlling every diverging freight district to include the next terminal.

It should always be remembered that a large terminal demands preferred consideration, because owing to restricted area its problems are intensive and expensive. A dispatcher has a hundred miles or more over which to keep his trains apart, while a yardmaster finds his engines bunched within a mile or two. Again, if the cost of terminal switching does occasionally happen to be reflected in a freight rate, the genial gentlemen of the traffic department are prone to recommend its absorption. I believe as a broad proposition that the management of railways is more scientific than that of most modern industries. I would not like, however, to file much of their terminal operation as an exhibit. A majority of the switch engines in the United States have one superfluous man in the crew. This is partly because so few operating officials have sufficient practical knowledge of switching to go out and intelligently handle a crew all day. If you don't believe this, make some time and motion studies of switching. Compare the relative performance of your yard conductors. The tasks of road conductors are relatively so well defined that comparison of individual performance is not so difficult. The intense conditions of a terminal complicate such differentiation as among yard conductors.

Another factor of prime importance in determining the size of an operating division is the location of train dispatchers. The dispatcher's table should always be considered an integral part of the superintendent's headquarters offices. The train sheet is perhaps the best record on a railway. It is never fudged by being made up in advance. It is a history usually unimpeachable because it is so close to the actual transactions which it records. It deals with the essence of railway operation, train movement. Few are the important records on a railway that do not derive their primary data from the train sheet. The sheet may be graphic, like a daily time card chart, or may be cut up into card strips, as under the A B C system. In any form, it is a fundamental of operating history.

The number of dispatchers to which a division is limited is, like the number of miles, a variable. With headquarters at the hub, one superintendent and one chief dispatcher may [illegible]

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fortably handle three or four sets of dispatchers. An outlying division with thin traffic may require only one set of dispatchers. When it becomes necesary to locate a set of dispatchers away from division headquarters, it is time to appoint another superintendent and create a new division, perhaps with only a light staff of all 'round officials. So important is the train sheet and so much of vital, human interest centers around a despatcher's office, that the far away superintendent must refer much correspondence to this detached portion of his office. The result is expensive circumlocution and a lack of human touch. The superintendent has in effect become a general superintendent too far away from real things. A trainmaster or a chief dispatcher is really carrying the responsibility of a superintendent without the title and authority necessary for smooth administration. I know several railways that are fooling themselves into the belief that they are saving money by having one superintendent for two dispatching offices. One of them has five superintendents and ten dispatching offices, really ten divisions in fact, if not in name. By a logical arrangement of territory these ten dispatching offices could be consolidated into seven division headquarters and the road operated in seven divisions. In these days of overtime and complex working schedules, a timekeeper should check the time slips against the original train sheet, not against a copy, a transcript or an excerpt. A division accounting bureau handling all that it should handle has also much other use for the train sheet.

Second only in importance to the train sheet as a record, and with which it should be closely related, is the conductor's car and tonnage report; what the men call the wheel report. This important report made by a division man is sent to a remote general office in disregard of the responsible head of such division, the superintendent. The result is that a distant authority, the superintendent of transportation, is telling the superintendent that certain cars are being delayed on the latter's division. This profuse correspondence is often foolish, because meantime the cars have actually gone. Some roads now have a carbon copy of the wheel report made for the use of the accounting department. Why not send this carbon to division headquarters and let the division accounting bureau make up the ton miles and the car miles, subject to proper check after the fact? Why not have the office of the superintendent know so much about the cars on his division that he will tell the general offices that certain cars are being delayed on his division for lack of motive power, loading or disposition, conditions which, perhaps, the general office, with its larger view, can remedy? This would also permit, when desirable, the checking of the agents' car reports against the conductors' reports. The more closely to actual transactions we can do our checking the more intelligent should be the process and the smaller its volume.

I wish that you would come out here and see the Southern Pacific run its monthly supply, pay and inspection train. Before coming, re-read my letter to you on the subject some seven years ago. I know of no place where the idea has been better carried out. Ideas seldom originate with any one man. They seem rather to float around in the air. They are pulled down by those who happen to erect lightning rods or like Benjamin [illegible] people who ride hobbies. Sometimes they ride well enough and far enough to demonstrate that the hobby is a real horse. Then it is the turn of the horse to laugh.

[illegible] the telephone for train dispatching, I always feel that there should be an accompanying apology for being several years behind the times. For years progressive young railway men [illegible] of the increased human touch. Whenever and wherever we can replace a specialist with an all 'round man we are gaining.

Minot when a superintendent on the Erie in the early fifties. So seriously was the matter taken that only the superintendent himself could issue a train order, even though this involved calling him out of bed. Hence the foolish, feudal custom of signing the superintendent's initials to all train orders. It soon developed that a regular dispatcher was necessary. Accordingly, a conductor, a man who knew how trains were practically handled, was taken off the road and brought to the superintendent's office to dispatch trains. Stop off at Port Jervis, N. Y., some time and in a local hotel see the portraits of some of these old Erie dispatcher-conductors, their dignity being protected by the tall beaver hats of the period. The dispatcher not being a telegrapher, he wrote out his orders and handed them to a young operator to send. This operator was a bright fellow, who, by and by, graduated into a dispatcher, able to send his own orders and often to do the work previously requiring both men. Too often it has happened that the experience of the new dispatcher, a telegrapher specialist, was limited to the office end, with no first-hand experience in train service. The telephone, fulfilling the immutable laws of evolution, will take us back to first principles. The dispatchers of the future will graduate from the train, engine and yard service, through the dispatcher's office to higher official positions. The man who gives the order will be a man who has once carried out such an order himself. The man below will obey the more cheerfully and the more intelligently because of increased confidence in the man above.

When the record is made up by the future historian, with that discriminating perspective which time alone can give, high will be the place accorded the railway officials and employees of America. The military, the pioneers of civilization, the forerunners of stability, have their periods of enervating peace. Transportation, the first handmaiden of progress, is in active attendance every day of the year. Those who worship at her shrine and follow her teachings must lead the strenuous life and love the voice of duty. The splendid, virile performance of the past, handicapped often by crude facilities and forced expansion, must and will be eclipsed under the intense, trying conditions of the present and the future. In no profession more than in ours is there eternity of opportunity.

Affectionately, your own D. A. D.

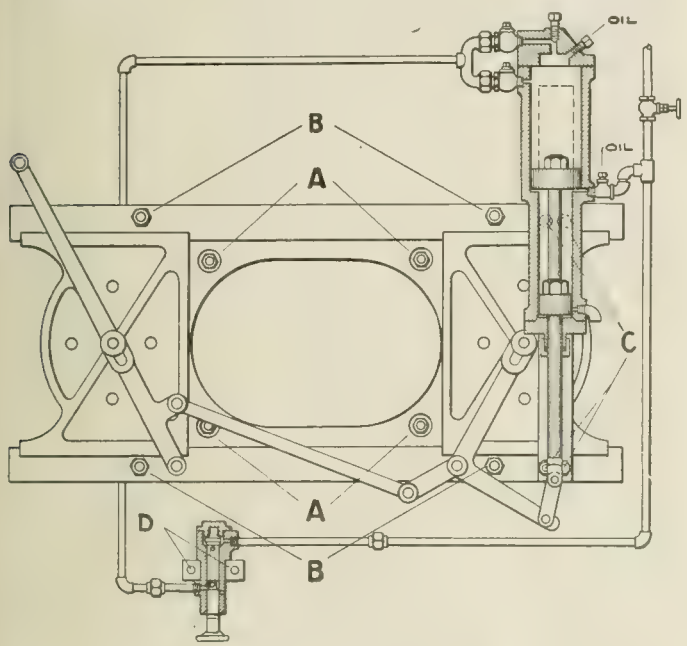
TELEPHONE INSPECTORS.

On the Canadian Pacific we have one telephone inspector for 250 to 300 miles of circuit with his headquarters approximately in the center. We have not found it necessary to provide motor cars, but I believe that every inspector should have a light motor car, particularly where there are few trains. Our inspectors are supposed to be continually on the move. I consider that an inspector's duty is not so much to remove interruptions, as to prevent them occurring.—*W. J. Camp* (C. P. R.).

China has now a total of about 5,404 miles of railway in operation, or almost completed. Of the railway lines in actual operation, 2,433 miles are in Manchuria, and about two-thirds of these are Japanese or Russian. There is in course of construction a total of about 1,702 miles, some of which will probably not be completed for several years. There is projected, with more or less definite plans of construction, surveyed or unsurveyed, authorized by the Chinese government or not, a total of 13,434 miles. Construction during 1910 added rather less than 500 miles to the railways of the empire. Nor is the prospect for 1911 much more promising, since almost no new enterprises have been undertaken. While plans for new railways in China are numerous, actual development is proceeding slowly. The Imperial decree declaring the nationalization [illegible] railways and the completion of the loan agreement toward the construction of the Hankow-Szechuan system in defiance of provincial opposition mark a very definite advance toward the resumption on a large scale of railway building.

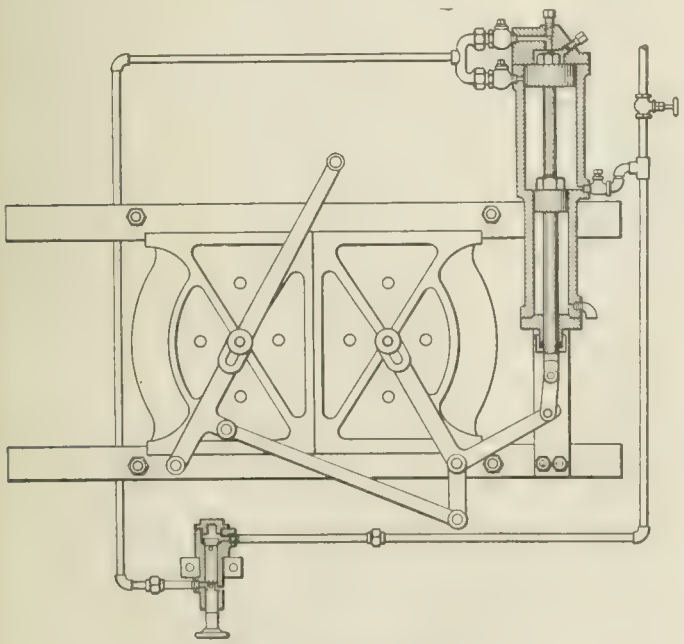
AUTOMATIC FIRE DOOR FOR LOCOMOTIVES.

The Shoemaker automatic fire door for locomotives illustrated herewith, has been redesigned to prevent a wasteful leakage of air past the two piston heads which operate the doors. The makers—the National Railway Devices Company, Chicago—claim



Shoemaker Fire Door; Open.

that the parts which have heretofore rendered the door inoperative on account of instense heat have been eliminated, and that the air containing parts are sufficiently removed from the door opening to avoid trouble due to the extreme heat. In the Shoemaker air cylinder, the differential idea which has been so successfully embodied in the construction of the locomotive air



Shoemaker Fire Door; Closed.

pump, has been used, and with it the up-stroke of the piston or the door-closing movement is automatic. The doors are locked shut by air in their closed position, which prevents them from working open when the locomotive passes over sharp curves. The piston down-stroke or door-opening movement is secured by applying the air to the upper side of the large piston head by means of a foot valve. In both up and down strokes, the piston action is automatically cushioned, relieving the jar on the doors, lever pins, levers and the cylinder itself.

The two illustrations show the fire door open and closed. The door ring is attached to the locomotive boiler by the studs *A*. The door guides are bolted to the door-ring by stud-bolts *B*, and an upright plate, to which the air cylinder is fastened, is attached to the right hand ends by bolts *C*. The foot-valve, which is operated by a pedal, is fastened to the end of boiler by the stud-bolts *D*, which are the only additional holes necessary to be made in boiler other than required for the swing door. It will be seen from the illustrations that the fire door is composed of two distinct and self-contained mechanisms, each possible to operate entirely independent of the other. These may be properly designated as door parts and air parts. The operation of the former, when disconnected from the latter by the removal of a pin joining the fulcrum lever arm to the piston, is by a hand operating lever.

CABLE RAILWAYS IN AFRICA.

The Schume, Schagai and Megamba forests, in German West Africa, are at an altitude of about 4,920 ft. above the sea. To bring them into communication with the Usambara Railway, which runs through the Pangain plain, the only feasible method was a cable railway. The firm of Wilkins & Wiese, which has a concession for exploiting these forests, contracted with the firm of Ad. Bleichert & Co. in Leipzig, Germany, to construct this road. The preliminary work was finished in 1906, but then difficulties on every side commenced. The road is now in operation for a length of 6 miles, rising in this distance 4,920 ft. It is in three sections, each with a completely independent endless cable. The first section extends from New Hornow to Corner Station No. 1. The section from New Hornow to the foot of the mountains was built on a steep grade. To accomplish this it was necessary to build a large power station, but from the crest of the ridge down to corner station No. 1, the weight of the logs is sufficient to bring down the cars and to furnish considerable surplus of power for producing electric light and power in New Hornow.

In order to get the power which was necessary for the first ascent, it was necessary to bring up a very powerful stationary engine, but the transportation of this machine on African roads from Mombo over the William valley to New Hornow, about 35 miles, caused the principal delay in the construction of the road. Two or three Europeans and more than 100 negroes worked seven months long at this. The boiler was fastened on a railway car and then run along on rails that were continually laid down, taken up and laid down again further on, until the top of the mountain was reached. According to the difficulties encountered, the advance made each day varied from 100 to 1,000 yds. It was necessary to build bridges, widen roads and blast rocks, and all along there was danger of letting the whole thing fall into the abyss. Between corner stations 1 and 2 there were reaches of about 1,000 yds. of cables without intermediate support. These required very strong towers at each end. The latter are of iron, 100 ft. high, and might be said to be stuck on to the side of the mountain. No piece of these towers could weigh more than the usual load—66 lbs.—for a native bearer. Each one had to be carried up along special paths cut for this purpose; and the same was the case with casks of cement, and all other building materials. From corner station 2 to the unloading station, Mkumbara on the Usambara Railway, the fall is comparatively slight. From this point the logs can be loaded easily on the cars. The entire run of 6 miles is made in an hour. Down grade, the maximum load is ten tons; up grade, only one ton. The heaviest piece that may be taken is 1,760 lbs., which is divided between two cars.

General News Section.

At Buffalo, N. Y., last week two Pullman porters were arrested on charges of having committed serious thefts from the baggage of passengers.

At Parame, France, September 4, R. G. Garros soared in an aeroplane to a height of 13,945 ft., nearly half a mile higher than the best previous record.

The Southern Pacific hospital at San Francisco has received from Mrs. E. H. Harriman a gift of $50,000, with which to establish a bacteriological laboratory.

The shops of the Pennsylvania at Pitcairn, near Pittsburgh, are now working at full capacity, over 300 men having been hired within the last three weeks.

On the Atchison, Topeka & Santa Fe lines in California, eleven passenger conductors have been discharged for the reason, it is said, that they carried passengers on "short fares."

One of the features of the general retrenchment recently ordered on the Southern Pacific is the discharge or suspension of train auditors on some or all of the divisions where these auditors are employed.

The Indiana Railroad Commission has begun suit at Peru to prosecute the Wabash Railroad for violating the law which requires three men in each switching crew. It is complained that a certain crew has three men a part of the time, but that one of the men has also other duties to perform.

The Cunard steamship Lusitania, delayed in its westward journey last week because of the strike of dock laborers in England, lay at her dock in New York City only 32 hours and 10 minutes, returning to Liverpool at 6 o'clock Monday evening. During this time the vessel took aboard 5,500 tons of coal. Her last eastward cargo of freight was still in her hold. The officers having been unable to get men in Liverpool to unload it.

The State Board of Equalization of Idaho has made sweeping increases in the valuation of the railways of the state. The valuation of the main line of the Oregon Short Line is reported as $26,028,090, as against $7,155,720 last year; and other important sections of railway are assessed at sums more than two or three times as large as former assessments.

A southbound express train of the Southern Pacific was attacked by robbers about forty miles north of Redding, Cal., on the night of September 1, and two safes in the express car were blown open. The robbers had boarded the train at a station and the engineman was ignorant of their presence and did not stop until he heard the explosion in the express car. The robbers grasped what valuables they could and jumped off and escaped in the darkness as soon as the train stopped.

In connection with an exhibition of flying machines near Boston on Monday last, E. L. Ovington, flying in a Bleriot monoplane made a flight of about 160 miles in 3 hours, 6 minutes, 23 seconds, actual time in motion. The flight was made from Boston northeast to Salem, thence southwest to Worcester, thence southeast to Providence, and thence northeast to the starting point. Stops were made at each of the cities named, where [illegible] were in progress, attended by many thousands of spectators. Mr. Ovington received a prize of $10,000 from the *Boston Globe*.

At Holly, Miss., on the Grand Trunk Railway a few weeks ago the engineman and fireman of a freight train were taken suddenly sick and were obliged to stop their train in the shortest possible time and get off the engine. They were picked up unconscious and according to newspaper reports, they had been poisoned by drinking water from the tender. An officer of the road reports on the [illegible] of the poisoning was strychnine. An examination by a physician led to the conclusion that the men had been poisoned by something much they had eaten at a station about 40 miles back.

The Frisco Refrigerator Line has been incorporated in Missouri, with a nominal capitalization, to engage in the refrigerator transportation business in connection with the St. Louis & San Francisco Railroad. It is planned to operate 2,500 refrigerator cars, and the handling of all fruit and other commodities requiring refrigeration will be taken over by the new company. The incorporators are the following officers of the St. Louis & San Francisco: W. B. Biddle, vice-president; W. C. Nixon, vice-president and general manager, St. Louis; F. H. Hamilton, secretary-treasurer; B. W. Redfearn, general perishable freight agent, and F. H. Wood, general attorney.

A recent explanation of the plan adopted some years ago by the Illinois Central, of giving its employees a chance to buy stock in the company, states that an application blank, which is printed in triplicate, is furnished to any employee wishing to purchase a share. When he fills it out the blank is sent to the officer of the road on whose payroll his name is listed, and it is then sent to the office of the comptroller in Chicago, where the price is fixed on the share, based on the latest quotation on the New York stock market on the day of the receipt of the application. Deductions from his payrolls of $5, or any multiple thereof, are authorized by the employee, and on completion of the payment a certificate registered in his name on the books of the company will be issued to him. He can then start to make payments on a second share.

The Pennsylvania is renewing its lectures on "First Aid to the Injured," and has notified employees that the interest taken by them in the subject will be one of the elements of their qualifications to be considered when they are up for promotion. During the last three years the medical officers of the company have given lectures of this kind to over 15,000 employees. During the coming season the company intends to invite local city firemen and policemen to attend the lectures. In these lectures the men are taught not only how to carry an injured person on a stretcher, but they also receive instructions for taking primary care of wounds, fractures, burns, and shocks, without the use of drugs, until competent medical aid can be obtained. They are also instructed in the emergency treatment of pain, unconsciousness, convulsions, effects of heat and cold, and resuscitation from electric shock.

A meeting of members and representatives of the State Railway Commissions of Kansas, Oklahoma, Iowa, Wisconsin, New Jersey, South Dakota and Nebraska was held at Lincoln, Neb., August 29 and 30, for the purpose of forming a permanent organization to exchange information and secure uniform methods of physical valuation and accounting. The decision of Judge Sanborn in the Minnesota rate cases was denounced in resolutions as imperiling the usefulness of state commissions in regulating rates; and it was decided to appoint a committee to brief the arguments of the commissioners and present them to the United States Supreme Court at the hearing on appeal of the Minnesota cases. The representatives of the Wisconsin commission declined to sign the resolutions on the ground that he opposed organization among the states to co-operate in rate litigation cases or for other similar purposes.

The auditor of the Texas Railway Commission has compiled the following statement, comparing the revenues and expenses of the Texas railways during the fiscal year ended June 30, 1911, with those of the previous fiscal year:

	12 months ending June 30, 1911	12 months ending June 30, 1910	Increase.	Per Cent. Inc.
Freight revenue	$63,832,382.86	$62,468,085.90	$1,364,701.46	2.12
Passenger revenue	30,644,940.00	28,225,473.35	2,419,557.65	8.57
Other revenue	1,774,586.73	1,643,491.77	131,094.96	7.98
Total operating rev..	$96,251,909.59	$94,381,651.02	$3,915,354.07	4.15
Operating expenses	75,876,737.91	72,246,030.22	3,630,707.69	5.02
Income from operation	$20,375,171.68	$22,135,620.80	$284,646.38	1.29

The Ohio state tax commission has fixed the value of the aggregate taxable property of the 102 railways in that state at $273,234,249, the valuation being almost 250 per cent in excess of the amount the same property was assessed for taxation last year. The total valuation of the different lines of the Pennsylvania system in the state is given at approximately $183,823,675; of the New York Central, $95,627,890, and of the Baltimore & Ohio, $70,713,375. Several of the roads which protested against the tentative valuations that the tax commission placed on their

property some weeks ago, were given hearings and some changes have been made; and investigations into the valuations of a few of the smaller roads have not been completed.

Eureka!

In Boston, barrels of beer being brought from the brewery to the bar-room are no longer broken by bad bungling, but are allowed to bounce on bags of cork, the bag being laid on the sidewalk. A Boston boy, with brains, observing this beneficent practice, began boldly to suggest its applicability to the unloading of baggage. As skids are clumsy and troublesome, and their use can only be enforced by regular prodding, we endorse this Boston idea most warmly.

Telegraphing Around the World.

On Sunday evening, August 20, a telegram sent around the world by the *New York Times* made the circuit in 16 minutes, 30 seconds. The message, addressed to the *Times*, was sent from the telegraph room of that paper at 7:00 p. m., and it was received at the same office at 7:16:30. The aggregate length of lines traversed is said to have been 28,613 miles.

Mails by Freight Train.

The order of the second assistant postmaster general directing the shipment of monthly and semi-monthly magazines by freight train, which was noticed last week, page 444, provides for such shipments not only westward from Buffalo and Pittsburgh, but also eastward over the same routes, and in addition over the following routes: Canton, Ohio, to Chicago (for "To-Day's Magazine"); Cleveland to Chicago for the "Railroad Trainmen's Journal and the Locomotive Engineers' Journal"; from Rock Island, Ill.; to Chicago, Council Bluffs, Kansas City and St. Paul for "Modern Woodmen of the World"; and from Springfield, Ohio, to seven prominent cities, for "Woman's Home Companion."

The magazines are to be termed "Blue-tag matter," and blue tags will be attached to every sack. The order says that shipments must be made in carloads of 10 tons; and a postmaster having less than this quantity must hold it until he gets enough more to make the carload. Special bills of lading will be used, printed in green ink, and three copies must be made, one of which is to be sent to Washington. At Chicago the freight cars will be taken to the Union depot terminal; at Council Bluffs to the Union Pacific transfer, and at St. Louis to the Annex post office, at the Union station, Eighteenth street yard. The railways whose bids have been accepted will assume the cartage charges at points of shipment and at destination. The order gives the names of the transfer companies which have been engaged at the different cities. Transfer clerks will be assigned at the different freight houses "to perform the necessary duties" and to weigh the mails, the railway company having a representative present to join in making the record of weight. An officer of one of the roads interested says that the compensation to be received by the railways will be regular third class freight rates, the Official Classification providing that merchandise of this kind shall be carried at third class.

The Indiana Full-Crew Law.

The attorney-general of Indiana, in an opinion given to the railway commission, holds that under the full train crew law of 1907, there can be no successful prosecution against roads which are employing colored men as both porters and brakemen or flagmen. Fred Teick, chairman of the legislative board of the Brotherhood of Railway Trainmen, has complained that instead of putting the number of trainmen required by law on a train, the roads were counting colored porters as trainmen. The law says: "Said brakeman or flagman shall not be required to perform the duties of baggageman, express messenger or porter." The attorney-general points out that there is no provision in any law of Indiana which sets out qualifications for brakemen or flagmen except one section of the full train crew act, which provides that a flagman must have had at least one year's experience in train service. The law is a penal one and must be strictly construed. The provision against requiring trainmen to do other work is so drawn that it is not within the intent of the act, which is to require the roads to have a specified number of trainmen on each train, this varying according to the size of the train. The brakeman or flagman may perform porter or other duties while the train is in motion. As another law requires trains to be equipped with power driving wheel brakes and appliances for operation by the engineer of the locomotive, the chief purpose of the act requiring a minimum number of men on a train, is to accommodate the traveling public at stations, and to guard against accidents when the train is not in motion. Compliance with the law is accomplished if the required number of men is carried on the train, according to the opinion.

Exercising Discretion.

The Indiana State Railroad Commission has exempted the Lake Erie & Western, and a number of other roads from the order requiring the use of the block system on the roads or on certain sections. The commissioners say that they have no fixed rule under which roads may be exempt, but that the condition of the road bed, the straightness of the track and the number of trains operated each way daily are matters considered. Roads operating fewer than 16 trains a day, or where passenger trains are operated in the daytime for the most part, are among those exempted. The character of equipment and of the employees are also items taken into consideration.

Cost of Grade Crossings on Long Island.

The Long Island has done as much within the last ten years as any road in the country, in the elimination of grade crossings, and the expenditure of money to safeguard crossings at grade, and, in general, to educate the public in the dangers involved. There are 962 points on Long Island where public streets and highways intersect the tracks of the company. Of this number 161 crossings have been eliminated and put under grade and 104 over grade, making a total of 265 crossings abolished—the majority of them during the last decade. The money involved in this work amounts to approximately $15,000,000. The annual interest charge on the investment is $750,000, and it represents work for safeguarding the heedless public and not work that improves the operation of the railway, or produces additional revenues, except as insurance against damage.

In addition to this, the company maintains flagmen and gates at 169 crossings, and flagmen, without gates, at 61 crossings, making a total of 230 crossings protected by men on the ground. This means the employment of 350 men, at a cost of about $200,000 a year. Seventy-four crossings are protected by electric alarm bells which ring automatically with the approach of trains. The installation of crossing gates and bells cost $115,000. To sum up, we have 265 crossings eliminated, and 304 crossings protected either by flagmen and gates, or flagmen and bells, which leaves 393 crossings protected only by the usual signs specified by the railroad commission. These are placed in conspicuous view on both sides of the tracks, and each sign bears the warning "Look out for the cars. Stop! Look!" Sixty-five of the 393 crossings protected only by signs are on branches of the road where no passenger trains are run and only an infrequent freight service maintained. These have not been reported heretofore, which accounts for the apparent increase over former figures.

The company has added 54 crossing gates and 75 crossing watchmen in the last four years. Work is now under way which will eliminate about twenty more crossings, at a cost of over $3,000,000. It would mean an initial investment of $235,000, and add approximately $250,000 a year to the payroll to cover every crossing with gates and flagmen. The company is doing all that it possibly can in this direction with the revenue derived from its present tariff of rates. To produce the revenue necessary to protect all crossings and to continue the work of elimination, the rates on about 65 per cent. of the traffic would have to be raised at least 25 per cent. This would mean an increase of at least $2 a month on all forms of commutation tickets.

Why should the traveler on the railway be made to pay more in order to protect the traveler on the highway? The trains must run on fixed tracks at a reasonable speed. The traveler on the highway has freedom of routes, and an opportunity of stopping. Being in small numbers, they should be made to stop and give preference to the railway travelers who are in larger num-

bers, on larger and heavier vehicles, which cannot be safely stopped on short notice or in a short distance.

The Long Island Railroad Company has not earned enough to pay a dividend to its stockholders in nearly fifteen years, notwithstanding the wonderful growth of its territory and its traffic. To keep pace with this growth, it has been compelled to expend in improvements vast sums amounting in ten years to almost the equal of the full capital investment. Traffic and earnings have shown a wonderful response to the expenditures and improvements that have been made. As a result, it will, no doubt, be able to get the money to continue the work of improving the road. If so, crossings will be taken out as rapidly as possible, especially where the company has the aid and co-operation of the state and municipality.

The railroad company will do its full duty in this direction, but it cannot and will not assume the position of public guardian and protector of every thoughtless user of the highway. . . . The legislature should enact a law requiring drivers of automobiles and other vehicles to stop, and make sure that a train is not approaching before attempting to cross tracks.—*Statement by President Peters.*

Handling Freight Claims on the Frisco.

The St. Louis & San Francisco has decided to transfer the entire work of handling claims and payments for loss and damage to freight from the traffic to the operating department. It has also put into effect, beginning August 1, a new system under which station agents are authorized to pay from station funds claims for visible damage to carload and less-than-carload freight, with certain exceptions and within the limit of $50 for any one claim. Claims for amounts which are in excess of $50 must be approved by the assistant general manager before payment.

The *Railway Age Gazette* published in its issue of November 12, 1909, page 925, an article on certain changes in the method of handling loss and damage claims which had been made on the Frisco. Under the plan described at that time, investigations were begun by the operating department as soon as freight was reported over, short or damaged; and decisions regarding the liability or non-liability of the company were made, not by the traffic department, but by the operating department. Special measures were also taken to fix responsibility and secure proper discipline for carelessness or violations of the rules by employees which lead to loss and damage. The change now being made is along the same line. It completes the transfer of all duty and responsibility regarding freight damage and claims to the transportation department. The office of superintendent of freight loss and damage claims is created at Springfield, Mo., and effective September 15. J. H. Doggerell is appointed to this office. The official changes consequent on the adoption of this plan are referred to in the Elections and Appointments department of this issue.

The superintendent of freight loss and damage claims will have charge of, investigate and settle claims for damage to freight, loss of freight and delay to freight; reports of freight over, damaged or short; disposition of refused and unclaimed freight; tracing of less-than-carload shipments, and such other duties as may be assigned by the assistant general manager. All letters and reports pertaining to these matters heretofore sent to the assistant general manager and freight claim agent will [illegible] the superintendent freight loss and [illegible]. Under the system which has been in effect on the Frisco, E. D. Levy, assistant general manager and formerly [illegible] of transportation, has had charge of the investigations of loss, short and damage reports, and the determination of the liability or non-liability of the company has been made in his office. On the other hand, claims have been settled [illegible] the office of the freight claim agent at St. Louis. It will be noted that under the new plan both classes of duties are to be performed by the superintendent of freight loss and damage claims. Otherwise the method of handling these matters will be the same as that already described in the *Railway Age Gazette* of November 12, 1909. The superintendent of freight loss and damage claims will report to E. D. Levy, assistant general manager, who has charged on the new system.

Regarding the new method and limited plan of having station agents pay claims for visible damage, an officer of the Frisco writes:

"Prior to August 1 only a few of our agents had authority to pay loss and damage claims of any kind, and when they paid them they were forced to file claim for relief for the amount paid, which was sent to the auditor freight accounts, and by him investigated; and if he found they were entitled to relief it was granted. This sometimes took months and in some cases years, and caused the agents to carry forward from month to month the relief claims that had not been acted upon; and those that did have the authority to pay claims did not pay as many as they should by reason of the fact that it took so long to secure relief and caused so much confusion in station accounts by carrying these open items.

"The thought in inaugurating the new plan was that the agents on the ground could better adjust claims for visible damage than a clerk in the freight claim office hundreds of miles away, provided we could inaugurate a system whereby we could keep a proper check on the agents. The new system we have adopted does give us this check.

"We also had in mind, in inaugurating this system, the idea that it would do more than any one thing to correct public sentiment against the railway. A small merchant in the country would not usually file his claims for small damages with the railway, but he would charge them back to the jobber, and the jobber was forced to maintain a claim bureau in many instances to collect claims of this kind. The merchant filed claims with the jobber because he was not skilled in the handling of claims, and it took him so long to collect the money that he felt the railways were discriminating against him because he was a 'little' shipper; and of course a great many of them have felt aggrieved at the railways on that account. The average country merchant could not understand, when he received a shipment, where the damage was visible, why the agent could not settle with him—why he had to send the claim to some one else hundreds of miles away. Under this new plan the country merchant is made to feel that he is given just as much consideration as the jobber who ships hundreds of cars a year. It promotes friendly relations between the agent and the merchants and does not cost the company anything.

"When a shipment checks damaged at a delivering station the agent has always made a 'bad order' report to the assistant general manager, which he continues to do. When he decides on the amount of damage he uses four copies of form 75-A local, to which he attaches a copy of the bad order report and the usual documents in support of a claim. He pays the claimant his money, secures a receipt and release on this form, mails three copies to the assistant general manager's office, and retains one copy for his file. The assistant general manager approves the copies, sends one of them back to the agent the day it is received, and when the copy with the assistant general manager's approval is received by the agent it becomes cash. All he has to do with it is to list it with others at the end of the month on form 75 local, and send that form to the auditor of freight accounts.

"At the time the assistant general manager approves the copies, and sends one to the agent, he sends the original, together with all of the papers, to the auditor of disbursements and tells him which ones to send back for further investigation and which ones to keep.

"The investigation is started from the assistant-general manager's office immediately on receipt of form 75-A from the agent, and we do not have to defer our investigation until the auditor of disbursements sends such claims back as we ask him for.

"The company takes absolutely no risk, in my opinion, by paying claims under this plan, because we investigate just as vigorously or more so than we did, and the claimant has his money while we are determining whether Bill Jones, Sam Johnson or someone else is responsible, or whether the Frisco or some other railway should pay the claim. From what I can hear, our agents are well pleased with the new plan, and so are our patrons, and I am quite sure it will be a big success."

There are certain exceptions to the authority given station agents to pay claims. An official circular issued on the subject says:

"Agents must not pay claims for damage to perishable freight, alleged loss of grain or coal from carload or less-than-carload shipments, damage to live stock, nor for damage to sewer pipe,

drain tile and kindred articles. All such claims should be promptly forwarded to the freight claim agent at St. Louis for attention.

"Before paying claims, the agent must first satisfy himself of the invoice price and also satisfy himself that proper credit is given for the salvage, or the salvage turned over to the company.

"On shipments of flour damaged by wet, the actual damage is usually very small; when the sacks become wet the flour immediately on the inside forms a paste impervious to water. Claimant should be requested to order new sacks from the mill and re-sack the flour and you will pay claims only for the net loss after this is done. If in doubt as to proper amount of damage or salvage, do not pay claims for wet damage to flour, but send them to the freight claim agent, in the usual way."

Demands of Shop Employees Rejected.

Three of the large railway systems on which demands for recognition of the federation of railway shop employees have been made have rejected them. These are the Harriman Lines, the Illinois Central and the Chicago & North Western. A conference between officers of the Harriman Lines and representatives of the shop employees' unions was held at San Francisco on September 1. It was attended for the railways by J. Kruttschnitt, director of maintenance and operation of the system; E. E. Calvin, vice-president and general manager of the Southern Pacific, and other officers of the Southern Pacific; and the shop employees were represented by J. W. Kline, president of the International Blacksmiths' Union, and the presidents or vice-presidents of the other organizations. At the end of the conference Mr. Kruttschnitt issued the following statement:

"A conference was held between the national officers of the shop employees and Southern Pacific officials. The question of the benefits to accrue to both the company and the men from a federation was fully presented by the international officers. The officers of the railway company explained at length the embarrassment the company would experience in performing its public functions if hampered by a committee vested with sufficient power to control or partially control its operations.

"The discussion lasted from 11 a. m. until nearly 2:30 p. m. without altering the situation."

At a conference with a committee representing the five principal classes of shop employees on its lines, the Chicago & North Western was represented by W. D. Cantillon, general manager, and H. T. Bentley, assistant superintendent of motive power. After the meeting Vice-President Aishton issued the following statement:

"The general manager and assistant superintendent of motive power met with five employees of various crafts of the mechanical department employed at the Chicago shops of this company this morning, and discussed with them whether the Chicago and North Western would make contracts with a federated committee representing all trades and crafts engaged in the shops of this company, or as heretofore, with committees of their employees representing each particular craft.

"The arguments for and against each particular method were gone into in detail and the attitude of the company as distinctly favoring the making and maintenance of contracts with committees representing the particular trades or crafts affected, as well as the desire for maintenance of the business and contract relations heretofore existing with our employees in the various trades, was clearly outlined to the employees present."

The representatives of the federation on the Illinois Central first held a conference with T. J. Foley, assistant general manager. Mr. Foley having indicated that the road would not recognize the federation, appeal was made to W. L. Park, vice-president and general manager; and Mr. Park having upheld Mr. Foley, further appeal was made to President Charles H. Markham. After the conference, which was participated in not only by Mr. Markham, but also by other officers of the Illinois Central, Mr. Markham issued the following statement:

"We had a conference with three of the representatives of the international brotherhood with which we have contracts, and they were told the officers of the Illinois Central could not and would not discuss a new agreement while such contracts are in existence, and that, if cancelled, it must be in the usual, formal manner that has heretofore prevailed and for which the contracts provided and which also stipulates that thirty days' notice shall be given either party of a desire to change the terms of the same."

The employees subsequently asked for another conference. This Mr. Markham refused. In a letter to W. F. Kramer, secretary of the Blacksmiths' union, he said that never before in the history of the roads the negotiations with labor organizations had it been asked to change contracts except in the usual manner provided for by them; that is, on 30 days' notice. He added that the management of the Illinois Central 'has reached the conclusion that its duty to the shipping and traveling public, dependent upon it for transportation facilities, its regard for the welfare of its employees and those dependent upon them, and also for the interests of its ten thousand stockholders, will not permit it to enter into negotiations with an organization, compliance with the initial demands of which would deprive the officers of the company of the power to manage its affairs.

"The paramount interest in this controversy is that of the shipping and traveling public, and, being convinced that it is the ultimate purpose of the federation to consolidate railway service employees into one organization, the management does not feel that public opinion would sustain it in entering into an agreement which would place in the hands of one body the power to throttle the commerce of the country."

The representatives of the nine organizations of employees who are in Chicago, on Tuesday evening, September 5, sent a reply to the letter in which Mr. Markham, president of the Illinois Central, flatly refused to recognize the officers of the federation. It was signed by W. F. Kramer, secretary of the Blacksmiths. It takes issue with Mr. Markham in his assertion that the unions failed to comply with the thirty-day notice clause.

The communication concluded as follows:

"Until equality is recognized, justice cannot manifest itself, and should your attitude be persisted in, such trouble as may result will not be the union's desire, but the seeking of yourself and those whose interests you represent. There are too many people teaching details of conduct who do not even understand first principles. . . . The Illinois Central, through its astute representatives, in seeking to shift the burden of responsibility, presents an argument based on a claimed technical violation of contract provisions. The apparent absurdity of the position assumed led to the introduction of a sentimental solicitude for the shipping and traveling public, that is, has been and always will be despised by railway magnates unless self-interests dictate a change of policy from the usual one of the 'public be d——d.'"

The letter included a copy of a letter sent to Mr. Markham from Paducah, Ky., June 10, by McCreery and Bowen, giving notice of a desire for a conference for the purpose of adopting working agreements.

American Society of Civil Engineers.

The first meeting of the season of 1911-12 of the American Society of Civil Engineers was held on Wednesday, September 6. A paper by George B. Francis and Joseph H. O'Brien, members Am. Soc. C. E., entitled The New York Tunnel Extension of the Pennsylvania Railroad: Certain Engineering Structures of the New York Terminal Area, was presented for discussion and illustrated with lantern slides. This paper was printed in the *Proceedings* for May, 1911.

New York Railroad Club.

The next regular meeting of the New York Railroad Club will be held at the building of the United Engineering Societies on September 15, 1911. The committee appointed to nominate officers for the ensuing year will present its report, and Edwin J. Clapp, of the New York University, will present a paper on German Waterways, which will be illustrated with lantern slides.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

Air Brake Association.—F. M. Nellis, 53 State St., Boston, Mass.

American Association of Demurrage Officers.—A. G. Thomason, Scranton, Pa.

American Association of General Passenger and Ticket Agents.—C. M. Burt, Boston, Mass.; next meeting, St. Paul, Minn., Sept. 19, 1911.

American Association of Freight Agents.—R. O. Wells, East St. Louis, Ill.

American Association of Railroad Superintendents.—O. G. Fetter, Carew building, Cincinnati, Ohio; 3d Friday of March and September.

American Electric Railway Association.—H. C. Donecker, 29 W. 39th St., New York; October 9-13, 1911, Atlantic City, N. J.
American Railway Association.—W. F. Allen, 75 Church St., New York; November 15, 1911, Chicago.
American Railway Bridge and Building Association.—C. A. Lichty, C. & N. W., Chicago; Oct. 17-19, 1911, St. Louis, Mo.
American Railway Engineering Association.—E. H. Fritch, Monadnock Block, Chicago; annual convention, March 19-21, 1912, Chicago.
American Railway Master Mechanics' Association.—J. W. Taylor, Old Colony building, Chicago.
American Railway Tool Foremen's Association.—O. T. Harroun, Bloomington, Ill.
American Society for Testing Materials.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.
American Society of Civil Engineers.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.
American Society of Engineering Contractors.—D. J. Haner, 13 Park Row, New York; 3d Tuesday of each month, New York.
American Society of Mechanical Engineers.—Calvin W. Rice, 29 W. 39th St., New York.
Association of American Railway Accounting Officers.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.
Association of Railway Claim Agents.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 22, 1912, Los Angeles, Cal.
Association of Railway Electrical Engineers.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago; annual, November 6-10, Chicago.
Association of Railway Telegraph Superintendents.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.
Association of Transportation and Car Accounting Officers.—G. P. Conard, 75 Church St., New York; December 12-13, Louisville, Ky.
Canadian Railway Club.—James Powell, Grand Trunk Ry., Montreal, Que.; 1st Tuesday in month, except June, July and Aug., Montreal.
Canadian Society of Civil Engineers.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.
Car Foremen's Association of Chicago.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.
Central Railway Club.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.
Civil Engineers' Society of St. Paul.—D. F. Jurgensen, 116 Winter St., St. Paul, Minn.; 2d Monday, except June, July and Aug., St. Paul.
Engineers' Society of Pennsylvania.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.
Engineers' Society of Western Pennsylvania.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.
Freight Claim Association.—Warren P. Taylor, Richmond, Va.; annual Buffalo, N. Y.
General Superintendents' Association of Chicago.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.
International Railway Congress.—Executive Committee, rue de Louvain, 11 Brussels; 1915, Berlin.
International Railway Fuel Association.—D. B. Sebastian, La Salle St. Station, Chicago.
International Railway General Foremen's Association.—L. H. Bryan, D. & I. R. Ry., Two Harbors, Minn.
International Railroad Master Blacksmiths' Association.—A. L. Woodworth, Lima, Ohio; annual, Aug. 15, Toledo, Ohio.
Iowa Railway Club.—W. B. Harrison, Union Station, Des Moines, Ia.; [illegible] month, except July and August, Des Moines.
Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York.
Master Car Builders' Association.—J. W. Taylor, Old Colony building, Chicago.
Master Car and Locomotive Painters' Association, of United States and Canada.—A. P. Dane, B. & M., Reading, Mass.; Sept. [illegible], 1911, Atlantic City, N. J.
New England Railroad Club.—G. H. Frazar, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.
New York Railroad Club.—H. D. Vought, 95 Liberty St., New York; 3d [illegible] month, except June, July and August, New York.
Northern Railway Club.—C. L. Kennedy, C., M. & St. P., Duluth, Minn; 4th Saturday, Duluth.
Omaha Railway Club.—H. H. Maulick, Barker Block, Omaha, Neb., [illegible].
Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.
Railway Club of Pittsburgh.—C. W. Allen, P. & L. E., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.
Southern and Southwestern Railway Club.—G. L. Stewart, St. L. S. W. Ry., St. [illegible], May 11, 1911, Kansas City, Mo.
Traffic Club of Pittsburgh.—C. C. Rosenberg, Bethlehem, Pa., [illegible], Oct. 10, Colorado Springs, Colo.
Transportation Club of Cincinnati.—J. P. Murphy, B. & O., Cincinnati, Ohio.
Richmond Railroad Club.—F. O. Robinson, Richmond, Va.; 2d Monday, [illegible].
National Association of Railway Veterans.—Walter E. Emery, [illegible].
Railroad Men's Improvement Society.—[illegible], 3511 St. Louis, Mo.
Railway Business Association.—B. W. Dunn, Woolworth Building, New York.
Railway Signal Association.—C. Stimpert, La Salle St. Station, Chicago; [illegible] Monday, except June, July and August, La Salle St. Station, Chicago.
Railway Storekeepers' Association.—[illegible], 1261 St. Paul, Minn.
Railway Supply Manufacturers' Association.—J. W. Southard, A. & W. P. [illegible], Chicago; October, Atlantic City, N. J.
Railway Tie Manufacturers' Association.—A. J. Merrill, Grand Rapids, Mich.; [illegible], May, 1911, Los Angeles, Cal.
Railway Water Service Supervisors' Association.—F. G. McMaster, Wisconsin Central Ry., [illegible], Chicago.
Roadmasters' and Maintenance of Way Association.—J. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.
Signal Section, American Railway Association.—C. A. Seley, 220 Broadway, New York; last Tuesday in [illegible], except June, July and August, New York.
Track Supply Association.—H. H. Wolcott, Oliver Building, Pittsburgh, Pa.
Traveling Engineers' Association.—J. E. McCabe, 2012 Brown-Marx Building, Birmingham, Ala.; last Saturday in August, Chicago.
Western Railway Club.—H. D. Vought, 95 Liberty St., New York; 3d Wednesday in month, except June, July and August, Chicago.
Western Railway Club.—W. P. Hedley, L. S. & M. S., Detroit, Mich.; [illegible].
Western Railway Club.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.
Western Railway Club.—W. H. [illegible], P. O. Box 167, Wauwatosa, Wis.; 3d Monday, except June, July and August, Milwaukee.
Western Railway Club.—J. W. Taylor, Old Colony Building, Chicago; 3d Wednesday in month, except July and August, Chicago.
Western Railway Club.—J. H. Wallace, L. S. & M. S. Railroad, Buffalo, N. Y.; [illegible] August, B. & O. Building, Baltimore, Md.
Wisconsin Railroad Club.—[illegible], Chicago.

Traffic News.

Shipments of coal by river from Pittsburgh on the "coal boat rise" of the river last week, amounted to 8,000,000 bushels, said to be the largest movement of the kind on record.

The Chicago & Eastern Illinois has put on a seven-hour mail train between Chicago and St. Louis in response to the request of the post office department for bids for faster schedules between those points. A train, consisting of a postal car, a storage mail car and a reclining chair car, will leave Chicago daily at 7 p. m. and reach St. Louis at 2 a. m., and a similar train having the same hours for departure and arrival will be run from St. Louis to Chicago. These schedules are 45 minutes shorter than the fastest schedule previously in effect.

An officer of the Pennsylvania estimates that in 85 per cent. of the small-lot shipments moving today the construction of the material forming the box or crate, the size of the nails, etc., are entirely inadequate to protect the contents. Insufficient packing of goods for shipment costs American manufacturers many thousands of dollars every year. The introduction of cheap paper and other substitutes for substantial wooden cases is responsible for much of the trouble. More attention is given all the time to making packages attractive in appearance, but less care is taken to make them safe. Fruit is shipped in paper-thin crates that are sometimes literally churned into pulp in transit. Tobacco is sent by rail in cases so flimsy that they can be perforated with a lead pencil. Heavy hardware is seldom packed carefully enough to keep it from breaking through its casing. Very often no thought is taken of the damage that may be done to freight when packed in cars with heavy, rough, or pointed articles. The way to save the large sums now lost through insufficient or improper packing is to go back to substantial wooden cases. No safe substitute has been found for them.

The Cotton Bill of Lading Bureau, New York City, announces that seventy-five railways of the southern states, including all of the principal cotton carriers, have signed an agreement under which they will send to the bureau copies of bills of lading of all shipments of cotton destined for Europe. The bureau hopes that shippers of cotton, in sending bills of lading to their New York correspondents, will send also a letter, addressed to the bureau, requesting it to furnish the New York buyer with all available information concerning his shipment. A representative of the Liverpool conference which established this bureau, says that the losses by the frauds of a year ago aggregated $6,000,000. The bureau is supported by The Transportation Mutual Insurance Company, which in the past has had an interest in the insurance of nearly or quite all of the cotton exported from this country. The insurance people say that they have a strong interest in the establishment and maintenance of the bureau because of losses by fire from which they have suffered in the past. Forgers have succeeded in using bills of lading for which no cotton has been shipped, and then have seen to it that the warehouse supposed to contain the imaginary cotton was set afire.

Condition of Cotton Crop.

The report of the Department of Agriculture for August 25 shows the condition of the cotton crop on that date as 73.2 per cent. of normal, as compared with 72.1 per cent. last year and 73.5 per cent. (average) on the same date for the past ten years. A month ago the condition was reported as 89.1 per cent. During the month the condition of the crop has fallen off in all of the important cotton growing states, the smallest loss being in Tennessee, where the percentage dropped from 92 to 88. In Virginia it fell from 102 to 96.

INTERSTATE COMMERCE COMMISSION.

The commission has authorized rates over the Atlantic Coast Line and other roads from Durham, N. C., to Richmond and other points in Virginia on certain cotton goods, in disregard of the long and short haul rule, and has also issued a similar order concerning certain rates on cotton goods over the Southern

Railway from points in North and South Carolina to points in Virginia, West Virginia and Maryland.

The commission has suspended until March 27 next certain tariffs on potatoes from Texas to points in the territory of the Central Freight Association. Different tariffs from different parts of Texas name minimum carload weights, said to be inconsistent with one another.

The investigation of the operations of express companies, which is being made by the commission, has involved such a large amount of work that public hearings will not be held for several weeks yet. The clerks in the office of the commission are using a large number of tabulating machines collating information from the waybills of the express companies.

The commission has issued an order allowing temporary changes in freight classifications regardless of possible violation of the long and short haul rule. This order applies to all tariffs concerning which the railways made application to the commission for relief before February 18 last. The purport of the order is to allow railways to defer final changes until the work of the committee on uniform classification shall have been brought more nearly to a conclusion. It permits the making of changes in classification ratings, rules and regulations occurring in the ordinary course of business.

STATE COMMISSIONS.

The Nashville, Chattanooga & St. Louis has filed suit in Alabama against the railroad commission of that state, praying for relief from a recent order of the commission requiring the running of a Sunday train between Guntersville and Attalla. The company declares that the order is unfair and unreasonable; that there is not sufficient patronage to justify a Sunday service, and that the commission has no authority to require the company's employees to work on the Sabbath day.

The New York State Public Service Commission, Second district, has ordered all public service corporations within its jurisdiction, maintaining poles or other structures for carrying overhead wires, to stencil or mark such poles with the initials of the owner and with a number whereby the location of any pole may be identified. Investigations made by inspectors of the commission show a general lack of such stencilling throughout the state, which is necessary for identification of poles as to ownership and location, in the inspection of construction, in service complaints and in valuation proceedings.

The Texas commission has issued an order recognizing the Fort Worth & Rio Grande, the St. Louis, San Francisco & Texas, the Paris & Great Northern and the Brownwood North & South railways as being under the same management and control. This action was taken on the application of the Fort Worth & Rio Grande, and the order has the effect of requiring that hereafter freight moving over two or more of these lines shall take the single-line rate. All of the roads named belong to the Frisco system. It is expected that at the next regular session of the legislature application will be made by the Frisco for the legal authorization of the consolidating of these roads as well as the Orange & Northwestern, the St. Louis, Brownsville & Mexico and the Quanah, Acme & Pacific with the other lines of the Frisco in Texas.

After consideration of the case of the Kansas City Transportation Bureau versus the Chicago, Burlington & Quincy, alleging excessive rates on iron and steel articles, etc., from St. Louis to Kansas City, the Missouri Railway Commission has ordered that, effective October 1, the rates charged by Missouri roads on iron and steel angles, bars, rods, sheet and plate roofing, horseshoes, nails, iron and steel wire, bolts, nuts, washers, and various other articles made of iron and steel, in straight or mixed carloads, shall not exceed 7 cents per 100 lbs. for distances of 25 miles and under; 10 cents for distances of from 50 to 100 miles; 13 cents for distances of from 100 to 150 miles; 15 cents for distances of from 150 to 200 miles; 17 cents for distances of from 200 to 250 miles; 19 cents for distances of from 250 to 300 miles; and 21 cents for distances of from 300 to 350 miles. The minimum carload weight shall be 36,000 lbs., subject to change by the Western Classification Committee.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

Morris McDonald, vice-president and general manager of the Maine Central, has been elected also president and general manager of the Sandy River & Rangeley Lakes, and the following officers of the Maine Central have been elected also to similar positions on the Sandy River & Rangeley Lakes: G. S. Hobbs, second vice-president and comptroller, and George W. York, treasurer, all with offices at Portland, Me. The offices of the accounting department of the Sandy River & Rangeley Lakes have been transferred from Gardner, Me., to Portland.

W. C. Nixon, vice-president of the St. Louis & San Francisco at St. Louis, Mo., has been elected also president of the Brownwood North & South, a line under construction in Texas. C. L. McCartney has been elected vice-president and secretary, with office at Brownwood, Tex., and the following officers of the St. Louis & San Francisco have been elected vice-presidents: W. B. Biddle, vice-president at St. Louis; W. T. Tyler, general manager at Springfield, Mo., and W. B. Drake, vice-president and general superintendent of the St. Louis, San Francisco & Texas at Fort Worth, Tex. Brooke Smith has been elected treasurer, with office at Brownwood, and F. H. Hamilton, secretary and treasurer of the St. Louis & San Francisco, has been appointed assistant secretary and assistant treasurer at St. Louis. L. C. Voelkel has been appointed auditor at Brownwood, Tex., and E. B. Pierce, assistant auditor, at Fort Worth, Tex.

Operating Officers.

W. C. Hurst, superintendent of the Cincinnati, Hamilton & Dayton at Dayton, Ohio, has resigned to engage in other business.

Homer Eads, division superintendent of the International & Great Northern at San Antonio, Tex., has resigned to engage in other business.

H. E. Richards has been appointed assistant superintendent of the Union Pacific, with office at Ellis, Kan., succeeding F. M. Jones, transferred.

M. A. Mulligan has been appointed trainmaster of the Lehigh Valley, with office at Jersey City, N. J., succeeding C. A. Austin, resigned to go to another company.

I. H. Luke has been appointed superintendent of the Fourth division of the Denver & Rio Grande, with office at Alamosa, Col., succeeding S. H. Barnes, resigned.

D. H. Robinson, trainmaster of the Missouri Pacific at Nevada, Mo., has been appointed trainmaster, with office at Jefferson City, Mo., succeeding R. G. Carden, promoted.

L. C. Voelkel has been appointed trainmaster of the Brownwood North & South, a line under construction in Texas, with office at Brownwood, Tex. See item under Executive, Financial and Legal Officers.

Charles Selden, superintendent of telegraph of the Baltimore & Ohio, at Baltimore, Md., has been promoted to general inspector of transportation. Mr. Selden will continue in the discharge of the duties of superintendent of telegraph.

H. C. Manchester, superintendent of transportation of the Maine Central, has been appointed also superintendent of transportation of the Sandy River & Rangeley Lakes, with office at Portland, Me. See Executive, Financial and Legal Officers.

J. M. Walsh, terminal trainmaster of the St. Louis & San Francisco at Memphis, Tenn., has been appointed superintendent of the Memphis terminals, with jurisdiction from the south limits of Bellevue yard to the north limits of Harvard yard, including the Marion-Hulbert cut-off.

James H. Brinkerhoff, until July of this year general traffic manager and general superintendent of the Grand Junction & Grand River Valley at Grand Junction, Colo., has been appointed superintendent of passenger terminals of the Illinois Central, with office at Chicago, succeeding William D. Dunning, resigned.

John K. Fahey, inspector of transportation of the Louisiana Western and Morgan's Louisiana & Texas R. R. & S. S. Co., at Houston, Tex., has been appointed superintendent of the Lake Charles & Northern, and general superintendent of the Louisiana & Pacific, with office at De Ridder, La., succeeding C. M. Boswell, resigned to go to another company.

H. W. Matthews, passenger trainmaster of the Grand Trunk at Detroit, Mich., has been appointed trainmaster of the 25th district (G. T. W.) 29th district (Detroit division) with office at Port Huron, and his former position has been abolished. All reports heretofore made to the assistant superintendent at Battle Creek, and trainmaster at Durand, from these districts, will in future be made to the trainmaster at Port Huron.

The following officers of the Oregon Short Line will hereafter be designated as assistant general managers. E. C. Manson, general superintendent; F. H. Knickerbocker, assistant to general manager; J. F. Dunn, superintendent of motive power; Carl Stradley, chief engineer, and A. E. Hutchinson, general purchasing agent, all with offices at Salt Lake City, Utah. They will continue in charge of duties heretofore devolving on them and retain their former titles to such extent only as may be necessary for compliance with the law and existing contracts.

Incident to a change in the operation of the freight claim department of the St. Louis & San Francisco (see item in General News Section), J. H. Doggerell, car accountant at Springfield, Mo., has been appointed superintendent of freight loss and damage claims, with office at Springfield. He will have charge of, investigate and settle claims for damage to freight, loss of freight and delay to freight; reports of freight over, damaged or short; disposition of refused and unclaimed freight; tracing of less-than-carload shipments, and such other duties as may be assigned by the assistant general manager. G. E. Whitelam, chief clerk to the assistant general manager at Springfield, has been appointed assistant superintendent of freight loss and damage claims.

Robert George Carden, whose appointment as superintendent of the Missouri Pacific, with office at Atchison, Kan., has been announced in these columns, was born in April, 1869, at Mt. Zion, Ill. He received a common school education, and began railway work in 1886 with the Peoria, Decatur & Evansville, now part of the Illinois Central, where he was employed as water boy and then track laborer. He learned telegraphy while working on a farm at Mt. Zion during the summer of 1888, and went with the Wabash as night operator in December of that year, and was later day operator and then despatcher of the Wabash. In January, 1903, he was appointed chief despatcher of the Southern Railway at Charleston, S. C., and was then consecutively, chief despatcher of the Kansas City Southern and despatcher of the Atchison, Topeka & Santa Fe. He went with the Missouri Pacific in September, 1905, as a despatcher at Osawatomie, Kan., and was promoted the next year to chief despatcher at that place. He was appointed trainmaster of the Omaha division in October, 1907, with office at Jefferson City, Mo., which position he held at the time of his promotion as above.

Traffic Officers.

H. C. Halverson, traveling passenger agent of the Missouri Pacific at Little Rock, Ark., has been transferred to Chicago, succeeding J. A. Russell, resigned. C. S. Blackman succeeds Mr. Halverson.

Harry Jones has been appointed soliciting freight agent of the Galveston, Harrisburg & San Antonio, with headquarters at Houston, Tex., succeeding Arthur Shelby, resigned to engage in other business.

A. E. Brown, traveling freight agent of the Minneapolis, St. Paul & Sault Ste. Marie at Cincinnati, Ohio, has been appointed [illegible] passenger agent of the Colorado Midland, with office at Chicago.

L. C. Voelkel has been appointed general freight and passenger agent of the Houston, East & West Texas, a new railroad construction in Texas, with office at Brownwood, Tex. See item under Executive, Financial and Legal Officers.

J. F. Reily, traveling freight agent of the Missouri, Kansas & Texas at St. Louis, Mo., has been appointed commercial agent, with office at Oklahoma City, Okla., succeeding J. J. Hartnett, resigned. J. F. Dodge succeeds Mr. Reily.

H. C. Bronson has been appointed freight and passenger agent of the Rock Island Lines, at Sacramento, Cal., and J. Merrow, Jr., has been appointed a commercial agent with office at Louisville, Ky., succeeding T. W. Bennett, promoted.

F. G. Frieser, assistant foreign freight agent of the Canadian Pacific at New York, has been appointed export foreign freight agent in charge of export traffic via the Atlantic seaboard, with office at Montreal, Que., succeeding E. N. Todd, transferred. L. D. Cole succeeds Mr. Frieser.

W. A. Boehm, traveling freight agent of the Minneapolis, St. Paul & Sault Ste. Marie at Cincinnati, Ohio, has been promoted to succeed A. E. Brown, who held the same title, with office at Cincinnati, and who has resigned to accept service with another company. R. E. Pierce succeeds Mr. Boehm.

G. L. Moore, whose appointment as commercial agent of the Texas & Pacific at Oklahoma City, Okla., has been announced in these columns, has been appointed also commercial agent of the International & Great Northern, his territory to include the state of Oklahoma and such Texas territory as may be assigned to him.

J. E. Buckingham, assistant general passenger agent of the Chicago, Burlington & Quincy, at Omaha, Neb., has been appointed general baggage agent, with office at Chicago, succeeding John De Witt, resigned to engage in other business, and L. H. Stebbins has been appointed assistant general baggage agent, with office at Lincoln, Neb.

G. C. Knickerbocker, traveling freight agent of the Wabash at Toledo, Ohio, has been appointed traveling freight agent, with office at Buffalo, N. Y., and J. L. Craig, agent at Peru, Ind., succeeds Mr. Knickerbocker. James S. Buchanan, ticket agent at Moberly, Mo., has been appointed traveling freight and passenger agent, with office at Moberly, succeeding I. M. Richards, transferred to other duties.

Professor A. E. Chamberlain, formerly connected with the South Dakota Agricultural College, has been appointed development commissioner of the Great Northern, with office at St. Paul, a new position. It will be his duty to aid the states through which the road passes in agricultural, commercial and manufacturing lines, much of his time to be devoted to the encouragement of better agricultural methods.

Eugene McAuliffe, general fuel agent of the St. Louis & San Francisco, the Chicago & Eastern Illinois and the Evansville & Terre Haute, at Chicago, has been appointed general agent of all Frisco lines, with office at St. Louis, Mo., and the office of general fuel agent has been abolished. In addition to his former duties, Mr. McAuliffe will assist the traffic department in the solicitation and handling of coal traffic. C. G. Hall has been appointed fuel agent of the Chicago & Eastern Illinois, with office at Chicago.

J. B. Payne, commercial agent of the Texas & Pacific and the International & Great Northern at Birmingham, Ala., has been transferred to Chicago, where he will report to the assistant general freight agent at St. Louis, Mo. T. B. Moss commercial agent at Kansas City, Mo., succeeds Mr. Payne, and H. H. Taylor, commercial agent at St. Louis, Mo., succeeds Mr. Moss. A. P. Smirl, chief clerk at St. Louis, succeeds Mr. Taylor. O. E. Duggan, traveling freight agent at Birmingham, has been transferred to Chicago, where he will report to Mr. Payne. G. A. Deuel has been appointed traveling freight agent, with office in New York City. R. H. Carrington, general agent of the Texas & Pacific at El Paso, Tex., has been appointed traveling freight and passenger agent of that road, with office at Phoenix, Ariz., and the office of general agent at El Paso has been abolished, as was previously announced in these columns.

H. Bromley having retired as general coal and ore agent of the New York Central Lines, west of Buffalo, with office at Cleveland, Ohio, a change has been made in the organization of the coal and ore department, and H. M. Griggs, assistant general coal and ore agent of the lines west of Buffalo, has been appointed general coal and ore agent, with office at Chicago, in charge of coal and coke traffic originating at points in Illinois,

Indiana and Michigan, and in the territory south of the Ohio river when moving via Ohio river gateways, except that which moves via Lake Erie ports, and J. B. Nessle, general freight agent of the Pittsburgh & Lake Erie at Pittsburgh, Pa., has been appointed general coal and ore agent, with office at Cleveland, in charge of coal and coke traffic originating at points in Pennsylvania and Ohio, and at points in West Virginia when moving via other than Ohio river gateways, including all coal, coke and iron ore traffic via Lake Erie ports; both general coal and ore agents reporting to the freight traffic manager at Chicago. W. A. Newman, general freight agent of the Lake Shore & Michigan Southern at Cleveland, has been appointed also general freight agent of the Pittsburgh & Lake Erie, with office at Pittsburgh, in charge of traffic other than coal, coke and iron ore, succeeding Mr. Nessle.

O. P. McCarty, who has been appointed passenger traffic manager of the Baltimore & Ohio System, with office at Baltimore, Md., was born at Massillon, Ohio, and began railway work on June 1, 1864, as a clerk in the general ticket office of the Cincinnati & Chicago Air Line, now a part of Pittsburgh, Cincinnati, Chicago & St. Louis, since which time he has been continuously engaged in the passenger business with various roads. In May, 1881, he was appointed assistant general ticket agent of the Union Pacific, and from November, 1887, to May of the following year he was chief rate clerk of the Trunk Line Passenger Committee of New York. He was appointed chief clerk in the general passenger office at Baltimore, of the Baltimore & Ohio in May, 1888, and in August of the following year was promoted to assistant general passenger agent, becoming general passenger agent of the Baltimore & Ohio Southwestern on March 1, 1890, with office at Cincinnati, Ohio, which position he held until September, 1894. The following month he went with the Southern Pacific as general traveling passenger agent at New Orleans, La., and was promoted in December, 1896, to assistant general passenger agent at New Orleans. He resigned from this position in October, 1897, to re-enter the service of the Baltimore & Ohio Southwestern as general passenger agent at Cincinnati, which position he held at the time of his recent appointment. Since March of this year Mr. McCarty has also been general passenger agent of the Cincinnati, Hamilton & Dayton.

O. P. McCarty.

Engineering and Rolling Stock Officers.

R. B. Burke has been appointed acting chief engineer of construction of the Chesapeake & Ohio, with office at Rickmond, Va., succeeding to the duties of Henry Pierce, chief engineer of construction, deceased.

T. L. Dunn, chief engineer of the Maine Central, and P. M. Hammett, superintendent of motive power, both with offices at Portland, Me., have been appointed also to similar positions on the Sandy River & Rangeley Lakes.

T. E. Freeman of the Chicago, St. Paul, Minneapolis & Omaha at Sioux City, Iowa, has been appointed general foreman of locomotive repairs on the Duluth & Iron Range, at Two Harbors, Minn., succeeding L. H. Bryan, resigned to go to the Chicago Pneumatic Tool Company.

C. J. McCarthy, chief carpenter in the Northern district of the Chicago, Milwaukee & St. Paul at Minneapolis, Minn., has been transferred to Aberdeen, S. D., succeeding E. Collins, resigned, to go to the Chicago, Milwaukee & Puget Sound, and W. H. MacArthur succeeds Mr. McCarthy.

F. G. Jonah, chief engineer of construction of the St. Louis & San Francisco at St. Louis, Mo., has been appointed also consulting engineer of the Brownwood North & South, a line under construction in Texas. Thomas Yates has been appointed chief engineer, with office at Brownwood, Tex.

The following general foremen on the New York, Ontario & Western have had their titles changed to master mechanic: P. H. Minshull, Southern division, Middletown, N. Y.; W. W. Daley, Northern and Utica divisions, Norwich, N. Y.; W. H. Kinney, Scranton division, Carbondale, Pa., and the title of general foremen on the above divisions has been discontinued. Harvey Shoemaker has been appointed shop superintendent at Middletown.

J. H. Nuelle, assistant engineer of the New York, Ontario & Western at Norwich, N. Y., has been appointed principal assistant engineer, with office at Middletown, succeeding to the duties of J. C. Bentley, resigned, and the office of assistant engineer at Middletown has been abolished. D. W. Fagley, Jr., succeeds Mr. Nuelle; F. J. Meyer has been appointed supervisor, with office at Kingston, succeeding A. Van Aken, resigned, and R. F. Gies, bridge inspector has been appointed bridge and building inspector.

Purchasing Officers.

C. D. Barrows, purchasing agent of the Maine Central, has been appointed also purchasing agent of the Sandy River & Rangeley Lakes, with office at Portland, Me.

Special Officers.

F. J. Angier has been appointed superintendent of timber preservation of the Baltimore & Ohio, with office at Baltimore, Md., reporting to the general manager.

The appointment of Victor J. Bradley to a position on the Pennsylvania was noted last week. His title is general inspector of mail service, and he will have supervision of the handling of mail on all the lines of the company. He will report to E. T. Postlethwaite, assistant to the president. Mr. Bradley has been connected with the government mail service since 1875, and since 1896 has been superintendent of the Second division, with headquarters in New York City.

OBITUARY.

Bradford Lee Gilbert, the architect of the first steel frame "skyscraper" in New York, being the second building of its kind designed in the country, died on September 1, at the age of 57. Mr. Gilbert designed several large railway stations, including the remodeling of the Grand Central station, New York, about 15 years ago, and the union station at Atlanta, Ga. He was particularly successful with small stations, of which he designed a great many.

Henry Pierce, chief engineer of construction of the Chesapeake & Ohio, died at Clifton Springs, N. Y., August 21. Mr. Pierce was born on June 7, 1859, at Quaker Hill, N. Y., and was graduated from Cornell University in 1880. He began railway work in 1881, on the Cincinnati & Southern, as a levelman. For several years he was engineer of maintenance-of-way of the Cincinnati, Hamilton & Dayton. In March, 1889, he became engineer of maintenance-of-way of the Western division of the Chesapeake & Ohio, and from 1902 to 1905 he was superintendent of the Greenbrier division. At the time of his death he was chief engineer of construction.

William W. Wimer, division freight agent of the New Jersey division of the Pennsylvania Railroad, died on Tuesday last at Wynnewood, Pa. His death was due to ptomaine poisoning. Mr. Wimer was born in Philadelphia in 1856, and entered the service of the Pennsylvania Railroad February 1, 1874, as clerk in the freight office at Thirteenth and Market streets, Philadelphia. In 1882 he was transferred to the general freight department. He became chief clerk to the through freight agent October 1, 1887, and on December 1, 1888, he was appointed chief clerk to the eastern superintendent of the Star Union Line, with office in New York City. He was promoted to chief clerk of the general freight department at Philadelphia on June 1, 1897, and was appointed division freight agent of the New Jersey division June 1, 1903.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Portland, Grey & Lewiston, Lewiston, Maine, has ordered one 35-ton electric locomotive from the Westinghouse Electric & Manufacturing Company.

The City & County Contract Company, West Chester, N. Y., has ordered one 80-ton electric switching locomotive from the Westinghouse Electric & Manufacturing Company.

The Wichita Falls Route has ordered 2 ten-wheel locomotives from the Baldwin Locomotive Works. The dimensions of the cylinders will be 18 in. x 26 in., the diameter of the driving wheels will be 56 in., and the total weight in working order will be 204,000 lbs.

The Raleigh & Southport has ordered one consolidation locomotive from the Baldwin Locomotive Works. The dimensions of the cylinders will be 20 in. x 24 in.; the diameter of the driving wheels will be 50 in., and the total weight in working order will be 144,000 lbs.

The Lake Superior Terminal and Transfer has ordered 1 eight-wheel switching locomotive from the Baldwin Locomotive Works. The dimensions of the cylinders will be 20 in. x 26 in., the diameter of the driving wheels will be 50 in., and the total weight in working order will be 143,550 lbs.

The Elkin & Alleghany, Raleigh, N. C., has ordered one consolidation locomotive from the Baldwin Locomotive Works. The dimensions of the cylinders will be 20 in. x 24 in.; the diameter of the driving wheels will be 50 in., and the total weight in working order will be 144,000 lbs.

CAR BUILDING.

The Ontario & San Antonio Heights has ordered 3 interurban cars with Brill trucks from the Kuhlman Car Company.

The Chicago, Indianapolis & Louisville is taking prices on 1,000 general service gondola cars of the company's own design.

The Southwestern Traction & Power Company, New Orleans, La., is in the market for 4 double truck, interurban cars, 2 single-truck city cars and 2 trailer cars.

IRON AND STEEL.

The Boston & Albany is in the market for 5,000 tons of bridge material.

The Canadian Pacific has ordered 1,200 tons of rails from the Illinois Steel Company.

The Pittsburgh & Lake Erie has ordered 2,100 tons of rails from the Carnegie Steel Company.

The Kansas City Terminal Company has ordered 2,200 tons of structural material from the American Bridge Company for the grade separation work in connection with the new terminal.

General Conditions of Steel.—The high rate of production is still maintained in the steel industry in spite of the falling off in orders. It is expected, however, that operations will be reduced during the coming winter. There has been some price cutting, but only on the part of the smaller independents. The volume of business at present is above the average for the last ten years, but the prices are lower. After October 1 a readjustment of prices to a higher level may be effected.

SIGNALING.

Interlocking at Grand Central Station.—The interlocking station "D" at the Grand Central station, New York City, described in the *Railway Age Gazette* of May 12, 1911, the principal remaining on the tracks of the lower level, started to operate on August 20 but the temporary interlocking machine in use in that part of the yard was found not [illegible] capacity. It has 160 levers, but only a part of the tracks of the lower level are now in use. Station D, at the north end of the yard, [illegible] will be put in use several months [illegible]

Supply Trade News.

Gano Dunn, for many years chief engineer and vice-president of the Crocker-Wheeler Company, Ampere, N. J., has resigned to go into other business.

The McKeen Motor Car Company, Omaha, Neb., has shipped a 70-ft. car to Ogden, Utah, for the Oregon Short Line. This makes the sixth car for this line.

Luther H. Bryan, general foreman of the Duluth & Iron Range, Two Harbors, Minn., and widely known as the secretary of the International Railway General Foremen's Association, has left railway service to take a position with the Chicago Pneumatic Tool Company, Chicago, as its representative at Birmingham, Ala. Mr. Bryan entered the employ of the Duluth & Iron Range as a machinist in 1893, and was made general foreman in 1895.

Frederick M. Nellis, New England representative of the Westinghouse Air Brake Company, Pittsburgh, Pa., and the Westinghouse Traction Brake Company, has resigned his position to become western representative of the General Equipment Company, New York, with office in Chicago. At the age of 14 Mr. Nellis entered the shops of the Pennsylvania lines at Dennison, Ohio, where he served three years as machinist apprentice; for the next three years he was fireman, and for the following two years was engineman on the same line. In 1887 he resigned to become traveling engineer of the Pittsburgh Locomotive Works Company, Pittsburgh, Pa. In 1889 he went to the Westinghouse Air Brake Company. In 1897 he obtained a two years' leave of absence to take a special course in mechanical engineering at Cornell University. Mr. Nellis is secretary of the Air Brake Association.

TRADE PUBLICATIONS.

Side Bearings.—The A. Stucki Company, Pittsburgh, Pa., has issued an illustrated catalog containing complete descriptions of its frictionless side bearings for electric and steam passenger and freight cars.

Frogs and Crossings.—The Frog, Switch & Manufacturing Company, Carlisle, Pa., has published a 150-page illustrated catalog, which completely covers the line of frogs, switches and crossings for standard and narrow gage railways made by this company.

Lathes.—Joseph T. Ryerson & Son, Chicago, have published an attractive catalog of Prentice high-speed, geared-head lathes, high-speed geared-head turret lathes, heavy-duty double back-geared lathes and engine lathes. The illustrations are large and the descriptions are detailed and clear.

Waterproofing.—The Ceresit Waterproofing Company, Chicago, has published a small booklet on Ceresit waterproofing, enumerating the prime requirements of a perfect waterproofing material and telling how Ceresit meets them all. Ceresit is a cream white paste of the consistency of butter, and is simply added to the water and used in mixing mortar or concrete. The booklet includes many illustrations of buildings in which Ceresit is used.

Feed Water Heaters.—The Bates Machine Company, Joliet, Ill., has issued a catalog of its cast iron heaters and receivers with cut-out valves. These heaters combine purifiers, oil separators and condensation receivers. Many advantages of these heaters are enumerated, one of the principal ones being economy, and the merits of the Cookson or open type heater are compared with those of the closed or pressure type. The catalog is illustrated and contains detailed descriptions and diagrams.

Pressure Filters.—James Beggs & Co., New York, have published a catalog of Blackburn-Smith pressure filters. These filters depend upon small, easily removable cloth-covered cartridges for removing suspended matter from water, and are useful in clarification of a muddy water supply and in removing oil and glue from boiler water. The system of separate and successive filtration through the cartridge compels clarification. The system is thoroughly discussed and illustrated in the catalog.

Railway Construction.

New Incorporations, Surveys, Etc.

Arizona Roads.—The Universal Mining & Development Company, of which H. A. Cogswell is president, is said to be back of a project to build an 18 mile line from Campo, Ariz., to the Pine Valley Mining district.

Atchison, Topeka & Santa Fe Coast Lines.—Contracts are to be let soon, it is said, for double-tracking a section of 31 miles from Needles, Cal., west.

Canadian Northern.—According to press reports this company will build a branch from Kamloops, B. C., southeast to Spokane, Wash.

An officer writes that the Canadian Northern Pacific Railway, which is carrying out the work in British Columbia for the Canadian Northern, has let contracts for all the work, except the steel bridges, from Yellow Head Pass, B. C., via Fraser river, north branch of the Thompson river, and south branch of the Thompson river, to Vancouver, 500 miles. The principal contractors are the Canadian Northern Construction Company and Foley, Welch & Stewart. The work will be very heavy. It has not yet been determined what the number and length of the bridges will be on the line. (September 1, p. 453.)

Canadian Northern Pacific.—See Canadian Northern.

Deering Southwestern.—An officer writes that work is now being pushed on an extension from Converse, Mo., to Hornersville Junction, 5.9 miles, from which point the tracks of the Paragould Southeastern to Hornersville will be used, 1.5 miles. The company is carrying out the work with its own men. This year an extension was opened for traffic from Deering east to Caruthersville, 13.7 miles, and another extension was opened from Hickory Landing Road to Converse, 2.1 miles.

Denver, Northwestern & Pacific.—According to press reports, this company will build a six-mile line from Utah Junction Col., to the Denver Union Stock Yards. It is understood that the contract has been let. The branch will cost about $100,000.

El Paso & Southwestern.—Bids are wanted until September 15, for reconstructing 10 miles of line between Lewis Springs, Ariz., and Fairbank. The work calls for about 385,000 cu. yds. of grading, constructing 3,000 cu. yds. of concrete, and excavating for foundations about 3,000 cu. yds.

Subcontracts have been let by MacArthur Brothers Company for work on this line between Fairbanks, Ariz., and Tucson, 67 miles, as follows: Ely Construction Co., Springville, Utah, grading sections 34 to 38; Vosburgh & Carlson Concrete Co., Denver, Colo., sections 26 to 33 and 39 to 41, inclusive; Reiwitz Construction Co., Denver, sections 1 to 3, and to Crook, Allen & Co., Denver, from Tucson, Ariz., to a point four miles east of Vail. (Sept. 1, p. 453).

Etowah Valley (Electric).—Application has been made for a charter in Georgia, to build from a point on the Louisville & Nashville, near Ballground, to Creighton, thence northeast to a point in the northern part of Towns county about 75 miles. The company is to have a capital of $50,000, and is being promoted by: G. R. Glen, J. E. Tate, J. H. Moore, T. J. Smith, W. B. Townsend and C. R. Arnold, all of Dahlonega.

Florida East Coast.—An officer writes that contracts have been let to the Kissimmee Valley Construction Company, Jacksonville, Fla., and work is under way building from Maytown, south to Lake Okeechobee, 130 miles, with a branch from this line at Whittier, south to Bassenger, 30 miles. Grading is finished on 40 miles and track has been laid on nine miles. The work involves handling about 9,000 cu. yds. a mile. Maximum grades will be .4 of 1 per cent., and maximum curvature 4 deg. There will be one 54-ft. bascule bridge; a 1,500-ft. trestle over the St. John's river, and a 900-ft. trestle over Econlockhatchee creek. The line is being built to carry fruit, vegetables, naval stores, timber products and cattle. (February 17, p. 335.)

Grand Trunk Pacific.—A contract for clearing 50 miles of the right-of-way from Aldermere, B. C., west on the Grand Trunk Pacific has been given by Foley, Welch & Stewart, it is said, to M. Sheady & Co., at $50,000.

Gulf Line.—An officer writes that this company has finished work on extension from Bridgboro, Ga., southwest to Camilla, 20 miles, and it is expected that the line will be open for operation by October 1. John Lamb, Thomasville, was the contractor. No decision has as yet been made as to the route for an extension south from Camilla, to the Gulf of Mexico.

Highland Park & Lake Burien.—Bids are being asked for building from Seattle, Wash., to Lake Burien. Reitz, Storey & Duffy, are the engineers, Seattle.

Kettle Valley Lines.—A contract has been given to L. M. Rice & Co., of Vancouver, B. C., and Seattle, Wash., it is said, for building a 40-mile section from Penticon, B. C., at the south end of Okanagan Lake, west to Ausprey Lake summit. (March 31, p. 814.)

Louisiana & Arkansas.—The line to Jena, La., is to be extended east to Vidalia, 48 miles. The extension has been surveyed and staked. A contract for grading has been let, and the Union Bridge & Construction Company, Kansas City, Mo., has delivered material for the construction of steel bridges over Little and Black rivers in Catahoula parish. The bridge over Little river is to be 400 ft. long, and the bridge over Black river 800 ft. long. It is thought that arrangements will be made with the Natchez & Southern to use that company's barges for transfer over the Mississippi river from Vidalia, to secure an entrance into Natchez, Miss. (February 10, p. 301.)

Marathon County.—According to press reports, this road which now extends from Stratford, Wis., east about 20 miles, will be extended east nine miles towards Mosinee.

Missouri, Kansas & Texas.—According to press reports, a contract has recently been given to Patton & Gibson for grading at the Ray yards, west of Denison, Texas. Ten additional tracks will be laid, each to hold 70 cars.

Nampa & Caldwell (Electric).—Contracts are to be let soon, it is said, to build from Caldwell, Idaho, southeast to Nampa, about 10 miles.

Nevada Roads (Electric).—A line is to be built from Carson City, Nev., it is said, southwest, to Glenbrook, on the east shore of Lake Tahoe, about 15 miles, and a line is also projected north to Reno. Donald Williams is interested.

Oklahoma Northwestern.—Incorporated in Oklahoma to build from Oklahoma City Northwest to Woodward, 150 miles. The incorporators include: E. A. Wagener, C. E. Close, J. J. Sullivan, W. H. Wood and E. F. Sparrow, all of Oklahoma City, representing the Classen interests, who own much of the street railway system of Oklahoma City.

Pacific Coast Line.—Incorporated in Oregon with $100,000 capital, to build from Portland, Ore., south to Humboldt Bay, in Humboldt county, Cal., about 360 miles. Branch lines are also to be built west of Tillamook Bay, Ore., and to Eugene Coos county. The incorporators include: T. V. Ward, T. J. Fording and George E. Frost, all of Portland.

Pittsburgh & Lake Erie.—An officer writes that a grading contract has been let to the Robert Hill Construction Company, Fayette City, Pa., to build a line 4.5 miles long, from Downer's Run branch, over the divide to a connection with the Elwell Run branch, connecting the company's existing line at Whittsett Junction with the line at Fayette City.

Quincy Western (Electric).—Incorporated in Illinois with $5,000 capital, and office at Quincy. The plans call for building from Niota, Hancock county, south through Hancock and Adams counties, to Quincy, about 50 miles. The incorporators include: W. T. Duker, H. F. Dayton, J. P. W. Wall, William S. Govert and S. B. Montgomery, all of Quincy.

San Francisco, Vallejo & Napa Valley.—This company has made financial arrangements to build an extension from St. Helena, Cal., northwest to Calistoga, about 10 miles.

Shearwood Railway.—This company, which operates a freight line from Brooklet, Ga., to Davis, 6 miles, is planning to build an extension to a connection with the Seaboard Air Line at Claxton, about 15 miles.

Western Pacific.—Plans are being made, it is said, to double-track this road from Oakland, Cal., northeast to Sacramento.

RAILWAY STRUCTURES.

Bayshore, N. Y.—Plans are being made for putting up a new passenger station on the Long Island at Bayshore. The structure is to be two stories high, 32 ft. x 64 ft., with brick walls and wood shingled peak roof. The cost of the improvements will be about $15,000, and the work will probably be started in October. It is understood that residents of Bayshore will pay part of the cost of the new station.

Del Rosa, Cal.—The Atchison, Topeka & Santa Fe Coast Lines has authorized the construction of a passenger station at Del Rosa.

Douglassville, Pa.—The Pennsylvania Railroad has given a contract to the Eyre-Shoemaker Company, Philadelphia, for putting up an 11-span concrete bridge over the Schuylkill river near Douglassville. The cost of the work will be about $90,000.

Elkhart, Ind.—The Lake Shore & Michigan Southern has let the contract for building a brick and steel power house 116 ft. x 145 ft.

Fort William, Ont.—An officer of the Canadian Pacific writes that a coal handling plant is being put up on Island No. 1 at Fort William, this is the only work under way at that place at the present time. The contract has been let to the Canadian Stuart Company, Chicago.

Galveston, Tex.—The Southern Pacific, it is said, will build a warehouse 71 ft. x 1,000 ft. to cost about $100,000.

Hershey, Pa.—An officer of the Philadelphia & Reading writes that a contract has been given to James McGraw & Co., for extension of culverts and constructing parallel retaining walls near Hershey.

Kingston, N. Y.—An agreement is said to have been reached between officers of the city of Kingston and of the Ulster & Delaware, and New York, Ontario & Western for the elimination of grade crossings on these lines in Kingston, at a cost of $75,000, and a similar agreement has been made with the West Shore for grade crossing and elimination work in Kingston, to cost $150,000.

Montclair, N. J.—Work is to be started at once by the Delaware, Lackawanna & Western on the terminal improvements at Montclair, also on the elimination of grade crossings at that place. The work includes putting up new freight and passenger stations, a viaduct, also an undergrade passageway and a foot bridge. (July 28, p. 200.)

Oskaloosa, Iowa.—The Chicago, Burlington & Quincy has let the contract for building a one story brick passenger station, 32 ft. x 77 ft., with tile floors and hot water heat.

Pearson, Chihuahua, Mexico.—The Mexico Northwestern, will build a new 16-stall roundhouse at Pearson.

Richmond, Cal.—The Atchison, Topeka & Santa Fe has let the contract for building an extension to its shops at Richmond. Construction will begin at once.

Saginaw, Mich.—The Pere Marquette has let the contract for a [illegible] 40 ft. x 40 ft., with a [illegible] platform, 260 ft. x 12 ft., to cost approximately $70,000. The building will be supported on concrete piles.

Truro, N. S.—The time for receiving bids for the stone passenger station to be built at Truro for the Intercolonial Railway has been extended to September 15. L. K. Jones, secretary, Department of Railways and Canals, Ottawa. (August 18, p. 358.)

[illegible]

[illegible]

Yardley, Wash.—The Northern Pacific, it is said, will build [illegible]

Railway Financial News.

Canadian Pacific.—A provisional agreement has been entered into for the lease of the Quebec Central for 999 years. The rental is to be sufficient to pay interest and dividends on the $3,382,000 stock and the $6,233,000 income bonds and debenture stock. The main line of the Quebec Central is 143 miles long, running from Levis, opposite Quebec, to Sherbrooke, through an important asbestos district.

Chicago, Milwaukee & Puget Sound.—See Chicago, Milwaukee & St. Paul.

Chicago, Milwaukee & St. Paul.—The New York Stock Exchange has listed $25,000,000 first mortgage guaranteed 4 per cent. bonds of 1949 of the Chicago, Milwaukee & Puget Sound. This block of bonds was sold several months ago, and is part of an authorized issue of $200,000,000, of which $147,802,000 is now outstanding. (June 2, p. 1298.)

Delaware & Eastern.—The bondholders' committee, which bought this property under foreclosure, has asked the Public Service Commission, Second district, for approval of a proposed plan of re-organization. The plan provides for the organization of the Delaware & Northern, having an authorized capital stock of $1,250,000, of which $250,000 will be preferred stock with cumulative dividends at 6 per cent. Delaware & Eastern bondholders are to pay to the committee an amount equal to 25 per cent. of the par value of their respective holdings of bonds, the total amount of such subscription to equal, if all bondholders subscribe, the amount of the preferred stock.

Delaware & Northern.—See Delaware & Eastern.

Illinois Southern.—The present issue of $4,600,000 first mortgage bonds is to be exchanged for $1,380,000 new first mortgage bonds and $1,380,000 income bonds on the basis of 3 per cent. of each issue of new bonds for existing ones. (September 1, p. 454.)

Interborough Rapid Transit.—This company has declared an extra dividend of 1 per cent. on its stock out of earnings for the past year, and a regular quarterly dividend of 2½ per cent., placing the stock on a 10 per cent. basis. Hitherto the regular quarterly dividend has been 2¼ per cent. These increased dividends will be used for the purpose of establishing a sinking fund for the $67,000,000 Interborough-Metropolitan Company 4½ per cent. bonds.

Marshall & East Texas.—This company has filed a mortgage with the St. Louis Union Trust Company to secure an authorized issue of $5,000,000 20-year 5 per cent. bonds. The company owns 90 miles of road from Elysian Fields, Tex., to East Winsboro. This issue was authorized last winter, but no bonds have as yet been issued.

Norfolk & Western.—This company has bought under foreclosure the Virginia Anthracite Coal & Railway Company, running from Christiansburg, Va., to Blacksburg, 10 miles. The purchase price was $100,000. The road connects Blacksburg with the main line of the Norfolk & Western.

Quebec Central.—See Canadian Pacific.

Virginia Anthracite Coal & Railway.—See Norfolk & Western.

The Interdepartmental Commission of Russia has approved in principle the formation of a company having the object of constructing branch lines serving existing state systems; branch lines afterwards to be worked by the state or company systems; and private branch lines. The company will have $1,250,000 capital, and will have power to issue bonds guaranteed by the government. Branch lines linking up the state systems will belong to the company during a concessionary period of 81 years, following the first day of regular working, but will be worked by the state. Profits will be divided on prearranged terms. Government loans will provide nine tenths of the funds for the construction of these lines and the company will provide the other tenth.

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GENERAL NEWS SECTION 533

THE increased interest of the public in railway affairs is all the time bringing up new problems, some of them puzzling. With our former mild or half dead railway commissions a profound quiet reigned—reigned too, completely—where now things are stirring constantly. The Public Service Commission of New York, when it set up its office in New York City, established its office hours as from 8 a. m. to 11 p. m., almost like a weather observer or a telephone exchange, the idea apparently being that the virtues of the new public body as a cure for all transportation ills should be constantly on tap. The Indiana commission, a few months ago, on the occasion of a holiday, when extra heavy travel was expected on the trolley roads, sat in its office all day, early and late, with its ear to the telephone in expectation of a report of a collision. At least this is the impression we got. On the occasion of the wreck last week at Manchester, N. Y., Chairman Clements of the Interstate Commerce Commission, according to the newspapers, ordered an inspector to start for the scene of the accident "instantly." (How the honorable chairman could justify to the auditor of the treasury department the expense of a special train or an aeroplane, is a mystery.) The instantaneousness of the start would not have much meaning after making the journey of 300 miles to Manchester, but the incident illustrates the temper of the public. But while the public cannot learn much more about a broken rail in the first hour after the accident than it could a week later, the derailment at Middletown, Conn., shows the need of even greater alacrity than any that has yet been manifested—unless railway officers can be trusted. And this brings us to the serious part of these comments. At Middletown a train carrying 400 passengers home from the seashore was thrown down a bank and 60 passengers were injured; and the superintendent of the road, offering a reward of $2,500 for the miscreant, declared that a rail had been maliciously loosened, all the spikes of one rail having been pulled on both sides of the rail, and the splice bars taken off. The spikes, undamaged by derailed wheels, were lying on the ground nearby. But the next day a chief of police and a sheriff arose to say that there was no evidence of malicious tampering with the track. They thought the roadbed had been softened by rain and that the heavy engine had spread the rails. They classed the engine as "heavy," because the train was a long one. Surely the public desires to know when train wreckers are abroad; and it would seem that an experienced railway officer ought to be able to diagnose the facts of a wreck more accurately than a sheriff.

THE train rules of the railways of Great Britain, which originally were written by masters of language and which have been the subject of careful modification and improvement for many years, ought to constitute one of the most complete and carefully matched documents of the kind to be found; and, indeed, they have that appearance. Thoroughness and a careful attention to every little element of the trainmen's work, and of the construction of language to fit the trainman's mind, appear on every page. But Colonel Yorke, senior inspecting officer of the Board of Trade, has discovered a place where the English code is deficient, while that of the American Railway Association is all right. It is the requirement that a signalman shall put a signal to the stop position immediately after the passage of a train. In our code the clause is a part of rule No. 319: "When a train . . . has passed the home block signal and the signalman has seen the markers, he must display the stop signal . . ." The obvious requirement is found in the British code only in relation to distant signals. So far as home signals are concerned it has to be implied. But then, it is very clearly implied, and of course the practice is substantially universal. So, in the case under discussion, which was that of a collision on the London & North Western, near Liverpool, the signalman is held responsible for allowing a second train to proceed towards his station before he had restored the signal to its normal position behind the preceding one. The government officer con-

cludes that the signalman received the offer of the second train just as he had given notice of the exit of the leading train and that, to save time, he accepted the second train at once, intending to put the signal to the stop position immediately afterwards; but that he forgot to do so. The error was not, however, a simple act of forgetfulness, for in other respects he failed to perform his duties in their proper sequence. To the American the remarkable thing is that the English manual signalmen, with no control apparatus except the ocular control afforded by their needle instruments, perform their millions of operations with so few serious errors.

THIS report affords another instance illustrating how the British inspectors have come to look with favor on the track circuit; but Colonel Yorke, while clearly setting forth that the use of track circuits would be a great safeguard against errors by signalmen where switching is going on within their territory while passenger trains are due, takes advantage of the occasion to make a little suggestion to the signalmen, as follows:

"The best way in which errors of this sort can be guarded against is by the introduction of the track circuit combined with automatic or semi-automatic signals. But to introduce this method of signalling upon English railways would involve the expenditure of a very large sum of money, and would take a considerable time to carry out. Supposing this were done, the natural result would be to cause a large decrease in the number of signalmen employed, and to lessen the responsibilities and status of those remaining. If everything were made "fool-proof," men of skill and intelligence would no longer be required for manning our railways. Signalmen would be well advised to show, by loyal and intelligent adherence to the rules and regulations (each one of which is based upon experience), that they can give as good results in the handling of traffic with safety as is claimed for automatic signalling."

That is good advice for the signalmen, for intelligent adherence to the rules, like virtue generally, is its own reward. But when they match themselves against automatic signals they have taken a large contract. A certain American road, in a rough comparison made a few years ago, found that, according to the record of the number of failures occurring in proportion to the number of signal movements made, automatic block signals gave one false clear indication in proportion to *thirty-five* given by men handling manual signals.

WHILE the Canadian Pacific, through its land department, has placarded the statement that reciprocity with the United States will increase the value of Canada lands 100 per cent., this is apparently almost the only appearance of a railway question or interest in the fervid political campaign over the border now drawing near to its voting days. We have seen no reference to the subject in the reports of the vehement speeches of the party orators of Canada. Yet it was at the last session of the Canadian House of Commons that on what was a kind of railway field day, Mr. Borden, Conservative leader of the opposition, attacked the government's railway methods in connection with the building of the Grand Trunk Pacific most savagely, charging fraud or mismanagement at many points; and it looked then, before the reciprocity agreement had materialized at Washington, as though the Dominion government's alleged railway lapses might be the foremost issue in the next general election. But the attack was on the details of the government's policy, not on the policy itself. Canada gave the Canadian Pacific more than $25,000,000 in money subsidies, be-

[illegible] materially modify the state aid policy. This basic fact presumably [illegible] reported [illegible]

New England extension, the question seems dormant as contrasted with a naval policy and the ghost of "annexation." From a different, if not wider viewpoint, it is to be noticed that all accounts agree that the Canadian farmers are turning to reciprocity, not only in the western prairie provinces, but in Ontario and Quebec. As it is mainly among the western Canadian farmers that the two great railway systems of the country have their profitable development, it is not strange that the major railway influence is thrown on the reciprocity side, as has been the case in this country in our states, which are adjacent to the northern boundary line.

BOILER CIRCULATION.

THE discussion on water leg circulation at the Master Boiler Maker's convention, particularly as applied to the Jacobs-Shupert firebox, attracted considerable attention, and, as a partial result, we publish in this issue an account of some tests that were made to determine the relative circulation in a Jacobs-Shupert and an ordinary firebox. The investigation may be accepted as showing that there was an upward circulation in both boilers, which few people are prepared to deny, but to most readers it is doubtful if it is accepted as proving much more.

The test was made by taking samples of the water from various heights along the water leg and judging from the amount of contained solid matter as to the velocity of the currents. The greater the excess of solid matter at the top over that at the bottom the more rapid the circulation was supposed to be.

The inference drawn, for example, that, because on trip 16 "there was no undue amount of solids at the bottom of the water leg . . . . there is a very complete circulation around the water leg," may or may not be accepted. It depends on the viewpoint.

What are the currents in a water leg? Are they all upward? Some guess not and think that possibly there may be a downward flow next the outer sheet. If that guess is correct then an accumulation of solid matter near the surface would indicate sluggishness in the circulation, which would permit of such an accumulation.

There is but one set of tests that seem, from the notes, to indicate similar conditions in the Jacobs-Shupert and the ordinary firebox and that is on runs 11 and 23, after standing 30 minutes at Kingman. From this, according to the scale of suspended matter and accepting the theory proposed, the circulation in the ordinary boiler was far the better of the two.

The investigation is interesting and of value, but we know so very, very little about boiler circulation and what it means in the generation of steam that it is decidedly unsafe to draw any generalizations from such meagre data as that which is presented here.

That there is an upward circulation in the water leg, there can be no doubt, but as to its rapidity, actual direction and complication of counter currents we know about as little as can be imagined. The one thing promising is that there is a prospect of its being actually measured in the near future, and then we may be able to design fireboxes with some idea of what actually goes on within them.

One final point regarding the article referred to in which a claim of a greater efficiency for the Jacobs-Shupert firebox is made. Road tests are said to show "an increase in evaporated efficiency per square foot of heating surface per hour of 35 per cent." As no definition is given as to what is meant by evaporative efficiency in this case, and as there is no data at hand as to the conditions of the test, such as pounds of coal burned, and the work done, the subject is not in a condition to be discussed. But 35 per cent increase of boiler efficiency is a good deal, and should be of vital interest and importance to every railway manager in the world, and the hope and [illegible] is true

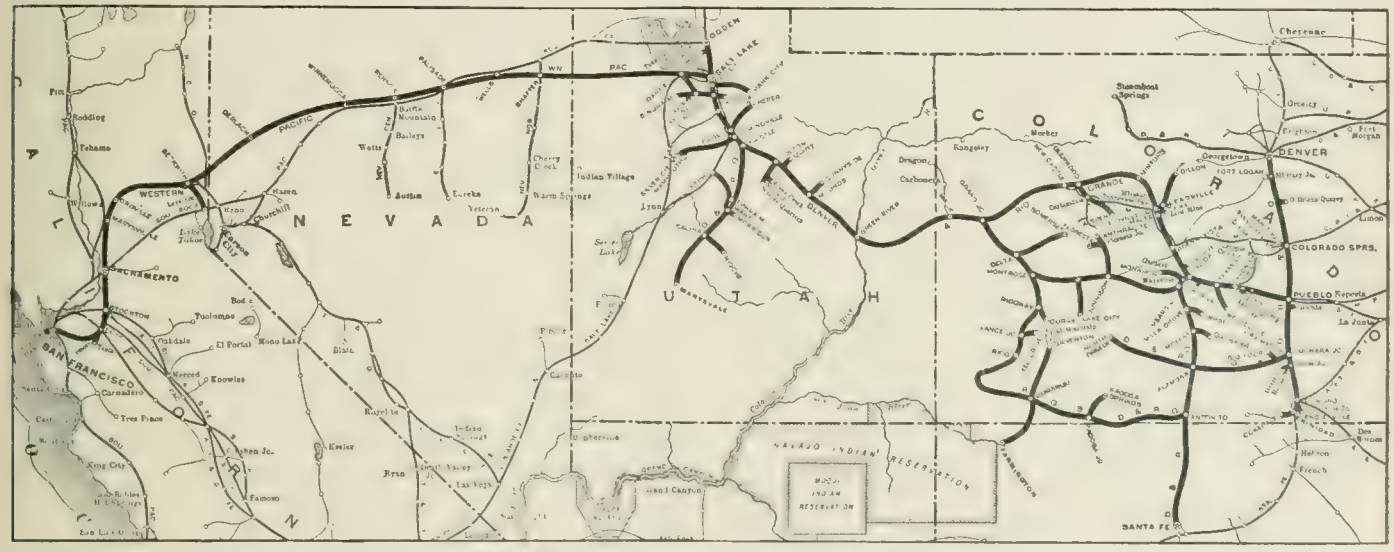
DENVER & RIO GRANDE.

THERE was one question that was asked repeatedly of the various witnesses before the Hadley Securities Commission in connection with the general investigation of the advisability of federal regulation of the issuance of railway securities. The question, worded in various ways, amounted to an inquiry as to what a company should do when, through former overissuance of securities, bad judgment, or simply some unforeseen natural causes, it found itself in need of raising large sums of money to put its property in condition to handle an increased business profitably, the company having already issued a stock to, let us say, 75 per cent. of its present value, and bonds to an equal amount. The showing of the Denver & Rio Grande from year to year is a good illustration of how real this difficulty is to certain railway companies. This is especially the case now that the Western Pacific has been completed and is in operation; and the problem is made more nearly vital by the recent decision of the Interstate Commerce Commission which reduced materially rates to intermountain territory, which reductions, it is thought, will bear heavily on the Denver & Rio Grande.

This road has two quite distinct kinds of business. One is a large volume of local business originating through the great natural resources of Colorado, and in the transacting of which business the D. & R. G. is largely without a competitor. Such business, for instance, is the transportation of precious ore and, to a less extent, of bituminous coal, as well as the transportation of products of agriculture. The other form of business is that which probably prompted the building of the Western Pacific. The D. & R. G. now forms the connecting link between the Missouri Pacific at Pueblo, Colo., and the Western Pacific at Salt Lake City, Utah. To handle through business the Denver & Rio Grande has got to compete directly with the Union Pacific; and regardless of whether or not the Western Pacific is as well built and can be as economically operated as its competitor, the Southern Pacific, between Salt Lake City and the Pacific coast, the D. & R. G. itself has got to be able to handle its through business in such a way as to make a favorable comparison with the Union Pacific. Otherwise the Gould system of roads cannot successfully compete for through traffic, on the theory that a chain is no stronger than its weakest link.

In the fiscal year ended June 30, 1911, the Denver & Rio Grande earned $23,400,000 gross, as compared with $23,600,000 in the previous year. Operating expenses amounted to $15,960,000 last year and to $15,800,000 the year before; so that, after the payment of taxes and clearing outside operations, operating income amounted last year to $6,550,000 as against $6,956,000. The company paid its fixed charges and annual dividends of 5 per cent. on the preferred stock in 1910, but after the payment of 2½ per cent. on the preferred in the first half of the past year, the second semi-annual payment on the preferred was passed, so that in 1911 the company had a surplus of $1,118,000 as against a surplus of $399,000 in 1910. But President Jeffrey, in his annual report, says that $1,248,000 semi-annual interest, due September 1, 1911, on the $50,000,000 Western Pacific first mortgage 5 per cent. bonds, will have to be paid by the D. & R. G.; thus actually, instead of a surplus the company will have a small deficit.

The Western Pacific has been in operation, or at least has published through tariffs, since 1910, but up to June of this year the results were a disappointment. There had been floods in the Humboldt valley and a series of storms on Great Salt Lake which had seriously interfered with traffic; and again early in January, 1911, rains in the mountain districts in California caused frequent slides in the deep cuts and the settling of some of the heavy embankments, so that during a good part of the winter and early spring train movement was uncertain. Beginning with the month of July, the Western Pacific is to make public its earnings, and the Denver & Rio Grande estimates that these earnings for July will be about $420,000. If the road did not earn more than this per month it would have to operate at something better than 50 per cent. ratio to pay 5 per cent. on its $73,000,000 cost of construction.



The Denver & Rio Grande and the Western Pacific.

However, as has already been mentioned, it is the problem of the Denver & Rio Grande itself, rather than that of the Western Pacific, that lends especial interest to the report of the company for 1911. Any one who has been over the road knows that it has heavy grades, high degrees of curvature and is not in physical condition to compare favorably with the Union Pacific. The territory is difficult. When the road was built, theories of construction had a quite different trend than they now have, and the quality of maintenance of the property in the past has, possibly necessarily, not allowed of rebuilding the line out of earnings, as has been done with so many parts of other roads originally built cheaply or with low standards of construction. Whatever the causes, however, and how little the officers who are now operating the road are to blame, the fact remains that it would require an expenditure of very many millions of dollars to put the road in shape to compare favorably with its transcontinental competitor; and apparently the D. & R. G. simply has not got the money to spend—at least at present. In 1908 a first and refunding mortgage was placed on the entire property, the old Rio Grande Western being included under this mortgage, and since that time, $33,944,000 of 5 per cent. bonds secured by this mortgage have been sold; but, of course, it is necessary to provide for the outstanding $79,667,000 underlying bonds, and the

price at which D. & R. G. securities are selling would hardly make it probable that a new large issue of refunding 5's could be successfully sold at a profitable figure.

What is meant by the policy of the company towards its maintenance, may be explained by an examination of the details of the expense account in 1911. The Denver & Rio Grande last year operated on a 68 per cent. basis; the Union Pacific operated on a 52 per cent. basis in 1910, the 1911 report not being available yet. It cannot be said that the class of commodities carried, unfavorably affects the operating ratio of the D. & R. G., because the Union Pacific's revenue per ton per mile was 1.02 cents and the Denver & Rio Grande's average revenue was 1.24 cents. As a whole, the operating expenses in 1911 on the Denver & Rio Grande amounted to $15,960,000, as against $15,800,000 in 1910; maintenance of way costing slightly less and transportation also costing less in 1911 than in 1910, while maintenance of equipment, traffic and general expenses cost more in 1911 than in 1910. The increase in cost of maintenance of equipment can be accounted for almost entirely by a charge for depreciation, made for the first time this year. Figured on a per road mile or per track mile base, the expenditures for maintenance of way and structures were fairly large, but it must be remembered that the D. & R. G. runs through territory which makes it unusually expensive to keep the line open at all in certain seasons of the year, and it is instructive to pick out certain items that can be fairly accurately compared as between different roads and see what the D. & R. G. is doing when measured against its competitors* for through traffic.

Taking the item bridges, trestles and culverts, the cost of maintenance per year per *road* mile is $85 on the D. & R. G., and $66 on the Union Pacific. This is because the D. & R. G. has a great many more bridges and trestles to maintain per mile than the Union Pacific, and also probably because the Union Pacific's bridges are of more modern construction or approved standard than the structures on the D. & R. G. Roadway and track is an item largely made up of labor costs; that is, the cost of placing materials in track, etc. On this account the Denver & Rio Grande spent $424 per *track* mile; the Union Pacific spent $611 per mile. The D. & R. G. spent $231 per track mile for ties; the Union Pacific, $263. But when we come to rails and ballast the contrast is striking. The Union Pacific spent $84 per track mile for rails; the D. & R. G., $22. The Union Pacific spent $12 per mile for ballast; the D. & R. G., $2.80.

What all this suggests is that possibly the future of the Denver & Rio Grande lies not in developing its through traffic, for which it cannot compete with the more favorably situated and financed Union Pacific, but in which it can earn from the local traffic that it can control and for which traffic it has not and probably never will have, a competitor.

The annual report of the company gives a table showing the various classes of traffic and the revenue derived from each class of traffic which is unusually full and instructive, and the frankness of these figures and, as far as that is concerned, of all the figures given in the annual report, is to be strongly commended.

The following table is an abstract of this classification of freight tonnage and revenue:

	1910-11.		1909-10.	
	Per cent of total tonnage.	Per cent of total revenue.	Per cent of total tonnage.	Per cent of total revenue.
Products of agriculture..	3.86	9.17	3.60	7.87
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Products of forests.....	2.21	4.04	2.33	4.28
Manufactures	5.54	13.88	5.54	14.97
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

The following table shows the results of operation in 1911, compared with 1910:

	1911.	1910.
Mileage operated	2,597	2,598
Freight revenue	$17,241,018	$17,306,613
Passenger revenue	5,124,383	5,275,895
Total operating revenue.....	23,391,771	23,563,437
Maintenance of way and structures	2,627,895	2,690,602
Maintenance of equipment.....	4,119,189	3,804,120
Traffic	587,083	511,108
Transportation	8,028,628	8,234,207
Total operating expenses.....	15,957,737	15,801,954
Taxes	859,621	823,515
Operating income	6,546,813	6,955,952
Gross corporate income.....	8,396,219	8,493,823
Net corporate income.....	2,483,044	3,008,167
Dividends	1,244,495	2,488,990
Renewal fund	120,000	120,000
*Surplus	1,118,549	399,177

*As explained in our comments, $1,248,125 was advanced by the D. & R. G. to the Western Pacific to pay its semi-annual interest on $50,000,000 first mortgage bonds.

WESTERN SHOP EMPLOYEES.

THE signs are that the leaders of the shop employees of western railways realize they have committed a serious error in making and pressing unreasonable demands at such a time as the present. The heads of the railway labor organizations have acquired the reputation of extremely good strategists. They have repeatedly out-generaled the railway managers. The leaders of the shop organizations have this time been completely out-generaled by the managers; and the emphatic course they have taken indicates that they got drunk with power and lost their heads. To have merely demanded at this time recognition of a federation which, as Mr. Kruttschnitt has pointed out, would have the power to declare a strike in all the shops of the Harriman Lines, and cause trouble and loss to all of the twenty millions of people that those lines serve, would have been going to great length. "Whom the gods would destroy they first make mad"; the labor leaders did not merely seek recognition of the federation, but also formulated a large number of grotesquely unreasonable demands which they intended to press as soon as the federation was recognized. The result has been that all the railway managements which originally refused to recognize the federation have "stood pat"; the public has backed them in doing so; in some places, as Houston, Tex., Omaha, Neb., and Denver, Colo.; commercial organizations have adopted resolutions condemning the stand of the employees and commending that of the managers; many of the employees are now manifesting a reluctance to go to the extreme of a strike; and the union leaders are seeking vainly for a loophole through which they can escape without irreparable loss of prestige from the untenable position they so cheerfully took up.

One rather important reason why many employees do not want to strike is afforded by the pension systems of the railways concerned. The Harriman Lines, for example, now have 722 pensioners to whom payments aggregating $258,588.33 were made in the fiscal year ended June 30, 1911. This is an average of over $358 per pensioner, which at 5 per cent., would be the interest on $7,160. In other words, at his retirement from the service the road practically gave to each of these employees the income from $7,160 for the rest of his life. It will do the same by other employees who remain continuously in its service for the periods specified in its pension plan. Every employee who struck would lose his pension rights. But the consideration most influential with a large number of employees is the great probability that a strike declared now would be unsuccessful, which would put it in the power of the companies to make material changes in wages and conditions of employment. It is not at all sure that there will not yet be a strike on one or more roads, but it is significant that for the first time in years the railway managers directly concerned are regarding the situation with more complacency than the labor leaders.

NEW BOOKS.

Fuel Oil Specifications. By Irving C. Allen. Published by the Department of the Interior, Bureau of Mines, Washington, D. C.

This pamphlet, listed as technical paper No. 3, gives specifications for the purchasing of fuel oil and the methods of sampling. It is issued for use by the government, but may be of general use to anyone dealing with fuel oil. It contains a method of finding the price to be paid for different oils, on the basis of the number of B. t. u.'s per lb. Methods for sampling natural gas from wells are also considered in detail.

Taxation of Corporations, Part III; a special report of the Commissioner of Corporations, Washington, D. C. 109 pages.

This pamphlet contains the results of a study, made by the commissioner, of the methods of taxation of corporations in Ohio, Indiana, Illinois, Michigan and Wisconsin. The work deals with manufacturing, mercantile, transportation and transmission corporations. There is a general view of the system in each state; a statement of details, with a summary of the law as it is found in the constitutions and statutes; court decisions and a summary of the financial results. A brief introduction tells the peculiarities of each state as compared with methods in force in other states. Part I of this series, dealing with the New England states, was issued in May, 1909; and Part II, Middle Atlantic states, in June, 1910.

Railroad Correspondence File. By W. H. Williams, third vice president of the Delaware & Hudson Company. Published by the author, 32 Nassau street, New York City; half leather; 230 pages; 7 in. x 9¾ in. Price $7.50.

This is a plan for filing letters in a large office, strictly according to subjects, an arbitrary number being assigned to each subject, the plan followed being that of the Dewey decimal system, used everywhere in large libraries, but here adapted, not to all the information in the world, but only to that dealt with in railway offices. Mr. Williams issued the first edition of his work nine years ago, when he was on the Baltimore & Ohio, and a notice of it was given in the *Railroad Gazette,* January 2, 1903. He not only has had extensive experience on a number of important roads, but, at the instance of Mr. Loree, who was president of the Baltimore & Ohio in 1902, he also examined the methods of filing in use in all sorts of offices, both in America and Europe. Since the first edition was issued, the Pennsylvania Railroad has had a committee investigate the general subject of filing, and that committee, of which J. L. Hanna was chairman, has given Mr. Williams about 1,000 additional titles; and the new book is enriched to that extent. As now revised, the book is used as standard on the Pennsylvania Railroad; and it is in use generally on the Harriman Lines. It is also in use on the Delaware & Hudson, the Baltimore & Ohio, the Chicago, Burlington & Quincy, the Lehigh Valley and the Canadian Pacific.

The ten primary numbers are assigned to the different departments of railway business as follows: 0 General; 1 Executive and Legal; 2 Finance and Accounts; 3 Roadway and Structures; 4 Equipment and Shops; 5 Transportation and Storage; 6 Traffic, Rates; 7 and 8 Spare; 9 Local Facilities and Affairs. To illustrate the arrangement we may take the sub-divisions of section 5, which are as follows: 510 Tracks and Terminals-Working; 520 Trains; 530 Locomotives—Utilization of; 540 Cars—Utilization of; 550 Spare; 560 Safety Measures—Signals; 570 Telegraph and Telephones; 580 Accidents. Under 540, we find for example, 541.1 Supply of passenger cars; 541.11 Orders for; 541.111 Orders for coaches. Again, 541.4 Dining-car service; 541.41 Meals; 541.414 Complaints of passengers. The last item under Dining-cars reads "Supplies—see 027.1." This reference back to a number under the head of Conducting Transportation is an example of the careful manner in which a variety of necessary or desirable cross-references have been introduced throughout the book. The complete adaptability of the system is again illustrated in the treatment of the last general subject, "Local Facilities." Here the author breaks away from the principle of indexing by subjects and follows a geographical plan. Correspondence relating to local matters in any one town or city is likely to combine two or more subjects, and in some cases of extensive track elevation a dozen subjects might arise, all of which it is desirable to keep together. Numbers from 900 to 906 are assigned to correspondence on Local affairs off the line; for example, South America 900.4; Massachusetts 901.4; Wisconsin 904.5.

The last half of the book consists of an alphabetical list of subjects, the relative importance of each being indicated by indentation in the setting of the type or by the use of fullface type.

Any office manager who has enough letters to render a simple alphabetical classification by names of writers insufficient for his needs will find it necessary to classify by subjects; that is to say, classification by subjects is his only resource. This conclusion seems to be concurred in by an overwhelming majority of those who have investigated the subject; and for a railway, with its hundreds of large stations and scores of other offices, a subject classification is peculiarly appropriate, as the same classification can be used in all stations and offices. The Dewey decimal system is so simple and is susceptible to such indefinite expansion by any user, that it meets all objections. When any new topic arises it is always closely related to some existing head, and combining it with the nearest head by adding a decimal place makes abundant room for the new comer. The system is thus capable of unlimited expansion, and can never break down for lack of room for growth. Not only are all papers sought bound together, but the most nearly allied subjects precede and follow.

Not the least significant feature of the commendatory testimony given by users of the Williams classification is that regarding the abolition of every thing in the nature of accessories. With the vertical flat filing system there are necessary only three units; the book, the filing case and the storage file, the latter for papers over a year old. No "record of correspondence" need be kept and letters sent out do not need to bear either a file number or any request to the recipient to refer to some number or letter in his reply.

Mill Buildings. By Henry Grattan Tyrrell, C. E. 6 in. x 9 in. 490 pages. 652 illustrations. Myron C. Clark Publishing Company, Chicago. Price, $4.00.

Henry G. Tyrrell, C. E., who was the author of a little book on Mill Building Construction, published in 1900, greatly enlarges the scope of this work in his book on the Design and Construction of Mill Buildings. This work is not limited to the calculation of stresses in steel frame buildings, but covers very completely the economics of location, the general and detailed design of such buildings, including a great many details of walls, floors, windows, doors and roofs. Chapters are included on loading and the calculation of stresses, but elementary discussions of graphic statics and stress calculation are eliminated on the assumption that a student of this subject is already thoroughly familiar with the elementary principles of structural design.

A feature of the book is the part devoted to the engineering and drafting departments of structural works, giving the organization of such departments, methods of procedure in estimating and designing and the organization and management of a drafting room. A great deal of the material in the volume is based on the personal experience of the writer, which covers a period of 20 years in designing and estimating structural work, and a great many of the estimates on prices and qualities are taken from his personal note book. This removes the work from the class of purely theoretical and academic volumes on designing, although the parts intended for students and draftsmen are sufficiently simple and elementary to permit them to be readily understood.

The railway development in Chile for the next few years contemplates the construction of two new trans-Andine railways to connect the railway systems of the Argentine with the Chilean railways; one of these to be about 300 miles north of the present trans-Andine and the other about 400 miles south. The north line will put the agricultural sections of the Argentine in close touch with the nitrate fields of Chile, to the great advantage of both.

Letters to the Editor.

CARELESS ENGINEMEN.

To the Editor of the Railway Age Gazette:

You have discussed the importance of knowing that enginemen are in a fit condition to exercise, and do exercise, the vigilance necessary for the protection of life and property. This is solely a matter of supervision and discipline. The time has gone by when a railway man's work can be improved upon by lectures or pleading, or calling attention to other's shortcomings. He must know that he is being watched and that if caught he will be punished. No better means of improving work has ever been devised than the surprise test and it is a great pity that the labor organizations have been successful in their efforts to knock it out on most of the large systems.

It corrects the tendency of enginemen to be careless in observing signals. If a runner knows that some one is going to display stop signals at unexpected places, extinguish lights in train order or block signals, and make other surprise tests with a view of finding out who are incompetent or careless he surely "takes notice." This, followed up with good stiff discipline for the delinquents effects genuine improvement.

A long association with locomotive enginemen has convinced me that the most dangerous yet the least considered fault of an engineman is that of "visiting" in the cab. In talking with another he not only draws the attention of that other, but his own face is turned to the left side, while he tells stories or relates his woes. Then we have the nodding engineman who is in the habit of dropping asleep between stations no matter how much rest he may have had. There are more of these men running engines than the general public has any idea of. The firemen can tell who they are if they will. Then there are the drinking and the reckless men. These, it is comparatively easy to detect, but to get at the first mentioned species it is absolutely necessary to have a system of surprise tests. Observation tests alone do not fill the bill at all.

RASTUS.

FOR BETTER SEAL RECORDS.

To the Editor of the Railway Age Gazette:

At the meeting of the Freight Claim Agents' Association in St. Paul, last June, as reported in the *Railway Age Gazette*, July 14, Mr. Tustin, freight claim agent of the Missouri Pacific, made mention of the amazing fact that the railways had paid out $30,000,000 in settlement of claims for loss and damage to freight in one year.

There are several causes that contribute to bring about this shameful waste, but to be brief, I will confine my remarks to pilfering. Chief among the causes is the use of cars for transporting valuable freight, that are worn out and unfit for the purpose; cars with doors and fastenings faulty; unreliable [illegible] and general lack of interest on the part of line officers in investigating claims.

When cars become unfit for valuable freight, by reason of doors and fastenings becoming worn and damaged, they should be assigned to less important traffic.

[illegible] a man, a green thief, minutes and a monkey wrench, can gain entrance to most cars by simply taking the nuts off of a few bolts, or unscrewing a few lag screws without breaking the seals. This could easily be remedied without increasing the cost of cars, by any mechanical man.

[illegible] that cannot be worked without leaving visible signs of having been tampered with; then keep a correct and [illegible] record of the seals. With seals numbered consecutively and running into the ten thousands, it is out of the question for [illegible] to take the numbers and every item in the train books furnished for that purpose, in the time allowed at the [illegible] and they should be relieved of this. Instead give them a list showing the cars in the train with complete seal record of each car noted thereon. The conductor should be required to certify that the cars were all sealed intact and to deliver the certificate with his train at the end of the run. Have reliable seal clerks at all freight terminals whose duty it shall be to take the seals immediately on arrival and compare with the forwarding agent's record. If any seal has been tampered with or the number does not tally with the forwarding agent's record, send the car to freight house to be checked. Ascertain the shortage, if any, and give the information to the train master by wire, who in turn will call on the conductor for an explanation. Make sufficient surprise tests to insure accurate checks at all terminals. Let the men know that the responsibility for loss of freight and for broken or improper seals, will be placed where it belongs and at the time it occurs, not three to six months after. Then they will give the trains more protection and stop some of the loss.

J. O. KELLY.

PUBLICITY.

Newton, Kan., August 19, 1911.

To the Editor of the Railway Age Gazette:

Publicity is, no doubt, one of the best remedies, or preventives, for evil or wrong doing, and the free press and free speech are as much a necessity to discourage crime as our army and navy are to maintain peace, or discourage war. And the indiscriminate use or abuse of the free press or speech would prove almost as disastrous to our business interests as would the use of the army to settle every little town row or labor dispute.

While there is, perhaps, no necessity for a government censorship, considering the fact that the press is advocating government regulation of nearly everything else, would a little regulation of the press be out of order? And would it not be a good thing for the country, especially when the extreme use of the press causes a greater loss than gain?

The country editor who happened to learn that the cashier of the town's bank was living beyond his salary, and would publish the fact in such a manner as to cause a run on the bank, might not be exceeding his legal rights, but he would be using mighty poor judgment, so far as the interests of the bank and community at large were concerned. His action would cause a greater loss than gain.

If any of our public men should go over the country denouncing our home banks, declaring their managers robbers and the banks unsafe, his free speech would be likely to be cut off by an angry mob. He would at least be condemned for an attempt to destroy confidence in an institution where it was most needed for the town's welfare or business interests. Why then should these same men be permitted to declare our large corporations a menace to public welfare and their managers robbers, when the very foundation of our prosperity and progress depends upon confidence in our large corporations, or combined capital?

When a well known insurgent congressman gave out a two column interview a short time ago telling of the faults and bad practices of the express companies, doubting their legal right to do business, and referring to them as doing business as "blithe as any pirate that ever scuttled a ship or cut a throat," he did not confer a public benefit or offer any way of regulating the express companies, but he did advertise one already well known congressman at the expense of increasing the lack of public confidence in our corporations in general.

The express companies, perhaps, need regulating, and the record of the congressman referred to would indicate that he is capable of assisting in their regulation. But would it not be more becoming a man in such a position to refrain from shouting "fire" just because he smelled smoke. Could he not go ahead, discover the fire, extinguish it, and permit the public to do the shouting? Is it necessary to stampede the public against our corporations in order to reform or regulate them?

The extremes of even the good things of this world are dangerous, and there are no reasons for the belief that free press and free speech are exceptions.

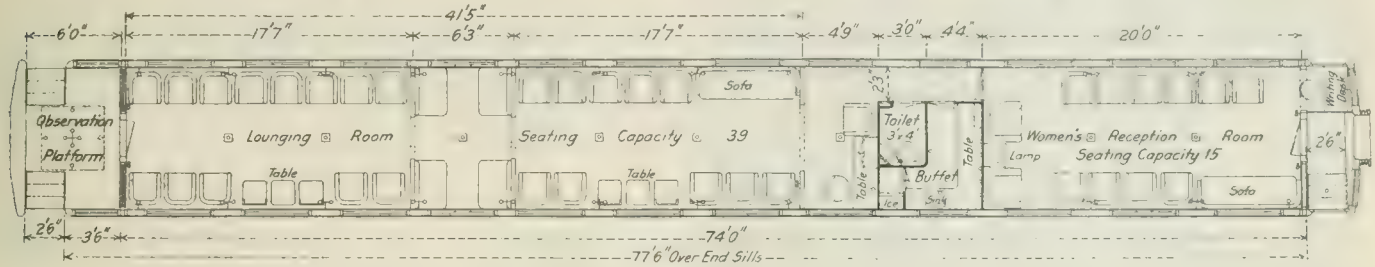
A. J. EWING.

WOMEN'S PARLOR CAR FOR THE BURLINGTON.

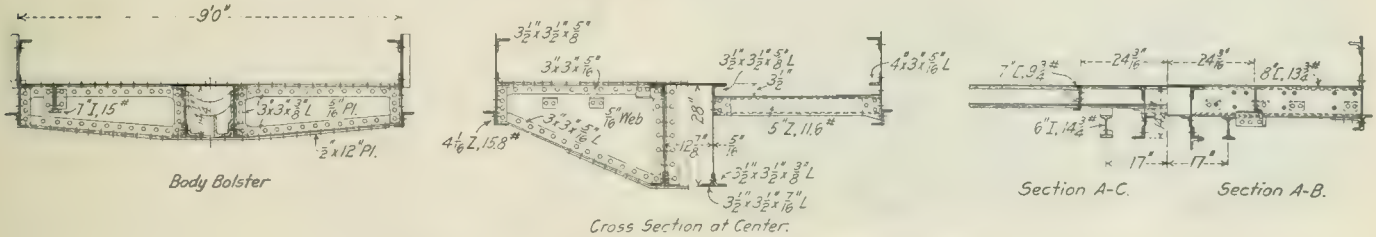
The passenger service between Chicago and St. Paul and Minneapolis on the different lines is so competitive that there is a constant endeavor to provide some extra comfort or pleasing features to attract first-class travel. The most recent result of this is seen on the Chicago, Burlington & Quincy, where cars have been introduced which provide for the special comfort of women passengers, having a separate reception room or parlor for their exclusive use. Two of these new parlor cars, one on the Minnesota Limited leaving Chicago at 6:30 p. m., and one on the Chicago Limited leaving St. Paul at 8:30 p. m., were put in service May 1. They are 77 ft. 6 in. long over the end sills, and have steel underframes, which are illustrated in detail. The weight of the car body is 85,600 lbs., and the two six-wheel trucks weight 40,000 lbs., making a total of 125,600 lbs.

The interior arrangement is shown on the floor plan, and not only presents the new features which are intended to contribute to the comfort of women passengers to a larger extent than first-class cars now in general use, but also provides an unusually large seating capacity in a lounging and smoking room for men. The men's lounging room is 41 ft. 5 in. long, with a seating capacity for 39 passengers. It is divided into three sections, the end one being furnished with chairs, the middle one with side seats, and the inner compartment with chairs, a sofa and table. Next to this is the buffet kitchen, and beyond is the women's reception room, which is 20 ft. long and has a seating capacity for 15.

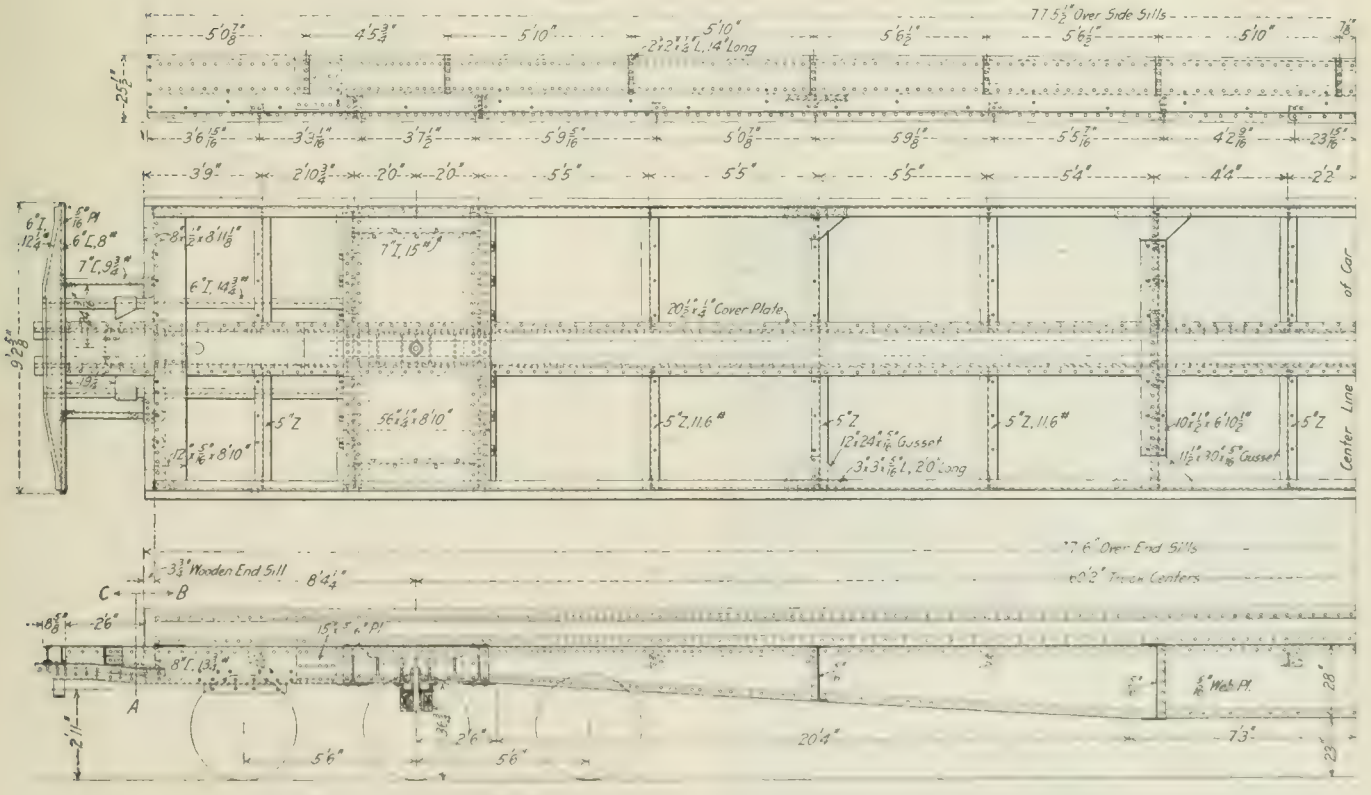
The large easy chairs and sofa are upholstered with frizette in a delicate shade of green, and there is a writing desk in a cozy corner which extends out over the platform. The interior finish and furniture is made of Cuban mahogany in the French



Parlor Car with Women's Reception Room.



Cross-Sections of Steel Underframe of Burlington Parlor Car.



Details of Steel Underframe for Parlor Car; Chicago, Burlington & Quincy.

Men's Lounging Room.

empire style. The chairs in the men's room are upholstered in brown leather.

The construction of the steel underframe is clearly shown. The center sills are 28 in. deep at the center, and consist of a box girder with webs 5/16 in. thick, top and bottom angles 3½ in. x 3½ in., and a top cover plate ¼ in. x 20 in. These sills are continuous between the end sills and at the body bolster are riveted to a ribbed steel casting which extends between them. The body bolsters are 14¼ in. deep at the center and 10 11/16 in. at the ends, and are made of rolled plates and angles. The side sill is 24 in. deep and 5/16 in. thick, with a 4 1/16 in. Z-bar at the bottom and a 3½ in. x 3½ in. x ⅝ in. angle at the top.

Ladies' Reception Room; Burlington Parlor Car.

TRAIN ACCIDENTS IN AUGUST.[1]

Following is a list of the most notable train accidents that occurred on the railways of the United States in the month of August, 1911. This record is based on accounts published in local daily newspapers, except in the case of accidents of such magnitude that it seems proper to write to the railway manager for details or for confirmation.

Collisions.

Date.	Road.	Place.	Kind of Accident.	Kind of Train.	Kil'd.	Inj'd.
1.	Mo. Pacific	Wagstaff, Kan.	bc.	P. & F.	..	..
7.	Seaboard A. L.	Petersburg.	xc.	P. & F.	2	0
†20.	Chi., R. I. & P.	Flagler, Col.	xc.	P. & F.	1	0
25.	Pitts. & L. E.	Pittsburgh.	xc.	P. & F.	0	25
29.	Erie	Newburgh, N. Y.	xc.	F.	0	0
31.	Ulster & D.	Halcottville.	bc.	P. & P.	1	4

Derailments.

Date.	Road.	Place.	Cause of derailm't.	Kind of Train.	Kil'd.	Inj'd.
2.	Balt. & Ohio	Salem, W. Va.	unx.	P.	2	0
2.	Southern	Watauga.	malice.	F.	1	2
†3.	Wichita Valley	Penick.	wind.	P.	1	25
4.	Southern	Salisbury.	unx.	P.	0	5
6.	Pennsylvania	Indiana Har.	....	P.	0	1
7.	Nor. Pacific	Moorhead.	....	P.	3	3
7.	C., C. & Ohio	Penland.	unx.	F.	1	1
7.	Ga., F. & Ala.	Colquitt.	acc. obst.	P.	1	2
13.	Cent. Ga.	Americus.	malice.	P.	2	1
13.	Penn.	Fort Wayne.	exc. speed	P.	4	50
14.	Balt. & Ohio	Buckhannon.	unx.	P.	1	0
†17.	Seaboard A. L.	Lumberton.	d. track.	P.	1	12
18.	Cleve., C., C. & S. L.	Columbus.	d. switch.	P.	0	50
20.	Southern	Sueville, S.C.	burn'd b'dge	P.	1	0
†25.	Lehigh Valley	Manchester.	b. rail.	P.	29	50
25.	Seaboard A. L.	Plant City.	malice.	P.	0	3
27.	Cin., H. & D.	Kirkwood.	b. rail.	P.	1	3
†27.	N. Y., N. H. & Hart.	Middletown.	....	P.	1	50
27.	Southern	McDonough.	d. switch.	P.	0	25
29.	Southern	King's Mtn.	unx.	P.	0	22
29.	St. J. & Lake C.	E. St. Johnsb'y.	sand.	P.	..	2
29.	St. L., I. M. & S.	Sterlington.	cow.	P.	2	4
30.	Hocking V.	Columbus.	d. switch.	P.	0	0

Manchester.—The passenger train derailed at Manchester, N. Y., on the 25th, was No. 4 eastbound, and is said to have been running about 25 miles an hour; the speed being limited by rule at this point, which is in or near a yard. The train consisted of two engines, two baggage cars, one parlor car, one dining car, and eight coaches. The derailment was due to a broken rail, but the engine and the first four cars passed over in safety. The next two cars ran off the track, and after running about 200 ft., came to a deck girder bridge over a stream; and both fell off at the right hand side of the bridge, one being broken in two and crushed, and the other lodging nearly in a perpendicular position, with one end resting against the side of the bridge. Nearly all of the persons fatally injured were in these two cars, and the majority in the first one, which was forced with greater momentum against the east abutment of the bridge. The stream was shallow and no persons were drowned. Twenty-seven passengers and two train men were killed, and about 50 persons were injured.

Indiana Harbor.—The derailment at Indiana Harbor, Ind., on the 6th, was of the 18-hour train from Chicago to New York.

[1] Abbreviations and marks used in Accident List.
bc, Rear collision——bc, Butting collision——xc, Other collisions——b, Broken——d, Defective——mt, Unforeseen obstruction——unx, Unexplained——derail, Open derailing switch——ms, Misplaced switch——acc. obst, Accidental obstruction——malice, Malicious obstruction of track, etc.——boiler, Explosion of locomotive on road——fire, Cars burned while running——P or Pass., Passenger train——F or Frt., Freight train (including empty engines, work trains, etc.)——Attack, Wreck wholly or partly destroyed by fire——Dagger, One or more passengers killed.

The front wheels of the engine truck left the track and ran alongside of the rail for some distance. The engineman noticed the ballast flying, but thought there was something dragging. He applied the air for a service stop and then found that the wheels were off the track. The engine slid over the bank and the tender partly followed. The club car and dining car next behind the tender were derailed but remained level with the tracks. The dining car was derailed promptly and went forward with the train. The fireman jumped from the engine, or was knocked from the step by the end of a cross tie. He had two ribs broken and sprained his ankle. The engineman, train crew and passengers were all uninjured, the cars being all of steel. The train was on time, running about 50 miles an hour and on perfectly straight track in good condition. The derailment, although not entirely determined, is thought to have been caused by a nut, or some other obstruction, on the rail.

Fort Wayne.—The train derailed at Fort Wayne, Ind., on the 13th, was the 18-hour Pennsylvania Special, drawn by two engines, the derailment occurring about 6:44 p. m. The engines and first five cars of the train were derailed at a temporary No. 10 cross-over which had been installed for diverting traffic during track elevation work, speed being restricted by general order to run ten miles an hour over the cross-over, the general order having been signed by the two enginemen on the train. The time table also contains an instruction restricting speed through all turn-outs to ten miles an hour. An officer of the road says that during the trip west to meet the train (as explained below) both engine crews looked over the layout, the engines having been stopped at that point. The surviving fireman of the second engine states that he and his engineman noted the conditions particularly at this time and, on the return trip with the train, he warned his engineman of the excessive speed approaching the cross-over, and the engineman signaled to the leading engineman to slacken. This engineman is not yet in condition to give his testimony.

The engines hauling the train on that portion of the division west of Fort Wayne had failed, and the engines and crews that were to haul the train from Fort Wayne to Crestline were sent west of Fort Wayne a distance of about 38 miles to meet the train. The train was about one hour late and was running at high speed which was but slightly reduced at the point of derailment (an employee in the vicinity testified to seeing fire flying from the brake shoes of cars at rear of train) and as a result both engines and five cars of the passenger train were derailed, the engines turning over on their sides and colliding with the engine of a freight train approaching at low speed on an adjacent track, this engine also being derailed, together with seven freight cars.

All cars in the passenger train, excepting the dining car, were of steel, and withstood the shock remarkably well, the principal damage being to underframes, one side of the club car, and the platforms of the dining car.

One of the two enginemen, and one of the two firemen on the passenger train, were killed; the engineman of the freight train and the baggage master of the passenger were also killed; the other engineman was seriously hurt but will probably recover. Fifteen other employees, two mail clerks, and twenty-eight passengers were injured. This derailment was reported in the *Railway Age Gazette* August 18, page 346.

Columbus.—The train derailed at Columbus, Ohio, on the 18th, at an interlocked switch, was an eastbound express No. 46. About 40 passengers were injured, most of them only slightly. The train approached a crossing at 50 or 60 miles an hour. When a very short distance from the home signal, the signalman ran out and gave a hand signal to reduce speed. The engineman had already applied his brakes, but immediately applied them with full force, and had reduced his speed to about 25 miles an hour when it passed over the switch which caused the derailment. The engine and the first three cars passed over this switch and the fourth car and the four behind it were derailed and overturned. The signalman in lining the route up for this train was unable to clear the home signal and discovered the cause to be a bent plunger in the lock on a facing switch close to the crossing. He disconnected the lock; but for some reason which he could not explain, he disconnected the switch also. He admitted that he had spikes and a spike maul ready, and debated with himself whether to spike the switch or not; and decided not to. He set the signals clear; but when the train was near he appears to have become alarmed, and he ran out and gave a slow signal by hand. He had been in the service for a number of years, and his error is unaccountable.

Middletown; Penick; Newburgh.—The derailment at Middletown, Conn., on the 27th is attributed to malicious loosening of a rail. Four suspected persons were arrested September 11. The derailment at Penick, Tex., on the 3rd was caused by a cyclone which occurred at about 9 o'clock in the evening. Three passenger cars were blown off the track. The collision at Newburgh, N. Y., on the 30th happened while a train was being moved in or near the yard and, according to the accounts, 30 of the 65 cars in the train were wrecked.

Electric Accidents.—Of the ten accidents to electric cars reported in the newspapers as occurring in the United States in the month of August, two are reported as having been attended with fatal results; a runaway in Philadelphia and a collision at Warren, Me.

CONSTRUCTIVE AS WELL AS RESTRICTIVE REGULATION OF INDUSTRY.*

BY FRANK W. NOXON,
Secretary, Railway Business Association.

The association which I serve holds that before the national or state government adopts a new policy which is offered as a medicine for railways we should know all about how it was compounded. We want to assure ourselves that it will not kill the patient. The railways have sometimes felt that they were a sort of poison squad themselves. It is said that a Chinese official rushed into a drug store in Peking and cried out, "Who's that foreign devil running out of your place?"

The owner answered, "He asked for a permanent cure for headache."

"And what did you give him?"

"I gave him rat poison."

You see what may happen when folks get to disliking each other. The fact is that the railway men of America are not foreigners, but patriots, and their work is not devilish, but a magnificent public service performed better and cheaper than in any other country under the canopy. Just because that service is the best in the world, and because it is given on the narrowest margin in the world, we scrutinize with anxiety any proposition to change the conditions by legislation. Every manufacturer knows something about the framing of policies in his own business. You are accustomed to the exhaustive investigation of new propositions. You cause all available facts to be obtained from the most reliable sources. You secure information and advice from competent experts. You find out how the thing has worked wherever tried. You confer with men of tested and proved experience and wisdom. Then if you decide that the scheme is sound you go carefully over your situation. How much will this cost? How much machinery must be scrapped? Is the working capital adequate for the purpose? Would the innovation unduly disturb the existing organization? Is this a favorable time to try it? Have all alternative propositions been investigated? Is there any other problem which is more urgent? All these and sometimes many more precautions you take before adopting a new policy in the management of your business. That is the business method.

Now, when a new proposition is brought forward to be adopted

*Extracts from an address before the recent convention of the National Association of Box Manufacturers, Hotel Netherlands, New York City.

in the governmental regulation of railways we ask whether this accepted business method has been followed. If the advocates reply that they have done something just as good, we feel it our duty to ask for the real thing. We hold that it is of the highest importance to the business interests of the country that changes of policy affecting railways should be entered upon with the same caution that would be exercised by the private responsible manager of any enterprise equal in extent.

We have found business men ready to co-operate with us. They mean to be fair, and they realize that wisdom in the regulation of railways will pave the way for wisdom in the regulation of commercial concerns. And already the regulation of industries has begun. Prosperity for the country will be restored or postponed, it will be thoroughgoing or hesitant, according to the sagacity of political leadership. Political leadership will be conservative, according to public opinion. All those interested in any enterprise, no matter of what size, have a stake. Nobody can afford to remain indifferent or passive. The determination of policies in state and nation affecting industries and transportation is everybody's business. It is a time for clear thought and bold speech. Clear thought is not easy. Questions of prosperity are confused with questions of wrong-doing. The development of what we call big business has made it necessary to meet new conditions with new safeguards. These will be provided, and wrong-doing will be prevented or punished. New standards are rooted in the public purpose and new devices will be found to enforce those standards. Wise citizens will acquiesce, just as they accept the common ordinance for the maintenance of public order and private honesty. The first requisite for a safe way out of our present commercial stagnation and anxiety is for business and railway men to show sincere and cheerful concurrence in the general proposition that the public shall maintain control over enterprises so far as may be necessary to protect the rights of all. This will tend to give the people confidence in men of affairs.

The next step is to give men of affairs confidence in the wisdom of the law-givers. This step is for political leaders. Such leaders face the perplexing problem. Without public support they cannot lead anybody or accomplish anything. Like Solon of old, they are tempted to give the people only "the best laws they will bear." The public has for several years been undergoing a thorough education in one direction—it has been taught that wrong must be put down. This has not been accompanied by any corresponding education of the public in another direction—it has not been taught that business which is all right must be built up. The legislator who confines his activity to what seems now to be uppermost in the minds of the people will busy himself wholly with the correction of evils. What is the result? Just what it might be if the common council of a city should devote its entire attention to the police department: The city would suffer from neglect of schools, sanitation, fire protection, water service, lighting, streets, transit and finance. Political leadership must broaden its view. Statesmen must embark upon the "glorious undertaking" recommended by Montesquieu—"to render a government subservient to human happiness." Not the temporary joy of the chase in running down malefactors, but the solid comfort of steady prosperity. Let theirs be that justice whose mouth bringeth forth wisdom. Political leaders must focus their energies upon measures which will promote industrial stability.

It will not be [illegible] of them may imagine to arouse popular interest in the dangers which are involved in neglect of that subject. A memorable instance has just occurred in Alabama. New leaders in that state went into the primaries [illegible] the people jumped to the [illegible]. The state convention of the dominant party boldly [illegible] public service corporations [illegible] to fair [illegible] capital invested in such enterprises should not be denied the opportunity of earning just and reasonable [illegible]. The new governor, Emmett O'Neal, told the legislature: "Your election, as well as mine, was a clear, positive and unambiguous mandate by the people for the restoration of that spirit of moderation and conservatism under which inspiring influence Alabama will confidently and triumphantly advance to the great future that awaits her." The legislature promptly passed an unprecedented address to the country. This proclamation frankly acknowledged that "by reason of legislation heretofore enacted in this state an impression has been created in many quarters that capital invested in Alabama may not have the conservative safeguards thrown around it that obtain in other sections of the country." It was then "hereby formally set forth and declared to be the permanent and settled policy of the state of Alabama that property rights . . . shall be rigidly and scrupulously protected, that investors of capital . . . shall have thrown around them the protection of wise and just laws, to the end that the great resources of mine, field and forest may be developed to their fullest scope and capacity."

That is the policy on which political leaders in Alabama went to the people and on which they have been entrusted with the government of the state. The reception given to that doctrine by the people of Alabama awaits the leaders in other states if they will seize their opportunity.

BRAKE SHOE FRICTION.*

The M. C. B. brake shoe testing machine has a flywheel of such dimensions and weight as to be equal in energy or stored work, to the energy of a moving loaded freight car of approximately 100,000 lbs. gross weight; it is mounted on a horizontal shaft with a car wheel. The motor or engine which drives this shaft may, when the desired speed is attained, be disconnected by means of a clutch, thus allowing the wheel to run by its inertia. A brake shoe is applied by means of weights which may be varied. It is prevented from being dragged with the wheel by a horizontal rod, corresponding somewhat to a brake hanger, which is connected to a dynamometer. This moves a pencil across a roll of paper which is driven by the machine. The height of the diagram indicates the tangential pull of the shoe at any instant, and the distance along the base line represents distance run, or car travel. The quotient of the tangential pull, recorded on the paper, divided by the shoe pressure gives the co-efficient of friction. Neglecting the actual distance from the shoe face to the hanger, the reading of the balance corresponds to the amount of friction or to the frictional force acting with a tendency to stop the rotation of the wheel. It is this frictional force which is recorded by a brake shoe machine, and a division of shoe pressure, or a change in vertical scale on the diagram, is all that is necessary to convert it into the co-efficient of friction.

In papers and remarks by others before other conventions the following facts have been brought out:

Co-efficient of friction (at least with moderate pressure) varies inversely with the speed. It changes with continued rubbing and temperature. It varies inversely with the pressure. The M. C. B. specifications for shoes recognize the effect of pressure, where, for example, on cast wheels 22 per cent. is required with pressure of 2,808 lbs., and but 16 per cent. with pressures of 8,640 lbs. It varies with tire and shoe materials. Thus, in the design of machinery bearings, similar metals are seldom run together, on account of reducing frictional resistance.

A few tests were made, covering various degrees of shoe and wheel wear, to illustrate some of the above variations. While it seldom happens that a large proportion of the shoes in a train are entirely new at the same time, the results may be of passing interest, and they will at least serve to illustrate some of the above-mentioned variations. All shoes used were of cast iron with steel backs, without inserts or chills, and were all poured

* Abstract of a paper on The Friction of New and Worn Brake Shoes on New and Worn Cast Wheels, presented before the Air Brake Association by A. S. Williamson.

from the same ladle. Shoe pressures of 2,808 lbs. were used in preference to the higher pressures of 6,840 lbs., at 70 per cent. braking power the lower figure implies freight cars of normal light weight.

The diagrams shown in Fig. 1 are almost self-explanatory. The upper one is a composite of tests of new shoes on a new wheel. The wheel was flanged and coned, was not ground, and was not cast with a straight tread especially for brake shoe machine work. The shoes fit as they happened to, as in practice, except that the adjustment of the wheel and brake head prevented the crowding of the flange or throat. In a rough shoe and rough wheel the pressure per unit of actual contact surface was of course high. In his paper, entitled What Stops a Moving Train, Mr. Dudley takes us through a range of co-efficients from 7 to 24 per cent. In the Lake Shore tests the co-officient appeared to be below 9 per cent. In tests with 18,000 lbs. at 80 m. p. h., by Mr. Sargent, it ranged around 7 to 10 per cent., and similar co-efficients have been obtained by the writer in stops from 80 m. p. h. on steel

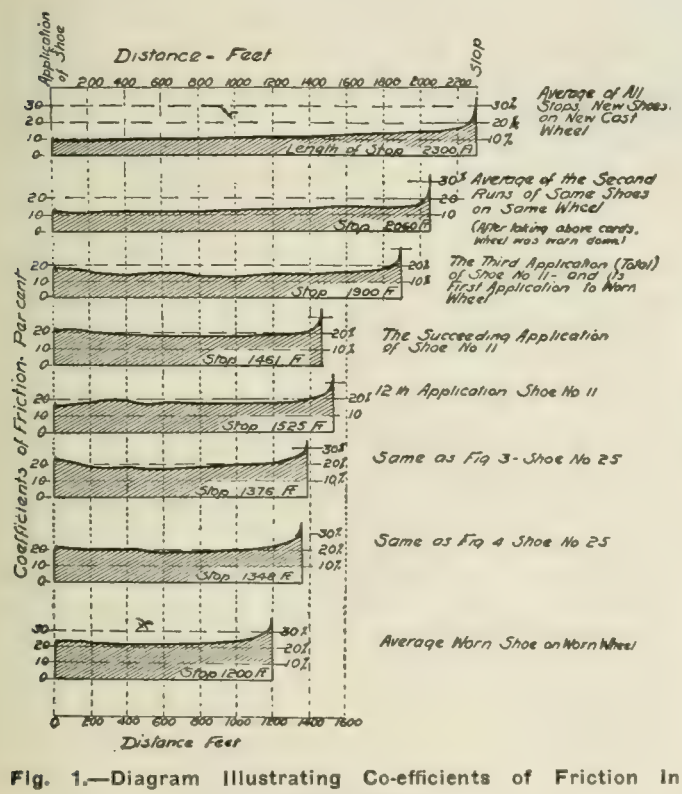

Application of Shoe
Distance - Feet
Stop
Average of All Stops, New Shoes, on New Cast Wheel
Length of Stop 2300 ft
Average of the Second Runs of Same Shoes on Same Wheel
(After taking above cards, wheel was worn down)
The Third Application (Total) of Shoe No 11 - and (1/3 first Application to Worn Wheel
The Succeeding Application of Shoe No 11
12 th Application Shoe No 11
Same as Fig 3 - Shoe No 25
Same as Fig 4 Shoe No 25
Average Worn Shoe on Worn Wheel
Coefficients of Friction. Per cent
Distance Feet

Fig. 1.—Diagram Illustrating Co-efficients of Friction In Various Stops.

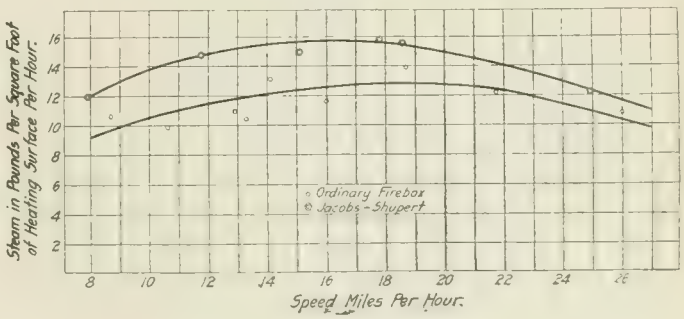
tires. The high unit pressure of imperfectly fitting shoes should lead us to anticipate similarly low co-efficients, but any such conclusion must be modified by the consideration that the speed was low. On the other hand, the materials in contact were hard. The increase in co-efficient at the stop, and especially as static friction is reached, is apparent.

The second diagram is similar to the first, the wheel and especially the shoe wear being slightly increased. The wheel was then run several hundred miles with as frequent applications of an emery shoe as could be made without danger of brake burns, followed by repeated applications of other shoes to make the tread as nearly normal as possible. The lower diagram is a composite of various applications of worn shoes on the worn wheel. The co-efficient of friction is normal and fulfills the M. C. B. requirements. The intermediate diagrams are miscellaneous representative tests of nearly new shoes on a worn wheel. The variations are none too regular, as is to be expected of new shoes, and they are introduced to show the variations which result from slight changes in actual contact surface, even during one stop. The diagrams are possibly of incidental interest as indicating that a new imperfectly fitting shoe on a new wheel has half the stopping effect of an old shoe on an old wheel, but they are presented primarily as illustrations of the combined effects of several of the variables which we have mentioned. The intention has been to illustrate briefly the present methods of finding the friction qualities of any particular shoe, to show the combined effects of several of the factors mentioned, and to furnish a basis for discussion. I have made many tests under various conditions of speed pressure and heat, with weights and with air applications, including tests at 80 m. p. h. and 18,000 and 20,000 lbs. pressures.

WATER CIRCULATION IN LOCOMOTIVE FIREBOXES.

BY H. B. MACFARLAND, M.M.E.

The design and development of the Jacobs-Shupert firebox has caused considerable discussion of the relative value of this new type of sectional construction in comparison with the ordinary firebox, with its flat sheets and numerous staybolts. Water circulation was the main question considered in the discussion of this firebox at the recent Master Boiler Makers' convention at Omaha, Nebraska, the discussion being reported in the *Railway Age Gazette* of June 2, 1911, page 1263. The circulation in a locomotive boiler results from the motion of the locomotive itself, from the velocity of the entering water, from temperature changes in the body of the water itself, and from the drawing off of steam from the boiler. The circulation at any instant is variable depend-



Evaporation Curves for the Ordinary Firebox and for the Jacobs-Shupert Firebox.

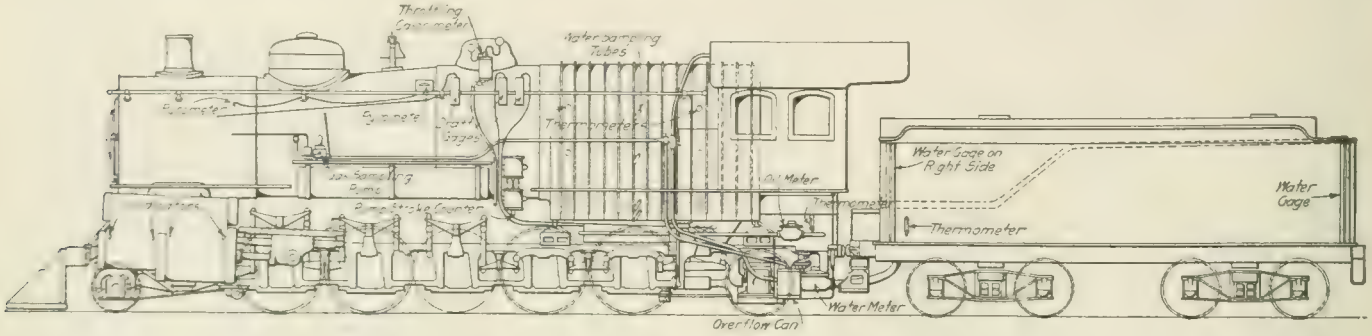
ing on these conditions. Of the forces causing circulation, the most active is due to the inertia of the water itself. Water circulation produced by heat conductivity is the least efficient in establishing uniformity of temperature throughout the boiler. While temperature measurements made at different points of the firebox are indicative of circulation to a certain extent, they are not a positive measure. This is especially true for relatively low velocities, such as must occur in a firebox with large water legs.

A special study and investigation of the circulation of water, and the location of solids and suspended matter in the water spaces around the firebox of a locomotive when in operation, was made on the Atchison, Topeka & Santa Fe, while road tests were being conducted on locomotives of the ordinary type firebox and with the Jacobs-Shupert type. The results obtained were of value in establishing a satisfactory theory of water circulation in the firebox and in determining the principal location of solids and suspended matter at times when the engine is working hard and is liable to foam on account of bad water. Samples of water were taken for analysis at various times during each run from the same relative position around the firebox of both engines. Four sampling tubes were arranged in a vertical row on the left side of the firebox about mid-way from front to back, as shown in the accompanying illustration. Tube No. 1 was placed at the mud ring; No. 2 was at the top of the brick arch, or about 8 in. above the mud ring; No. 3 was half way up the side of the firebox, about 42 in. above the mud ring; and No. 4 was near the water line of the boiler.

The sampling tubes consisted of cylinders 2 in. in diameter

and 8 in. long. One end of each cylinder was connected to the firebox by means of a short piece of 1½-in. pipe fitted with a globe valve. A pet cock was attached to the bottom of the cylinder. In taking the sample of water the pet cock was first opened, and then the globe valve. The water blown from the boiler forced the air out of the cylinder and also washed out any sediment that might have been deposited in the piece of pipe. After the cylinder was thoroughly cleaned out the pet cock was closed and, a few minutes later, the globe valve was closed. In this way about a pint of water, representative of conditions at this point of the firebox, was obtained. The water was allowed to stand in the cylinder until it had cooled sufficiently so that

The data showing analyses of waters secured from the two different engines, is presented in the accompanying table. In analyzing the conditions as obtained from the composition of the water samples taken from the engine with the Jacobs-Shupert firebox, definite conclusions can be drawn as to the circulation of the water in the boiler. As long as the suspended matter is nearly constant at the various points, there is assumed to be a positive circulation around the firebox. For example, a study of the samples taken during run No. 12, going into Yampai, shows a great uniformity and reveals the fact that there is a regular increase in the suspended matter, as well as in the total solids from bottom to top, showing the force of circulation toward the



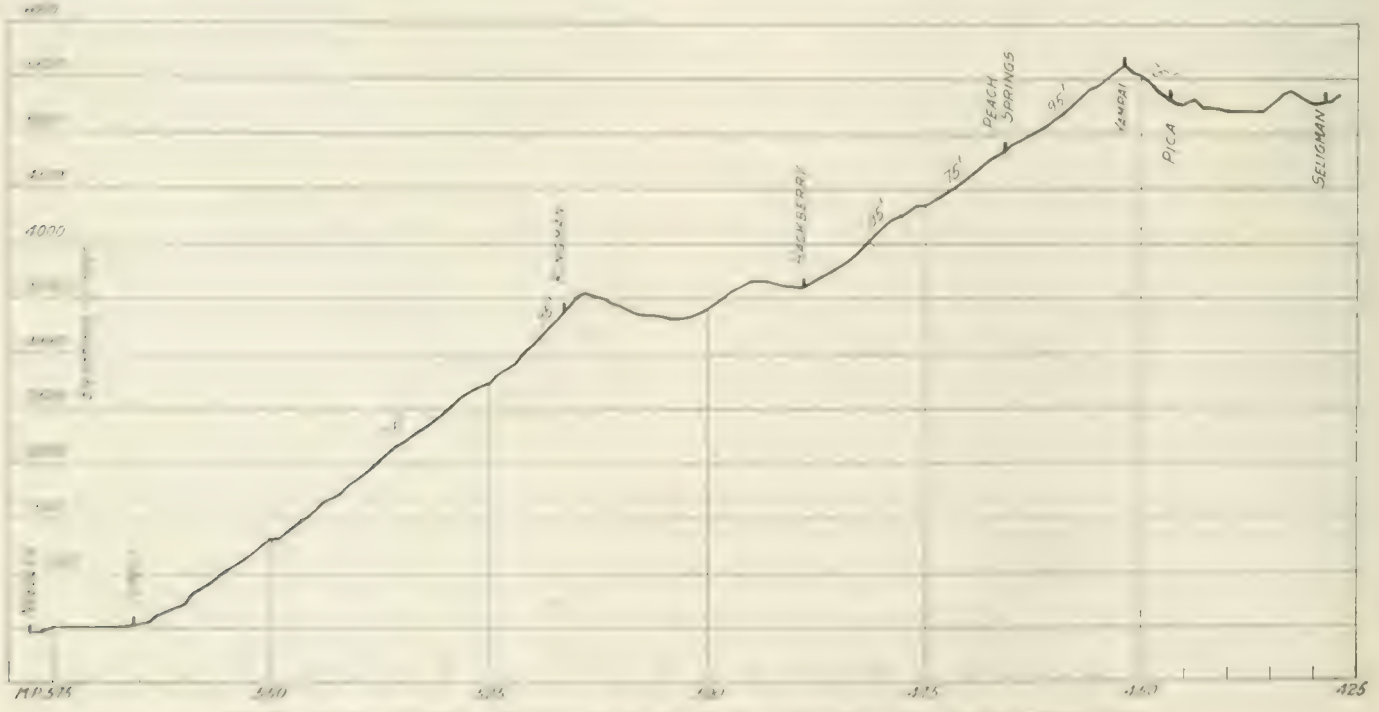
Locomotive Arranged for Road Tests; Atchison, Topeka & Santa Fe.

when drawn from the cylinders into a sampling tube it did not flash into steam.

Since all particles of undissolved matter in the water would be carried along in the boiler and in the water leg, due to the velocity of the current of water, a study of the location of suspended matter at different times and for different positions will give some idea of the direction and force of these currents. Therefore, the suspended matter, and also the total solids, as determined from the water analysis, may be used to indicate the nature of the boiler circulation. The samples of water secured for analysis from the various points in the boiler must be taken at the same time, before conditions of circulation change, in order to obtain consistent results. There was, however, some irregularity in these analyses due to the fact that during the tests the samples of water could not be taken at exactly the same time.

top of the boiler. These samples were taken after pulling up a 75-ft. grade from Pica, a distance of 5 miles, with the locomotive working at its full capacity. A consistent uniformity of conditions is also found in the samples taken upon arrival at Needles at the end of the trip.

During run No. 11, there is a uniformity of conditions with the same general increase in suspended matter and total solids from bottom to top, indicating an upward circulation. On this trip, the samples taken while going up Kingman Canyon, show a regularity in the total solids but an irregularity in the suspended matter, which may be accounted for by the fact that the injectors were on at the time the samples were taken. In noting the analyses of samples 5 to 8, inclusive, taken at Kingman on the same run, it will be seen that there is a decrease in the amount of suspended matter in each of the samples, showing



Profile of the Atchison, Topeka & Santa Fe from Needles, Cal., to Seligman, Ariz.

how effectively the suspended matter has been thrown down after the engine had stood for some length of time.

It is to be noted for the round trip runs, 11 and 12, that there is a continual increase in the total solid matter in the samples from any given tube. This is explained by the fact that during a complete round trip more and more water is taken into the boiler and evaporated; consequently the total solids remaining must increase gradually, although blowing off has the effect of a temporary decrease. There is a greater decrease in the total solids for trips Nos. 13 and 14 than for trips 11 and 12, because the boiler was washed more thoroughly after trip 12 than after trip 10.

Samples 42 to 45, inclusive, from trip 16, were taken while going into Hackberry. They show the same general relation of the total solids, indicating currents towards the top, and also that there was no undue amount of solids at the bottom of the water leg near the mud ring. These figures confirm all predictions regarding positive circulation claimed for the Jacobs-Shupert firebox and denotes clearly that there is a very complete circulation around this firebox.

A careful study of the analyses of water samples from the engine equipped with a firebox of ordinary construction in comparison with those from the engine equipped with the Jacobs-Shupert firebox, reveals a difference in the water circulation in the two fireboxes. In most cases the total solids and the suspended matter for the engine with the ordinary firebox show an inclination to increase towards the bottom, indicating a very much decreased force of upward currents, or possibly the presence of currents in another direction. There is no regular increase in the total solids and the suspended matter from the bottom to the top of the boiler as is the case of engine with the Jacobs-Shupert firebox. On run 25, samples of water were taken from the four tubes after the engine had been standing for 30 minutes with the injector off. Blow-off cocks were then opened after which further samples were secured. A comparison of the analyses of samples secured before and after blowing off, shows an increase in the amount of the total solids as well as the suspended matter at the points where the samples were taken. Such results apparently indicate that the object of blowing off, which is to reduce the suspended matter and solids, had not been accomplished. Such a conclusion, however, would not be correct. The apparent paradox is explained as follows: The water in the back head of the firebox, due to cooler temperatures and less circulation, undoubtedly contains a great many more grains of solids and suspended matter per gallon than that in the front portion around the firebox. The blow-off cocks being located in the front portion of the firebox, will, when open, draw the water from the back to the front. This movement causes an increase in suspended matter and solids at the middle sections where the sampling tubes were located, during and just after the period of blow-off.

This fact shows that a complete substantiation of the theory of boiler circulation cannot be effected, nor the location of solids and suspended matter around a firebox be fully determined by taking water samples from only one vertical section of the firebox. However, the results in this direction show that the circulation in a Jacobs-Shupert firebox is very positive and much better than in an ordinary firebox. Rapid and positive circulation in a boiler, especially around the firebox, results in a higher rate of heat transmission through a unit of heating surface and, hence, a better steaming engine.

This data on the analyses of the waters, was obtained during comparative tests of the same class of power handling practically the same tonnage over the same district. The evaporative performances of the two engines were practically the same, although the evaporation per square foot of heating surface per hour, was somewhat greater on the engine with the Jacobs-Shupert firebox than on the engine with the ordinary type of firebox, the actual increase being about 20 per cent. Further road tests on an engine with the Jacobs-Shupert firebox and an engine with the ordinary firebox, shows an increase in evaporative efficiency per square foot of heating surface per hour of 35 per cent. Comparative tests of two engines over the same territory, one with the Jacobs-Shupert firebox and the other with the ordinary type of firebox, shows an average evaporation per square foot of heating surface per hour to be 29 per cent. greater for engine with the Jacobs-Shupert firebox than for the engine with the ordinary firebox, at speeds ranging from 8 to 16 m. p. h., as shown in the accompanying chart.

Analyses of Waters from Jacobs-Shupert Firebox.

Sample number.	Tube number.	Grains per U. S. Gallon. Total solids.	Suspended matter.	
		Run 11.		
1	1	122.4	17.5	
2	2	163.8	37.9	
3	3	192.4	19.8	Going up Kingman Canyon.
4	4	188.9	20.4	
5	1	138.7	25.9	
6	2	158.0	13.4	After standing 30 minutes at
7	3	177.8	11.1	Kingman.
8	4	220.4	17.5	
9	1	208.7	30.7	
10	2	213.4	30.3	
11	3	223.3	33.2	Going into Peach Springs.
12	4	241.9	36.1	
13	1	184.8	29.7	Pica, before blowing out.
14	1	181.3	50.7	Pica, after blowing out.
		Run 12.		
21	1	219.2	36.1	
22	2	211.1	36.1	
23	3	246.0	39.0	Going into Yampai.
24	4	245.4	40.8	
25	1	202.9	32.6	
26	2	200.5	27.0	
27	3	222.1	39.1	Upon arrival Needles.
28	4	227.9	40.2	
		Run 13.		
29	1	60.6	2.3	Leaving Needles.
30	1	174.9	13.4	
31	2	167.9	14.6	
32	3	199.4	19.3	Going into Hackberry.
33	4	192.4	22.1	
		Run 14.		
34	1	180.7	40.2	
35	2	181.3	39.1	
36	3	190.6	39.6	Going into Hackberry.
37	4	199.4	42.0	
		Run 16.		
42	1	155.1	36.6	
43	2	159.2	36.7	
44	3	176.6	33.2	Going into Hackberry.
45	4	166.7	36.7	
46	1	176.6	28.6	
47	2	176.6	31.5	Taken at Kingman after
48	3	195.3	35.0	standing 30 minutes with
49	4	200.0	29.1	injectors off.

Analyses of Waters from Ordinary Firebox.

Sample number.	Tube number.	Grains per U. S. Gallon. Total solids.	Suspended matter.	
		Run 23.		
1	1	174.3	21.6	
2	2	180.7	17.5	Going up Kingman Canyon.
3	3	174.3	15.2	Throttle open. Injector on.
4	4	185.5	16.9	
5	1	148.1	32.9	
6	2	172.6	25.6	After standing 30 minutes at
7	3	166.7	20.4	Kingman. Injector not
8	4	172.6	19.2	working.
10	1	159.1	16.3	Same as Sample 5. Taken after blowing off.
		Run 25.		
11	1	46.6	8.2	Leaving Needles.
12	1	136.0	16.3	
13	2	135.8	18.6	Going up Kingman Canyon.
14	3	151.6	14.6	Throttle open. Injector on.
15	4	146.9	15.7	
16	1	153.9	17.5	
17	2	153.9	18.1	After standing 30 minutes at
18	3	152.2	16.3	Kingman. Injector not
19	4	148.7	16.3	working.
20	1	151.6	22.7	
21	2	158.6	21.0	Same as Samples 16, 17, 18
22	3	155.7	21.0	and 19, after blowing off.
23	4	155.1	16.9	

LETTERS FROM AN OLD RAILWAY OFFICIAL TO HIS SON, A GENERAL MANAGER.*

XVI.

Salt Lake City, Utah, July 22, 1911.

My Dear Boy:—Supplies and purchases are a feature of railway operation illustrating the tendency to overcentralization through overspecialization. Please notice that I say supplies and purchases; not as some roads do, purchases and supplies. Is not "supply" the broader term, including "purchase" as a very important component? If we happen to make some of our supplies from our own scrap, a question of supply and accounts is involved, but not necessarily one of purchase. The volume of work involved in purchasing for a large railway may be so great as to warrant the segregation of the purchasing function.

Among the best purchasing bureaus in the United States are those of the Harriman Lines. As I understand it, their able director of purchases does not, as many people suppose, scrutinize all requisitions. Each of the eight vice-presidents and general managers has his own purchasing agent who, under the broad policy of local autonomy, buys many articles as best he can. Those large items which experience proves can best be bought for all by the director of purchases, are so purchased under blanket contracts. For those items the local purchasing agent becomes an ordering agent. The point of it all is that no iron clad rule is laid down. Because some items can best be purchased in bulk, it does not follow that local administration should be hampered by requiring all items to be so procured. Instead of a narrow, rigid rule, there is a broad policy enunciated which permits the discriminating judgment of experience to decide questions on their individual merits under the ever-changing conditions of service.

When railways are older similar broad treatment will be accorded other features of operation as well as supplies and purchases. Broad policies and individual judgment will gradually supplant attempts to decide questions in advance in accordance with preconceived notions of probable conditions.

The evolution of the so-called store department on most railways has been a striking instance of one sided development. A railway exists to manufacture and sell an intangible commodity, transportation, not necessarily to carry either a large or small stock of material and supplies. The purchasing agent tells us in good faith how much money he has saved the company by time spent in driving good bargains. He is not in a position to know how many men have been worked to poor advantage, or have been idle, while waiting for proper tools, materials and supplies. Such features of economic waste are not always the fault of the purchasing agent. The general storekeeper and the local storekeeper, ambitious for low stock records, may hold down their requisitions. It is so easy to say that a telegram will bring a cylinder head or other spare part to the desired point. If meantime a big locomotive has been out of commission in a distant roundhouse for two or three days and a light engine has been sent to protect the run, there is nothing in the store accounts to reflect this needless expense. The individual batting averages are high, but some way the team is not winning games.

One of the fallacies introduced by the store people is that the user of material can not be trusted with its custody, because he will carry too much stock, due to an exaggerated view of future necessities. This mistaken theory is carried to the extent of denying to the division superintendent the custody of [illegible] used by the emergency gang of [illegible] men which it is entirely within his province to order out to clear the road. The men he can command. The shovels, without which [illegible] must borrow from a storekeeper receiving, perhaps, one-third as much salary as himself. Of course, in an emergency, the superintendent takes the shovels, anyway. As I said before, it is a pretty poor system that breaks down in an emergency. The test of a system is an emergency. I confess my inability to see that being a user of material necessarily makes a man more indifferent to the company's interests. Perhaps it is the same habit of mind that causes me to deny greater rectitude to the man in the accounting department.

The user of material has undoubtedly been careless in many cases. Will he not become more careless if relieved of responsibility and informed that he can not be trusted? When children err, the wise parent does not disown them. From his fund of riper experience, he helps them by impressive teaching to gain a proper viewpoint. Similarly, the general storekeeper should control the superintendent and teach the latter the most economical handling and use of material and supplies. Control is comparatively valueless without authority. This authority can be most effectively conveyed by rank. The general storekeeper should not be a keeper of a general store. He should be a general officer, under the general manager, superior in rank and pay to the division superintendent. Instead of the superintendent being relieved from responsibility, he should be held to a greater accountability. The reformed and reconstructed bandit often makes a relentless police chief. The despised user of material under proper organization becomes the zealous conserver and protector.

The general storekeeper, like the chief mechanical officer, should be located in the same building with the general manager. There is no more reason for locating either one at a store or at a shop than there is for locating a general superintendent in a switch shanty near a yard. General officers must see the whole property and maintain a balance among its component units, which are normally operating divisions. If I were you, as between your purchasing agent and your general storekeeper, I would appoint the most experienced an assistant general manager, so that his office file can be logically and consistently consolidated with your own. The other of these two men, I would make purchasing agent with a distinct title and a separate office file, because of his large volume of business with outside persons. Such assistant general manager would be in effect manager of supplies and purchases, the trained expert seeing the whole problem of operation and deciding normally what material and supplies the company needs. Under such assistant general manager, would be the purchasing agent, a staff officer, specializing on the technique and psychology of bargaining. Such assistant general manager as a line officer would be his own general storekeeper and would hold division superintendents responsible for the stores on their respective divisions. His work would be coordinated with that of the other assistant general managers by the chief of staff, the senior assistant general manager.

The organization thus outlined would preclude the necessity for the usual perfunctory approval of requisitions by the general manager. The assistant general manager for supplies would normally put the final approval on requisitions. Large or exceptional items the general manager would approve. When differences of opinion developed among the interested assistant general managers as to the relative ultimate economy of different mechanical or structural devices, the general manager would be invoked to give a decision that is really worth something, because made after considering different view points. Under the old order of things, the superintendent of motive power or the chief engineer is tempted to seek the ear of the general manager on the latter's best natured day to put over a requisition for some pet device. So sporadic is the comprehensive consideration of requisitions, so perfunctory is the usual approval, that the general manager frequently tells his purchasing agent not to take the former's approval too seriously, and to hold up approved requisitions about which the latter is doubtful. This is another species of unconscious administrative cowardice which attempts to put on the subordinate the burden of responsibility for a departure from the normal. True organization and administration demand normal

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procedure by subordinates. At normal speed, the administrative machine should run well balanced. When the speed becomes great enough, higher authority should be a governor brought into action more or less automoatically. Telling a subordinate habitually to question the acts of his superior has the same cheapening effect as unchecked disregard of block signals. It puts higher authority in the undesirable attitude of exploiting a fad, or an over-worked system, rather than of demanding reasonable compliance with proper and logical requirements.

Have we not overdone the matter of low working stocks? Is it not more expensive for a railway to carry too small a working stock of material and supplies than one too large? Is not the problem too extensive to warrant very rigid comparisons as between different roads? Like the average miles per car per day, does not the equation contain too many variables to admit of a very exact solution? Can we compare effectively the dissimilar conditions involved in climate, distances from producing and distributing centers, character of predominating traffic, etc.? Are not some records for seemingly low economical stocks based upon the fallacy that it costs the company nothing to ship and reship its own material? Where would these records land if company material carried a freight charge of, say, 5 mills per ton per mile? Is it not more economical to handle numerous items of supply in carload lots regardless of average monthly consumption? Have we given due weight to the concealed items of expense in arriving at conclusions as to the cost of handling company material and supplies?

Two of the best managed roads in the country, the Pennsylvania and the Big Four, had no stores department the last time I inquired. At the other extreme, we find the Santa Fe and the Lake Shore carrying their departmental system to their stores in an intensified form. In between—that happy medium which I mentioned to you—stand the Harriman Lines with division stores under the division superintendent, who in turn as to supply matters is under the general storekeeper or other chief supply official, the latter already having in some cases the title and status of an assistant general manager. The man in direct charge of the one general store which is allowed each general jurisdiction is called a storekeeper. The underlying conception is that railway stores are maintained to help make the wheels go around, that all supply activities should be concentrated upon the most economical manufacture and sale of transportation.

This brings us to another phase of the problem. Frequently a railway as a plant is adequate to manufacture more transportation than it can sell. The other fellow is getting too much of the competitive business. Investigation often shows that railway solicitors can sell a shipper no freight or passenger transportation, because his salesman receives no orders from the railway's purchasing agent. The industrial bureau of a traffic department works to create new business which is fostered by discriminating freight rates. Yes, I stand up and use the word "discriminating," because, when properly understood, it implies intelligence and science, and is therefore one of the finest words in the language. This good work of the traffic department in creating wealth and developing industrial communities in territory local to a particular road may be largely lost to that road because its purchasing agent, consciously or unconsciously, fails to exercise proper and legitimate discrimination in the performance of his important function.

At first blush, in these days of doubting insinuation and hysterical aspersion, when a railway official is often denied the presumption of possessing common honesty, when the burden of proof is to show him as having average rectitude, such a statement may be construed by distorted minds as a plea for subtle forms of rebating. Tenuous as may seem the line here between right and wrong, it can in a given case be readily determined. Too often apparent complexities are only the result of an abstruse contemplation of abstract possibilities. Give honest, fearless, practical treatment to each concrete case as it arises, indulge more in inductive reasoning which predicates laws upon facts, not facts upon laws, and complexity gives way to common sense. Transportation is the most exacting, the most diverisfied, the most far-reaching of commercial and industrial activities. It follows, then, under the law of the survival of the fittest, that those who can survive in the art and science of transportation, must be the fittest of the fit. In their hands can safely be left the solution of these difficult problems.

After three years of satisfactory experience with division accounting bureaus, the Harriman Lines have extended such activities to include the division stores. This is done by moving the division storekeeper, his accounting and correspondence clerks to the division superintendent's office in order that division records may be consolidated in one file and division accounts in one bureau. A division material-on-hand account is included. The necessary issue clerks, foremen, etc., are left at the storehouse, which is often a mile or two from the superintendent's office. Another avowed object is to get the division supply people closer to the train sheet, to give propinquity a chance to develop love, and to counteract that we-are-so-different feeling which comes on many railways, not only in the spring, but under all signs of the zodiac. The logical development on divisions of considerable volume of supply business will be to make the division storekeeper an assistant superintendent. This method of store accounting is relatively closer to real transactions, especially where the division supply train is used, than might be supposed. On the Hill lines, the store accounting is done in the general auditor's office, perhaps one or two thousand miles from the store itself, a decidedly long range proposition. Which policy is better, is of course a question of opinion. A man's views on organization and methods are largely a matter of temperament and association, just as his polictics and religion depend usually upon heredity and environment.

Affectionately, your own, D. A. D.

SOME BITS OF RAILWAY HISTORY.

The New England Association of Railway Superintendents, which was organized in Boston April 5, 1848, and which lived nine years and six months, has been brought to the attention of the present generation by the publication, through the instrumentality of the Eastern Railroad Association, of the minutes of its meetings, and to some of our older readers many of the names in the book will be familiar. Mr. Harrower, secretary of the Eastern Railroad Association, says that the book containing these minutes has been in his possession since 1875, when he obtained it directly from the widow of the secretary who kept the records.

One of the prominent members of the association for a short time was Charles Minot, who was superintendent of the Boston & Maine, though he soon resigned and went to the Erie. Mr. Minot was the man who is distinguished as the sender of the first telegraphic train order (from Turner, N. Y.), while he was superintendent of the Erie. Another prominent figure was Samuel M. Felton, superintendent of the Fitchburg road, afterwards president of the Philadelphia, Wilmington & Baltimore and father of the present president of the Chicago Great Western. From many interesting paragraphs in these minutes, which make up a pamphlet of 100 pages, we notice a few which will serve to remind some of the younger generation of railway officers that the troubles which now beset the profession are in some respects not very different from those experienced by their fathers and grandfathers.

The men who issued the call for the meeting which organized the association (April 5, 1848), and the roads of which they were superintendents, were as follows:

William Parker, Boston & Worcester.
Wm. Raymond Lee, Boston & Providence.
Waldo Higginson (Agent), Boston & Lowell.
James Barnes, Western.
Charles Minot, Boston & Maine.
S. M. Felton, Fitchburg.

One paragraph in the call was to the effect that "refreshments

(upon temperance principles) will be provided." The charter members, in addition to the foregoing, were: Joseph H. Moore; N. G. Upham; Chas. F. Gove; Onslow Stearns; John Russell, Jr.; Isaac Hinkley; S. H. P. Lee; Wm. A. Crocker; George Haven; Luther Haven; Lucian Tilton; Josiah Hunt; E. H. Brodhead. After the third meeting the minutes were uniformly signed "Wm. P. Parrott, Secretary."

One of the first matters of business was a resolution looking to "joint resistance to the application of Ross Winans for a modified renewal of patent"; and questions concerning patents, license fees, etc., and questions relating to contesting patent claims constituted the main subject at many meetings. For a long time a committee was at work on a proposition that the association should have a "rail road gazette," which seems finally to have resulted in what would now be called a railway guide. September 6, 1848, Messrs. Felton and Minot were appointed a committee to take under consideration the matter of persons riding upon the engines and to report regulations. About that same time a committee was appointed to formulate rules to regulate the matter of employing men who have been discharged from other roads. In October, 1848, James Barnes resigned his place as superintendent of the Western Railroad, and was made an associate member. In February, 1849, William Parker left the Boston & Worcester to take charge of the Baltimore & Ohio, and a committee was appointed to prepare a testimonial. In March, 1849, Charles F. Pond, of the Springfield & New Haven, was elected a member. At that meeting there was discussion of a code of regulations for passengers, for baggage and for the receipt, transportation and delivery of freight. The whole of the proposed code of rules filled only about two small pages. In July, 1849, a committee was appointed to attend the funeral of Col. George W. Whistler, who had died in Europe. At one of the meetings there was a discussion concerning sprinklers, and the fee that would have to be paid for the use of the "machines"; but what they sprinkled is not stated. In August a committee on car and wheel springs reported having found in use on the Baltimore & Ohio a car spring which consisted of "simply an oak plank placed across the car near the middle and connected with the draw links by an iron rod passing the whole length of the cars." The committee on standard time made a report recommending the time of a meridian two minutes later than the meridian of Boston, and this was recommended to all the railways of New England; but concerning the extent to which this recommendation was followed nothing appears. In December, 1849, Mr. Ashcroft laid before the superintendents a proposed new arrangement of safety plugs, and a committee was appointed to learn on what terms it could be used. The committee on patents was instructed to investigate Tyler's patent switch, for which he asked a royalty of $10 per mile of road, and to compare it with "the safety switch commonly used in England."

It seems quite evident that inventions possessing merit were not the only kind offered to the association, for in February, 1850, it was voted "that hereafter models shall be presented to the association only by a member and shall not be accompanied by any person in charge of the same except by a special vote of the association, unless such person be an invited guest for the evening." At that meeting a vote was passed requesting each member to [illegible] report of wheel taken from under engines, passenger or freight cars, on account of cracks, breakage or from [illegible] on the rail. Another report which was [illegible] apparently was not furnished with much regularity, was one showing all pieces of unclaimed baggage on hand at the first of each month.

In April, 1850, it was voted that as a great deal of the secretary's time was taken up by committee meetings to examine inventions, it would be proper for him to make a suitable professional charge on the [illegible] he may be employed, whenever he [illegible]

In July, 1850, Henry Gray, superintendent of the Western Railroad (Boston & Albany), was proposed for membership. Mr. Gray remained superintendent of the Western Railroad until about 1866.

It was resolved that each superintendent in New England be requested on the first of every month to record the numbers of all foreign merchandise cars on his road and send a report to the superintendent of the road to which the cars belonged. At this meeting we find the first mention of Mr. Tanner and his brake patent, a subject which developed controversies that long outlived this association. In November, 1850, it was voted that the next annual meeting be held at Springfield and that the superintendents of railroads in New York be invited; but we find no information as to whether they came. In February, 1851, William L. Dearborn presented to the association a box of danger signals imported by him from England, his idea being to have the superintendents experiment with them. What these were we can only guess. Mr. Kimball's patent was briefly discussed, but as to what this patent refers to the reader is left wholly in the dark. The secretary was authorized to subscribe for the *Mechanics' Magazine*, published by Appleton, New York, and for *Herapath's Railway Journal* and the *Railway Times*, published in London. At the meeting in April, 1851, Henry Gray, superintendent of the Western Railroad, was elected a member. Why he was kept waiting nearly a year is not explained. The meeting examined a chair designed by S. Ashburner, a civil engineer of Boston; also a coupling for a bell rope. A committee was appointed to investigate the claim of Septimus Norris for a patent on the use of four eccentrics on locomotive engines. Mr. Williams presented a model for a new arrangement of spiral springs for cars. A proposition was offered that express men should be required to give bonds to save railway companies from loss through their default.

In September, 1851, the secretary was authorized to spend $500 in preparation for the trial of locomotives on the Boston & Lowell; but for any further record of that famous trial we look in vain. At the meeting in May, 1852, there was exhibited a fine model for a brake for cars used on the Reading Railroad, but the members thought it was "too complicated for common use."

In January, 1854, George W. Bentley, of the Worcester & Nashua was elected a member. Mr. Bentley continued in the railway field until 1888, his last official position being that of general manager of the Jacksonville, Tampa & Key West. In January, 1855, the members inspected a cast iron joint chair fitted with rubber, which was shown to them by D. L. Davis, roadmaster of the Providence road. The chair had been in use for a year. In July, 1855, E. M. Reed, of the Hartford & Springfield road, was taken in. Mr. Reed was vice-president of the New York, New Haven & Hartford up to 1892.

At the annual meeting in January, 1857, at which nine members were present, it was voted unanimously, after an address by the president, that it was expedient and necessary that the association be preserved and continued; and there were two or three more meetings at which the subject of patents was discussed, usually with reference to some particular patent or patent claim; but at a final meeting, in July of the same year, it was voted that the association be dissolved on the first of October following, and apparently this vote was carried out.

The Russian ministry of ways of communication is working out a scheme for the electrification of the St. Petersburg railway system. It is proposed to develop the electricity from power obtained at the Volchoff weir, where an electric generating plant will be built which should yield 50,000 h. p., that is 27,000 to 28,000 kw. Of this power about 22,000 kw. will be used for electrifying the railway system and 2,000 to 2,500 kw. will be used for traction on the Lake Ladozh canal. The balance of electrical energy will then be available for sale. It is estimated that the cost of this plant will be between $7,200,000 and $8,400,000, and that the net profit will be from 15 to 20 per cent.

Maintenance of Way Section.

THIRTEEN contributions were submitted in the contest on "Drainage" which closed September 1. The first prize has been awarded to J. F. McNally, assistant superintendent, Atchison, Topeka & Santa Fe, Chanute, Kan., and the second prize to S. B. Peter, roadmaster, St. Louis & San Francisco, Pittsburg, Kan. The judges making this award were: L. C. Fritch, chief engineer, Chicago Great Western, and L. W. Baldwin, engineer maintenance of way, Illinois Central. The two prize-winning papers are published in this issue, together with the papers submitted by the following men which have been accepted: G. Le Boutillier, division engineer, Pennsylvania Lines West, Cincinnati, Ohio; J. C. Bach, roadmaster, El Paso & Southwestern, Douglas, Ariz.; A. E. Preble, supervisor, Cumberland Valley, Chambersburg, Pa.; W. T. Main, division engineer, Chicago & North Western, Chicago; P. H. Hamilton, St. Louis & San Francisco, Pittsburg, Kan.; Claude L. Van Auken, 5930 Erie street, Austin Station, Chicago; Robt. H. Orwig, supervisor, Cumberland Valley, Chambersburg, Pa. While it may appear that the same features of drainage are covered in several of the papers printed, it will be found that each brings out a very important fact and the repetition is only such as is necessary to emphasize the most essential requisites for proper drainage of roadbed. The fact that drainage can usually be secured by the adoption of a few well-established principles is evidenced by the fact that in addition to the papers published a number of well written, comprehensive articles on the subject were received in this competition, each of which covered, in the main, the points which had been found necessary in draining roadbed by men who had had long experience in maintenance of way work.

ONE of the most important duties of a track foreman is to protect, by flagmen and slow orders, any section of track he may have occasion to disturb, as to render it unsafe for traffic at the usual speeds. All rule books define the proper methods to be followed and the distance the flagman should go out. But many roadmasters simply provide new foremen with the rule books without making sure that they know and understand these rules. Examinations and surprise tests are conducted to ascertain whether trainmen know and obey the rules applying to their duties. Similar precaution should be taken to insure proper knowledge and action by the track foremen. It is much to their credit as a class that the number of accidents resulting from lack of, or improper, flagging is as small as it is. At the same time, an accident such as that which happened recently at Martin's Creek, N. J., should not be possible. Although a curve had been thrown in from 2 to 9 in. that morning and the gang had but partially done the surfacing, the flagmen were recalled an hour before the wreck occurred. No other notification of slow track, either in the form of a train order or "slow board," was out. In a case which happened near Chicago recently a flagman's failure to go out a sufficient distance while protecting a rail relaying gang resulted in the engine and two cars of a freight plunging off an embankment. The increasing number of foreigners in track gangs makes proper flagging work more difficult; but for this very reason the foreman must take more precautions to insure that the track is fully protected at all times. If the men in his regular gang cannot be relied on for such work, the roadmaster should see that several native laborers are sent to him. The responsibility, however, does not rest entirely on the track foremen. It is equally necessary that a slow order or flag be respected by the enginemen. The flag is very generally respected, but the slow order is apt not to be so closely followed. On many roads most trains will pass over a piece of track on which a 15-mile order is in effect at from 20 to 30 miles per hour. Although the track foremen may report the matter to his superiors, the enginemen seldom hears of it unless there is a derailment, when the blame is placed on him. By ignoring such infractions of the rules, the superintendent shares responsibility with the engineman for any accident resulting.

A REPORT of the annual convention of the Roadmasters' and Maintenance of Way Association and the programme of the meeting of the American Railway Bridge and Building Association, to be held in St. Louis next month both appear elsewhere in this issue. Like the American Railway Engineering Association, these organizations are of great value to men engaged in the various branches of maintenance of way work. Their annual conventions are a clearing house for experiences and ideas gained on many roads in all parts of the country. The standards of maintenance work are being raised. At the same time the demand is becoming stronger for more results with the expenditure of less money. The labor problem is becoming more serious. New labor-saving devices are being introduced in all branches of the work. Alert and progressive roadmasters and master carpenters are enabled to get a point of view beyond the limits of their own divisions, and to keep in touch with current developments by their association with other men at these conventions. Although they may be able to handle their present work satisfactorily without the broader outlook thus gained, they cannot become eligible for larger duties unless they are fully abreast of the times. In addition to the privilege of attending the membership conventions in such an organization affords an opportunity for committee work, which is very valuable both to the individual members of the committees and to the association, as a whole, for the field for original investigation is large. It is to be regretted that all committees do not make the most of these privileges, and that lack of interest, frequently covered by the plea of lack of time, sometimes prevents the attainments of the most valuable results. The members who secure the greatest benefit from the association is the one who enters into its activities as fully as his duties will allow, and railway companies are fast learning that they can well afford to allow their men to participate in such work.

RAILWAY managers are becoming aware of the advantages to be derived from impressing on employees in the maintenance of way department the value of both the labor and the material in their charge. The general manager of the Chicago Great Western has recently sent out a circular to the employees of that road, informing them of the new, second hand and scrap value of the tools they use. The Chicago, Burlington & Quincy is revising its standard tool order book to include the prices of all material, so that the foremen may know the value of the material they want at the time they are ordering it. The average man will not willfully destroy the property of his employer, and carelessness in the use of tools results largely from a lack of realization of their value, since the foreman can secure others by simply making requisition on the roadmaster. The necessity for a more thorough consideration of the value of labor is also beginning to be realized. When two firemen are working under similar conditions with the same number of men, and one accomplishes more than the other, it is usually concluded that the second man is not getting the most out of his labor; but he has no way of knowing this until his attention is called to it. The supervising officer may notice the difference, but his conclusions are merely the result of general observation unless he keeps some sort of a comparative cost record of the work of his foremen. Many men keep such records for their own information, and it is to

be regretted that the practice of doing so is not more general. We desire to publish descriptions of the different methods used and the results obtained for the information of those who are planning to inaugurate some such system in connection with their work, and, to secure such descriptions, we are conducting a contest on "Methods of Keeping Cost Data in Maintenance of Way Work." Contributions to this contest should be sent in at once, as it closes October 1. Prizes of $25 and $15 will be awarded the best two papers, and regular space rates will be paid for all other contributions accepted. All papers should be sent to the Civil Engineering Editor of the *Railway Age Gazette*, 417 South Dearborn street, Chicago, before the date of closing.

WHAT IS THE MATTER WITH THE ROADMASTER?

Temple, Tex., August 26, 1911.

To the Editor of the Railway Age Gazette:

What is the matter with the roadmaster, and why does he need so much advice on how to handle his work and how to treat his men? Why not hand out tips to trainmasters on how to handle conductors and brakemen? Or hints to master mechanics on how to promote efficiency and get the most work out of enginemen and firemen? Also help out the bridge, building and water service by a few well chosen remarks? And while you are at it, give Mr. Store Department a few short-arm jabs.

Why make chalk of one and cheese of another? It can't be possible that the track department is the only one that is not perfect.

Why take it for granted that the section foreman is different from any other man and has to be handled in some peculiar manner to get work out of him?

Are our railways better today than they were 20 years ago? If so, who made the improvement? Are our railways as good as those in other countries, and do we haul freight and passengers as fast and at less cost? If so, why not give the section foremen and roadmasters credit for knowing their business and doing good work? If they are doing good work why do they need so much advice as to how it should be done?

SAM LINCOLN,
Roadmaster, Gulf, Colorado & Santa Fe Railway.

THE above letter merits an answer. It indicates a misunderstanding regarding the purpose of the Maintenance of Way Section, which may exist in the minds of others besides Mr. Lincoln.

The reply to his question as to why the columns of the *Railway Age Gazette* are not used as a medium for handing out "tips" to trainmasters and "hints" to master mechanics is that they are being so used. They have been for some years. For example, in May, 1909, this paper offered a first prize of $75 for the best article, and a second prize of $50 for the second best article, on "How to Be a First Class Trainmaster." A large number of contributions were received from trainmasters and published in the issue of [illegible]. They contained all manner of [illegible], but not only on how to handle conductors and brakemen, but on how to perform other duties. As to "hints" to master mechanics and other mechanical men, they have been [illegible] in almost every issue of the *Railway Age Gazette* for years, and have been particularly abundant in the Shop Section, which is published in its first issue of each month. As to the [illegible] a number of contributions which were drawn out by a "Bridge Kink" competition were published in the Maintenance of Way Section for August 18, 1911, page [illegible], and we hope to be able from time to time to publish others of the same sort.

The foregoing shows that Mr. Lincoln has gone astray in assuming that we are trying to cover all of the duties of railway officers in the Maintenance of Way Section. The section was not started, as he seems to think, on the assumption that the track department is the only one that is not perfect." It was started on the assumption that the track department, like all other branches of railway service and indeed all branches of every industry, is one [illegible] and therefore can be improved by [illegible] to [illegible] and suggestions as to how it may be done. The aim and desire was to make this section a clearing house for the ideas and experience of those connected in engineering and maintenance work. It was believed that its establishment would be welcomed, that railway men would make generous use of its columns to tell the results that they have got or that they believe could be got by the use of different methods, and that it would thus become a useful instrumentality in promoting railway efficiency.

The results thus far have been gratifying to the *Railway Age Gazette*. We believe they have also been so to most of the readers of this section. The large number of contributions on a variety of engineering and maintenance subjects that has been received is the best indication possible of the interest that the section's readers are taking in it. It shows that roadmasters in general recognize the fact that methods of maintenance work can be improved; the more efficient they are the more keen they are to receive suggestions as to how their work may be better done. Mr. Lincoln writes with a vigor and pungency that indicates he is a man of ability, who could probably offer some good efficiency suggestions himself. We are sure that his fellow roadmasters would much rather receive them than to read his criticisms of the "kinks," "hints" and "tips" offered by other contributors.

CONSTRUCTION KINKS.

THE opportunity for developing originality and ingenuity is possibly even greater for the man engaged in construction work than for the one concerned with maintenance of track and structures. Re-alinement, second track, grade reduction and yard extensions have come largely under the supervision of the maintenance of way department, until the present practice on most roads is for the local division organizations to handle all work except the construction of new lines. Construction work in the future will consist more and more of the improving of existing lines rather than the building of new ones. Local division men must handle construction work at intervals in connection with their other work, but usually they do not become specialists in construction details. Many kinks are devised by them to get out of tight places which the originators never think of as kinks.

If the work to be done consists of reconstruction of an existing line or the building of additional tracks, arrangements must be made to handle the traffic without interruption, which often introduces more difficulties than the actual construction work. Many short methods are developed in connection with the grading; the storing and handling of material may be arranged to facilitate the progress of the work; quick methods may be found to lay or move construction track or turnouts; or traffic may be handled safely by clever arrangement of the tracks or by installing some simple but effective form of temporary protection. In construction work on new lines a somewhat different class of problems is met. The equipment used in constructing the roadbed may be of various types; the problem of handling supplies may become very serious while there is no revenue traffic to handle.

The lack of transportation facilities makes impossible many methods applicable to work on an existing line. Each of these special difficulties gives rise to a number of kinks. We want to draw out as many kinks of both these classes as possible, and we announce a contest on construction kinks, which will include all devices or methods resulting in a saving in time or labor, or a gain in efficiency, and adapted to handling any feature of construction or reconstruction work, from the clearing of the right-of-way to the ballasting of the completed track, except those relating to bridge and concrete work, which will come within the limits of another competition. Prizes in this construction kink competition of $25 and $15 will be awarded for the best two contributions, and all other contributions that are submitted in the competition are printed and accepted will be paid for at our regular space rate. All contributions to be considered must be in the hands of the Civil Engineering Editor of the *Railway Age Gazette*, 417 South Dearborn street, Chicago, not later than November 1.

Letters to the Editor.

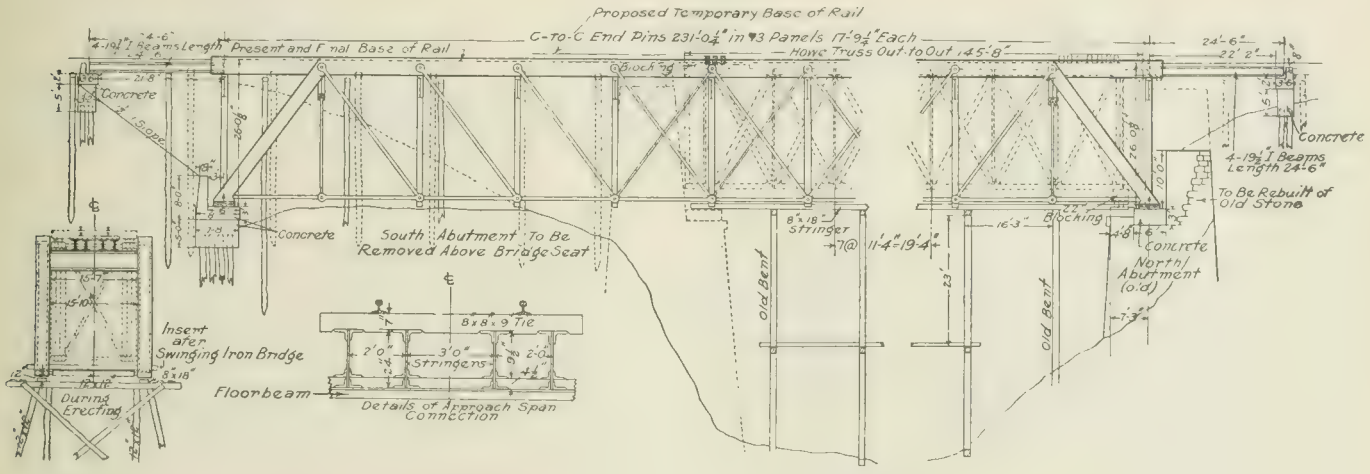
A METHOD OF ERECTING SMALL BRIDGES WITH DERRICK CARS.

Louisville, Ky., September 4, 1911.

To the Editor of the Railway Age Gazette:

One of the many kinds of work which can be handled to advantage with a derrick car, similar to the one described in the issue of the *Railway Age Gazette* of July 21, is the erection of small and medium sized bridges. Such a car has been used recently in replacing a number of bridges with heavier structures on the Louisville division of the Pennsylvania Lines West, of which the work done near Grayford, Ind., is typical. At this point it was necessary to replace a deck Howe truss 145 ft. 8 in. long out to out, having trestle approaches at each end, with a deck Pratt truss 231 ft .0¼ in. long having I-beam approaches.

In handling this work those parts of the north and south abutments above the new bridge seat were first removed and new bridge seats built. A new pier was built for the south end of the new span and new abutments were also built for the approach spans. Two additional floor beams per panel were



Replacing Howe Truss With Steel Spans.

then inserted in the floor of the Howe truss. This truss was raised 22 in., the stringers and truss removed, and the rails spiked to the floor beams.

The floor beams of the Howe truss were then raised 8 in. on blocking between the beams and the top chord, leaving the rail 11 in. high, and a run-off was built at each end. The wooden trusses were then drawn in to 15 ft. 7 in. out to out. False work sufficient to carry the new span during erection was built, and the new truss erected. Ties were placed on the new deck of the truss, and the approach spans placed. The wooden floor beams of the Howe truss were then removed and the rails lowered to final position on the ties of the Pratt truss, after which the old Howe truss was torn down and the false work removed.

This work was handled by the regular division forces. All material was handled by the derrick car, both in unloading and in erection, and no heavy equipment was required. Under the more common method of handling such problems, false work heavy enough to carry the traffic would have been built and the track supported on this false work while the old structure was dismantled and the new one erected. In this case, however, it was only necessary to build false work to reach the lower chord of the bridge and heavy enough to carry the bridge without any live load.

D. B. Johnston,
Division Engineer, Pennsylvania Lines West.

BALTIMORE & OHIO MOUNTAIN DIVISION IMPROVEMENTS.

The Baltimore and Ohio has two crossings of the summit of the Allegheny mountains, one between Cumberland, Md., and Connellsville, Pa., on the line to Pittsburgh and Chicago, and one between Cumberland and Grafton, W. Va., on the line to Cincinnati and St. Louis, and Chicago via Wheeling. The slopes on this range are particularly steep, and the problem of securing an easily operated line has always been a very difficult one. The amount of traffic handled in this territory, of which a large percentage is coal from the extensive deposits in West Virginia and Pennsylvania, is so great, however, that it is imperative that ample facilities for intensive operation be provided. A great many improvements have been made on both the divisions which cross the summit in the 12 years since the reorganization of the road, but the principal work has been done since the record tonnage of 12¼ billion ton miles was handled in 1907. The bulk of the tonnage over the mountains is eastbound, and most of the recent work has been undertaken to facilitate the movement of that traffic. Following 1907, it was decided to increase the capacity of the line by at least 50 per cent., and to that end $5,000,000 has already been spent on improvements between Baltimore and Grafton alone, and work now under way and being planned will cost from two to three times that amount.

Heavy third track work is being done on the Cumberland division between Cumberland and Grafton, which involved the elimination of several tunnels and other important changes. A large part of this work is now nearly completed. The accompanying map and profile show the characteristics of this portion of the line, and the track diagram shows the changes made in the recent improvements. In the 44 miles between Cumberland and Altamont, the highest point on the system, the grade is uniformly rising, the difference in elevation being 1,979 ft. A little more than 14 miles of this distance is on a grade exceeding 2 per cent., and the curvature is high over the entire division. From Altamont to Terra Alta, about 19 miles, the line dips and rises again to a summit 69 ft. lower than Altamont. The maximum grade is a little more than 1 per cent. From Terra Alta to Grafton, 38 miles, the line drops 1,560 ft. with a sag at Rowlesburg and a peak at Blaser. About 14 miles of this distance is on a descending grade 2 per cent. or greater, and nearly four miles, from Rowlesburg to Blaser, rises on a grade equally severe. Six tunnels were included in the section from Cumberland to Grafton one over 4,000 ft. long, four averaging more than 500 ft. long, and one 310 ft. long; a total length of over 6,500 ft. These were all for double track except the Kingwood tunnel, the longest of the six, which was operated as a double track gauntlet. With the exception of this tunnel there was a

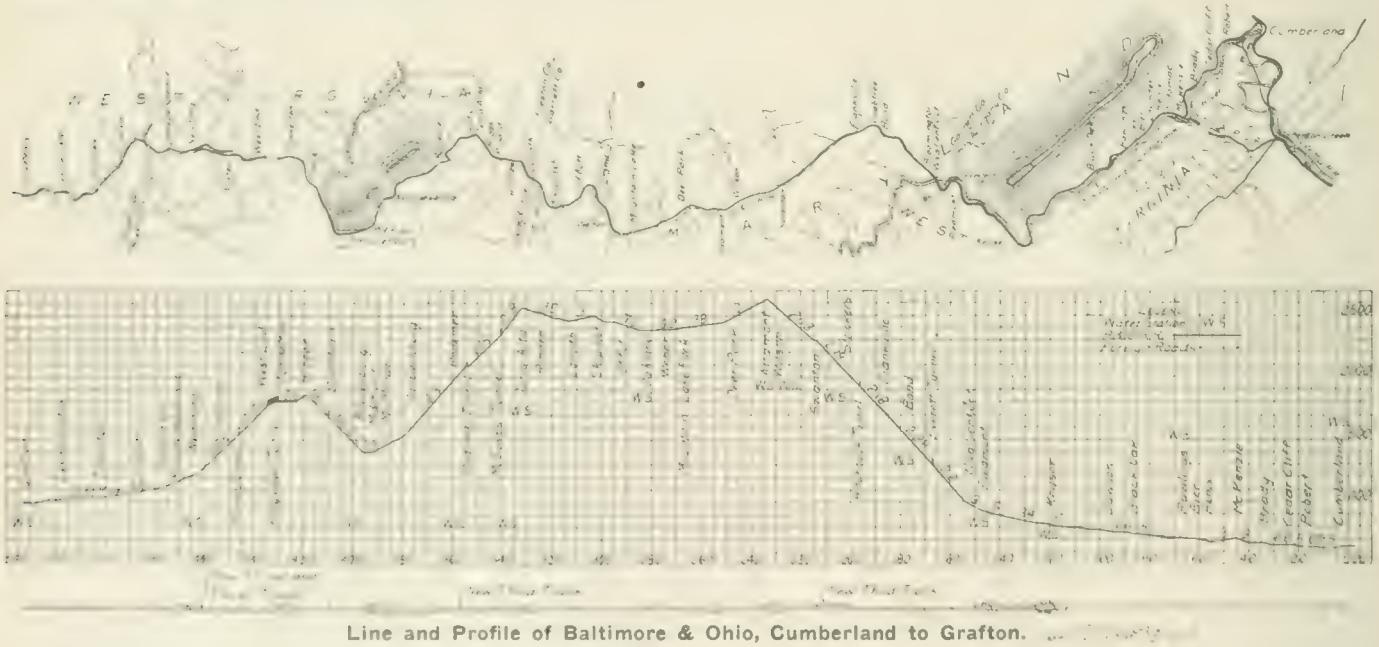
continuous double track over the whole section, and in several places there were considerable lengths of third and additional extra track.

While it was not possible to reduce the long, heavy grades over the mountains, it was feasible to reduce the undulating grades on the tablelands and to improve the grades approaching the foot of the heavier grades to a maximum of 0.5 per cent. compensated. This made it possible to increase the actual tonnage of the trains and the distance over which a single engine could haul its full tonnage, and also reduced the mileage of the pusher engines, thereby improving operation. By the use of Mallet engines the heavier trains are operated over those steep grades which could not be improved.

The sections where grade revisions have been made are between the east end of the new Grafton yard and the foot of the Newburg grade at Hardman; between West End and Blaser, which includes the Kingwood tunnel; and from Corinth to a point just east of Hutton through what is locally known as "58 Cut." At the first of these sections the improvement consists of the reduction of the grade from 0.6 per cent. uncompensated to 0.5 per cent. compensated, which permits a full rated train to pull out of the Grafton yard and proceed eastbound to the foot of the Newburg grade where a helping engine is attached to the train.

Shooting East Portal of McGuire's Tunnel.

Over the second section a change of line and grade has been made for a length of about four miles, the grade being reduced from 1 per cent. uncompensated to 0.5 per cent. compensated over the summit at Blaser. Over the third section the grade has been reduced from 0.7 per cent. uncompensated to 0.4 per cent. compensated for a distance of practically 2.3 miles. This lighter grade was adopted east of Rinard, where there is a filling-in yard, as a 0.4 per cent. train could be operated with only one pusher over the heavy grade between Deer Park and the summit at Altamont.



Line and Profile of Baltimore & Ohio, Cumberland to Grafton.

West Portal of Rodemer Tunnel, Immediately Before Shot.

In addition to the changes in grade a new third track was built on the steeper grades and at points where operation was necessarily slow. In addition to the third track work a reservoir was built at Newburg to furnish a stable water supply and a new classification yard was built at Grafton.

The new third track was in three sections: 2½ miles between Swanton and Strickers, an extension of the existing third track down the heavy grade east of Altamont; 5¼ miles between Rodemer and Terra Alta, completing the third track on the heavy grade between Rowlesburg and Terra Alta, and 8½ miles between Blaser and Newburg, covering the section of 2 per cent. grade descending from Blaser. When the work is completed there will be three tracks on all grades, 2 per cent. or heavier eastbound to eastbound traffic, and a considerable mileage of third track on the heavy grades westbound, all of which will ultimately be three-tracked.

The work between Swanton and Strickers included a slight change in alignment to reduce the amount of excavation and also involved the extension of three small structures over Crab Tree creek, but presented no special difficulties.

TUNNEL ELIMINATION.

The section between Rodemer and Terra Alta included Rodemer tunnel and McGuire's tunnel, which were eliminated

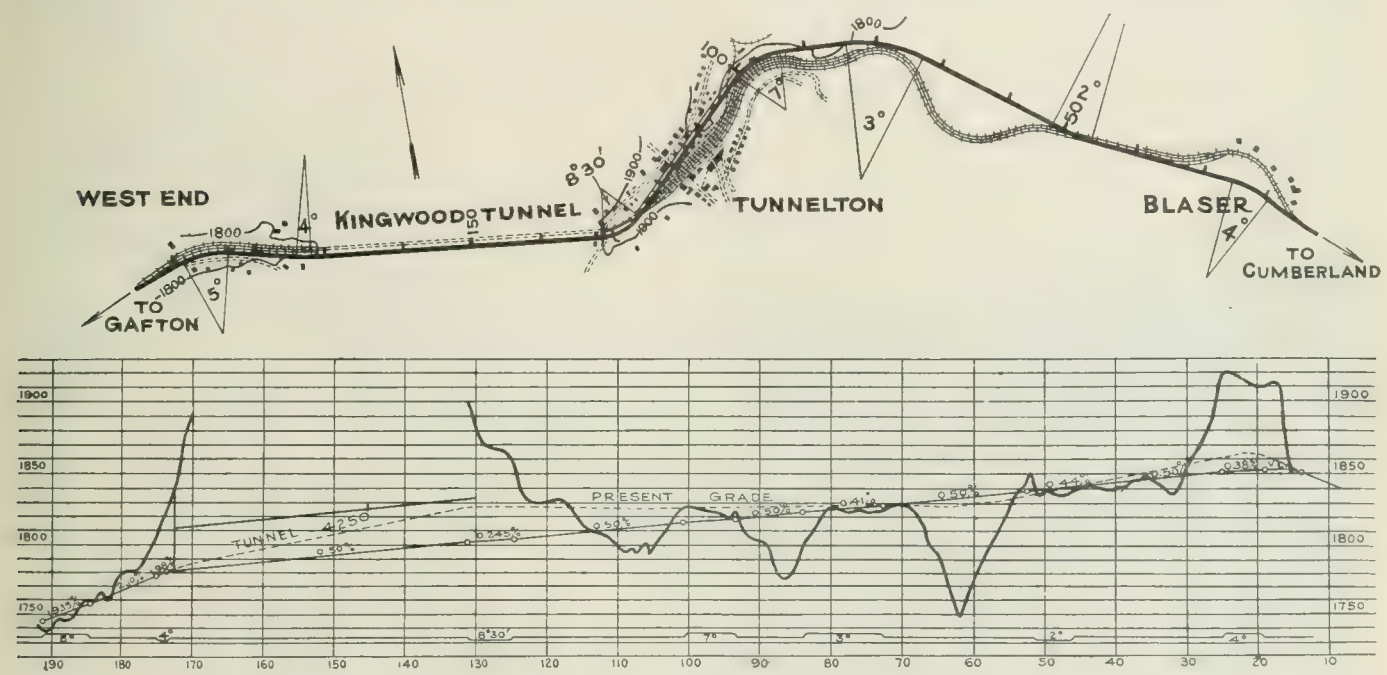
Mule Carts Working in Graveyard Cut.

in connection with the third track work. Murray tunnel in the Blaser to Newburg third track section, and Everett tunnel below Strickers, on the "17 mile" grade were also eliminated, the methods employed in all four cases being similar in the essential features. The principal reason for eliminating these tunnels was that they did not provide sufficient clearance to allow the operation of the largest Mallet locomotives through them. The tunnels were all double track and in the case of the three included in the new third track work their elimination was also necessary in order to provide the additional width for three tracks.

The method of removing the tunnels was in general to make a steam shovel cut over the existing tunnel, dynamite the tunnel lining and remove the remaining material, leaving an open cut. All of the tunnels were located on heavy grades, and it was not considered safe to operate single track at these points during construction work on account of the danger of the heavy trains meeting on the single tunnel track. For this reason it was necessary to provide run-arounds to carry all traffic during the removal of the tunnel lining. In each case a double track cut was made alongside the tunnel, a wall of rock averaging about 15 ft. thick being left adjoining the tunnel wall. The line was then shifted to carry all traffic through this cut, and excavation was started above the tunnel. This cut was carried down to about 10 ft. above the arch ring. The material in all these cuts was sandstone in ledges, with layers of shale and some coal. All of the excavation was handled with steam shovels, the rock being removed in dump cars hauled by dinkey engines, and used in bank widening for the third track, or wasted in dumps on the hillsides.

The top and side of the tunnel lining, with the overlying shell of rock, was blown down by a charge of dynamite. This charge was first placed horizontally on the springing line of the arch, but it was found that better results were secured by drilling the charging holes diagonally downward from points a little above sub-grade. These holes were placed 6 ft. apart and were staggered, one being started 1½ ft., and the next 2½ ft. above sub-grade. They were driven to a depth of 3 ft. below sub-grade on a slope of one to one. Each charge consisted of thirty to forty ½-lb sticks of 40 per cent. dynamite. A length of tunnel of about 160 ft. was blown down at each shot. The three tunnels, Everett, Rodemer and McGuire's, were each more than 500 ft. long and required a maximum cut of about 130 ft. The approximate yardage moved was 175,000 at Everett, 250,000 at Rodemer, and 290,000 at McGuire's.

The section of third track work between Rodemer and Terra Alta involved no particularly interesting features besides the tunnel elimination. One cut near Rodemer, which was inaccessible to the steam shovels, was handlel by mule cars. The accompanying illustration shows two carts loading on different ele-



Grade and Line Revision; West End to Blaser.

Cut at Murray Tunnel Before Completion of Third Track.

vations in this cut. About 10,000 yds. of rock were moved in this manner.

KINGWOOD TUNNEL.

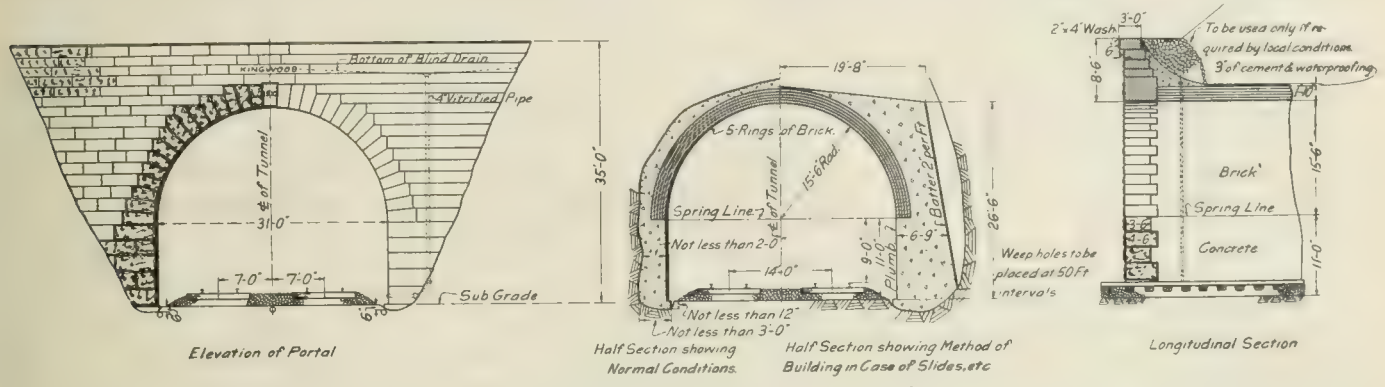
On the section between Blaser and Newburg the work included the driving of a new double track tunnel parallel to the present Kingwood tunnel, the revision of alinement and grade between Blaser and West End, and the elimination of Murray tunnel. The old Kingwood tunnel is 4,138 ft. long and is on a 1 per cent. grade. The new tunnel is 80 ft. south of the old one, is 4,250 ft. long and on a .5 per cent. grade, the elevation at the westportal being approximately the same as the old. This makes the elevation at the east portal about 24 ft. below the old grade and to get the tracks on the same embankment again, the alinement is revised, as shown in the small drawing herewith. This ledges of harder stone. It could be blasted by a light charge, and the material was hauled to the shafts in small cars drawn by mules. The first heading averaged about 8 ft. in height by 16 ft. in width. This section was somewhat irregular, as it was necessary in places to increase or diminish the height in order to secure a good roof, and the width varied considerably on account of irregular drilling. The bottom of the heading was kept as near as possible at the grade of the wall plates, which is 17 ft. above the sub-grade of the finished tunnel. An attempt was made at first to enlarge this heading to the full width of the completed tunnel section, and place the timbering at a single operation, but the effort was abandoned, principally on account of the poor ventilation, as gasolene apparatus was used for lighting, and the small headings were hot and smoky. After the

Cut Above and Alongside Existing Tunnel.

timbering was stopped the small headings were rapidly advanced westward from the east portal shaft, eastward from the west portal, and both ways from the two interior shafts, until a continuous heading was completed. The enlarging and timbering were then resumed, and the original heading was widened at the bottom to allow the placing of the wall plates 35 ft. 8 in. face to face. These were placed, blocked and wedged, and the roof blasted down as near the contour of the tunnel arch as possible. Compressed air for operating the rock drills was furnished by a compressor at the east end, and piped over the mountain to the intermediate shafts and to the west portal. The timbering in this heading consisted of 2-in. lagging on 12-in. x 12-in. arch ribs placed 4 ft. center to center, or 2 ft. in some cases

where the material required additional support. The arch rings rested on 16 ft. wall plates.

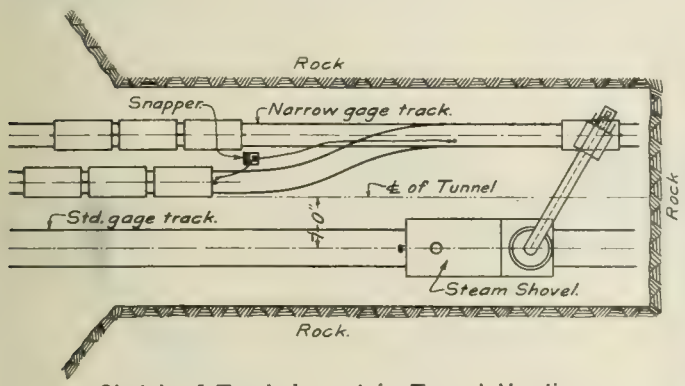
While this heading was being driven a steam shovel was cutting the approach to the east portal and working on the cuts for the revision of line through Tunnelton. As this work adjoined the near the switch pulls one car at a time into place alongside the shovel and out on the other track when loaded. One man operates the switch and two others ride the cars to apply the brakes as needed. When a train of loaded cars is ready another dinkey engine pulls them out. The snapper in use is very similar to an



Masonry Plan of New Kingwood Tunnel.

operated line, blasting had to be done with light charges to prevent blocking the tracks. This excavation was handled with Western dump cars and was used for filling through the town of Tunnelton.

The first heading is now being enlarged to the full tunnel sec-



Sketch of Track Layout in Tunnel Heading.

tion by 60-ton Marion shovels, one working in from each portal. The face of the rock is blown down as near the standard section as possible, and irregularities are trimmed up by hand. The shovel runs on a standard gage track, as near one wall as convenient, and loads the material into 4-yd. dump cars running on a narrow gage track parallel with the shovel track, as shown in the accompanying sketch. A dinkey engine backs in a train of empty cars on the middle track, and a Byers snapper located ordinary hoisting engine except that it is geared for high speed. It has a double drum with a line extending in both directions, one used for pulling in the empties and the other for pulling out the loaded cars. The engine is operated on compressed air. The steam shovel and the dinkeys that enter the tunnel burn charcoal to avoid the effects of gases given off by other fuels. An attempt was made to use coke for this purpose, but it was not successful.

Spillway and Lower Slope of Dam, Newburg Reservoir.

The tunnel walls will be of concrete up to the springing line of a minimum thickness of 2 ft., and the arch will be of 5 layers of brick turned to a radius of 15 ft. 6 in. A small quarry was opened up near the west portal to supply stone for packing

Newburg Reservoir; Baltimore & Ohio.

over the arch. A concrete plant at each end of the tunnel supplies concrete for the walls. A Brown hoist handles the materials to the mixer, and another one places the forms in the tunnel and handles the buckets of concrete into the forms.

To improve the air conditions in the existing single track tunnel, a ventilating system was installed which drives a current of air through the tunnel at a rate which is varied to suit the speed of the train. The fan house for this ventilating system is located at the west portal and can be seen in the photograph of the work at that end. The heavy covering of 4 in. timbers supported on a framework of 12-in. x 12-in. pieces was built around the house as a protection against shocks from blasting in the new tunnel. An interlocking tower near this point was protected in the same manner.

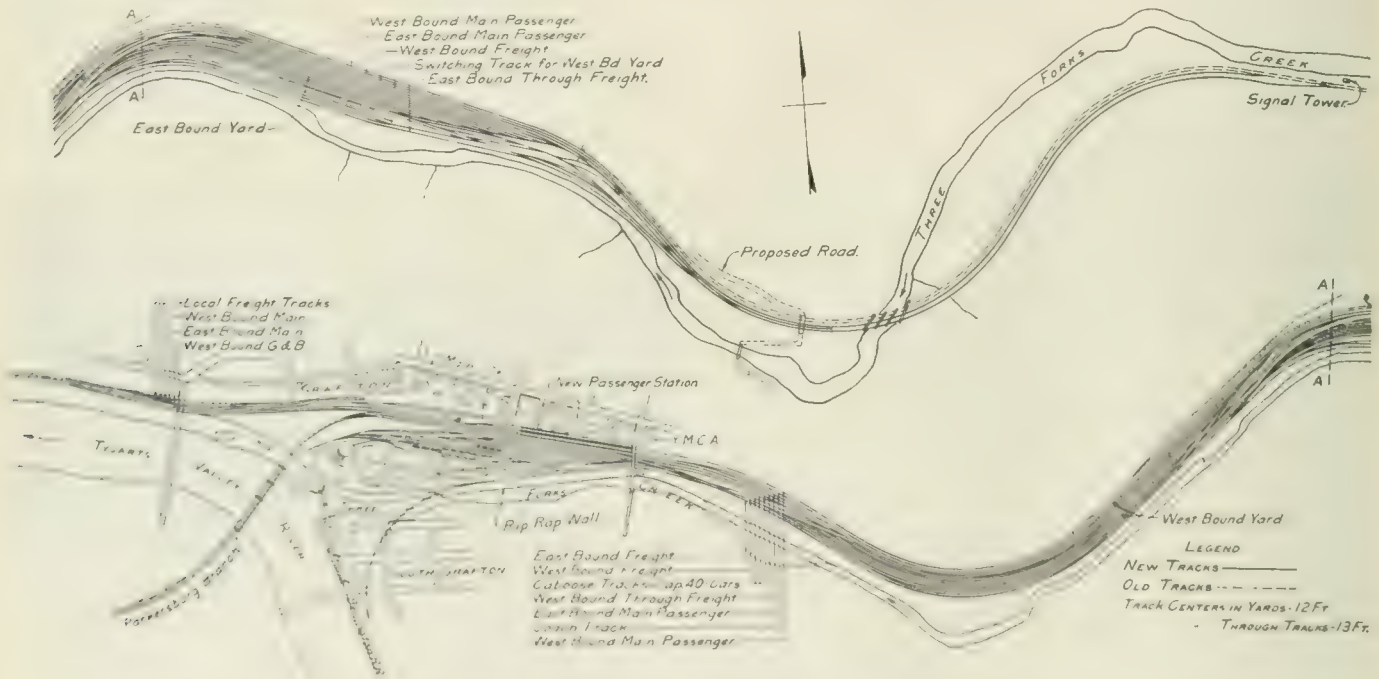
The material from the west tunnel heading was hauled about ¾ miles west and wasted in a deep ravine. It was necessary for the narrow gage construction track to cross the main line, and this crossing was protected by a temporary installation of standard signals and derails controlled from a 4-lever section of an old mechanical interlocking plant installed on the track level near the crossing. The machine was not covered, but an operator's cabin was provided and a man was kept constantly in charge. The derails on the construction track were normally closed and the main line signals clear. Before the derails could be opened the signals had to be placed at danger.

[illegible] RESERVOIR

Near Newburg at the west end of the third track work a 30,000,000 gal. reservoir has been provided. The problem of securing engine water during the dry season over this mountain division has been at times a very serious one. It has frequently been necessary to [illegible] water trains for considerable periods, as the wells from which the supply was drawn were intermittent. The [illegible] Sandy Creek and a [illegible] from a [illegible] of about 1,700 acres. The dam has a concrete core wall and spillway, the filling being of clay, deposited in 6 in. layers, [illegible] and rolled. Stripped and stump rock was [illegible] on the [illegible]. The concrete wall was [illegible] into the rock [illegible] below the top of the dam. The width [illegible] at the top is 9 ft. [illegible] in., and the slopes on both sides are 2 to 1, with 6 ft. and 7 ft. berms about half way down the upper and lower slopes, respectively. The spillway is 75 ft. wide and the [illegible] is 14 ft. [illegible] The water [illegible] is 14 ft. below the elevation of the spillway, and is near the toe of the upper slope. The supply is controlled by a valve in a valve box on the dam. A 6-in. gravity supply pipe leads down to a storage tank at Newburg, the fall from the outlet to the storage tank being about 140 ft. The details of the design of the dam are shown in the drawing on the opposite page.

GRAFTON YARD.

One of the most important steps in increasing the capacity of the road across the mountains was the installation of ample terminal facilities at Grafton. This is a junction point for two branches and a division point on the main line. There was an insufficient number of tracks in the yard at this point before the beginning of the present improvement and the necessary switching had to be done largely on the main line. To eliminate the congestion occasioned by such switching movements and to prepare for the increased volume of business made possible by the other improvements, a yard of adequate size and improved connections to the branches were designed and are now practically completed. The location of the yard was made somewhat difficult on account of the fact that the entrance to Grafton is through a narrow winding valley with steep slopes on both sides through which flows a small mountain stream. The bed of this stream was changed three times during the construction of the yard, and was finally disposed of south of the principal part of the yard, with a single crossing near the east end. About 1,250 ft. of riprap wall was built near the west end of the yard as protection against bank erosion. The high curvature throughout the yard is a very noticeable feature of the layout, but, because of the topographical features, was unavoidable without involving excessive cost. The classification yards are operated as level yards, being of the push and pull type. The eastbound classification yard has ten tracks with a capacity of 40 cars each, the westbound seven tracks holding 60 cars each, and, in addition to these, there are four engine tracks for ten engines each, and facilities for repairing 90 cars. The main line tracks are 14 ft., and yard tracks 12 ft. center to center. Turnouts from ladders are No. 8. The yard is laid with 85-lb. second-hand rail. Two new Y connections with the Grafton & Bellington branch were provided to eliminate back-up movements of branch trains in reaching the passenger station. The additional tracks over Three Forks creek near the east end of the yard required an extension of the masonry in the substructure of the existing deck girder structure. To care for highway traffic it was necessary to



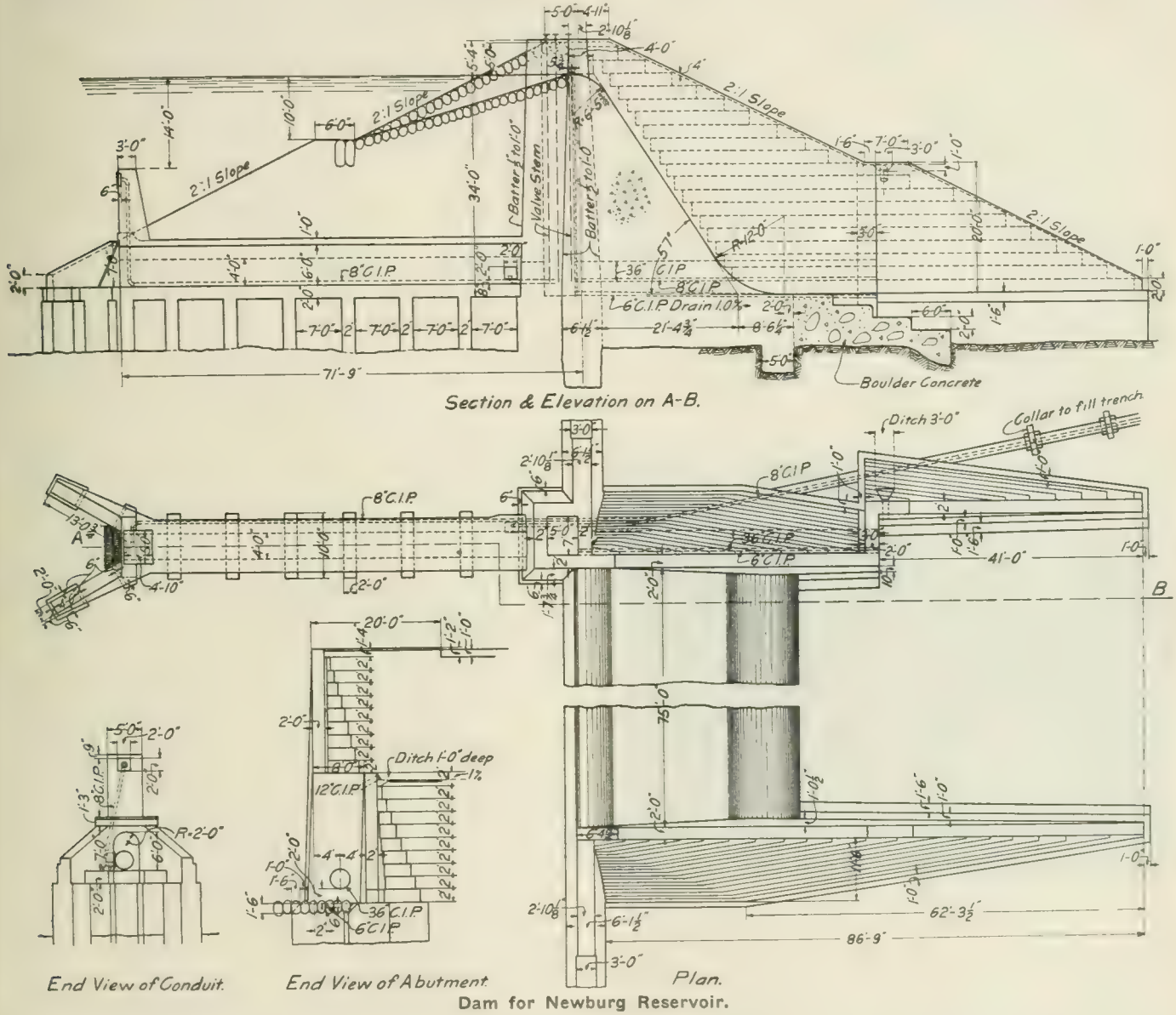
Layout of Grafton Yard; Baltimore & Ohio.

change the location of a road just west of the stream crossing and to build a new steel highway bridge over the tracks.

Incident to the work at Grafton a new station was built, which was opened August 22, 1911. The building is three stories high, of concrete construction with terra cotta and compressed brick facing, and a copper and composition roof. On the first floor, or track level, are the baggage and express offices, division telegraph office and emmigrants' quarters. On the second floor, or street level, are the main waiting room and ticket offices. On the third floor are offices for all division officers. The architecture of the building is modern renaissance. The interior is trimmed throughout in quartered oak. The floors in all public rooms are of marble and tile. The general waiting room, women's retiring room, men's smoking room and toilet rooms are finished with marble wainscoting and plastered beam ceilings. A broad covered stairway of ornamental concrete leads from the track level to the main waiting room and two hydraulic freight elevators handle baggage and express between these two levels. Separate eastbound and westbound platforms, 600 ft. long, covered with umbrella sheds, are provided.

The end of the third track at the east end of the yard is controlled by a 28-lever mechanical interlocking machine; and the junction of the two branches, the end of the fourth track and the crossings of freight and passenger tracks over the branch tracks are controlled by an electro-pneumatic interlocking plant containing a 72-lever machine. Other signaling work in progress between Cumberland and Grafton includes a 28-lever mechanical plant at the east end of the third track at Bond; a 24-lever mechanical plant at the west end of the same track; a 24-lever mechanical plant at the east end of the Strickers third track, and a 32-lever mechanical plant at the east end of the Blaser third track. Interlocking plants will also be installed at the west end of the Kingwood tunnel, at the helper station at Hardman, and at the helper station at Rowlesburg, but definite plans have not been completed for these plants. In the signaling installations all high signals are power operated, semi-automatic, three-position, upper quadrant. Dwarf signals are two-position.

The improvement work on this division was planned under the direction of F. L. Stuart, chief engineer; Earl Stimson, chief engineer maintenance of way, and J. T. Wilson, district engineer.



Dam for Newburg Reservoir.

The *Proceedings* of the seventh annual meeting of the Wood Preservers' Association includes a list of wood preserving plants in the United States. It shows that 86 plants are now in operation owned by 60 companies, and situated in 31 states. Of these plants 64 are operated by 43 private companies and 22 are operated by 17 railways. The plants report the use of various processes of preservation as follows: Creosote, 26; Bethell, 16; Burnettizing, 14; Lowry, 13; Card, 5; Rueping, 4; Kyannizing, 2, and Allardyce, 1. The number of plants built during the past four years is given as follows: 1907, 13; 1908, 7; 1909, 9; 1910, 4.

TRACK DRAINAGE COMPETITION

FIRST PRIZE.—POROUS TILING IN WOODEN TROUGHS.

BY J. F. MCNALLY,

Assistant Superintendent, Atchison, Topeka & Santa Fe.

When the Santa Fe inaugurated fast passenger and freight service, with heavy locomotives, we found it necessary, in order to maintain perfect track, to experiment on draining cuts and fills. We first used 4-in. porous tiling, at the ends of ties, about 2 ft. deep, and had section men put it in without stakes set by engineers We found after the tiling had been in from one to two years that the heavy traffic caused it to become misplaced and in many instances the ends of the tiles would stick out through the surface, as a result of the heaving of the ground underneath. We then experimented by putting tiling along the bottom of the ditch 2 ft. deep, 4 to 6 ft. from the rail. This was not a success, as it was too far away from the roadbed to give the proper drainage. Then we placed the tiling 18 in. from the ends of the ties. The section men dug test holes 30 to 50 ft. apart, and the engineers ran levels and marked on the base of rail the depth that the ditch was to be cut, giving the tiling enough fall to maintain perfect drainage.

We used old fence boards to make a V-shaped trough with broken joints. This trough was laid in the bottom of the ditch and the drain tiling placed in it.

Water Running From Cross Drain in Fill.

[illegible] made in 1905. Since then we have laid all tiling in such a trough, using fence boards or car siding for lumber. After laying the tiling, the ditch should be filled [illegible] of any kind. The tiling cannot become misplaced, as the trough that is placed in the bottom prevents it [illegible]. Instead of using 4-in. tiling we have adopted 6-in., and find that it gives much better results.

The accompanying cut shows a section of track laid at the [illegible] per cent. grade, with 90-lb. rail and Weber joints, with [illegible] under the ties. Each tie has two tile [illegible]. Both [illegible] and fresh [illegible] last time over this piece of track, with heavy equipment. This section of track is located in a very rough and hilly country, in a cut which is [illegible] with yellow clay, [illegible], and with springs and seepages from the hillside. We placed 6-in. drain tiling, one [illegible] of tiling to each side of track, 18 in. from ends of ties. First we had the [illegible] made out of old fence boards; had section men dig test holes 30 ft. apart, then we had engineers run a [illegible] and mark on the base of rail every 30 ft. the depth [illegible] ditch was to be cut. These men then placed the trough in [illegible] above. Tiling was placed in the fall of 1905, and we have had no trouble maintaining this track since that time. There is water running out of the tiling every day of the year.

In many instances wet banks can be drained by using old engine flues. Punch holes in the engine flues, plug one end of the flue and drive it into the bank far enough so that it will reach the center of track on each side. In some places we have experienced very good results by putting in rock drains, starting at the bottom of the dump, if necessary making the ditch under the track and laying a rock drain. This will stop bad slides, but where the slides do not continue to the bottom of the dump, tracks can be drained much more cheaply by using engine flues.

SECOND PRIZE—TILING AND CROSS DITCHES.

BY S. B. PETER,

Roadmaster, St. Louis & San Francisco.

The following is our experience in trying to maintain track through a wet cut where sub-grade consisted of a mixture of potters' clay and soapstone. When the road was new it was ballasted with about six inches of stone, broken with napping hammers, the largest pieces being supposed to pass through a 2-in. ring. Sufficient stone was broken at the ends of ties to make a good shoulder, and it was thought that trouble with this piece of track was ended. After a long wet spring the following year the shoulder had about all been used to tamp up the joints, and had pounded down into the mud, forming pockets that held water from one rain until the next. Side ditches were made deeper in an effort to drain the track. This, however, seemed to make matters worse, for as fast as the ditches were made deeper the mud squeezed out from under the track. Eight inches more ballast of the same kind was applied during the second year; but pockets having formed under the joints, the clay continued to squeeze out, making the pockets deeper, and the condition of the track became worse after each rain.

The third year it was decided to tile the cut. Ditches were made one foot from the end of ties, cut as narrow as practicable with tiling spades, and 2½ ft. deep. The grade of track was 0.5 per cent., and the grade of tile was made the same, except at the lower end of cut where conditions permitted a greater fall. Six-inch tile was laid in the ditch, which was then filled with broken stone. Both sides of the track were tiled in the same manner. After the first rain, water flowed from the ends of the tile freely and it seemed that the proper remedy had been applied. The year following, during the spring rains the dirt in the ditches showed signs of heaving; the surface of the track began to get bad, and at the end of the year conditions were about the same as before the cut was tiled.

At the end of two years after the tile was laid, it began to show above the mud in the ditches in a number of places. The ditches had been cleaned twice each year, and the worst places three or four times. It was then decided to try tile placed at the back of the ditch six feet from the rail. These ditches were carried down four feet below base of ties, maintaining the same grade as the track. Lateral ditches were cut at each 15 ft., tapping all pockets. The side of ditch farthest from the track was kept vertical, and the tile laid at back of the ditch. Six-inch tile was used as before, and when the tile was in place sufficient cinders were dumped into the cut to fill up level with top of tie. This tile was applied [illegible] years ago, and the track has given no trouble since. The tile should be placed so it will stay in position, and should be deep enough in the ground to drain all pockets that may [illegible] formed.

Different conditions existed on a 15-ft. fill that had been ballasted with crushed rock to a depth of about two feet. This fill had been widened to 30 ft. on top, and track raised 18 in., the material used for widening being mostly clay. The ballast became bowed in, thus holding practically all the water that fell

on the track. When it was undertaken to drain this fill it had been giving a great deal of trouble, having to be surfaced at least once each week. The ballast used in raising track was what is known as chatts or Joplin gravel. The traffic was very heavy, consisting of 20 heavy passenger trains and about 40 freights during each 24 hours.

A lateral ditch was cut every 30 ft. on each side of track, alternating so as to provide a drain at each 15 ft. Ditches were made deep enough to get below the bottom of ballast. In many places this was six feet, and in one place eight feet. These ditches were made just wide enough for a man to work in and were cut into the track until they were of sufficient depth to drain all pockets. There had been no rain for thirty days at time the drains were made, but water ran from the ditches for several hours when they were first opened. The ditches were filled with boulders and the track has given very little if any trouble since.

PROPER SIZE AND LOCATION OF DITCHES.

BY CLYDE L. VAN AUKEN.

Many unforeseen drainage problems arise after the construction of a railway, the solution of which sometimes necessitates the expenditure of a large amount of money. On a new constructed railway, especially any case of bad drainage should have the attention of the engineer in charge, before an attempt is made to remedy the trouble. The need of thorough investigation by an engineer is emphasized by the following experience: Upon the completion of a western line, a large pool of water collected on one side of the track at the intersection of two grades. The elevation of the track was only a few feet above the original ground surface, and the pool of surface water kept the sub-grade soft. The side ditches provided did not drain off the water and the roadmaster ordered the ditch deepened through a cut toward the west. The section gang worked for a week deepening this ditch, but the water failed to run off as expected. Consequent inspection and reference to the profile showed that the ditch was being deepened along an up grade, which, on account of the excessively steeper grade adjacent, appeared to be a moderate down grade. Three hours' work with a team and slip, deepening the ditch in the opposite direction was sufficient to drain the pool.

Just after the completion of a new section of railway, trouble was experienced in a 3 deg. curve which followed quite closely along the foot of a hill. The slope of the hill was gradual, but extended a long distance back from the track, so that the drainage area was quite large. When grading at this place, the ordinary ditches were provided at either side of the track. The grading was very light, consisting practically only of leveling up the ground. The earth at this point was yellow clay, covered with a thin layer of black earth. The ballast used was obtained from a nearby gravel pit; and was not of first class quality, as it contained clay and some gumbo.

After a heavy rainfall the water would gather at the foot of the hill faster than the ditch could carry it around to the tangent at the end of the curve, where a culvert was located. Consequently the water would rise at this point and flow over the rails, and after rainstorms the track would sink into the subgrade very badly and clay would ooze up between the ties. The outside rail of the curve was affected most and the super-elevation would be entirely destroyed. Either of two solutions was practical. The curved ditch could be made big enough to carry the water away; or a culvert could be put in at the place where the water collected. Instead of adopting either of these methods the track at this point was raised and reballasted several times. This resulted in keeping the track in proper shape only until the next rain storm.

The final solution was to enlarge greatly the ditch on the uphill side, keeping as far back from the track as possible. This work was done by teams and slips. After this ditch was enlarged, the track gang was instructed to raise the track at least eight inches. Instead of using the ballast from the local pit, seven or eight carloads of cinders were obtained and unloaded at the worst spot in the track. The lift given at this place was a little over 12 in. This depth of ballast distributed the pressure to the sub-grade more uniformly and stopped the clay from oozing up between the ties.

USE OF STONE AND CINDERS IN WET ROADBED.

BY A. E. PREBLE,

Supervisor, Cumberland Valley.

At the first indication of pumping track the foreman should assign one or two men at once to dig out the pumpers; as one pumper will cause a dozen others. At the first opportunity he should give the entire zone of pumping track a thorough cleaning, digging or forking the material between the cribs down to three or four inches below the bottom of the ties, putting the fit material back and wasting the other. If the drainage is poor, the most efficient and economical plan is to raise the entire stretch on about two feet of cinders as cinders act as an absorbent and hold the water in suspension, allowing it to percolate through slowly and preventing its going direct to the sub-grade, causing pumping.

If pot holes are in the track, where the material pushes out at the sides, these should be treated promptly. If these places are short and the sub-grade is of a clayey or impervious material, the zone of this foreign material should be dug out and filled in with cinder and the ballast put back. If the pot holes are very troublesome where the ballast goes down and the sub-soil comes up, dig out under the ties 3 or 4 ft., and from 11 in. inside the rail to 6 in. outside the ends of the ties and fill in with big stone from 8 to 14 in. in diameter or larger. This stone will set and take the bearing of the tie and at the same time open an underground drain allowing the water to seap through. If there are two or more tracks, a very simple and effective method of draining the grade is to dig out the intertrack space just below the bottom of the ties and lay two lines of old switch timber longitudinally end to end with about 6 in. space between the lines, covering them with old plank, taking cross drains out to the side ditches, about every rail length. This old timber is at the disposal of every foreman and is better than tile drains because if it gets clogged up the plank can be taken off and the drain cleaned out.

REPLACING WET CLAY WITH CINDERS.

BY ROBT. H. ORWIG,

Supervisor, Cumberland Valley.

The usual cause of soft spots in track is clay in the roadbed. Many foremen have discovered this and dug out the clay, filling in the space with large stones. This gives temporary relief, but soon both clay and stones push out in the ditch. Laying tile to correct this condition is useless since they will soon be pushed out of place if stones weighing 100 lbs. or more will not stay in position. One method of correcting this trouble is as follows: Dig out all the clay from under the ties, then fill in with good crisp, locomotive cinder, made from bituminous coal and flooded with water as soon as drawn into the ash pit. This flooding is necessary, for if the cinders are allowed to burn out, the "life" is lost and they lack the most important qualification, porosity.

In digging out the clay it is necessary to go from one to four feet below the bottom of ties, depending upon the character of material found in the roadbed. These trenches are dug the length of the soft spot and about 5 ft. from the rail, parallel to it and extending into the track as far as the clay extended, and are filled with cinders to within 6 in. of the bottom of the ties, on top of which is placed the 6 in. of stone ballast. The cinders answer the double purpose of distributing the train load evenly and acting as a blanket to the material beneath, and, on account of its porous qualities, dries up the wet material by

capillary attraction and evaporation, draining the spot from above instead of from below.

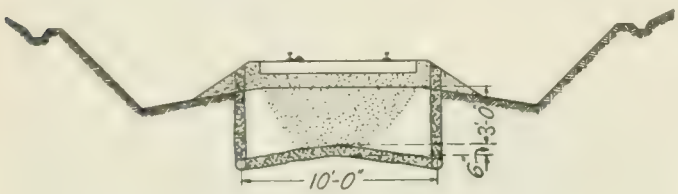
Locomotive cinders have long been used for ballast on Eastern roads, but the mistake is frequently made in filling the track with the material and doing the tamping and surfacing on the cinders, which soon causes them to lose their "life." This can be overcome by ballasting the track with stone after the cinders have been placed beneath, which allows all the work to be done on the stone and also allows the cinders to retain all the good qualities. On all of our present construction work we first put a foot of cinders and on top of this 8 in. of stone ballast, and we expect in this way to reduce the wet cut and soft spot trouble to a minimum.

DRAINING NEW CUTS AND FILLS.

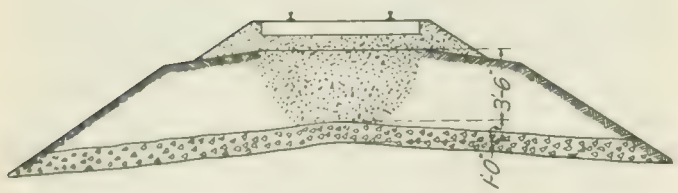
BY J. C. BACH,

Roadmaster, El Paso & Southwestern.

To keep cuts properly drained, ditches should be kept clean. There should also be intercepting ditches on the tops of cuts to keep any water from draining from watersheds into the cuts. I once had on my district a considerable portion of reconstructed track. The new roadbed was ballasted with cinders and river gravel. We had very large engines on this district and, of course,



Method of Tiling Cuts.



Cross Drains in Fills.

Cross Section of Roadbed, Showing Drains.

the cinders soon began to go down in the soft roadbed, the track got soft, and we continued to place cinders and gravel until we had 3 or 4 ft. of ballast under the track in soft places. It soon became apparent we must have sub-drainage, as the ballast was settling in the roadbed as fast as we could apply it. I used 6-in. tiling, 1 ft. long, without bells. The manner of placing the tiles was as follows:

First, test holes were dug in the center of track to find the depth of ballast. Plenty of water was found standing in the roadbed on portions of track where there had been no rains for sixty days. After digging test holes an engineer ran levels on the track and marked the depth of tile on the web of the rail every 20 ft. The ditches were dug to these levels, always with a fall of not less than [illegible] and located not more than 12 in. from ends of ties and parallel with the track.

After the ditch was dug, 1 in. x 6 in. x 16 ft. boards were laid in the bottom of the ditch and [illegible] a level board to conform exactly to the engineer's levels. Tile was laid on these boards very carefully and the ditches were filled with cinders to the top of the sub-grade. Only in a few instances was it necessary to put tiling under the rails on the outside, but in order to get water to drain to the tiling from the center of track [illegible] were placed in every 30 ft. of track, and filled for a depth of not less than 12 in. with cinders or broken rock. In all cases tiling was placed 6 in. lower than any ballast in track.

This tiling was placed with extra gangs, about twenty men in each gang. The foremen received $75 per month and laborers $1.50 per day. The average cost of tiling, including putting surface ditches in cuts in proper shape and disposing of dirt taken from ditches, was 26 cents a foot.

In a number of fills where the same conditions existed similar cross drains were tried without success, as the heavy weight of the locomotives would buckle the tiling.

The most successful way to drain fills was found to be by cutting ditches every 15 ft. across the entire width of the fill and 6 in. below any ballast, filling them with coarse clinkers or broken rock for at least 2 ft. in the bottom, and filling the rest with cinders to the top of the sub-grade, always taking care that these ditches sloped from the center of track each way sufficiently for drainage.

ECONOMICAL METHODS OF DRAINAGE.

BY P. H. HAMILTON,

St. Louis & San Francisco.

The prevalent method of draining cuts is by the use of drain tile. If drain tile is considered too expensive a trench can be dug and filled in with cinders or rock. Cinder drains cost from four to ten cents per foot, according to the depth of the trench, and other conditions which are not constant. Eight and 10-in. No. 2 tile can be bought about as cheap as standard 6-in. tile, and they are much more satisfactory. They are much stronger and not so apt to crush; the larger opening will carry away more water, and they do not fill up with debris so quickly. Before covering the tile hay should be put around the joints to keep out the dirt. No. 2 tiles or culls are the tiles that are over glazed, slightly distorted, or have some other minor defects, but they are as good for draining cuts as first-class tile. Eight inch vitrified seconds cost six cents per foot. They are easier to handle, being 30 in. long, which allows them to be applied much more rapidly. For tiling a 1,000 ft. cut on both sides of the track, putting the tile about 30 in. deep, the cost is:

Labor	$75.00
2,000 ft. 8-in. No. 2 vitrified bell-end drain tile	120.00
	$195.00

No charge is made for the cinders used.

In very wet cuts cross drains of cinders or spawls should be put in under the track. Tiles can be used but they are apt to crush. A cross drain, if made of cinders or spawls, should extend clear across under the track to equalize the bearing of trains passing over it. With half width drains the side opposite the cross drain holds up, while the side over the drain has a tendency to "slough off," or give, making the track "swingy."

Old boiler flues can be used to advantage in draining embankments. A cap is put over the flue to keep out the dirt and it is driven into the embankment to the center of the track with maul or a heavy sledge hammer. A rod is run into the flue and the cap is knocked off. This makes a good pipe drain, which may be considered permanent, cheap and easily put in. The cost of these scrap flues is practically nothing. The company gets about one-half of a cent per pound for them. The cost of putting them in will run from thirty cents to a dollar each.

The most economical drains for embankments are old cross or switch ties. An old tie put into the shoulder of the fill at intervals will not make a clear opening, but seepage will pass along it if it is placed in a slanting position. After the tie is decayed it will leave a porous earth which the water will pass through.

Boxed track is often caused by failure to keep the earth levelled down with the bottom of the ballast when widening banks, forming two parallel walls at the ends of the ties. All of the water that falls on the track will run down between these walls to the lowest place on the road bed and accumulating there, [illegible] to make a soft place. In widening banks care should be

taken to have the crown of the fill in such shape that it will drain off at all times. If the levelling down is done by hand the foreman in charge should see that the earth is kept below the bottom of the ballast. If the work is done with a spreader the same care should be taken. Possibly this extra precaution will run the cost per yard of bank widening a little high, but it is justified in the reduction in maintenance costs. A spreader is much more economical when it will work satisfactorily. In a recent job of bank widening the earth which was being handled would soon pack so there was trouble in getting it levelled down below the bottom of the ballast. The front of the wings of the spreader would nose into the dirt and it would stick. When the spreader was backed off and run at it, the front end would cramp and the rear wheels would buck off the track. After several efforts of this kind the spreader was in bad order. Then the shoulder had to be levelled off by hand. In handling about 1,500 cu. yds. per day it cost about two cents per yard to keep it levelled down to the bottom of the ballast. While the spreader was being repaired fish plates were placed on the wings for teeth, which kept the earth loosened up, and there was no further trouble. This reduced the cost of levelling to practically nothing as the spreader was operated by the unloading crew.

PREVENTING AN EMBANKMENT FROM SLIPPING.

BY W. T. MAIN,
Division Engineer, Chicago & North Western.

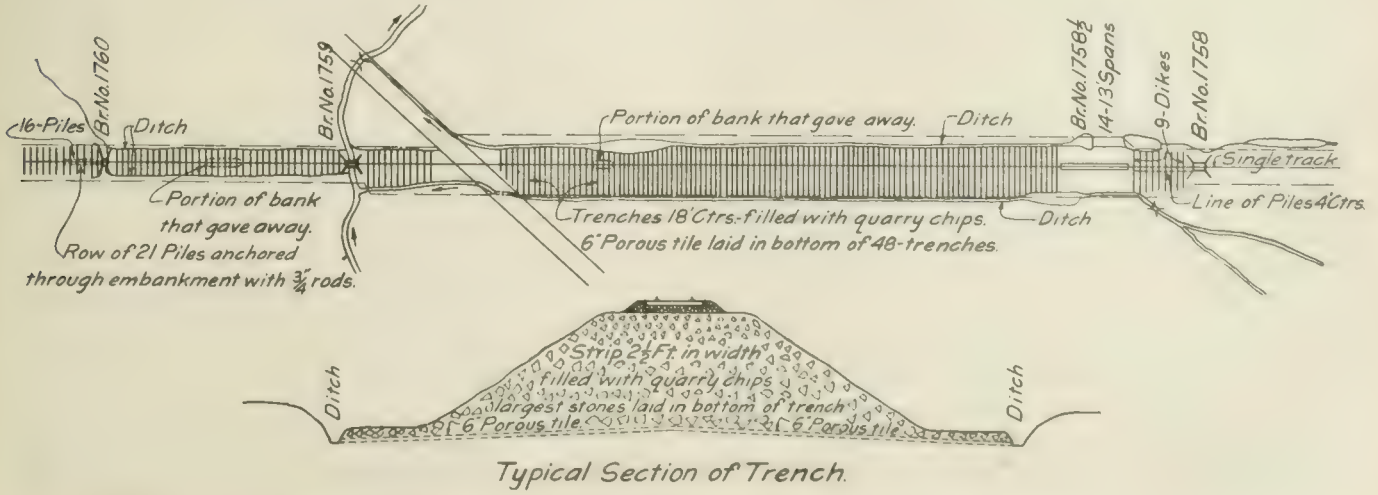
"Eden Slide" is four miles north of Eden, Wis., on the single track line of the C. & N. W. The portion of embankment which has given trouble is 3,500 ft. long, including the north third of the whole fill, which is on a tangent having 0.80 per cent. descending grade to bridge No. 1758; 0.74 per cent. descending grade from bridge No. 1758 to bridge No. 1759 and 0.6 per cent. rising grade for the remaining 1,200 ft. of the fill. The height of embankment above original ground level is 18 ft. at bridge No. 1758; 14 ft. at bridge No. 1759 and 10 ft. at bridge No. 1760. The earliest records show slippage of the embankment and settlement of the west track rail 200 ft., and cracking of the embankment 400 ft. north of bridge No. 1758. In November, 1902, such slippage of the west shoulder as had occurred had been filled with cinders, sections showing maximum depth of cinder filling 4 ft. under ties at the west end, and 5 ft. below the subgrade at the shoulder, 10 ft. from the center of track. Sections indicate the length of slip to be about 150 ft. along the west shoulder and extending to the east end of the ties at one point. At this time it was proposed to drive 20-ft. cedar piles on three-foot centers along the west shoulder for 250 ft., but as the embankment froze and gave no further trouble work was postponed.

No record of further slippage appears until August, 1903, when a heavy rain almost in the nature of a cloud-burst caused the utter failure of the embankment for 140 ft. at a point 300 ft. north of bridge No. 1758. This wrecked a passenger train. A pile bridge 143 ft. long, No. 1758½, was immediately driven to carry traffic, and an examination of the embankment was made by cross cutting, the report being in part as follows:

"This excavation shows that bank was originally constructed of about 4 ft. of light porous black soil borrowed adjacent to right-of-way. On top of this was placed 7 or 8 ft. of heavy red clay taken from cut to the north. Afterward apparently grade was raised and bank widened with light yellow clay. This combination of material left a very unstable bank, which finally resulted in slipping as shown.

"The road at this point is located in a slight sag which was evidently the drainage to the ditch north for the land east and west. The water now comes from east and west to our banks, and owing to the drainage box under highway on west being too small and no opening on the east, keeps the borrow pits full of water. This standing water by capillary action saturated the porous black soil to such an extent that the red clay slid out to the right-of-way fence. The sliding action was aggravated by filling in with cinders which left pockets for the retention of water. I would recommend that natural conditions be restored as nearly as possible by constructing drainage ditches along the east and west sides, putting an opening along highway on east and enlarging present opening on the west and fill all borrow pits. The bank under the temporary pile bridge should be leveled off and the red clay cut down and spread out so that material above would rest upon it instead of enveloping it at present. We are likely to have trouble at other points on this bank, as it is all of the same construction."—(*W. H. Finley's report, November* 5, 1903.)

The above recommendations as to drainage were carried out in the summer of 1904, additional right of way being secured for ditches. Also, three additional spans were added at the south end of bridge No. 1758½, and piles driven on 4-ft. centers along the west shoulder of the embankment from bridge No. 1758 to No. 1758½, on account of the embankment showing some settlement and cracking in wet weather. In the fall of 1904 it was apparently decided that any ordinary system of drainage was insufficient to drain the embankment, and during the winter of 1904-5 62 cross trenches, 2 to 2½ ft. wide and on 18-ft. centers, were dug north from bridge No. 1758. Trenches were carried from the ditch on the east through the embankment to the ditch on the west, with about 2-ft. elevation of the bottom of the trench under the track above the side ditch. Trenches were filled with quarry chips, and 48 had 6-in. porous tile laid in the bottom. The trenches average 100 ft. long across the tracks, and are 12 to 16 ft. in depth. Those laid with tile cost $79.86 each, and those without tile, $77.16. No further trouble has been experienced in this part of the embankment. In April, 1908, there was a slippage of the west shoulder some 60 ft. long just north of bridge No. 1760, also some settlement of track midway between bridges No. 1759 and No. 1760. Immediate action was taken by driving piles on each shoulder and anchoring them with rods across the track. It was then decided to continue the construction of the cross trenches, and 106 were built during the summer



Typical Section of Trench.

Remedying Trouble From Sliding Roadbed; Chicago & North Western.

of 1908 to connect with the work of 1905. These were laid without porous tile in the bottom, quarry chips and small rubble only being used for filling trenches, which cost $65 each. Pile bridge No. 1758½ was filled with sand and gravel in 1908 and the stringers removed.

This red clay will absorb water until it will run like mortar. The clay seems to have sufficient fine sand in its composition to become thoroughly saturated. The cupping action of track and ballast on the embankment would hold water from running off the slopes and allow it to soak into the embankment, and whenever rain was of sufficient duration the embankment became soaked and slips occurred either in spring, summer or fall. Cross ditches provide escape for excess of water and also bolster up the fill. There has been no trouble since the completion in 1908.

DRAINING AN EMBANKMENT WITH DRIFTS.

BY G. LE BOUTILLIER,
Division Engineer, Pennsylvania Lines West.

At a number of points on this line there are deep fills or embankments which have continually slipped, due to bad subdrainage conditions, causing considerable expense to keep the tracks to line and surface. One of these embankments was treated by applying a special drainage system, and since that time no movement in it has taken place; the work has been extended with similar results.

The embankment referred to is situated where the gradient is 0.97 per cent., descending westward and the alinement a 6 deg. 45 min. curve to the right. It is of variable depth, the maximum being about 50 ft., and carries two high speed main tracks. As long as any record has been kept, it was impossible to keep the west track to good line and surface, on account of settlement in the roadbed, and some difficulty was experienced with the east track. This settlement of the roadbed was going on at all times, but was particularly troublesome during wet or thawing weather. It was necessary to line and surface the west track for a distance of 500 ft. every few days, and on one occasion the embankment suddenly settled about a foot for some distance.

Careful investigation showed that the embankment was built on a bed of shale and nearly all water entering it was retained above the shale, so that the embankment was saturated to a greater or less extent at all times. A 36-in. cast iron pipe culvert located near the middle of the slip and extending through the embankment was found to be broken off under the west track, inside the embankment. The down stream portion, under the west track, had settled with the slip about 18 in., allowing large quantities of water to flow directly into the embankment.

Three fresh drains were constructed by driving drifts into the embankment. These drifts were 3½ ft. high, 4 ft. wide at the bottom and 3½ ft. wide at the top, lined with 3-in. oak plank. When the drifts were completed, flat stones were placed in the bottom of each to form a box drain about 5 in., square, and the remainder of the drift was back filled with No. 2 rubble.

The drifts were all started about 35 ft. below the top of rail, in the embankment along the west track, and were driven on an ascending grade of 10 per cent. Each drift is about 20 ft. below the top of rail.

Two drifts were started at points about 80 ft. apart at spots where water was flowing from the embankment in small quantities. Each of these drifts followed the subterranean water course and gradually approached each other. The first drift was driven 65 ft. to a point about 20 ft. from the center of the west track. The second was driven 115 ft. to a point about midway between the two tracks. Considerable water was encountered in driving these drifts and when the second one had been driven to a point directly under the west track a 6-in. stream of water was tapped at a pocket of yellow clay, which flowed roughly for a period of twenty hours. There appeared to be very little hardpan above these two drifts.

The third drift was started at a point about 150 ft. east of the second one, which appeared to be below the portion of the embankment saturated with water, due to the uneven bed of shale. Water dripped in considerable quantities through the roof of this drift throughout its entire length.

The third drift was driven 145 ft., extending entirely through the embankment. Shale rock was encountered under the east track, so the rest of the drift was cut part way into the shale.

In all of the drifts limestone ballast was found in large quantities, which gives a good idea of the amount of settlement that had taken place in the embankment since it was constructed, about sixty years ago.

While the drifts were being driven, repairs were made to the cast iron pipe culvert. The tracks were supported on pile bents and the portion of the culvert which had settled was taken up. Test piles were driven in the water course, and it was found that the shale bed descended to such an extent that a satisfactory foundation for the culvert could only be obtained by driving a pile foundation for the pipe to rest on; therefore three rows of pipes were driven on 3½-ft. centers, each row containing nine 35-ft. piles. The rows of piles were placed 5 ft. apart. On this pile structure was constructed a 36-ft. reinforced concrete culvert, 48 ft. long, connecting with the portion of the cast iron pipe which had not been disturbed by the slipping of the embankment.

A grouted cobble stone gutter was also constructed for a distance of about 150 ft. from the up stream end of the culvert, to insure the conduct of all water from the ravine into the culvert. From the down stream end of the culvert a similar gutter about 100 ft. long was constructed to join the original ground surface, to prevent the collection of debris which might back water into the culvert and along the foot of the embankment.

The entire cost of the work described was as follows:

Three drifts complete	$1,857
Repairs to culvert and concrete gutter	1,663
Total	$3,520

About $600 was annually expended on this embankment in addition to ordinary maintenance expenditures.

ENGINEERING ARTICLES SINCE AUGUST 18.

The following articles of special interest to engineers and maintenance of way men, and to which readers of the maintenance of way section may wish to refer, have appeared in the issues of the *Railway Age Gazette* since August 18:

Three letters on College Men in Railway Work, referring to former letters which have appeared from time to time in recent issues, appear on page 365 of the issue of August 25, and on pages 396 and 397 of the issue of September 1.

Peking-Kalgan Railway.—The building of this Chinese railway was the most difficult piece of construction ever handled in that country and it is particularly noteworthy on account of the fact that the entire work was handled by native officers employing native labor. The costs were less than many of the foreign built roads under much more favorable conditions and the building of the road sets a precedent for future construction in the Chinese Empire. The engineering detail of this work are given in an illustrated article, page 366 of the issue of August 25.

Dredging Suction Dredge.—The results secured by the use of a suction dredge for filling along the banks of the Mississippi river for the second track of the Chicago, Burlington & Quincy are given in an article, with valuable drawings, photographs and detailed information, in the issue of August 18, page 337.

Worcester Union Station.—The new union station at Worcester, Mass., which is part of the complete plan of improvements by the roads entering that city, is described and illustrated in the issue of September 1, page 399.

Shops and Terminal Yards of Canadian Northern and Grand Trunk Roads at Winnipeg.—The new Fort Garry terminal in Winnipeg is described in the issue of September 8, page 436, by I. Schofield, assistant architect of the Canadian Northern, who furnishes an interesting description of the building, yards and terminal layout.

Concrete Piles for Bridge Foundations.—The use of concrete piles in railway work is of comparatively recent date and data concerning the driving of such piles is scarce. The experience gained on the Kentucky & Indiana bridge over the Ohio river at Louisville is given in an illustrated article on page 480 of the issue of September 8.

BRIDGE AND BUILDING CONVENTION.

The twenty-first annual meeting of the American Railway Bridge and Building Association will be held in St. Louis, Mo., October 17, 18 and 19. The committee reports will include the following subjects: Best Method of Numbering Bridges; Buildings and Platforms for Small Towns; Sash, Size and Kind of Glass that is Economical for Roundhouses and Shop Buildings; Plans of Fireproof Oil Houses; Best Method of Fireproofing Frame and Trestle Bridges; Derricks or Other Appliances for Handling Heavy Material in Supply Yards; Pumping Engines, Best Kind and One Most Economical to Use—Gasolene, Oil or Electric; Records of Bridges, Buildings and Other Structures, Showing Cost of Construction and Maintenance; Concrete Tank Construction and Recent Developments and Suggestions: Feasibility of Using Brick Veneer for Station Buildings; Roofs and Roof Coverings.

OILING TRACKS IN CHICAGO.

The Chicago, Burlington & Quincy has been oiling its tracks in the suburban district between Chicago and Downers Grove, 21 miles, to keep down the dust. A simple sprinkling arrangement was devised by the mechanical department. It consists of a 4-in. pipe perforated on the bottom and connected at the center to the outlet pipe of an ordinary tank car. Two elbows are placed in this pipe a short distance outside the rail, forming a joint to allow the outer section of the pipe to be raised when passing obstructions, such as station platforms and cattle guards. As the pipe is perforated over the rail, small shields are placed at these points to divert the oil from the rail. The flow of oil is regulated by the long lever extending up along the side of the car and connected to the outlet valve. The oil is heated with steam from the engine, so that it will flow readily. The entire apparatus can be disconnected from one car and attached to another in 10 or 15 minutes.

Oil Sprinkler in Service.

About 1,800 gal. of crude oil is used per mile and the track is sprinkled at the rate of about 3 miles per hour. The ballast is a rather coarse gravel. The cost of the first 39 miles of track oiled was $50 per mile, of which about $45 was for oil. Three men in addition to the train crew are required to operate the sprinkler.

The Illinois Central is using the same arrangement in oiling their six passenger tracks between Grand Crossing and Chicago, a distance of about 8 miles. About 2,200 gal. per mile is used on these tracks, as the ballast is largely cinder. The accompanying view shows the apparatus in use on these tracks.

SINK HOLES ON THE CANADIAN NORTHERN EXTENSION INTO DULUTH.

The Canadian Northern has encountered a number of bad sink holes on the extension now being built between Duluth and Virginia. Many of these were filled directly with small dump cars, but in two instances the surface did not break through until after the track was laid over them and construction trains were running. At the larger one, located at milepost 56, soundings taken for a distance of about 1,500 ft., showed a depth of from 20 to 45 ft. of soft mud. The surface crust appeared to be fairly solid and it was hoped that it would hold up, but it broke through early last spring after trains had been running over it but a short time. About the middle of April this hole became so bad that it was impossible to operate trains over it and steps were taken to completely fill it.

To support the track, timbers were laid about 30 ft. out on each side of the center line and parallel with it. Large white and Norway pine and tamarack logs were laid across these outside timbers at intervals of 3 ft. The track was then laid over this grillage and the cars were dumped between the cross timbers. In the first 100 ft. of the hole an average of 200 12-yd. cars were dumped each day for three weeks before the material appeared above the surface of the water, for after the crust of the swamp was broken there was nothing immediately below the track but water and liquid mud. About a week after soundings were begun new soundings were taken, and where they had formerly showed a depth of soft material of 35 ft. they now showed a depth of 60 ft., indicating that there were harder layers of material in the soft mud. This was borne out by the action of the embankment which would be brought up nearly to grade, and would then drop suddenly a distance of 15 or 20 ft.

After spending over six weeks of steady work at this hole, and after filling only about 500 ft. of it, it was decided to try to prevent the rest of the swamp from breaking through. Contractors were ordered tc crossway it with heavy timbers for a width of 50 ft. and a depth of at least 2 ft. where it had not already broken through, which work is now under way. In constructing this grillage, timbers are first laid close together longitudinally and with broken joints for the 50-ft. width. On top of this cross timbers 50 ft. long are laid close together. A layer of brush is put on top of this and the embankment dumped on the brush. In addition to this crosswaying a dredge is now digging a ditch 12 ft. deep for a distance of two miles to drain the swamp and solidify its surface. It is expected that these measures will remedy the trouble at this point.

At milepost 69 two sink holes were encountered close together with a small ridge between them. Each hole was about 600 ft. long, and one had a maximum depth of 35 ft., while the other showed no bottom at a depth of 50 ft. Both of these have been filled solidly, using the same method as at milepost 56. They required about six weeks' work, dumping an average of 180 12-yd. cars per days.

This line is being built under the direction of H. T. Hazen, chief engineer, to whom we are indebted for the foregoing information.

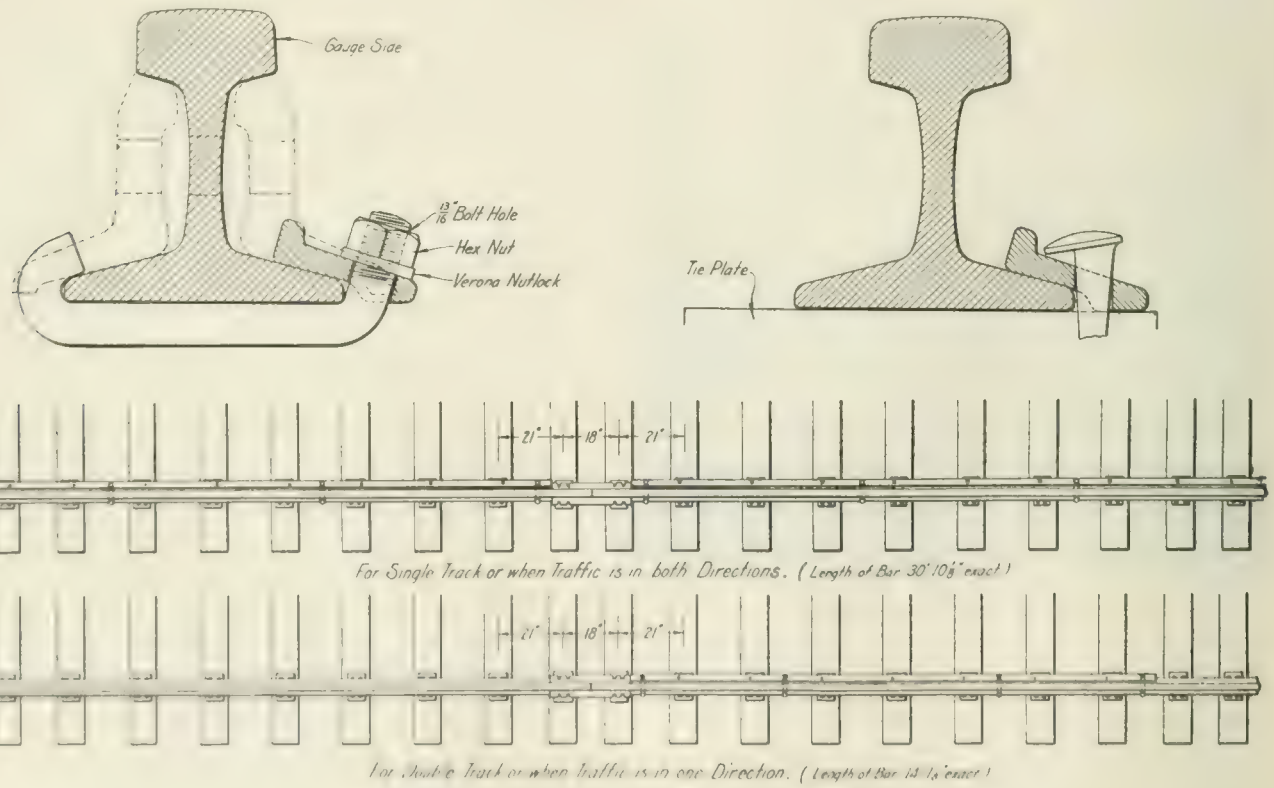
Gravel or stone ballast which lodges in the cars during unloading can frequently be loosened by laying the end of a lining bar or a track chisel on the rail in front of the car wheels, and allowing them to pass over it. This will jar the material loose much quicker than having the men pound on the sides of the car or pockets. In some cases small chisels or pieces of steel bars are carried by the unloading gang for this purpose.

THE SULLIVAN ANTI-CREEPER.

On the lines of the Canadian Pacific east of Winnipeg conditions are very favorable for excessive creeping of rails. The tracks cross many muskegs, some of which are four to five miles long, and in extreme cases the rails move as much as 8 in. during the passage of a single train. Since the second track has been constructed between Winnipeg and Fort William, this trouble has been greatly increased, owing to the traffic on each track all moving in one direction. For a number of years experiments have been made with various anti-creepers in an endeavor to arrest this movement. It was found that it could be stopped if enough rail anchors of the ordinary types were used, but the cost was very high.

After considerable study and experimental work, J. G. Sullivan, assistant chief engineer, designed the anti-creeper shown in the accompanying drawings. It consists of a bar fitting over the base of the rail on the gage side and butting against the angle bar at the joint. Hook bolts pass through this bar and under the rail near each end, and at intervals along the bar to maintain contact with the rail in order to prevent its slipping past the angle bar, and to avoid rattling. This bar is slotted and spiked to each tie. On single track lines, where the traffic moves both ways, the bar extends from one angle bar to the next, butting against the joint at either end, but on double track it is only necessary that it be in contact with the angle bar at one end. For single track the total length of the bar is made the exact distance between angle bars for the rail used and the bars are slotted for the spikes to correspond with the standard tie spacing.

This bar was first placed in the track in the spring of 1908, and the results have been entirely satisfactory. It was found that it was necessary to place the bars only on every second rail in the worst places and at longer intervals where the creeping was less severe. Its use is being gradually extended to all parts of the system. This device would not be economical where, on account of the rail joints, because of its cost, which varies from $900 to $1,000 per mile in place, according to the number of bars placed, but under severe conditions it is more economical than the common rail anchors, of which it would be necessary to put on large numbers to accomplish the same results. This device was patented by Mr. Sullivan some time ago, and he has since disposed of his interests to the Q. & C. Company, Chicago.



Sullivan Anti-Creeper for 33-ft., 85-lb. Rail.

CONSTRUCTION COSTS ON PANAMA CANAL.

A recent statement of construction expenses on the Panama canal work shows the following detailed cost of manufacturing concrete piles:

Items.	Atlantic Division.			
	April.	May.	June.	Total.
Quantities—lineal feet	10,002	5,904	5,760	21,666
Cement	$0.1024	$0.0828	$0.0760	$0.0900
Stone	.0750	.1176	.1145	.0971
Sand	.0178	.0255	.0080	.0173
Mixing	.0358	.1157	.0512	.0617
Placing	.0334	.0711	.0323	.0434
Reinforcements	.8584	.7276	.6346	.7734
Forms	.0922	.0344	.0786	.0729
Maintenance of equipment.	.0053	.0054	.0114	.0069
Plant arbitrary	.1794	.1700	.1700	.1743
Division expense	.0114	.0170	.0210	.0155
Total cost	$1.4111	$1.3671	$1.1976	$1.3525

The cost of driving these piles varied so widely owing to climatic and other local conditions, that the figures are of little value. For instance, during April the piles, which cost $1.41 to make, only required an additional expenditure of 26 cents for driving, while the piles during June, which had cost $1.19 to make, required an expenditure of $9.35 for driving. This latter figure, however, is apparently the exception, for the costs of driving in the other three months are, respectively, 26 cents, 62 cents and 77 cents.

Arrangements have been made to sow various kinds of grass seeds on the slopes of the Culebra cut at the Panama canal with a view to reducing the erosion. The seed is now on hand and will be planted under the direction of a botanist from the Smithsonian Institution.

ROADMASTERS AND MAINTENANCE OF WAY CONVENTION.

The twenty-ninth annual convention of the Roadmasters and Maintenance of Way Association was held in the parlors of the Southern Hotel, St. Louis, Mo., September 12, 13, 14 and 15. The opening session on Tuesday was called to order at 11:30 a. m. by T. Thompson (A. T. & S. F.), president of the association. The registration was about 75 members and 40 guests. The secretary reported 85 new members.

President Thompson, in his opening address, said: "We are here to educate ourselves by exchanging ideas on the best methods of track maintenance. Every member should take an active part in discussing all questions. Improved standards in track construction make it necessary that every roadmaster keep in touch with the latest track appliances and material. I would advise every member to watch the standards adopted and conform thereto as strictly as possible. The benefit of the convention is as great for railway companies as for the individual members."

The secretary read letters from several general managers expressing the desire that their roadmasters attend the convention. Memorials of deceased members were then read. It was voted to form a ladies' auxiliary.

MANGANESE FROGS AND CROSSINGS.

The members of the committee reported close examination of a number of frogs and crossings in use on various roads, the general conclusion from such investigation being that manganese frogs and crossings have proved a success. It was found that the use of this material has greatly reduced maintenance expense by eliminating the cost of bolts which are ordinarily used in Bessemer frogs and crossings, and by saving timbers which are ruined by respiking and rail cutting when used with ordinary frogs and crossings. One member of the committee cited a case in which he had installed two No. 10, 85-lb. manganese frogs in December, 1908. These frogs were in a track carrying the heaviest kind of traffic on a switching lead. One of the frogs is still in the track and will wear one more year. The other frog was removed February 1,1911, on account of flange wear on the toe and heel of the adjoining Bessemer rail. The manganese part of the frog is still in good condition, and would wear out another set of rails. The longest service obtained from the ordinary Bessemer rail frog at this point was 30 days. On this basis the manganese frog has given service equal to 26 Bessemer frogs, the relative cost being about $29 apiece for Bessemer and about $94 for manganese. There has been no expense for maintaining the manganese frogs up to date, while the rebolting of Bessemer frogs was always a heavy item. The committee recommends the extensive use of solid, boltless manganese frogs and crossings for heavy switching leads, and at other points where traffic is heavy, particularly for crossings used for high speed main line movements.

Committee:—M. Burke (C. M. & St. P.), chairman; James J. Duffy (C. & I. W.), T. Thompson (A. T. & S. F.).

Discussion:—A. M. Clough (N. Y. Cent.)—I lack confidence in manganese frogs for main line high speed track. Many roads use hard steel frogs with centers constructed exactly like manganese frogs. Evidently they consider it safe to bolt single-faced rails to such frogs and use them under fast traffic.

A. Grills (Grand Trunk)—We have had a manganese crossing frog in service for four years, which shows slight cracks in the flangeway. The wear on the rail is imperceptible, so that cracks cannot be due to the flanges bearing on the flangeway.

A. B. Richards (L. E. & W.)—On a crossing having heavy high speed traffic in one direction and low speed traffic in the other direction cracks which developed in the flangeways of the frogs under low speed traffic have not opened up since they were first noticed.

Mr. Grills—Manganese points in crossings are usually cut off too short and the frogs are badly worn by impact, followed by rapid wear on the adjacent Bessemer rail.

W. R. Thompson (Cent. of Ga.)—We have experimented on frogs in yards and found that manganese gave a service of 6 to 1 as compared with Bessemer. I would recommend manganese for use in yards, but I doubt the advisability of using it in high speed tracks where a severe blow comes on the frog as the wheel leaves the worn soft rail abutting the hard frog.

The convention accepted the statement of the committee that manganese frogs and crossings have proved a success.

T. Thompson (A. T. & S. F.)—We estimate the saving in maintenance by using manganese frogs to be 70 per cent.

W. R. Thompson—My experience shows 75 per cent.

L. C. Ryan (C. & N. W.)—The North Western has solid manganese frogs throughout the new Chicago terminal. Some of the curves are very sharp and there is a speed as high as 50 miles an hour over some of the frogs. The reports show almost perfect service.

T. Thompson—The Santa Fe had adopted as standard for No. 14 turnout solid manganese frogs with lap-jointed rails.

At the request of the convention, F. B. Bradley (Ajax Forge Company) explained that there are four kinds of manganese frogs. First, a solid one including wing and point rails; second and third, solid frogs, one having Bessemer track rails butt-jointed and the other lapped; fourth, a rail-bound manganese frog having a rail bolted to the manganese. There is difficulty in making the first type because of the difference in temperature throughout the frog during casting, causing a tendency to crack. In this type the length of the point and wing rails is changed from the type used in the Bessemer frog, since no company can afford to pay for manganese frogs made to the standard now used.

T. H. Donahoe (B. & O.)—We have had seven years' experience with manganese and frequent tests show that it gives three times as much service as Bessemer. One test shows ten times as much service with only 1/10 as much maintenance. Boltless frogs are all right for yard use but for high speed track they are too short. We have had very few bolt failures. For crossings on acute angles solid manganese frogs should be used. On obtuse angles manganese frogs reinforced with Bessemer rails are better. Manganese switch points give ten times the service of Bessemer. Manganese points are usually more blunt than Bessemer points, causing engines to climb, but this is remedied in recent devices.

That part of the report of the committee referring to solid boltless frogs was changed so as to recommend solid center manganese frogs and crossings.

SOFT TIES.

The committee reported on the subject, "Is It Economy to Use Soft Ties for Switches, Switching Leads and Tracks?" It was decided to consider cedar, pine, gum and similar woods as soft wood; and oaks, beech, hickory, hard maple, ash, pecan and honey locust as hard wood. As the most common representatives of these two classes, cedar from the soft woods and white oak from the hard woods were particularly considered. The necessity for safety in track construction must be considered as of equal importance with economy, and in commenting on that subject the report brings out the following points: Safe track depends on line, surface and gage; which are produced, respectively, by rail, ballast and ties, each, of course, being in a manner influenced by the others. The weakening of any one of these three elements in the track produces an unsafe condition which must be guarded against. The safety of the main track is also affected by adjacent tracks, and for that reason ladder tracks and passing tracks must be designed to prevent derailments or other accidents which might block the main track. The freight business on the average road has developed far more rapidly than the track facilities in the terminal yards, and it must be remembered in designing tracks for such yards that

an accident may block the entire yard, and cause considerable delay to important freight traffic.

For branch lines cheap soft wood ties are often laid when the road is built, with the intention of replacing them with hard wood ties when business has sufficiently developed to warrant the expenditure. It is pointed ont in the report that such economy is proper if the managers can be sure that the increased business will not come before the end of the life of the soft wood tie. An instance is cited of a track 34 miles long, built with 65-lb. rail on cedar ties and gravel ballast, which handled the line's traffic satisfactorily for 13 years, when, simultaneously, a stone field was developed near the line, coal was diverted from another line, and merchandise was sent over that line to take advantage of its low grade. The light track construction was entirely inadequate to support the heavy equipment which had to be used to handle the increased business, and the first step taken was to replace 1,500 cedar ties per mile with oak during one year. The remainder were changed as fast as possible. The gravel ballast and the light rail after five years of this service are still in good condition. The cedar ties when removed were apparently sound on top, but were slightly decayed from the bottom; were crushed from 1 in. to half their depth by the rail; and were seriously damaged by respiking to restore the gage. When this line was built the cedar ties were selected on account of their long life, and the fact that there was no apparent demand for a hard wood tie within 25 years. The committee is of the opinion that conditions in repair yards are ideal for soft ties. Here the heaviest load is a switch engine and the speed is always low. Similar conditions exist in empty tracks at coal mines and in storage tracks where traffic is light. The long life of the tie and its lower first cost can properly be taken advantage of in such places.

Committee:—Jas. Sweeney (C. & E. I.), J. W. McManama (B. & M.), W. H. Heath (Cent. of Ga.), Oscar Gabriel (A. T. & S. F.), John McNulty (C. R. I. & P.), Chas. Newberg (C. & N. W.).

Discussion:—T. H. Hickey (Mich. Cent.)—The Michigan Central has used cedar ties for many years, but has now quit buying them. They are not satisfactory under heavy traffic, and even on branch lines where standard equipment is used these ties are being replaced by white oak.

G. M. Greene (C. R. I. & P.)—If the question is limited to cedar and oak ties, I would say that the cedar tie is unfit for use in any kind of track.

T. Thompson—I do not believe we should condemn cedar ties. The number in use on branch lines and side tracks is very great and they are giving good service.

C. H. Ewe (Chicago & Northwestern)—It is economy in our part of the country to use cedar ties, because that is the only kind we can get.

A motion was carried to the effect that cedar ties are not suitable for switch leads or main track under heavy traffic, but may be economical for straight track under light traffic. The committee report was revised so as to recommend that no wood softer than yellow pine be used for switch ties for main track, but that softer woods than yellow pine may be economical for light traffic. The report was then accepted.

[illegible]

[illegible]

together as the formation of the subgrade requires. They should be 18 in. wide and filled with coarse engine cinders to a depth of 15 in., with ordinary cinders above that to the level of subgrade. The cost of such work in dollars per trench is given as follows:

Depth of Ditch.	Material.		Labor.		
Ft.	Tile.	Cinders.	Max.	Min.	Ave.
3	.04	.04	.18	.10	.14
4	.04	.05	.37	.15	.20
5	.04	.06	.56	.21	.26
6	.04	.07	.75	.27	.33
7	.04	.09	1.00	.35	.42

Soft spots in cuts, due to the presence of gumbo, are also formed by pockets of water which are the result of insufficient drainage. Many methods have been tried for remedying such conditions in cuts, and the one to be employed is very frequently determined by the amount of money available. The least expensive remedy is surface drainage. A surface ditch can be built to intercept water running toward the cut from adjoining fields, and an open ditch on each side of the track will carry away the water flling in the cuts. Such open ditches should be kept clean and free from obstructions, so that no water will stand in them. If bottom of the pocket in the subgrade is below the ditch, so that the surface drainage fails, the ballast may be removed together with the clay shoulder, which usually heaves on both sides of the track, and a new subgrade formed of good top soil from the adjoining right-of-way. In many cases this will fill up the pocket and prevent further trouble. The best results will, of course, be secured from a complete system of tile drains. In one method of tile and cross draining which has given satisfaction, an 18-in. trench is dug parallel with the track, beginning at the outlet, the center line of the tile being 9 in. outside of the end of the ties and not less than 18 in. below the pockets to be drained. A fall of at least 1 ft. in 1,000 ft. should be provided. Four-inch or 6-in porous tile without bell joints are laid in this trench after shaping the bottom of the trench with a round tool. The trench is back filled with engine cinders, and cross trenches are dug as conditions require.

The cost of such drains per foot is given as follows:

Depth of Drain, Ft.	Yards of Material.	Cinders.	Labor (Average).
3	2.5	.55	1.10
4	3.4	.76	1.49
5	4.4	.98	1.93
6	5.4	1.21	2.50
7	6.6	1.47	3.20

In another system of drainage the grade line should be determined by an engineer, and bell-end, vitrified tile, not less than 6 in. in diameter, laid on a bed of well tamped engine cinders 3 in. deep. The depth of the tile drain is governed entirely by local conditions, being always below frost line. The trench is filled with cinders, and cross drains are put in alternately from the center of the track to the drains on each side. Vitrified tile or short lengths of cast iron pipe can be used for cross draining, connection with the longitudinal drains being made with tees. In a cut which is expected to be double-tracked later, a single line of pipe may be laid on one side, with cross drains at intervals leading to concrete catch basins on the other side of the track. When the second track is laid the ditch can be partly filled with cinders and an additional line of pipe laid outside the new track.

Committee:—M. Henry (C. & E. I.), Chairman; W. B. Strother (T. & W. R. R.), Henry Klein (C. & A.), P. H. Griffin (Mo. Pac.), J. A. Roland (C. & N. W.), A. B. Richards (L. E. & W.).

Discussion: M. J. Muff (A. T. & S. F.)—In a bad clay fill we have tried tile under the ballast. It was unsuccessful, as the heavy traffic broke the tile and displaced it. We drained it by digging cross trenches filled with slag and cinders.

Mr. Hickey.—The principal trouble on fills is lack of sufficient ballast. In some cases we have remedied bad spots by digging out the surface clay and filling it with riprap.

W. A. Brandt (C. & N. W.)—In draining cuts we back-fill the trench over the tile with cinders level with the surface. I see no

advantage in partly filling the trench with cinders and covering the cinders with earth.

Mr. Richards—We use hard glazed tile in preference to porous tile. It gives equal satisfaction and is much more durable.

J. P. Warren (St. L. S. W.)—There are three reasons for slides on fills. First, borrow pits left too close to the fill; second, hard packed runways made by scrapers and filled with loose material; third, soil laid over limestone, resulting in slides when the soil gets wet. We have found it necessary to blast the surface of the rock, scarify the surface of old runways and drain or fill borrow pits.

Mr. Clough—I would recommend non-porous bell tile. The water enters at the joints and, since the tile is usually forced out of line by traffic, bell tile is necessary to provide drainage if the line is so distorted. When the surface material on a soft spot is removed the space should not be filled with soil; stone, slag or other hard material should be used.

Bruce James (C. & E. I.)—Bell tile will fill with dirt as easily as porous tile, and porous tile draws water better than vitrified pipe.

Mr. Grills—We find that old fence boards laid along side of the line of tile largely prevents its getting out of line.

The report was accepted, after amendment to the effect that when surface material is removed the space should be filled with hard material rather than with soil; also with vitrified or glazed tile be recommended instead of porous tile. A recommendation was added that more attention be given in the construction of new roadbed to the prevention of drainage troubles.

MOTOR HAND CARS FOR SECTION USE.

The committee's report was based on the experience of its members. The chairman emphasized the fact that simplicity of construction is one of the first requisites of a satisfactory motor hand car, since section foremen are not skilled mechanics and it is desirable that the foreman be able to make any necessary adjustments during the operation of the car. Sufficient power must also be secured in such a car, as it is often necessary to carry a large force of men under adverse conditions of grade and wind. He stated that his road had installed a Fairbanks-Morse motor car which had enabled them to reduce the maintenance force practically one-half, giving one foreman a 12-mile section which had been covered previously by two foremen, each with six-mile sections. The one gang is now able to do the work easier and better than it was done before by two gangs with ordinary hand cars. Not including the wages of the laborers, the savings in the wages of one section foreman at $65 a month has amounted to $1,365 since the car was put in service. The car is equipped with handles in addition to the motor, so that in case of motor failure it can be hand-operated. This feature is considered very desirable in such a car. A member of the committee pointed out the fact that the old fashioned walking beam hand car is the most out of date piece of apparatus in use on railways today. He mentioned the use of a sail car which was a brilliant success as long as the wind blew from the right direction.

Committee:—D. E. Lynch (C. B. & Q.), Chairman; John Heshion (Mo. Pac.), A. L. Klein (A. T. & S. F.), Warren Peachey (E. & T. H.).

Discussion: C. King (Long Island)—The committee received letters from various individuals showing that motor cars are economical for branch lines and lines with light traffic. The information included was similar to that given in the *Railway Age Gazette* of May 19, 1911.

J. P. Warren (St. L. S. W.)—Motor cars should be recommended and used wherever practicable, but sections should not be lengthened nor forces reduced. The cars should be used to increase the efficiency of men on the sections they now cover.

Mr. Richards—The tendency is to increase section lengths far beyond the amount warranted by the saving in time and labor of men going to and from work.

Mr. King—It should be easy to combine three seven-mile sections in two and maintain the tracks to better standards, keeping all the labor but saving one foreman.

Mr. Ryan—We have tried maintaining twelve miles of double track with one gang and a motor car, but it was found impossible and it is now divided into three sections.

Mr. King—I do not favor lengthening sections, but it is difficult to secure motor cars unless the company could be given the advantage of some of the savings effected by their use.

A motion was made and carried, to the effect that the association approves the use of motor hand cars for section use.

CONCRETE AND STEEL TIES.

The concrete and steel ties which are being experimented with on many roads have developed a number of defects. Many of them are heavy and hard to handle, increasing both first and maintenance cost. Some of the steel ties are hard to maintain in track protected by automatic signals on account of the difficulty of securing proper insulation. Others are so designed that it is hard to apply the rail to them with anything but a bolt and nut, which by many roads is not considered satisfactory. Such a fastening might become so damaged by salt brine from refrigerator cars, the loosening of the nuts, or derailment of an engine or car, that new ties and fastenings would have to be applied before the track could be made safe. The following points must be considered in deciding on any steel or concrete tie:

1. Original cost.
2. Cost of handling as determined by its weight, shape and kind of fastening.
3. Safety of the appliance by which the rail is fastened.
4. Labor required to fasten the rail to tie and keep such fastenings in proper condition.
5. Durability and efficiency of the insulating material in all kinds of weather on all kinds of roadbed and under all kinds of traffic.

The report suggests that a steel or concrete tie somewhat wider and not so deep as the standard tie might answer the purpose. A tie of this shape would secure the same amount of bearing from the rail and on the roadbed with a fewer number per mile, and less material would be required in the ties. Such a tie would also require less ballast, which is an important item with the expensive ballasts which are being used on heavy traffic roads.

Committee:—L. C. Ryan (C. & N. W.), Chairman; P. J. McAndrews (C. & N. W.), F. R. Layng (B. & L. E.), John D. Boland (U. P.), F. D. Harrigan (Pere Marquette), John O'Leary.

Discussion: Mr. Ryan—Most of the steel ties the committees examined cost $2.50 to $3.50 and the life was estimated at 25 to 35 years. Our oak ties now cost more than $1.00.

Mr. Muff—We have in use 106 insulated steel ties on a curve on a heavy grade and under heavy traffic. They have not slewed and have not required any maintenance in two months after the ties were properly surfaced.

A. C. Rupp (C. C. C. & St. L.)—We have in service about one mile of Carnegie steel ties. We had a derailment affecting both steel and wooden ties; the steel was undamaged, but two-thirds of the wooden ties were destroyed.

T. Thompson—I believe it is economical to use steel ties in some form in cinder pits or in locations where wood is rapidly burned by hot cinders.

Several patented steel ties were then described and their relative merits discussed.

Mr. Foley—We have used three types of concrete ties. Two have failed, but the third is still in track and apparently giving satisfaction. I doubt whether concrete ties will ever be used for heavy main line traffic, but they may be developed for use in passing tracks or industrial tracks.

The report was accepted as information.

TREATED TIES.

Treated ties are usually received from the treating plant a very short time after they receive treatment. On ties treated

with creosote there is usually a considerable amount of oil which is not yet absorbed by the wood. It is considered best to lay such ties in track immediately if possible, especially if they are laid in gravel, rock or burnt gumbo ballast, with a box dressing. The ties in such ballast are surrounded so as to prevent air and moisture entering to any great extent. In most cases, however, it is necessary for various reasons to pile the ties before placing them in track. Care should be taken in unloading ties on single track to place them on the side opposite telegraph line, if possible, and in any event at least 50 ft. from telegraph poles or crossing or station signs, to eliminate danger of fire. Ties treated with creosote should be piled close to prevent air and moisture from coming in contact with them. Unlike untreated ties or ties treated with zinc chloride, it is not considered necessary to place old ties on the ground under creosoted ties. Sod should be removed for a distance of 15 ft. from the pile to prevent fire being carried to the ties. The number of ties to be placed in a mile of track determines largely the size of piles. Most roads, however, have a standard for piling creosoted ties which calls for two ties as sleepers, with 77 or 78 ties piled in close layers cross-box style. The committee suggests an alternate method for the consideration of the association. In this method the ties are all laid in the same direction, either parallel with or perpendicular to the track. The piles rests on two sleepers and each course of ties contains one less than the course below, breaking joints and providing a slope on both sides which will shed water easily. It is thought that this method of piling will reduce the expense and will give equally as good results as the more usual method. By putting 12 ties in the bottom tier the pile will contain 78 ties. Smaller piles can be made by starting with a smaller number in the bottom tier. One advantage of this method of piling is that it is easy to discover if any ties have been stolen, and if it is considered necessary to protect them a single strand of wire can be fastened to all the outside ties. Ties treated with zinc chloride should be piled so as to expose their surface as much as possible to secure rapid absorption, since the wood is more thoroughly impregnated with the zinc chloride as it dries.

Committee:—J. H. Lynch (C. R. I. & P.), Chairman.

EMERGENCY STOCK OF TOOLS.

The prevalent practice of permitting section foremen to carry surplus tools and track material in stock in the tool house results in a large amount of material being stored in this way which represents a large idle investment. The chairman of the committee suggests a method for eliminating this practice, which is agreed to by all the members of the committee. The suggestion includes the following points:

1. Suitable buildings should be provided at the roadmaster's headquarters in which a specified number of surplus tools and a considerable amount of small track material, such as bolts and spikes, could be kept. This material could be secured by the foreman upon requisition, and if desired, the roadmaster's clerk could keep a record by sections of the material furnished each foreman.

2. Worn out tools which cannot be repaired by the foreman should be sent to headquarters to be exchanged for new ones. This will enable the roadmaster's department to know what [illegible] of old tools. They can be inspected under the roadmaster's supervision and those which cannot be repaired shipped to the storekeeper, and the parts which may be of use sent to the shops for repair. This would enable all old tools from a roadmaster's territory to be sent to the storekeeper at one shipment instead of many as at present.

3. The roadmaster can make use of the storekeeper's requisition on the storehouse for tools and material, securing on this requisition a 30 days' supply. This eliminates the necessity for the [illegible] required by section foremen.

Committee:—[illegible], Chairman, J. J. Sampson (B. & M.), B. A. West (A. T. & S. F.), J. T. Martin (D. T. & I.), Wm. J. McDermot (C. & N. W.).

NEW APPLIANCES.

The committee includes in its list of new appliances some devices which are not entirely new, but which have undergone such radical changes in recent years that they deserve renewed attention. The following devices are included in the report:

1. Shoulder tie plates.—The committee recommends shoulder plates 7½ in. x 9 in., extending 2¼ in. beyond the base of the rail on the outside and 1¾ in. on the inside, the plate to be ½ in. thick at the outside edge of the rail base, tapering to 7/16 in. at the inside edge. The plate should be corrugated or flanged on the bottom to prevent rattling. The use of tie plates is recommended on all main line tracks and switch leads and turnouts where traffic is heavy.

2. Rail anchors.—The anchors with the fewest number of parts are recommended, as they are easy to apply, can be readily removed when the rail is changed, and are applied without loss or breakage.

3. Solid manganese frogs.—The use of solid manganese spring rail frogs under heavy traffic at high speed, and some form of hard frog on all heavy traffic switching leads is recommended.

4. Manganese steel points.—Solid manganese steel or a similar material is recommended for use in switch points, the full length of the point to be made of the special steel where traffic is heavy enough to warrant the expense.

5. Switch slide plates.—Gage plates should be at least 3¼ in. x 6 in., insulated when necessary and turned up at both ends to form a shoulder for bracing. Slide plates should be 12 in. long and turned up at the ends. Braces should be placed on every tie from the gage plate to the heel of the switch point. Special plates punched to order should be used on joint tie back of the heel of the switch point to the point where standard tie plates can be used. A malleable iron casting should be made to fit between the stock rail and the switch point, to be bolted to the stock rail.

6. New automatic switch stand.—Automatic switch stands are recommended for yards to prevent derailments caused by running through switches equipped with rigid stands.

7. Motor hand cars for section men.—The use of gasoline motor hand cars of simple two-cycle design, weighing between 650 and 700 lbs. is recommended.

8. Screw spikes.—The use of screw spikes is favored.

9. Hydro-carbon for snow melting.—The use of hydro-carbon, a highly inflammable liquid, for melting snow around switches, by pouring out the liquid and setting fire to it, is mentioned as an experiment worth consideration.

10. Ballast sprinkler.—A car equipped for sprinkling stone ballast is described and illustrated. This car was described in the *Railway Age Gazette* of June 16, 1911, page 1419, and the arguments in favor of its use were given in that description.

11. Sod line trimmer and roller.—A new sod line trimmer and roller is described and illustrated, the device being the same as that mentioned in the *Railway Age Gazette* of June 16, 1911, page 1422.

12. A railway ditcher.—A ditcher is described and illustrated which has all the qualities of a steam shovel and can be used for sloping and ditching wet cuts, removing slides, handling rock, timber or ties, and can also be used as a light wrecking crane. It can be handled on the deck of an ordinary flat car, or can be placed on the ground and used in the same manner as the steam shovel. It is recommended for stripping the top soil from gravel pits, and it is thought that it could be more widely adopted.

Committee:—A. M. Clough (N. Y. C. & H. R.), D. Foley (Mich. Cent.), M. H. Connolly (Cinn. No.), T. Thompson (A. T. & S. F.), J. M. Meade (A. T. & S. F.), A. W. Tabert (C. & N. W.).

ELECTION OF OFFICERS.

New officers elected are as follows: President, A. M. Clough, New York Central & Hudson River, Batavia, N. Y.; first vice-president, T. F. Donahoe, Baltimore & Ohio, Glenwood, Pa.;

second vice-president, M. H. Connolly, Cincinnati Northern, Van Wert, Ohio; secretary-treasurer, L. C. Ryan, Chicago & Northwestern, Sterling, Ill.; member of executive committee, James Sweeney, Chicago & Eastern Illinois, Danville, Ill.

The next convention will be held at Buffalo, N. Y., September 10, 1912.

At a meeting of the Track Supply Association, the following officers were elected for one year: President, W. C. Kidd, Ramapo Iron Works, Hillburn, N. Y.; vice-president, A. H. Weston, Lackawanna Steel Company, Buffalo, N. Y.; secretary-treasurer, F. A. Preston, P. & M. Company, Chicago; executive committee, Walter H. Allen, Pennsylvania Steel Company, Steelton, Pa.; Thomas E. Vaughn, Vaughn Rail Support Company, St. Louis, Mo.

EXHIBITS.

The following firms made exhibits in connection with the convention:

Adreon Manufaceuring Company, St. Louis, Mo.—Clark tie plate; Security rail brace; Boss nut lock. Represented by E. L. Adreon, Jr., and D. R. Niederlander.

Ajax Forge Company, Chicago.—Ajax manganese steel one-piece guard rail; Ajax rail steel braces. Represented by F. B. Bradley and H. C. Hutchins.

American Hoist & Derrick Company, St. Paul, Minn.—Moving pictures of American Railroad Ditcher in operation. Represented by J. J. Cox and Edward Coleman.

American Valve & Meter Company, Cincinnati, Ohio.—Anderson interlocking switch stand; Anderson economy switch stand; Safety point lock. Represented by J. T. McGarry and F. C. Anderson.

Appleyard, G. T., Grand Rapids, Mich.—Appleyard and Robson compound railway tie. Represented by G. T. Appleyard and A. M. Robson.

Buda Company, Chicago.—Motor cars; track drills; track jacks; tool grinders; switch stands. Represented by S. T. Hatcher and T. H. Wheeler.

Continuous Frog & Crossing Company, St. Louis, Mo.—Model of Continuous rail frog. Represented by William G. Brown and R. B. Pender.

Cook Standard Tool Company, Kalamazoo, Mich.—Track appliances and descriptive literature. Represented by Eugene Cook and E. Edelmann.

Chicago Pneumatic Tool Company, Chicago.—Rockford railway section and inspection gasoline motor cars; pneumatic tools; electric tools for drilling, grinding and screwing spikes in ties. Represented by C. E. Walker and E. S. Cole.

Fairbanks, Morse & Company, Chicago.—No. 26 Fairbanks-Morse section gang car; No. 28 and No. 30 Fairbanks-Morse inspection cars; forty-ton geared ratchet jacks; forty-ton Duff ratchet forged steel hydraulic jacks; other track jacks. Represented by Lorenzo Norvell, E. E. Penbray, A. T. Young, E. M. Fisher, D. J. Higgins and C. F. Fuggit.

Goldie, William, Jr., & Company, Bay City, Mich.—Samples of Goldie Perfect tie plugs. Represented by William Goldie, Jr.

Hayes Track Appliance Company, Richmond, Ind.—Hayes derails. Represented by William Harding Davis.

Indianapolis Switch & Frog Company, Springfield, Ohio.—Models of solid manganese frogs and crossings and test bars of steel used; photographs of installation and complete line of blue prints showing details of construction. Represented by E. C. Price.

Kalamazoo Railway Supply Company, Kalamazoo, Mich.—General display of track devices. Represented by John McKinnon and Lewis O'Key.

Lackawanna Steel Company, Buffalo, N. Y.—Abbott rail joint plate; Abbott insulation joint; anti-creeper, double strength, equal resistance in either direction. Represented by A. H. Weston.

P. & M. Company, Chicago.—P. & M. anti-rail creeper; bond wire protectors. Represented by P. W. Moore, F. A. Preston, D. T. Hakberg and George E. Johnson.

Pennsylvania Steel Company, Steelton, Pa.—Design No. 160 Manard frog; Steelton Positive switch stands; main line adjustable switch stand; New Century adjustable and non-adjustable switch stands. Represented by Robert E. Belknap, N. E. Salsich, G. S. Vickery, W. H. Allen and E. Dwitt.

Rail Joint Company, New York.—Continuous, Weber and Wolhaupter rail joints. Represented by William E. Clark, H. O. Holloway, Charles Jenkinson and W. J. Boyer.

Railroad Supply Company, Chicago.—Wolhaupter and Harriman spike plates and track bolts. Represented by M. J. Camerford and W. A. Dayton.

Railway Age Gazette, New York.—Copies of *Railway Age Gazette*, *Signal Engineer* and *Signal Directory*. Represented by John N. Reynolds and H. H. Simmons.

Railway List Company, Chicago.—Copies of paper. *Railway Engineering & Maintenance of Way* and *Official List of Railway Officials*. Represented by W. E. Magraw, L. F. Wilson and K. L. Van Auken.

Ramapo Iron Works, Hilburn, N. Y.—Switch stands; solid rolled shoulder tie plates; enameled interlocked switch stand targets. Represented by W. C. Kidd and Arthur Gemunder.

Reinforced Rail Joint Company, S. Louis, Mo.—Compromise and insulated joints. Represented by H. F. Reelch, William G. Brown and R. B. Pender.

Sellers Manufacturing Company, Chicago.—Sellers Anchor Bottom tie plates. Represented by J. T. Markham and L. S. Gordon.

Southern Railway Supply Company, St. Louis, Mo.—Saunders car stopper. Represented by E. Catlin, Jr., and L. E. Truxler.

Templeton Kenley Company, Ltd., Chicago.—Simplex track jacks. Represented by A. E. Barrow.

U. S. Wind Engine & Pump Company, Batavia, Ill.—Switch stands. Represented by C. E. Ward.

Universal Metallic Tie Company, Salt Lake City, Utah.—Universal metallic ties. Represented by B. S. Rupp.

Vaughan Rail Support Company, St. Louis, Mo.—Samples of Vaughan rail support and model of Champion concrete fence mold. Represented by Theodore E. Vaughan and J. C. Sterling.

Verona Tool Works, Pittsburgh, Pa.—Diamond stone tamping bar; master gage for testing track gages. Represented by Henry Fischer.

There are about 375 miles of railways in the Dominican Republic, of which 225 miles are private.

NEW RAIL RELAYING MACHINE.

A rail relaying machine has been in use on the Aurora division of the Burlington for some time which differs in several respects from other machines built for this purpose. It consists essentially of a 4½-in. x 9-in. timber beam resting on a light standard gage push car about 4 ft. longer than the common car and with platform removed. This beam is supported on a ball bearing pivot at the front end of the car and moves on a nest of five rollers concentric with this pivot at the rear end. The beam is strengthened by a steel truss rod which passes through the

Rail Relaying Car in Service.

vertical center post. A 1½-in. rope, with a rail tong at one end, passes over a pulley near the front end of the beam and over another pulley in the center post, to a reel mounted on a platform at the rear end, upon which it is wound. Three hundred pounds of old rail are placed on this platform to balance the car when it is carrying a rail with the tongs at the front end. A ladder is provided near the front end of the beam, on which a man rides when a rail is not being handled in order to maintain the balance. Eight men are required to operate the car. Two men on the platform raise and lower the rail with the reel, while two other men working on the ground at the rear end swing the car sideways and move it forward. One man handles the tongs at the front end, another one at the front end assists in swinging the car when loaded, and balancing it

Rail Relaying Car Lifting a Rail.

while empty, while a man is required at each end of the rail to steady it and guide it into place.

Two important advantages of this machine are that it runs on the rails already laid and that rail can be laid to equal advantage on either or both sides at the same time. At the time at which these views were taken both rails were being laid at the same time and all work was cleaned up as the gang moved forward.

While it is not so important that the car be got off the track hurriedly, as a steel gang is always working under flag protection, this car is readily lifted off the track in two pieces

by the men using it. The speed in relaying rail with this car is the same, or a little faster, than when using tongs. However, but eight men are required, where ordinarily, with 100-lb. rail, such as was being laid at this point, 18 or 20 men are required to handle it with tongs, showing a saving of 10 to 12 men with the use of the machine. On the afternoon of July 24, 4,428 track ft., or 8,856 lineal ft. of rail were laid with it between 1:20 and 4:50 p. m. This resulted from an attempt to see what could be done under the most favorable circumstances. All traffic was thrown on to other tracks, the afternoon was cool and cloudy, and half the spikes had been pulled in advance. The gang consisted of 61 men; four pulling spikes, six throwing out rail, six adzing ties, eight on the car, one placing expansion shims, one distributing bolts and spikes, 20 bolting up, 12 spiking, two flagmen, and a water boy, in addition to the timekeeper, assistant foreman and foreman. The rail was fully spiked and bolted, but the old rail was not uncoupled.

This machine was devised and built by Lew Gudgell, master carpenter of the Chicago, Burlington & Quincy at Galesburg, Ill., and is being used on the Aurora division of the Burlington under the direction of W. S. Kirby, superintendent, and E. Keough, roadmaster, to whom we are indebted for assistance in gathering this information.

MAINTAINING AUTOMATIC SIGNALS WITH SECTION FORCES.

For the past year the Union Pacific has been maintaining automatic block signals on double track with the regular section forces on that part of the Nebraska division between Kearney, Neb., and North Platte, a distance of 95 miles. Previous to this time the signals in this territory were maintained by a separate corps of men working under a district maintainer and independent of the track department, as on other parts of the system. The sections on this district are 9 miles long, and each section foreman has an assistant and from 10 to 15 men. At the time the maintenance was turned over to the track department the district maintainer was made an assistant roadmaster, and the maintainers were made assistant foremen, except in one or two cases where maintainers with track experience were made foremen. The pay of the foremen was raised at the same time from $65 to $75 per month. While the former maintainers have practically all left by this time, the section foremen have rapidly learned the work.

Previous to taking up the signal work nearly all the foremen had enrolled in the correspondence courses of signaling provided by the educational bureau of the Union Pacific (see *Railway Age Gazette* for June 16, 1911, page 1424). These lessons were of much help to the men in handling their new duties. As was to be expected, the number of signal failures increased at first, but they came down to normal within a short time. Signal [illegible] mechanical and electrical knowledge and skill beyond those of the average foreman, but they have mastered it readily.

This method of maintaining signals with the track forces has several advantages. In the first place, it eliminates the double [illegible] the old system it was necessary for the maintainer to call on the [illegible]

WOOD TREATED WITH PRESERVATIVES.

A bulletin published by the United States Department of Agriculture, Forest Service, on quantity of wood treated with preservatives in United States during 1910, shows that the 71 plants reporting treated 17,933,918 hewed ties and 8,500,657 sawed ties during that year. In addition to these standard ties, there were also treated by these plants 9,383,366 board feet of switch ties, 1,402,109 board feet of bridge ties and 7,826,749 lineal feet of piling. Fifteen railways reported the operation of timber-treating plants, and many others reported that their supply was being treated by commercial plants. The report shows a tendency toward the treatment of certain classes of material which have heretofore been little treated, including tie plugs, pole brackets, fence posts and tunnel wedges. The following is a table showing quantities of wood preserved in the United States during the last four years prepared from statistics gathered by the Forest Service and the Wood Preservers' Association:

Preservatives.	Crossties. *Cu. feet.*	Piling. *Cu. feet.*	Poles. *Cu. feet.*	Paving blocks. *Cu. feet.*
Creosote:				
1907[1]	17,252,622	4,423,611	(4)	2,874,560
1908[1]	28,861,760	6,059,919	(4)	1,260,020
1909[2]	29,830,080	4,421,726	659,664	2,994,290
1910[2]	44,525,529	5,219,254	265,597	4,692,453
Total	120,469,491	20,124,510	925,261	11,821,323
Zinc chloride:				
1907[1]	29,504,295	(4)	(4)	(4)
1908[1]	25,920,690	(4)	(4)	(4)
1909[2]	24,153,162	(4)	(4)	(4)
1910[2]	27,587,583	(4)	(4)	(4)
Total	107,255,730	.....	.....	.....
Zinc creosote:				
1907[1]	7,037,010	152,541	(4)	(4)
1908[1]	9,781,590	426,610	(4)	(4)
1909[2]	8,095,794	(4)	(4)	(4)
1910[2]	6,354,219	38,392	(4)	(4)
Total	31,268,613	617,543	.....	.....
Grand totals of materials by classes	258,993,834	20,742,053	925,261	11,821,323

Preservatives.	Construction timbers. *Cu. feet.*	Cross-arms. *Cu. feet.*	Lumber and miscellaneous. *Cu. feet.*	Totals of each treatment by years. *Cu. feet.*
Creosote:				
1907[1]	1,987,480	238,742	4,561,327	31,038,312
1908[1]	2,657,398	480,640	6,065,717	45,384,954
1909[2]	4,904,311	41,764	417,787	43,267,622
1910[2]	7,801,272	88,069	2,682,713	65,274,887
Total	17,048,491	849,215	13,727,544	184,965,775
Zinc chloride:				
1907[1]	325,886	(4)	74,564	29,994,745
1908[1]	640,606	(4)	95,900	26,657,196
1909[2]	3,010,891	(4)	2,333	24,476,386
1910[2]	541,514	(4)	71,060	28,200,157
Total	1,828,897	.....	243,857	109,328,484
Zinc creosote:				
1907[1]	(4)	(4)	5,691	7,195,242
1908[1]	95,700	(4)	35,858	10,339,758
1909[2]	62,918	(4)	43,699	8,202,411
1910[2]	181,143	(4)	30,646	6,604,400
Total	339,761	.....	115,894	32,341,811
Grand totals of materials by classes	19,217,149	849,215	14,087,295	326,636,070

Total material treated each year	*Cu. feet.*
[illegible]	68,128,799
[illegible]	87,381,908
1909	75,946,419
[illegible]	100,079,144

[1] Figures furnished by Wood Preservers' Association.
[2] Figures compiled by the Forest Service.
[3] Figures of used would reveal operations of reporting firms.
[4] Data not collected.

A law of the Dominican government provides that 30 per cent. of the internal revenues be applied to the payment of interest on capital invested in the building of railways, whether by private corporations or borrowed by the government. It further provides that interest may be paid up to 6 per cent.; that a bonus of $[illegible] be allowed for each mile constructed, and that this portion of the revenue shall not be used for any other purpose.

General News Section.

The station of the Denver & Rio Grande at Thistle Junction, Utah, was destroyed by fire September 6; loss, including seven freight cars, $25,000.

The government has begun suit in Boston against the Boston & Maine for eight violations of the safety appliance law, said to have been committed in April last.

Three thousand freight cars, which for some months have been stored on one of the main tracks of the Petersburg cut-off of the Pennsylvania, near Altoona, have been put into service.

Announcement has been made by H. B. Perham, president of the Order of Railroad Telegraphers, at Denver, Colo., that an increase of 5 to 10 per cent. in the wages of operators has been authorized on the Denver & Rio Grande.

At Boston, September 6, Mr. Grahame-White, carrying one passenger, flew across Boston Harbor and back, a total distance of 33 miles, in 27 minutes, 25 seconds. At Etampes, France, September 8, Mr. Halles flew continuously for 14 hours, 7 minutes, making in that time a distance of 777 miles.

The real estate committee of the board of trade of Little Rock, Ark., has adopted resolutions expressing its appreciation of the efforts of President Bush of the Missouri Pacific to improve and expand railway service in Arkansas, and urging fair and just treatment of the roads in all of their relations with the people.

Firemen on the Erie Railroad have made demands for increased rates of pay which will involve an increase of between 10 and 12 per cent. A year ago the company granted a 10 per cent. increase of wages to its firemen and present demands, if granted, will mean an advance of more than 20 per cent. in two years.

Four trains of the Louisville & Nashville running between New Orleans and Mobile along the coast of the gulf of Mexico have been fitted with wire mosquito screens, the screens being provided in all of the windows and doors of all the passenger cars. The trains are numbers 7 and 9 westbound, and 8 and 10 eastbound.

The gasolene electric passenger car recently bought by the Bangor & Aroostook is now running regularly between Squa Pan and Van Buren, 48 miles. The train consists of this car and a trailer containing baggage accommodations. The time taken for the trip is 2 hours 12 minutes, the same as heretofore with steam power.

An appeal in the Union Pacific-Southern Pacific merger suit, which was decided in favor of the railways last June, was filed by the government in the United States Court at Salt Lake City, September 9. The government contends that the court erred in holding that the Union Pacific was not competing for traffic with the Southern Pacific, and in holding that the purchase by the Oregon Short Line of 51 per cent. of the Salt Lake route was not in violation of law.

Under a new contract between the Missouri Pacific and the Western Union Telegraph Company, each company will pay the other for all services rendered. All telegrams sent under the franks issued to officers of the road will be charged against the railway; and an order has been issued requiring the elimination of unnecessary telegraphic reports or communications. Officers and employees must use the telegraph only when the business of the company actually demands it, and when train mail will not serve the purpose.

Col. B. W. Dunn, chief inspector of the Bureau of Explosives, 30 Vesey street, New York City, has issued a four-page pamphlet describing a number of accidents which have occurred in the handling of explosives, acids, inflammable gases, etc., with a view to showing how different kinds of accidents can be prevented. Rough handling of cars in switching is still complained of quite frequently, and the necessity of severe punishment for such carelessness is pointed out. Col. Dunn will furnish copies of this bulletin at 3 cents each; $2 a hundred, or $15 a thousand.

The civil suit of the Illinois Central against John M. Taylor, former general storekeeper of the road, who, with F. B. Harriman, Charles L. Ewing, O. S. Keith and Joseph E. Buker, all former officers of the Illinois Central, was prosecuted in the car repair fraud cases about a year ago, has been dismissed, following an agreement before Judge Heard of the Circuit Court at Chicago. The civil suits against Mr. Harriman and Mr. Ewing were settled some time ago, and it is understood that negotiations are pending for settlement of the suits against the other two men.

At Seattle, Wash., the manager of an electric railway has been sentenced to thirty days' imprisonment for violation of an order of the Public Service Commission limiting prices to be charged for fares on street cars in the city of Seattle. The defendant appealed to the superior court and was released on $500 bond. For sometime an acrimonious controversy has been going on between the railway company and the citizens; and after a federal judge granted a temporary injunction which favored the railway, a mass meeting was held which denounced the judge; and a crowd in the street hanged him in effigy.

A press despatch from Salt Lake City says that the Interstate Commerce Commission recently authorized an express company to make a special rate on a carload of binder twine from Chicago, and thereby has helped save the wheat crop on 50,000 acres of land near Idaho Falls. The farmers suddenly found that their wheat was ripening so fast that it must be cut at once. No binding twine could be had at local supply houses, and the matter was placed before the commission. The petition was granted and a car of twine was rushed through on passenger time. Within 30 minutes after its arrival at Idaho Falls the twine was being distributed and the gathering of the wheat began. It is rumored that a bill will be presented in Congress at the next session making an appropriation of $18,000,000 for the construction of a long distance telephone line connecting the office of the Interstate Commerce Commission in Washington, with each farm in the country which does an interstate business. With suitable means of communication that twine might have been started at least a half day earlier.

The Motives of Strikers.

Conservative workmen frequently acquiesce in a strike vote on the theory that, while their chance of gaining much is very small, their chance of sustaining any important loss is still smaller. Mr. Kruttschnitt puts it in this way:

The rank and file of the men of the Harriman Lines know that we have for years made it a point to treat them fairly, give them the best wages being paid, provide a pension system out of the road's treasury without a cent of expense to them and provide for their promotion on the merit and seniority basis. But there are always some young fellows on the road who like to take the role of leaders and agitate matters. They stir up the men who are otherwise contented by means of alluring pictures of what they might get by some new scheme. You cant blame the men much for it. They are just like a small boy without a thought of candy in his head. You take him into a candy shop and point out the loaded shelves and ask how he would like to have some of that, and you are in trouble at once.

Centennial of Steam Navigation on the Mississippi.

At Elizabeth, Pa., on the Monongahela river there has been launched a replica of the New Orleans, the first steamboat to navigate the waters of the Ohio and the Mississippi. It is to head the river pageant that will be held next month to commemorate the centenary of steam navigation on our inland rivers.

The New Orleans, called at first the Enterprise, was built at Marietta and sent to Pittsburgh to be provided with engine and stern wheel of Robert Fulton's design. The little boat of some 350 tons burden cost $40,000 to build, and left Pittsburgh on its trial trip October 11, 1811. Thereafter for three years it made regular trips between New Orleans and Natchez, until it was wrecked. Up to the year 1817 there were 12 steamboats on the Father of Waters. In 1817 the average of speed against stream of a steam vessel heavily laden was about 60 miles a day. Charles Dickens, using a succession of these boats in 1840, said that he

was told to keep as far aft as possible, "because the steamboats generally blew up forward." The apogee of steamboat navigation on the Mississippi was reached in 1859, when there were 32 boats, "all fine passenger steamers," plying between St. Louis and New Orleans. Their total tonnage was 48,800.

After the war a New Orleans newspaper declared there were not more than eight boats trading between Cincinnati and New Orleans, their aggregate tonnage amounting to 10,000. The extent to which rail competition made inroads upon the steamboat traffic is shown by the compilation of statistics for the principal landings on the Ohio river in 1869 and 1886. In the former year the value of shipments was $591,754,000, and 17 years later it had declined to $253,481,783, less than half the former amount. But today the Ohio and its tributaries are transporting each year some 15,000,000 tons of coal, grain, lumber and the output of the iron and steel mills and other establishments upon their teeming banks.—*Philadelphia Public Ledger.*

Employees' Passes on the Pennsylvania Lines.

Every employee who has been in the service of the Pennsylvania Lines west of Pittsburgh for three years is to receive a division pass for himself. For 10 years' continuous service the pass will include employee and wife. For 15 years' continuous service a pass for employee and wife will be given either over the Northwestern system or the Southwestern system, according to which one the person is employed by. For 20 years' service a pass will be granted over all Pennsylvania lines west of Pittsburgh to employee and wife.

The order includes all employees except common laborers and porters. This class of workmen will be given a division pass after 10 years' service, and, after 20 years' will get a pass for self and wife. On entering the service of the company a pass will be given to each employee between his home and work. After one year the pass will include his wife. In the case of division passes, the employee may choose on which division he wants the pass if he lives at a point which is on more than one division.—*Pittsburgh Post.*

Illumination of Tunnels.

An arrangement for energizing electric lights on passenger station platforms, through the means of a circuit-closer actuated by an approaching train as it passes the last signal before reaching the station, which is in use on the Southern Pacific, in California, was described in the *Railway Age Gazette* of August 18, page 347. This arrangement is now being installed at a number of tunnels on the lines of the Southern Pacific in that state. The lights are provided in the tunnel both as a convenience to the engineman and as a warning to any pedestrian who may be in the tunnel.

The Western Shopmen.

No strike has as yet resulted from the refusal of the managements of the Harriman Lines, the Illinois Central and the Chicago & North Western to recognize the federations of shop employees on their respective systems. Repeated reports have been current that the employees of the Illinois Central were on the verge of a strike, but on each occasion when the time came on which it was said the strike order would be issued, it was not [illegible]

Differences of opinion have developed between the officers of the federation and those of the individual unions which compose it. J. F. McCreary, president of the Illinois Central federation, is said to have been requested by the officers of the various organizations to withdraw his demand for recognition of the federation and to have refused to do so. Previous to a confer[illegible] Mr. McCreary said there was going to be a strike on the Illinois Central, and it was stated that full power to act had been delegated to the officers of the federation. It [illegible] taken to determine whether or not they still favored a strike. It [illegible] Mr. [illegible] president of the International Association, declared that he would not sanction a strike or give the [illegible]

[illegible] and Houston, Tex., have adopted resolutions criticising the demands of the Harriman Lines' shop employees and opposing a strike. In the course of its resolutions the chamber of commerce of Houston said:

"We have invited and had before us representatives of the railway company and representatives of the labor organizations directly involved in the controversy. We have thoroughly discussed the situation with said representatives and, from the information obtainable from them, coupled with the demands of the labor organizations concerned, it is our frank opinion that many of the demands made upon said railway system go beyond the legitimate bounds which conscientious employees, however much interested, should properly demand as concessions from their employers."

The Signal Engineer's Special Train From New York.

The Signal Engineer has arranged for a special train from New York on the occasion of the annual convention of the Railway Signal Association at Colorado Springs, October 10-12. It is scheduled to run to Chicago as a second section of the Pennsylvania Limited, leaving New York Saturday, October 7, at 10:50 a. m., and from Chicago over the Rock Island as a second section of *The Signal Engineer* special from Chicago. The usual connections will be made from Washington and Baltimore, and the train will be due in Chicago Sunday morning at 8:46; leave Chicago at 9:30 a. m., and reach Colorado Springs Monday afternoon at 2:55. The train will be composed of a compartment observation car, three sleeping cars, a dining car (with a la carte service) and a baggage car. The railway fare from New York to Colorado Springs (one way) will be $47.60; lower berth, $11; upper berth, $8.80; section, $19.80; stateroom, $31, and drawing room, $39.

Passes will be honored on this train on both roads. A preliminary canvass indicated that enough members and guests would enroll to insure the success of the movement. Should the number not meet the requirements of the railway company, arrangements will be made to attach two or three special sleeping cars to the Pennsylvania train leaving New York October 7 at 8:04 a. m.; and these cars will, in turn, be attached to the Rock Island special at Chicago.

Orders for reservations may be sent to the office of *The Signal Engineer*, 83 Fulton street, New York. In New York City the Pennsylvania Railroad will deliver tickets to intending passengers and collect payment therefor. Persons expecting to board the train at any place other than New York should buy their railway tickets in the usual way, and pay Pullman charges on the train.

Master Car and Locomotive Painters' Association.

The forty-second annual convention of the Master Car and Locomotive Painters' Association was opened Tuesday morning at Atlantic City, N. J., by the president, J. H. Pitard, of the Mobile & Ohio.

F. W. Brazier, superintendent of rolling stock, N. Y. C. & H. R., addressed the assembly at the request of the president. In his remarks he laid particular stress on the value of these conventions to not only the men attending them but to the roads on which the men are employed. He mentioned the fact that the New York Central Lines firmly believe in having their foremen attend their respective conventions to the extent of providing their transportation and considering the time thus spent as time spent for the company. Special mention was made of the younger men present and to them he told of what value just such a convention as this had been to him from the time he was a practising mechanic up to his present position. He spoke of the difficulty in obtaining young men to enter the painters' trade in railway work, with the idea of working up to the important positions, laying their lack of interest to the fact that the young men of today do not realize the importance of beginning at the bottom and working up. Mr. Brazier closed his remarks by quoting several clippings he has collected under the head of Success. Eugene Chamberlain, also of the New York Central, followed this address with a few remarks.

At the close of the first day the registration showed about 200 [illegible] including the convention is a record breaker, the members hailing from the territory within the limits of from Canada to Texas and from Maine to Washington. The supply men pro-

vided an interesting program for the entertainment of the members and their friends. The following supply companies are represented:

Acme White Lead & Color Works, Detroit, Mich.
American Roll Gold Leaf Company, Providence, R. I.
Anglo-American Varnish Company, Newark, N. J.
Aquart Manufacturing Company, St. Louis, Mo.
Atlas Paint Company, Nashville, Tenn.
Ball Chemical Company, Fittsburgh, Pa.
Cheesman & Elliot, New York.
Chicago Varnish Company, Chicago.
Detroit Graphite Company, Detroit, Mich.
F. W. Devoe & C. T. Raynolds Company, New York.
Jos. Dixon Crucible Company, Jersey City, N. J.
Flint Kote Manufacturing Company, Boston, Mass.
Flint Varnish Works, Flint, Mich.
Flood & Conklin Company, Newark, N. J.
Glidden Varnish Company, Cleveland, Ohio.
N. C. Graves Company, Philadelphia, Pa.
Hildreth Varnish Company, New York.
Kay & Ess Company, Dayton, Ohio.
Ideal Manufacturing Company, Chicago.
Imperial Car Cleaner Company, Newark, N. J.
Chas. R. Long, Jr., Company, Louisville, Ky.
Louisville Varnish Company, Louisville, Ky.
Lowe Bros., Dayton, Ohio.
John Lucas & Company, Philadelphia, Pa.
Mamolith Carbon Paint Company, Cincinnati, Ohio.
Murphy Varnish Company, Newark, N. J.
Patton Paint Company, Newark, N. J.
Penna. Specialty Company, Philadelphia, Pa.
Pratt & Lambert, New York.
Sherwin-Williams Company, Cleveland, Ohio.
James B. Sipe & Company, Pittsburgh, Pa.
Edward Smith & Company, New York.
St. Louis Surfacer & Paint Company, St. Louis, Mo.
M. B. Suydam Company, Pittsburgh, Pa.
Tousey Varnish Company, Chicago.
U. S. Metal & Manufacturing Company, New York
Valentine & Company, New York.
Wadsworth-Howland Company, Chicago.
Wolfe Brush Company, Pittsburgh, Pa
C. H. Willey, New York.
Wilson Remover Company, New York.
J. L. Whiting—J. J. Adams Company, Boston, Mass
Yarnell Paint Company, Philadelphia, Pa.

Western Society of Engineers.

At the regular meeting of the Western Society of Engineers, held at Chicago on September 6, W. C. Armstrong presented a paper on The New Passenger Terminal of the Chicago & North Western Railway; at an extra meeting on September 13 a paper was presented by H. Gansslen on Ball Bearings for Heavy Loads; at an extra meeting on September 20, J. A. Peabody will present a paper on The Signaling and Interlocking of the New Passenger Terminal, Chicago & North Western Railway; and at an extra and joint electrical meeting on September 27, S. G. Neiler will present a paper on The Electrical and Mechanical Equipment of the New Terminal, Chicago & North Western Railway.

Society of Railway Financial Officers.

At the annual meeting of the Society of Railway Financial Officers, held in St. Paul, Minn., September 12-14, officers were elected as follows: President, H. C. Ausley; first vice-president, Odell S. Smith, and second vice-president, Joseph B. Lacy. H. C. Ausley, Odell S. Smith, Arthur B. Jones, Joseph B. Lacy and T. H. B. McNight were elected members of the executive committee.

Traffic Club of Pittsburgh.

F. A. Ogden, general freight agent of the Jones & Laughlin Steel Company, Pittsburgh, Pa., has been made president of the Traffic Club of Pittsburgh, succeeding O. M. Ellsworth, general agent of the Rock Island Lines. D. L. Wells, general agent of the Erie at Pittsburgh, has been made secretary, succeeding T. J. Walters, district freight agent of the Baltimore & Ohio.

American Electric Railway Association.

The American Electric Railway Association has published convention bulletin No. 3, giving full information on transportation to the convention, which will be held at Atlantic City, N. J., October 9-13, and telling of the low rates authorized by the steam railway passenger associations. The convention calendar is included.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass.
AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomason, Scranton, Pa.
AMERICAN ASSOCIATION OF GENERAL PASSENGER AND TICKET AGENTS.—C. M. Burt, Boston, Mass.; next meeting, St. Paul, Minn., Sept. 19, 1911.
AMERICAN ASSOCIATION OF FREIGHT AGENTS.—R. O. Wells, East St. Louis, Ill.
AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—O. G. Fetter, Carew building, Cincinnati, Ohio; 3d Friday of March and September.
AMERICAN ELECTRIC RAILWAY ASSOCIATION.—H. C. Donecker, 29 W. 39th St., New York; October 9-13, 1911, Atlantic City, N. J.
AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York; November 15, 1911, Chicago.
AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W., Chicago; Oct. 17-19, 1911, St. Louis, Mo.
AMERICAN RAILWAY ENGINEERING ASSOCIATION.—E. H. Fritch, Monadnock Block, Chicago; annual convention, March 19-21, 1912, Chicago.
AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago.
AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—O. T. Harroun, Bloomington, Ill.
AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.
AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.
AMERICAN SOCIETY OF ENGINEERING CONTRACTORS.—D. J. Haner, 13 Park Row, New York; 3d Tuesday of each month, New York.
AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York.
ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.
ASSOCIATION OF RAILWAY CLAIM AGENTS.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 22, 1912, Los Angeles, Cal.
ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago; annual, November 6-10, Chicago.
ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.
ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 75 Church St., New York; December 12-13, Louisville, Ky.
CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.
CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.
CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.
CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.
CIVIL ENGINEERS' SOCIETY OF ST. PAUL.—D. F. Jurgensen, 116 Winter St., St. Paul, Minn.; 2d Monday, except June, July and Aug., St. Paul.
ENGINEERS' SOCIETY OF PENNSYLVANIA.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.
ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.
FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Richmond, Va.; annual Buffalo, N. Y.
GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.
INTERNATIONAL RAILWAY CONGRESS.—Executive Committee, rue de Louvain, 11 Brussels; 1915, Berlin.
INTERNATIONAL RAILWAY FUEL ASSOCIATION.—D. B. Sebastian, La Salle St. Station, Chicago.
INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—L. H. Bryan, D. & I. R. Ry., Two Harbors, Minn.
INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, Lima, Ohio; annual, Aug. 15, Toledo, Ohio.
IOWA RAILWAY CLUB.—W. B. Harrison, Union Station, Des Moines, Ia.; 2d Friday in month, except July and August, Des Moines.
MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York.
MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago.
MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOCIATION OF UNITED STATES AND CANADA.—A. P. Dane, B. & M., Reading, Mass.
NEW ENGLAND RAILROAD CLUB.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.
NEW YORK RAILROAD CLUB.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.
NORTHERN RAILWAY CLUB.—C. L. Kennedy, C., M. & St. P., Duluth, Minn; 4th Saturday, Duluth.
OMAHA RAILWAY CLUB.—H. H. Maulick, Barker Block, Omaha, Neb.; second Wednesday.
RAILROAD CLUB OF KANSAS CITY.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.
RAILWAY CLUB OF PITTSBURGH.—C. W. Alleman, P. & L. E., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.
RAILWAY INDUSTRIAL ASSOCIATION.—G. L. Stewart, St. L. S. W. Ry., St. Louis, Mo.; annual, May 12, 1912, Kansas City, Mo.
RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Bethlehem, Pa.; annual, Oct. 10, Colorado Springs, Colo.
RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, Box C, Collinwood, Ohio.
RICHMOND RAILROAD CLUB.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.
ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—L. C. Ryan, C. & N. W., Sterling, September 10, 1912, Buffalo, N. Y.
ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.
SOCIETY OF RAILWAY FINANCIAL OFFICERS.—C. Nyquist, La Salle St. Station, Chicago.
SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.; annual, October 20, Atlanta, Ga.
SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.
TOLEDO TRANSPORTATION CLUB.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.
TRAFFIC CLUB OF CHICAGO.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.
TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.
TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.
TRAIN DISPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7043 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.
TRANSPORTATION CLUB OF BUFFALO.—J. M. Sells, Buffalo; first Saturday after first Wednesday.
TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.
TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.
WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.
WESTERN RAILWAY CLUB.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.
WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago, 1st Wednesday in month except July and August, Chicago.
WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, B. & O., Baltimore, Md., annual, January 16-18, Chicago.

Traffic News.

The report of the Department of Agriculture for September 1 shows the condition of the corn crop on that date as 70.3; wheat, 68.8; oats, 64.5, and apples, 56.2. The changes from the estimates of August 1 are slight.

Press despatches announce that the trans-Atlantic steamship lines have made an increase of 10 per cent. in rates on freight, with a view to offsetting the loss suffered by reason of the recent strikes in England; and also an advance of $1.25 has been made in the third class passenger rates.

Brigadier-General Mills of the United States Army, reports to the War Department that on the occasion of the instruction manoeuvers of the army held at Chickamauga Park last year, a regiment from North Carolina and one from South Carolina were delayed in reaching the camp by reason of the law of South Carolina prohibiting the running of special trains on Sunday; and he says that this incident raises a grave question which ought to be settled.

The Pullman company has issued a revised tariff for seats in parlor cars between Trenton, N. J. and Long Branch and intermediate points, satisfying the complaint which led to the recent investigation by the Public Utilities Commission of New Jersey. It appears that the original complainant was the governor of the state. On some of his trips to the sea coast he had ridden to stations which were not mentioned in the tariff and the conductors had exercised their own judgment as to the amount to be collected; and then when a new tariff was issued he had to pay 40 cents where he had been paying but 25.

Car Surpluses and Shortages.

Arthur Hale, chairman of the committee on relations between railways of the American Railway Association in presenting statistical bulletin No. 101-B, giving a summary of car shortages and surpluses by groups from May 25, 1910, to August 30, 1911, says:

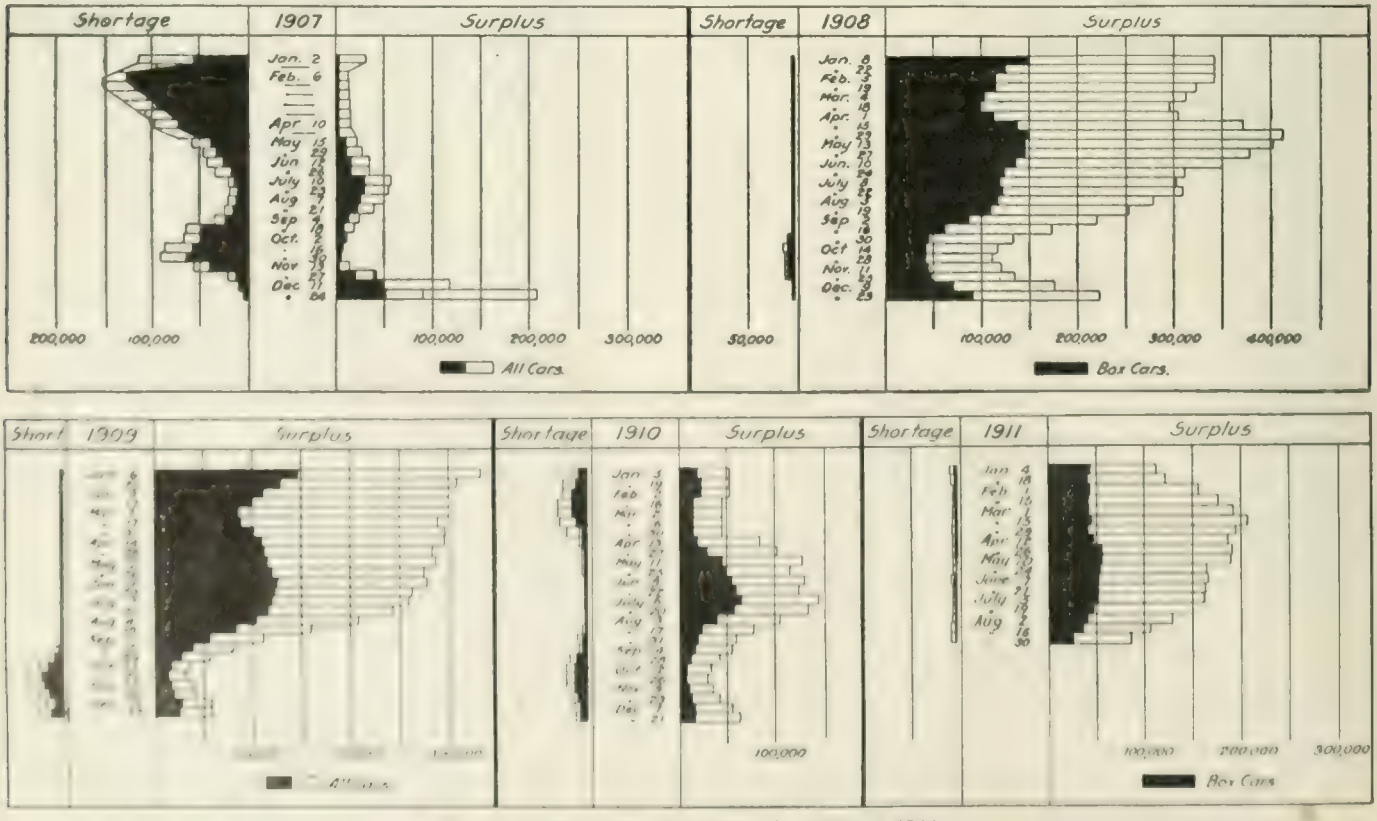
"There is a continued decrease in the surplus of all classes of cars, the total decrease being 19,134 cars, which brings the total surplus down to 88,866 cars. The principal decrease is in box cars, the total box car decrease being 9,804 cars. Coal cars show a decrease of 4,941 cars and flat and miscellaneous cars decreased 4,389 cars. Most of the box car decrease is in group 6, which includes Illinois, Iowa, Wisconsin, Minnesota and the Dakotas.

"There is a slight increase in the shortage of cars, the total shortage being 4,325 cars, of which 2,743 cars are box cars, the

Car Surpluses and Shortages.

Date.	No. of roads.	Surpluses: Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.	Shortages: Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.
Group *1 August 30, 1911	7	345	514	1,716	411	2,986	585	101	450	0	1,136
" 2 " 30, 1911	25	1,795	77	8,760	2,928	13,560	234	2	262	3	503
" 3 " 30, 1911	26	2,916	263	9,460	3,282	15,921	122	80	7	65	274
" 4 " 30, 1911	10	1,464	80	322	1,092	2,958	15	139	200	0	354
" 5 " 30, 1911	17	1,208	75	1,578	1,215	4,076	30	10	0	0	40
" 6 " 30, 1911	23	8,750	634	2,058	4,933	16,375	15	0	2	2	19
" 7 " 30, 1911	3	1,219	67	77	436	1,799	0	0	0	0	0
" 8 " 30, 1911	17	4,591	133	2,060	3,878	10,662	0	0	0	0	0
" 9 " 30, 1911	12	946	377	353	796	2,472	40	0	0	0	40
" 10 " 30, 1911	21	3,952	594	2,142	9,053	15,741	224	28	0	0	252
" 11 " 30, 1911	4	922	20	723	651	2,316	1,478	158	0	71	1,707
Total	165	28,108	2,834	29,249	28,675	88,866	2,743	518	921	143	4,325

*Group 1 is composed of New England lines; Group 2—New York, New Jersey, Delaware, Maryland, and Eastern Pennsylvania lines; Group 3—Ohio, Indiana, Michigan and Western Pennsylvania lines; Group 4—West Virginia, Virginia, North and South Carolina lines; Group 5—Kentucky, Tennessee, Mississippi, Alabama, Georgia and Florida lines; Group 6—Iowa, Illinois, Wisconsin, Minnesota and the Dakotas lines; Group 7—Montana, Wyoming and Nebraska lines; Group 8—Kansas, Colorado, Missouri, Arkansas and Oklahoma lines; Group 9—Texas, Louisiana and New Mexico lines; Group 10—Oregon, Idaho, California and Arizona lines; Group 11—Canadian lines.



Car Surpluses and Shortages in 1907 to 1911.

largest shortage being in Canada and New England. The shortage in coal cars shown by our last report is cut in two."

The accompanying table gives the surpluses and shortages by groups for the last period covered by the report and the chart shows biweekly totals in 1907 to 1911 inclusive:

Biggest and Finest.

Division Passenger Agent Ridgely of the Louisville & Nashville, is making most complete arrangements for the special train to the Negro Baptist convention at Pittsburgh. The train will be made up of three sleepers, two coaches, a diner and a baggage car. It will be the biggest and finest special train for negroes ever sent out of the South.—*New Orleans Picayune.*

Interstate Commission Investigation of Wool Rates.

The Interstate Commerce Commission is making an investigation of wool rates. It grows out of complaints filed by the commercial organizations of Spokane, Wash.; Salt Lake City, Utah; Phœnix, Ariz.; Roswell, N. Mex.; and also by the National Wool Growers' Association, the Oregon Railway Commission and the National Mohair Growers' Association. Commissioner Prouty took testimony in the case at Chicago last week.

J. E. Cosgriff, who grows sheep extensively in Wyoming, Idaho and Montana, was the first witness. He expressed the opinion that the present rates on wool from the western intermountain country are excessive, and said that it costs 17 cents per 100 lbs. to lay down clean Idaho and Wyoming wool at Boston, Mass., while the transportation cost of Australian wool to the same place is only 2 cents. He claimed that English and South American wools are laid down at Boston at even less transportation cost than Australian wool. From Rawlins, Wyo., to Boston the rate is $2.04, being made up of $1.54 to Chicago plus 50 cents beyond. He alleged both parts of the rate are excessive. It developed that the cost of transportation from Australia which had been mentioned was merely the water rate, and the question was raised as to whether there was not an additional rail rate from the Australian interior to the coast. It was admitted that this might be the case, but it was contended that most Australian wool is grown near the coast. Charles Donnelly, assistant general counsel of the Northern Pacific, asked if the establishment of a baling-in-transit rate under which sack wool might move from the ranch to nearby concentrating points and be there compressed and shipped on to destination at the through rate from the point of origin to destination, plus a reasonable charge for the transit privilege, would be of advantage, and the witness thought it would. He would not acknowledge the fairness of charging a higher rate from intermountain points to Boston than from Portland, Ore., because of water competition at the last named point. Commissioner Prouty asked that particular attention be paid by both the railways and the shippers to the question of whether, in view of the heavier loading of wool compressed into bales, it would not be justifiable and expedient to charge a lower rate per 100 lbs. on it than on sack wool.

W. Anderson, of Seattle, said the cost of production of wool has increased from 80 to 100 per cent. within the last few years. The withdrawal of land from free grazing had been a large item in this increase, and the cost of labor and supplies had also advanced. P. G. Johnson, a member of the state legislature of Idaho and a ship grower, blamed the "tariff tinkers" for the general unrest in the wool business. He believed that a reasonable rate from the intermountain points to Boston would be $1.66½, made up of a rate of $1.20 to Chicago and 46½ cents beyond.

J. A. Munroe, freight traffic manager of the Union Pacific, said that in 1896 the wool industry was in a precarious condition, and the Harriman Lines were asked to help the growers. After investigation it was decided to give the territory from central Wyoming and Nevada and to the southern boundary of Utah a rate to Boston of 2 cents per pound, and the eastern lines accepted 44½ cents for the haul from the Mississippi river. Later when wool increased very substantially in value the eastern lines advanced their part of the rate to 57½ cents, making the present rate to Boston of $2.13. The western lines have continued to accept the same revenue as they did before. He said that the Union Pacific considers wool as merely a part of the general sheep industry. In the upbuilding of that industry thousands of dollars have been invested in double deck cars which are idle eight months out of the year. Expedition has been given even in the return of empties and rates on supplies to the sheep ranches have been reduced. From the Pacific coast to Boston the rate on baled wool is $1.00. This, it was contended, is a water-compelled rate. The steamer rate is said to have been as low as 40 cents from Portland to Boston. Going into the interior, rates have been based on a combination of this terminal rate plus the local rate to the coast. The $2.13 rate applies on a territory about 1,000 miles wide. Mr. Munroe gave it as his personal opinion that if compression of wool could increase the loading 33⅓ per cent., the rate per 100 lbs. should be decreased about 12½ per cent. He contended that when wool advanced in price the railways were justified in sharing the increased prosperity of the shippers for the same reason that when the price declined the roads reduced their rate. He thought that the sheep and wool rates should be considered together, and that an increase in the rates on sheep should be followed by a decrease in the rates on wool, so that the railway revenue on the entire product would be the same.

F. C. Dillard, commerce counsel of the Harriman Lines had read into the record statements from the first annual report of the National Wool Warehouse & Storage Company, showing that its stock was to be sold at a premium of 50 per cent., and that its earnings were good. He testified that it was his understanding that this concern had made 20 per cent. net annually in recent years. F. H. Plaisted, assistant general freight agent of the Oregon Short Line, believed the establishment of fourth class rates on wool in carloads would curtail the carriers' revenues. Commissioner Prouty asked why if a Utah cannery was given as low a rate as an interior California establishment in the same business, the Utah wool growers should not be given the same rates as the interior California ranch. Mr. Plaisted answered that the canned goods met unlimited competition in a limited territory, while the wool moved largely to one market against foreign competition, and that the difference between the California and intermountain rates did not interfere with the movement of traffic.

F. W. Robinson, general freight agent of the Oregon-Washington Railroad & Navigation Company, said that the steamships are vigorously soliciting wool tonnage, and gave the following figures showing the decline in the eastbound wool tonnage of his road: 1909, 6,695 tons; 1910, 5,028 tons; and 1911, 5,196 tons. In the territory served by his line the charge for baling wool is about 25 cents per 100 lbs. The road maintains baling-in-transit privileges whereby the shipper may send his wool to some baling point and enjoy the through rate from point of origin to final destination.

INTERSTATE COMMERCE COMMISSION.

The commission began hearings on September 12 at Oklahoma City on the readjustment of rates on packing house products on about 140 railways.

The commission has denied the application of the Louisville, Henderson & St. Louis to maintain lower rates on apples from Westpoint, Ky., to Cincinnati, Ohio, than to intermediate points.

The San Joaquin County Table Grape Growers' Association has filed a complaint with the Interstate Commerce Commission against the extra charge for re-icing cars which had been pre-iced. (See August 11, p. 299.)

The commission has still further suspended (until April 28 next) the tariffs filed by a great many railways increasing the minimum charge to be made for shipments of freight which weigh less than 100 lbs. or which, at the tariff, would be charged less than the price for a shipment of 100 lbs. at first class.

The commission has authorized the distribution of an abstract of the statistical matter used in the investigation of the proposed general advances in freight rates last year (which advances were disapproved). These tables, now printed in a 275-page pamphlet, show the operating expenses of the railways in official classification and Western trunk line territory for the ten fiscal years ending June 30, 1901 to 1910, inclusive. Twenty-two of the principal roads are included. The pamphlet gives also financial statistics, mileage, cost of road and equipment, capitalization, revenues, etc.

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF JULY, 1911

Name of road	Mileage	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
		Freight.	Passenger.	Total.	Maintenance: Way and structures.	Maintenance: Of equipment.	Traffic.	Transportation.	General.	Total.					
Alabama [illegible]	[illegible]	$[illegible]	$[illegible]	$[illegible]	$[illegible]	$[illegible]	$11,424	$111,398	$8,713	$340,537	$118,807	- $667	$14,748	$100,392	$25,033
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF JULY, 1911—(CONTINUED).

Name of road.	Mileage operated at end of period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
		Freight.	Passenger.	Total, inc. misc.	Maintenance: Way and structures.	Maintenance: Of equipment.	Traffic.	Transportation.	General.	Total.					
Michigan Central	1,804	1,409,104	763,181	2,390,212	243,880	236,001	80,244	910,362	43,152	1,513,639	876,573	1,512	110,000	768,085	186,133
Midland Valley	323	69,231	35,209	111,632	25,067	21,021	3,401	36,009	5,080	90,578	21,054	.....	5,484	15,570	15,785
Minneapolis & St. Louis	1,027	212,577	119,053	361,311	36,880	48,014	9,750	155,178	11,923	261,745	99,566	95	19,969	79,692	—35,284
Minneapolis, St. Paul & Sault Ste. Marie	3,769[j]	1,353,831	567,967	2,050,158	232,941	269,202	44,438	663,203	41,253	1,251,037	799,121	17,320	125,715	690,726	—22,177
Missouri, Kansas & Texas	1,740[13]	888,193	383,512	1,370,943	236,200	210,493	32,405	437,815	43,829	960,742	410,201	—2,041	58,500	349,660	92,704
Missouri, Kansas & Texas of Texas	1,345	355,572	312,606	719,264	225,993	114,178	24,027	429,709	33,239	827,146	—107,882	—3,689	22,500	—134,071	—205,748
Mobile & Ohio	1,114	640,561	126,377	896,703	116,564	159,647	32,747	328,167	30,881	668,006	228,697	—1,629	24,595	202,473	35,963
Monongahela	64	88,282	2,355	91,914	19,582	9,607	218	19,367	1,964	50,738	41,176	.....	1,900	39,276	5,301
Morgan's La & Tex. R. R. & S. S. Co.	404	214,162	106,497	338,638	48,464	51,062	12,982	134,116	12,589	259,213	79,425	—2,812	18,698	57,915	6,031
Nashville, Chattanooga & St. Louis	1,255	637,979	266,261	970,505	155,067	174,676	35,102	354,800	24,801	744,745	225,760	—2,167	23,816	199,777	1,689
New Orleans & North Eastern	195	192,052	53,673	265,202	25,507	51,678	9,984	97,406	12,316	196,890	68,312	—278	9,250	58,784	—21,193
New Orleans & Great Northern	282	91,324	31,488	131,704	18,907	17,179	2,656	42,305	6,764	87,811	43,893	—4	2,000	41,889	—21,916
New Orleans, Mobile & Chicago	404	96,704	33,524	140,166	23,746	14,625	2,873	45,226	7,892	94,362	45,804	—54	4,493	41,257	3,518
New Orleans, Texas & Mexico	264	69,898	18,507	95,120	18,040	11,341	3,975	44,905	6,855	84,646	10,474	.....	.....	10,474	9,767
New York Central & Hudson River	3,571	4,678,442	3,175,136	8,725,589	1,204,457	1,154,398	224,689	3,062,554	255,330	5,901,428	2,824,161	1,569	414,372	2,411,359	662,129
New York, Chicago & St. Louis	561	694,676	171,255	901,761	130,733	91,449	47,162	358,471	16,574	644,389	257,372	—1,344	39,000	217,028	—4,109
New York, New Haven & Hartford	2,091[14]	2,314,405	2,408,312	5,197,708	572,454	583,135	30,506	1,940,013	138,799	3,264,907	1,932,801	115,980	300,000	1,748,781	664
New York, Ontario & Western	565[15]	586,518	302,141	932,512	122,135	152,679	10,030	302,322	15,376	602,542	329,970	4,065	17,917	316,118	—66,648
New York, Philadelphia & Norfolk	112	244,835	40,241	306,393	36,124	53,833	4,979	116,783	11,882	723,601	82,792	.....	7,500	75,292	—43,855
New York, Susquehanna & Western	152	161,624	57,781	245,883	32,931	24,034	1,163	87,597	3,506	149,631	96,252	1,745	11,733	86,264	16,358
Norfolk & Western	2,004[16]	2,550,652	399,494	3,053,712	401,118	584,268	52,147	863,652	57,355	1,958,540	1,095,172	—2,261	115,000	977,911	85,221
Norfolk Southern	607	139,607	87,936	255,052	30,434	30,449	5,314	85,006	13,802	165,004	90,048	1,721	7,500	84,269	3,922
Northern Central	472	682,400	207,729	948,918	127,832	190,745	15,547	479,730	23,699	837,553	111,365	738	40,336	71,767	—42,347
Northern Pacific	6,017[17]	3,270,045	1,667,235	5,233,852	845,417	716,666	99,877	1,581,404	86,134	3,329,498	1,903,354	41,679	261,643	1,683,390	—585,796
Oregon Short Line	1,646[k]	1,124,899	506,882	1,728,005	227,561	160,565	30,144	359,538	35,190	812,998	915,007	—724	77,107	837,176	15,170
Oregon Washington R. R. & Nav. Co.	1,856	882,381	522,298	1,493,437	219,503	119,159	41,359	475,820	41,496	897,337	596,100	4,815	77,749	523,166	—
Pecos & Northern Texas	296[l]	88,798	26,024	120,749	18,621	26,240	2,976	39,072	4,642	91,551	29,198	.....	3,447	25,751	—16,174
Pennsylvania Co.	1,415	3,281,967	805,667	4,428,883	513,343	768,522	69,701	1,424,511	86,113	2,862,189	1,566,694	—4,082	173,949	1,388,663	—27,669
Pennsylvania R. R.	3,978	8,747,796	3,049,729	12,721,057	1,424,999	2,467,493	180,056	4,626,123	337,034	9,035,705	3,685,352	—121,162	605,931	2,958,259	—151,362
Peoria & Eastern	351	176,963	59,479	255,791	44,323	35,332	6,992	104,331	6,618	197,596	58,195	.....	10,500	47,695	4,469
Pere Marquette	2,331	789,935	419,792	1,360,877	170,373	194,046	37,843	590,085	32,597	1,024,944	335,933	—7,010	56,213	272,710	—46,199
Pittsburgh, Cincinnati, Chic. & St. Louis	1,467	2,153,585	712,463	3,209,997	586,000	640,875	62,644	1,088,175	63,009	2,440,703	769,294	—1,238	128,783	639,273	90,265
Philadelphia, Baltimore & Washington	713	850,829	620,415	1,611,557	205,379	275,274	28,005	631,735	34,646	1,171,039	442,518	.....	50,697	391,821	—17,526
Pittsburgh & Lake Erie	215[18]	1,194,283	153,356	1,389,945	150,056	132,537	17,821	305,697	24,719	630,830	759,115	—365	30,000	728,750	—93,738
Richmond Fredericksburg & Potomac	83	113,794	61,772	200,502	21,054	25,261	3,161	69,011	5,694	124,181	76,721	.....	1,000	75,721	2,769
Rutland	468	160,080	116,591	313,005	44,210	60,068	8,723	116,761	6,504	236,266	76,739	.....	12,703	64,036	22,813
San Antonio & Aransas Pass	727	159,248	115,185	294,872	67,248	39,838	5,474	111,434	9,506	233,550	61,322	.....	11,000	50,322	—15,107
San Pedro, Los Angeles & Salt Lake	1,113	431,693	253,422	729,769	143,279	148,926	29,812	288,776	17,125	627,918	100,851	—2,506	24,975	73,370	—18,626
Santa Fe, Prescott & Phoenix	364	101,960	37,415	147,750	20,982	14,378	3,813	45,689	5,359	90,221	57,529	.....	4,333	53,196	69
St. Joseph & Grand Island	319	97,329	39,266	148,235	26,785	17,280	5,791	55,635	5,415	110,906	37,329	80	5,712	31,537	23,475
St. Louis, Brownsville & Mexico	509[m]	85,358	54,605	155,257	33,956	9,701	3,012	58,034	7,937	112,640	42,617	.....	4,500	38,117	33,578
St. Louis Merchants' Bridge Terminal	9	.....	246	120,470	31,336	8,084	386	67,986	4,461	112,253	8,217	.....	5,700	2,517	—39,404
St. Louis, San Francisco & Texas	243[n]	54,520	29,421	90,359	16,055	24,002	2,609	40,989	4,541	88,196	2,163	.....	1,360	803	—1,281
St. Louis Southwestern	796[o]	393,555	116,342	536,136	40,151	96,408	23,968	137,016	22,301	319,844	216,292	—778	19,564	195,950	17,573
St. Louis Southwestern of Texas	703	180,680	85,295	285,090	48,374	71,691	11,489	121,320	15,379	268,253	16,837	—258	10,000	6,579	7,788
Seaboard Air Line	3,046[p]	1,028,638	412,495	1,636,165	246,487	237,422	51,683	583,974	51,947	1,171,513	464,652	150	72,000	392,802	64,741
Southern	7,076[q]	2,869,437	1,532,617	4,797,307	556,679	749,244	134,438	1,698,292	145,533	3,284,186	1,513,121	—1,885	196,774	1,314,462	83,373
Southern Kansas of Texas	124	75,886	15,067	94,850	14,517	18,895	2,754	35,903	4,264	76,333	18,517	.....	1,981	16,536	—256
Southern Pacific	260	34,427	33,456	75,525	24,508	8,365	2,042	33,370	3,521	71,806	3,718	.....	5,217	—1,498	3,226
Southern Pacific Co.	6,214[q]	4,172,309	3,044,285	7,731,470	1,067,720	878,624	172,474	2,102,277	212,910	4,434,005	3,297,465	—21,211	301,144	2,975,110	—497,776
Sunset	58	78,968	18,340	100,372	10,090	1,182	27	21,254	264	32,817	67,555	.....	3,106	64,449	3,284
Syracuse, Binghamton & New York	80	44,621	36,427	93,292	18,680	5,804	2,808	28,910	2,260	58,462	34,830	.....	6,220	28,610	—6,276
Tennessee Central	293	91,253	38,796	137,013	21,665	18,028	5,175	46,423	14,884	106,175	30,838	.....	4,212	26,626	—18,134
Terminal R. R. Assn. of St. Louis	35	.....	238	197,324	34,079	25,336	586	68,405	4,877	133,283	64,041	2,596	26,000	40,637	—30,690
Texas & New Orleans	488	185,233	90,812	295,134	51,925	52,603	6,716	108,140	9,051	228,435	66,700	—1,980	12,748	52,472	—10,025
Texas & Pacific	1,884	701,544	344,100	1,115,716	147,897	244,265	21,763	493,102	44,748	951,775	163,941	1,515	38,000	127,456	91,495
Toledo & Ohio Central	440	352,832	62,319	443,587	60,063	57,176	7,421	148,755	8,729	282,144	160,443	—993	20,343	139,107	—49,817
Toledo, Peoria & Western	247	56,366	39,841	102,265	17,963	23,053	2,061	39,610	3,361	86,052	16,213	.....	4,800	11,413	2,514
Toledo, St. Louis & Western	450	268,523	46,446	335,525	46,419	58,771	8,240	113,849	8,150	235,429	100,096	.....	14,500	85,596	—7,553
Trinity & Brazos Valley	462	74,392	37,137	117,213	26,903	25,676	12,163	61,781	9,240	135,763	18,550	.....	3,500	22,050	23,340
Union R. R. of Baltimore	9	92,427	19,460	113,224	7,841	.....	995	5,721	2,350	16,907	96,317	.....	5,923	90,394	—17,570
Union R. R. of Pennsylvania	31	.....	.....	408,941	27,919	88,361	100	132,532	2,327	251,239	157,702	2,799	3,250	157,251	10,833
Union Pacific	3,497[19]	2,511,773	1,038,051	3,937,611	454,113	435,803	119,192	996,430	105,792	2,111,330	1,813,982	241	151,650	1,661,873	—478,768
Vandalia	837	516,023	224,803	836,427	173,271	153,635	29,616	303,762	20,274	680,558	155,869	.....	27,401	128,468	27,148
Vicksburg, Shreveport & Pacific	171	53,404	41,846	105,987	20,528	21,584	3,499	35,512	4,934	86,057	19,930	—921	6,300	12,709	—22,503
Virginian & Summerlee	240[3]	108,874	15,308	138,303	16,182	26,045	1,816	37,646	3,892	85,581	42,632	.....	4,560	38,062	13,630
Wabash	473	309,961	27,473	348,111	39,626	59,554	5,108	84,107	8,105	196,500	151,611	4,262	17,300	138,573	58,918
Western Maryland	2,514	1,581,556	688,455	2,447,442	310,655	430,496	83,219	930,849	84,838	1,840,047	607,395	357	71,655	536,097	25,987
Wheeling & Lake Erie	38	37,517	32,083	92,805	17,501	12,076	1,386	33,984	2,495	67,342	25,463	.....	3,245	22,218	—14,385
Wheeling & Lake Erie	944	266,603	107,718	410,084	66,129	32,382	29,720	162,080	20,222	310,533	111,551	—2,866	14,350	94,335	—
Wisconsin Central	355	166,772	65,177	254,132	70,172	80,432	15,737	209,164	10,692	646,197	407,935	5,772	23,473	378,680	19,826
Wrightsville & Tennille	54	53,805	63,749	615,193	24,810	108,425	6,544	194,100	13,946	397,825	217,358	2,377	21,152	198,583	—12,532
Yazoo & Mississippi Valley	1,371	467,455	209,676	730,559	164,054	112,586	15,181	262,878	24,738	579,437	151,122	—286	38,000	112,836	58,830

Mileage operated on July 31, 1910—[1] 7,540 miles; [2] 599 miles; [3] 2,223 miles, July 1911 includes C. & O. of Indiana; [4] 7,629 miles; [5] 1,521 miles; [6] 7,395 miles; [7] 1,982 miles; [8] 819 miles; [9] 780 miles; [10] 1,959 miles; [11] 7,274 miles; [12] 366 miles; [13] 1,724 miles; [14] 2,040 miles; [15] 545 miles; [16] 1,951 miles; [17] 5,814 miles; [18] 191 miles; [19] 7,050 miles; [20] 3,411 miles; [21] 188 miles. — Indicates Deficits, Losses and Decreases.

Mileage operated on July 31, 1910—*a* 90 miles; *b* 2,242 miles; *c* 998 miles; *d* includes Evansville & Indianapolis for both years; *e* 9,024 miles; *f* 1,248 miles; *g* 1,518 miles; *h* 4,552 miles; *i* 1,179 miles; *j* 3,534 miles, *k* 1,594 miles; *l* 225 miles; *m* 494 miles; *n* 132 miles; *o* 773 miles; *p* 3,027 miles; *q* 6,147 miles. — Indicates Deficits, Losses and Decreases.

The Red River Oil Company and other cotton seed oil companies of Louisiana have complained to the commission against the concentration charge of from one to three cents per 100 lbs. on cotton seed which is now made by the railways and which charge is refunded when the manufactured product is shipped out on the same road on which it was brought in.

The Southwestern Missouri Millers' Club, with headquarters at Joplin, Mo., and composed of millers in southeastern Kansas, southwestern Missouri and northwestern Arkansas has complained to the commission that the rates now charged by the Missouri, Kansas & Texas and connecting railways on grain and its products from those states to points of consumption in Arkansas, Louisiana and other southern destinations, are excessive by at least 5 cents per 100 lbs. It is claimed that mills in southern Iowa, northern Missouri, eastern Kansas and Nebraska, Illinois and eastern Missouri have an undue advantage to that extent over the complainants. The complainants also ask the commission to order the carriers to smooth the sides and floors of cars by removing splinters, loose nails, etc., so as to prevent the tearing of sacks containing grain products. The expenses of doing this amounts to about $1.50 per car, and has been borne by the shipper heretofore, but complainants ask that an allowance be made by railways for this service and that they should receive reparation for what they have expended in this manner during the past two years.

Shipper Granted an Allowance for Drayage Charges Incurred Through the Fault of the Railway.

W. C. Sterling & Son Company v. Michigan Central et al. Opinion by the commission:

The initial carrier misrouted the shipment of which complaint is made. To obtain delivery that was called for in the bill of lading, the consignee drayed the shipment to its plant at its own expense. The case illustrates the hardship that would be imposed on shippers in many instances without fault on their part if shippers could not recover for actual damages by reason of the improper delivery of freight. On the other hand, the commission is not without admonition from past practices of the danger of discrimination if the door be left open for indiscriminate adjustment of claims of this kind without submission of these claims to the commission. The commission on further consideration has reached the conclusion that justice requires the modification of its prior rulings in respect of claims of this character to the extent that where, as in this case, by default of the carrier and without connivance on the part of the shipper, the consignee is put under the necessity of transferring his freight at the point of destination on completion of the delivery to which he is lawfully entitled under the tariffs and routing instructions, the shipper or consignee is entitled to recover damages to the amount of the actual cost to him of such transfer. All claims of this kind now pending before, or that have been refused by, the commission will be reconsidered in accordance with this modified ruling. (21 I. C. C., 451.)

STATE COMMISSIONS.

The Public Utility Commission of New Jersey has begun an investigation of Pullman car rates between Trenton and points on the seashore, which have recently been increased. One hearing has been held.

The Illinois Railway Commission issued an order on September 6, reducing express rates in that state an average of 23 per cent., effective October 1. The order is practically the same as that issued last year, which was enjoined by the federal court on the ground that the commission did not have jurisdiction, except that the minimum charge is not reduced from 25 cents to 20 cents. Merchandise rates per 100 lbs. for distances up to 30 miles are reduced from 30 to 40 cents, and by the establishment of a new graduated scale, general reductions are ordered in rates for all shipments under 100 lbs. At a hearing to be held later the commission will endeavor to establish new express classifications.

A member of the Railroad Commission of Texas after an inspection of the Missouri, Kansas & Texas lines in that state recommends that the commission issue an order requiring improvements to the property in the coming year as follows: Renewal of ties on the line on basis of not less than 600 a mile, preference to be given San Antonio, Houston and Austin divisions, and line from Smithville to Granger; relay much of main line with 85-lb. rails; relay Dallas branch and line from Smithvile to New Ulm within three years with 85-lb. rails; reenforcement of ballast, Smithville to San Marcos; systematic replacement of woden bridges by permanent work; adoption of uniform standards of construction and methods of work and issue of rules governing maintenance of way department to promote such ends; new station at Temple and extra waiting rooms at Red Oak, and union station at Hillsboro.

The Indiana commission, denying an appeal made by the Vandalia Railroad, has sustained the board of trustees of the town of Lyons in requiring the road to have a flagman at Broad street in that town from 7 a. m. to 9 p. m. every day. The railway company appealed on the ground that the automatic bell at the crossing, which was put in about a year since, at the demand of the town, was sufficient, especially as the town subsequently ordered the speed of all trains limited to 15 miles an hour. The population of the town or village is only 1,200, but the commission, after sending Chairman Wood to examine the ground, finds that, on account of the large farming population around Lyons, the crossing is much more used than is usually the case in so small a town; and two persons have been killed there. Considering these things and also the obstructions to the view, the curves in the railway line, the number of non-stopping trains, the amount of switching, the contiguity of another crossing, and "many other things," the commission concludes that the crossing is especially dangerous. Three hundred children live on one side of the railway, and attend school on the other. The commission puts little faith in the speed limit as an element of safety, as it is the "common experience of all that such orders are not generally effective." The commission listened to the argument that local authorities could easily impose unreasonable burdens on a railway, but it is held unreasonable to think of reversing the expressed will of the people of Lyons merely because it will cost a fraction of the value of a human life annually. Incidentally the commission refers again to the repeated appeals which have been made by it to the legislature to abolish grade crossings. In spite of these appeals, "the policy of the law of Indiana seems to be not to separate grades but to protect the crossings."

COURT NEWS.

The Supreme Court of Massachusetts, in the case of Hooker v. Boston & Maine, has confirmed a verdict of $2,133 damages for the loss of baggage which was destroyed by fire while waiting in the station at the passenger's destination. The court holds that the limitation of such damage to $100 is not binding on the passenger where he was ignorant of its existence and had not assented to it; and this, notwithstanding that the limitation clause appeared in the tariffs of the road which were published and had been filed with the Interstate Commerce Commission.

Judge C. A. Willard of the federal district court at Minneapolis, Minn., on September 6, pending a hearing, enjoined the South Dakota Railway Commission from enforcing lower railway rates in that state as provided for by legislation passed at the last session of the legislature. The Chicago & North Western, which operates 980 miles in South Dakota, submitted a statement through its counsel, showing that the proposed reductions would so seriously affect its earnings as to cause it net losses.

Judge Willard of the federal district court at Minneapolis, Minn., on September 7 declined to enjoin the South Dakota Railway Commission from reducing the rates of Wells, Fargo & Company in that state, on the ground that the evidence submitted by the company failed to show that it was not earning 7 per cent. on the investment which it claims to be its assessable value in South Dakota. In July of this year attorneys for the express company appeared before Judge Willard, asking to be relieved from paying taxes on $171,000, and saying that its assessable property in South Dakota did not exceed $12,000 and that its true valuation was not over $4,000. The fact was brought to the attention of the court when the injunction to restrain enforcement of order for reductions in rates was sought.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

F. W. Russell has been appointed assistant treasurer of the Virginian Railway, with office at Norfolk, Va., succeeding John J. Corell, resigned to go into other business.

Operating Officers.

J. H. Black, superintendent of the Temiskaming & Northern Ontario, at North Bay, Ont., has resigned and his former position has been abolished.

E. E. Backus has been appointed superintendent of telegraph of the El Paso & Southwestern System, with office at El Paso, Tex., succeeding H. W. Cutshall, resigned.

W. A. Ross, trainmaster of the Chesapeake & Ohio, at Ronceverte, W. Va., has been appointed inspector of transportation of the West Virginia General division, with office at Huntington.

John R. Jones, trainmaster of the International & Great Northern, at San Antonio, Tex., has been appointed superintendent, with office at San Antonio, succeeding Homer Eads, resigned. J. L. Otis succeeds Mr. Jones.

C. M. Boswell, whose resignation as superintendent of the Lake Charles & Northern, and general superintendent of the Louisiana & Pacific, with office at De Ridder, La., was announced in these columns last week, has been appointed general manager of the Madeiro-Mamore Railway, with office at Porta Vehlo, Brazil.

Traffic Officers.

Allington Baxter has been appointed a commercial agent of the Southern Railway with office at Washington, D. C.

L. M. Hogsett has been appointed assistant general freight agent of the International & Great Northern, with office at Houston, Tex.

S. M. Spears has been appointed traveling passenger agent of the Illinois Central, with office at Memphis, Tenn., succeeding Owen Durham, resigned.

F. S. Sleight has been appointed soliciting freight agent of the International & Great Northern, with office at Galveston, Tex., succeeding J. Fry, resigned.

J. E. Meroney has been appointed commercial agent of the Trinity & Brazos Valley, with office at Corsicana, Tex., succeeding C. F. Norton, transferred.

Robert Ralston has been appointed soliciting freight agent of the Cincinnati, New Orleans & Texas Pacific, with office at Cincinnati, Ohio, succeeding J. G. Bliss, transferred.

W. B. Courtright, traveling freight agent of the Chicago, Burlington & Quincy at New York City, has been appointed general agent, freight department, with office at Buffalo.

A. C. Valentine, traveling freight agent of the Queen & Crescent at Dallas, Tex., has been appointed traveling freight agent of the Texas & Pacific, with office at Shreveport, La.

J. K. Dirmeyer has been appointed traveling freight agent of the Trinity & Brazos Valley, with office at Dallas, Tex., succeeding J. D. Gowin, resigned to accept service with another company.

H. D. Snepp has been appointed commercial agent of the Wichita Falls & Northwestern, with office at Wichita Falls, Tex., succeeding George L. Moore, resigned to go to the Texas & Pacific.

J. W. O'Brien, traveling passenger agent of the Chicago & Alton and the Toledo, St. Louis & Western at Pittsburgh, Pa., has been appointed traveling passenger agent of the Denver & Rio Grande, with office at Pittsburgh.

George Robertson, commercial agent of the Southern Railway, at Atlanta, Ga., has been appointed commercial agent, at Athens, succeeding Paul Pinkerton, who in turn succeeds Mr. Robertson as commercial agent, at Atlanta.

J. F. Garvin, chief clerk in the freight traffic department of the Missouri, Kansas & Texas at St. Louis, Mo., has been appointed assistant general freight agent of the Missouri, Kansas & Texas of Texas, with office at Dallas, Tex.

E. H. Wilde, chief clerk in the office of the general passenger agent of the Great Northern at St. Paul, Minn., and A. J. Dickinson, assistant chief clerk, have both been appointed assistant general passenger agents, with office at St. Paul.

George A. Walton, general agent in the passenger department of the Canadian Pacific at Spokane, Wash., has been appointed general agent in the passenger department, with office at Chicago, succeeding A. B. Calder, resigned to engage in other business.

J. A. Ritchie, traveling agent of the Chicago & North Western at Cincinnati, Ohio, has been promoted with the same title, and with office at Cincinnati, to succeed A. R. Gould, resigned. A. M. Linz, soliciting freight agent at Cincinnati, succeeds Mr. Ritchie.

V. C. Williams, eastern superintendent of the Star Union Line of the Pennsylvania Railroad, has been apopinted division freight agent of the New Jersey division of the Pennsylvania Railroad, with office at Philadelphia, Pa., succeeding William W. Wimer, deceased.

O. G. Fetter, secretary and chairman of the Cincinnati Freight Bureau, and secretary of the American Association of Railroad Superintendents, with office at Cincinnati, Ohio, has resigned to become president and general manager of the Cincinnati Freight Service Bureau.

Eugene McAuliffe, general fuel agent of the St. Louis & San Francisco, the Chicago & Eastern Illinois and the Evansville & Terre Haute at Chicago, has been appointed general coal agent of all Frisco lines, with office at St. Louis, Mo., instead of general agent as was announced in these columns last week.

G. F. Snow, special agent of the Bangor & Aroostook at Bangor, Me., has been appointed traffic agent, and will have particular charge of locating new industries on the company's lines, and such special freight, passenger and other matters as may be assigned to him from time to time by the vice-president, to whom he will report.

W. P. Warner, assistant general freight and passenger agent of the Chicago, Milwaukee & Puget Sound at Butte, Mont., has been appointed district freight and passenger agent, with office at Portland, Ore., succeeding J. R. Veitch, promoted. A. J. Hillman, traveling freight agent at Tacoma, Wash., has been appointed district freight and passenger agent, with office at Butte, succeeding to the duties of Mr. Warner.

E. F. Feeney, traveling freight agent of the Rock Island Lines at New Orleans, La., has been transferred to Atlanta, Ga., and E. S. Newhauser, also a traveling freight agent at New Orleans, has had his jurisdiction extended over the territory formerly in charge of Mr. Feeney. J. E. LeBlanc, soliciting freight agent at New Orleans, has been appointed a traveling freight agent at that place, and A. N. McCoy succeeds Mr. LeBlanc.

H. A. Cochrane, assistant coal and coke agent of the Baltimore & Ohio, at Cleveland, Ohio, has been promoted to coal freight agent, with office at Baltimore, Md., reporting to H. M. Matthews, general coal and coke agent. C. R. Wright, chief clerk of the coal and coke department, at Pittsburgh, Pa., succeeds Mr. Cochrane. G. B. Keith has been appointed traveling coal freight agent, with office at Baltimore, succeeding J. H. Baker.

Walter Bowles Calloway, whose appointment as general passenger agent of the Baltimore & Ohio Southwestern, and the Cincinnati, Hamilton & Dayton, with office at Cincinnati, Ohio, has been announced in these columns, was born December 28, 1873, at Harrison, Ohio. He was educated in the public schools of Home City, Ohio, and spent a year at Wabash College. He began railway work in September, 1891, with the Cleveland, Cincinnati, Chicago & St. Louis at Cincinnati, and was with that road until 1898, first in the freight claim department and then in the passenger department. He then went with the Cincinnati, Hamilton & Dayton, where he was consecutively, division clerk in the passenger department, chief rate clerk and advertising agent. In June, 1902, he was appointed assistant general passenger agent of the Cincinnati, Richmond & Muncie at Richmond,

Ind., and the next year was promoted to general passenger agent of the Chicago, Cincinnati & Louisville, successor to the Cincinnati, Richmond & Muncie. In November, 1904, he was made assistant general passenger agent of the Cincinnati, Hamilton & Dayton, and the Chicago, Cincinnati & Louisville, with office at Cincinnati, and in January, 1906, he was promoted to general passenger agent, which position he held until March 21, 1911. The traffic departments of the C. H. & D., and the Baltimore & Ohio Southwestern were consolidated on the latter date, and he was appointed assistant general passenger agent of both roads, from which position he has just been promoted as above noted.

Engineering and Rolling Stock Officers.

F. E. Bates has been appointed assistant superintendent of locomotive fuel service of the St. Louis & San Francisco, with office at Francis, Okla.

T. T. Cloward, foreman of locomotive repairs of the Philadelphia, Baltimore & Washington, at Bay View, Md., has been appointed general foreman of the Wilmington (Del.) machine shops.

J. M. R. Fairbairn, engineer maintenance of way, Eastern lines of the Canadian Pacific, at Montreal, Que., has been appointed assistant chief engineer, Eastern lines, with office at Montreal.

M. A. Baird, supervisor of signals of the Erie Railroad, at Jersey City, N. J., has been appointed general signal inspector, and H. C. Price, foreman of interlocking, succeeds Mr. Baird, with office at Jersey City.

George Seanor, division foreman of the St. Louis & San Francisco at Joplin, Mo., has been appointed general foreman of shops, with office at Sapulpa, Okla., succeeding J. F. Long, promoted. J. Morgan has been appointed assistant to the general foreman of shops at Sapulpa.

F. Ringer, principal assistant engineer of the Missouri, Kansas & Texas at Parsons, Kan., has been appointed assistant chief engineer, with office at St. Louis, Mo., and his former office has been abolished. R. M. Garrett, resident engineer at Sedalia, Mo., has been appointed district engineer, with headquarters at Parsons, and the office of resident engineer at Sedalia has been abolished.

OBITUARY.

George M. Place, secretary and treasurer of the Fonda, Johnstown & Gloversville, died at his home in Gloversville, N. Y., September 12, after a long illness.

W. B. Hixon, superintendent of bridges and buildings of the Delaware, Lackawanna & Western, was found dead in his office in the Lackawanna station at Scranton, Pa., on September 10. He had been shot with a bullet in the right temple and a revolver was lying on the floor. The coroner decided it was a case of suicide. Mr. Hixon was born in July, 1850, at Archer, Harrison county, Ohio, and in 1869 was an apprentice bridge raiser with the American Bridge Company. Since 1877 he has been superintendent of bridges and buildings on various railways. From 1899 to 1900 he was superintendent of bridges on the Minneapolis & St. Louis, and since that time he has been superintendent of bridges and buildings of the Delaware, Lackawanna & Western.

David Hawksworth, formerly superintendent of motive power of the Burlington & Missouri River, now part of the Chicago, Burlington & Quincy, died on August 23 at his home in Plattsmouth, Neb. Mr. Hawksworth was born in England in 1831, and began railway work in that country. He came to America in 1849 and after working in the machine shops of different railways he became a machinist for the Burlington in 1857. During the Civil War he was an assistant engineer on a gunboat in the U. S. Navy, and after being mustered out in 1864 returned to the Burlington, at Burlington, Iowa, remaining there until 1873. He then went to Plattsmouth, Neb., as master mechanic, and was appointed superintendent of motive power at the same place in 1876, which position he held until his retirement from active service in 1901.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Chicago, Indianapolis & Louisville is taking prices on 9 mikado locomotives.

The Grand Trunk has ordered 10 switching locomotives from the Lima Locomotive & Machine Company.

The Laramie, Hahn's Peak and Pacific has ordered 2 mikado locomotives from the Baldwin Locomotive Works. The dimensions of the cylinders will be 20 in. x 28 in., the diameter of the driving wheels will be 48 in., and the total weight in working order will be 181,500 lbs. The tractive power will be 35,700 lbs., the water capacity will be 5,500 gal., and the fuel capacity will be 10 tons.

CAR BUILDING.

The Vandalia has ordered 47 steel underframe box cars from the Pressed Steel Car Company.

The North & South Carolina has ordered 2 passenger cars and 2 cabooses from the Pressed Steel Car Company.

The Baltimore & Ohio has ordered 5 well cars from the Cambria Steel Company, and 4 smoking cars from the American Car & Foundry Company.

The Erie has ordered 10 through passenger cars from the Barney & Smith Car Company, and 10 through passengers cars and 25 suburban passenger cars from the Pullman Company.

The St. Louis & San Francisco is said to be in the market for some new passenger equipment. Part of this equipment will be for the Chicago & Eastern Illinois. This item is not confirmed.

The Frisco Refrigerator Line, a subsidiary of the St. Louis & San Francisco (see *Railway Age Gazette* of September 8, page 484) has ordered 2,500 refrigerator cars from the American Car & Foundry Company.

IRON AND STEEL.

The Canadian Government is in the market for 10,000 tons of rails for the Hudson Bay.

The Pennsylvania has ordered 300 tons of structural material from the Pennsylvania Steel Company.

The Boston & Albany has ordered 4,000 tons of structural steel from the Pennsylvania Steel Company.

The Louisiana & Arkansas has ordered 1,600 tons of bridge steel from the McClintic-Marshall Construction Company.

The Philadelphia & Reading has ordered 200 tons of structural material for the new power house at St. Clair, Pa.

The New York, New Haven & Hartford has ordered 200 tons of structural material from the Pennsylvania Steel Company.

The Chicago, Great Western has ordered 310 tons of structural material for the improvements at Oelwein, Ia., from the Vierling Steel Works.

The New York Central is taking prices on about 4,000 tons of steel for two turntables, three deck plate girder bridges and one set of steel viaduct shapes.

General Conditions in Steel.—The large volume of daily orders in the steel industry shows no decrease, even though the railways are only ordering half their normal wants. The Steel Corporation increased its unfilled tonnage by almost 112,000 tons during August, and it is now higher than at any time since July 31, 1910. The immediate future of the industry is uncertain, for a good deal depends on the settlement of the railway troubles and the Moroccan situation. The Steel Corporation is operating at about 75 per cent. of its capacity.

Supply Trade News.

The Delaware & Hudson is taking prices on a number of machine tools.

The Baldwin Locomotive Works, Philadelphia, Pa., is figuring on making additions to its plant at Eddystone, including the construction of a 500-ft. annex to the erection shop.

The Boston Elevated has ordered from the Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., 50 quadruple equipments of No. 306 motors with type HL control.

The Baltimore & Ohio, which has let contracts for building machine shops at Hardman, W. Va., and Rowlesburg, will be in the market in a short time for machine tools equipment for them.

Olin A. Stranahan, for a number of years mechanical engineer of Westinghouse, Church, Kerr & Company, New York, and formerly with the British Westinghouse company, died suddenly while undergoing an operation in New York on September 8. Mr. Stranahan was born in 1866. He was a member of the Engineers' Club and the American Society of Mechanical Engineers.

W. G. Hovey, recently with the Hall Signal Company, New York, has taken a position in the railway sales department of the Okonite Company, New York. W. A. Peddle, signal engineer of the Hall company, in charge of estimating and construction, with office at Garwood, N. J., has been transferred to the sales department, with office in New York. H. L. Hollister, engineer for the western district, with office in Chicago, succeeds Mr. Peddle.

The Railway Steel-Spring Company, New York, has closed a deal whereby it will acquire the plant and property of the Inter-Ocean Steel Company, Chicago Heights, Ill. The Inter-Ocean company is a close corporation, organized a few years ago to make car wheels and rims. It has outstanding $2,500,000 stock and $478,000 6 per cent. convertible notes. The stockholders will receive for their holdings from the Railway Steel-Spring Company $125 per share, making the purchase price of the plant, provided the notes are converted, something over $3,500,000. The money required for the purchase will probably be raised by an issue of $3,500,000 bonds.

TRADE PUBLICATIONS.

THROTTLE VALVES.—The Watson-Stillman Company, New York, has issued a small folder enumerating the 16 prime advantages of the Chambers locomotive throttle. Diagrams are included.

NORTHERN PACIFIC.—This company has published a small pamphlet giving the 1910 population of all cities, towns and villages in Minnesota, Montana, Wisconsin, Idaho, North Dakota, Washington and Oregon. The pamphlet includes summaries of the agricultural statistics of these states.

CAR FURNISHINGS.—The Dayton Manufacturing Company, Dayton, Ohio, has published several small illustrated folders describing its Naery door holders, Dayton switch locks, white enameled cast iron cuspidors, Dayton car basket racks and Hart's combined deck-sash ratchets, pivots and stops.

PUMPS.—The American Well Works, Aurora, Ill., has devoted catalog 124 to illustrations and brief descriptions of the standard types of "American" centrifugal pumps. This company has also issued bulletin 122, supplementing the general deep well catalog No. 110 and the general centrifugal catalog No. 117.

ELECTRIC LOCOMOTIVES.—The General Electric Company, Schenectady, N. Y., has published three bulletins on electric locomotives. Bulletin 4829 deals with electric locomotives for industrial railways, bulletin 4852 is devoted to 50-ton electric locomotives for interurban roads and bulletin 4867 describes electric locomotives varying in weight from 22 to 35 tons for switching and light freight service. All these bulletins are illustrated and include tables and diagrams.

Railway Construction.

New Incorporations, Surveys, Etc.

ATCHISON, TOPEKA & SANTA FE.—The line under construction from Lometa, Tex., west to Eden, about 100 miles, is now in operation to Brady, 66 miles. It is understood that an additional section of 16.2 miles to Melvin will be opened for business this month, and it is expected that the entire line will be finished and ready for business by October 16. (April 14, p. 912.)

BARTLETT WESTERN.—According to press reports, this company has started work on an extension from Jarrell, Tex., west to Florence, 12 miles, and it is expected that the work will be finished by October 1. (June 30, p. 1713.)

BRINSON RAILWAY.—This road has been extended from Sardis, Ga., northwest to Waynesboro, 19 miles.

BRITISH COLUMBIA ELECTRIC.—Construction work will be started soon, it is said, on a line from New Westminster, B. C., to Millside.

BUTLER COUNTY.—This road has been extended form Melville, Mo., to Menorkenut, 10 miles.

BUTTE, BOISE & SAN FRANCISCO.—This company, which was incorporated last year in Montana with $25,000,000 capital, to build from Butte, Mont., southwest through Montana, Idaho, Oregon and California to San Francisco, Cal., is reported to have secured financial backing for the project from English capitalists. An English construction company has been formed, it is said, for the purpose of securing the construction of the line. An advisory board, of which Dr. W. H. Haviland, Butte, Mont., will be a member, will have its headquarters at Butte.

CADDO & CHOCTAW.—See Memphis, Dallas & Gulf.

CALIFORNIA ROADS.—A line will be built from Susanville, Cal., it is said, southeast via Standish, Spoonville and Milford to Doyle, about 50 miles. J. E. Sexton, is interested.

CANADIAN PACIFIC.—The report of this company for the year ended June 30, 1911, shows that the company has 983.3 miles of new line under construction, on which work is now under way, as follows:

Name.	Miles.
Ontario Division.	
Georgian Bay & Seaboard: Coldwater to Bethany	74.7
South Ontario & Pacific: Guelph Junction to Hamilton	16.2
Manitoba Division.	
Virden branch: Virden, northwest to Macauley	35.4
Souris branch extension: Tilston, westerly to Alida	24.2
Saskatchewan Division.	
Moose Jaw branch: Moose Jaw, southwesterly	35.0
Outlook to Kerrobert	102.4
Kerrobert branch: Kerrobert, northeast	25.0
Weyburn branch: Forward, westerly	46.0
Estevan branch: Estevan to Forward	55.0
Bulyea branch: Craven to Bulyea	21.0
Colgesay branch: Regina to Colgesay	133.1
Swift Current branch, southeasterly	45.0
Wilkie branch: Wilkie, southeast to Anglia	31.0
Wilkie, northwest	32.0
Alberta Division.	
Kirkwie branch: Irricana, east	36.7
Bassano line: Bassano, northwest to junction with Kirkwie line	35.5
Swift Current branch, northwest	35.0
Crow's Nest Pass line: Kipp branch, Carmangay, northwest to Aldersyde	56.3
Waldo branch: Galloway to Waldo	13.4
Calgary & Edmonton: Lacombe branch, Castor, east	60.0
British Columbia Division.	
Three Forks to White Water	3.5
Kootenay Central: Golden, south	42.0
Wardner, north	24.9
Total	983.3

By the construction of a 16.2 mile line between Hamilton, Ont., and Guelph Junction, the distance from Hamilton to points in western Ontario will be shortened, and an agreement has been made with the South Ontario Pacific Railway for the construction of the line and for a lease of it when completed. The general improvement work done during the year included enlarging terminal yards and buildings, providing additional shops and machinery, and laying many miles of new passing tracks and extending the telegraph lines. This work was continued during the year, and amounted to $18,000,000. The double-track work between Winnipeg, Man., and Brandon, is nearing com-

pletion, and second-track will probably have to be laid on some portions of the main line between Brandon and Calgary, Alb., in the near future.

An officer writes that grading contracts have been let as follows: Moose Jaw, Sask., southwest, 35 miles; Swift Current, northwest, 35 miles; Swift Current, southeast, 45 miles; Weyburn, westerly, 20 miles, and Jukeson, B. C. to Fort Steele. 25 miles, to Foley Brothers, Welch & Stewart, St. Paul, Minn. Wilkie, Sask., southeast, 25 miles; Wilkie, northwest, 32 miles, and Wilkie, southwest, 25 miles, to Dutton & Timson, Winnipeg, Man. Estevan Sask., northwest, 55 miles, to J. D. McArthur. Golden, B. C., south, 41 miles, and Galloway, B. C., to Baynes Lake, 12 miles, to Janse-McDonald, Vancouver.

Cumberland Railroad.—This road has been extended south via Lunsford and Jones Trestle to Tunnel, 2.6 miles, and a branch has been opened for business from Lunsford to Anchor, 2.7 miles.

Elkin & Allegheny.—An officer writes that work is now under way from Elkin, N. C., northwest towards Sparta. Surveys for the entire line are not yet finished. Grading has been completed on 12 miles to the foot of Blue Ridge mountains, and track laying has been started. No contract will be let for the work. H. G. Chatham, president, Elkin.

Gulf, Colorado & Santa Fe.—The San Saba district of the Southern division has been opened for business from Lometa, Tex., south to Brady, 66 miles.

Gulf, Texas & Western.—An officer writes that this company is planning to begin work soon on the extensions from the western terminus at Seymour, Tex., west towards Lubbock, and from the eastern terminus at Jacksboro, east to Dallas, with a branch south to Fort Worth. The cut and fill work will average about 16,000 cu. yds. a mile. Maximum grades will be 1 per cent., and maximum curvature 5 deg. (April 28, p. 1016.)

Harrisville Southern.—An officer writes that work is to be started at once from Harrisville, W. Va., westerly following the Hughes river, six miles, to Cornwallis, at which point connection is to be made with the Baltimore & Ohio. The work calls for the removal of about 15,000 cu. yds. of rock and 25,000 cu. yds. of shale per mile Maximum grades will be 1.4 per cent. eastbound, and 1 per cent. westbound, and maximum curvature 16 deg. There will be two steel bridges, 90 ft. and 100 ft. respectively, and about one-half mile of trestle work. The company has taken over the rights and property of the Harrisville & Cornwallis, and will finish the work on this line which was started in 1908. The masonry for bridges and about half the grading work is finished. W. O. Stout, president, and C. A. Kriechbaum, chief engineer, Harrisville.

Harrisville & Cornwallis.—See Harrisville Southern.

Hot Springs, Glenwood & Western.—See Memphis, Dallas & Gulf.

Lehigh Valley.—This company has opened for operation a new branch, known as the South Side Industrial branch, from the main line at Glendon, Pa., on the Lehigh river, to Easton, two miles, with a spur from this line of about .5 miles.

Louisville & Nashville.—The Wasiota & Black Mountain, on the Cumberland Valley division, has been extended from Baxter, Ky., to Harlan, two miles.

Memphis, Dallas & Gulf.—An officer writes that this line is now in operation between Ashdown, Ark., and Pine Bluff on the following sections: From Ashdown, Ark., northeast to Murfreesboro, 41 miles; Roseboro to Cooper, 13 miles; Glenwood to Wiggs, 23 miles, Dollark to Fairview, 17 miles, and from Carpenter to McLeod, 16 miles, a total of 110 miles. The company has recently taken over the Caddo & Choctaw, 12 miles, which will be given as the Murfreesboro division, and the Hot Springs, Glenwood & Western, 23 miles, to be known as the Hot Springs division. Work is now under way on sections as follows: Murfreesboro to Bear Creek Junction, 18 miles; Roseboro Junction to Glenwood, three miles; Lowenberg to Hot Springs, 13 miles, Fourche Mountain to Shawmut, 12 miles, two miles east of Shawmut to Forkville, 21 miles, and Dollark to Pine Bluff, 63 miles, a total of 130 miles. No grading has yet been done between Lowenberg and Hot Springs, or between Dollark and Pine Bluff, but is now under way between Murfreesboro and Bear Creek Junction and between Brown and Arkadelphia. About 10 miles of track has been laid since the first of the year between Shawmut and McLeod. This latter station is midway between Shawmut and Arkadelphia, and is not the station on the Graysonia branch, which is to be abandoned. The contractors now carrying out the work are: T. H. Sater & Brother and W. C. Murphy, both of Murfreesboro; J. Thorn, Graysonia; W. C. Tellar, Leard; C. J. Philpot, Kirby, and W. S. Wilson, Rock Creek. (March 31, p. 814.)

Meridian & Deepwater.—An officer writes that the company is now carrying out construction work with its own men, but that contracts for building the eastern end of the line will be let in October. The plans call for a line from Meridian, Miss., east via Causeyville, Blankstown, Yantley, Ala., and Pennington, to Myrtlewood, on the Louisville & Nashville, about 50 miles. The work calls for handling about 20,000 cu. yds. a mile. Maximum grades will be 1 per cent., and maximum curvature 4 deg. There will be a 400-ft. steel bridge over the Tombigbee river. The line will carry cotton, timber, coal and agricultural products. Under the name of the Meridian & Memphis, a line is to be built from Meridian, northwest via Philadelphia or Union, thence via Carthage and Kosciusko to Winona or Granada, about 100 miles. Surveys are not yet made and contracts will be let after January 1. The work calls for the handling of about 15,000 cu. yds. a mile. Maximum grades will be 1 per cent., and maximum curvature 4 deg. There will be a 300-ft. steel bridge over Pearl river. S. A. Neville is president of both companies, Meridian, and W. C. Stowell, chief engineer, Chicago. (July 28, p. 198.)

Meridian & Memphis.—See Meridian & Deepwater.

Missouri, Kansas & Texas.—See item under State Commissions.

Nashville, Lafayette & Eastern.—Incorporated in Tennessee with $10,000 capital, to build a railway in Macon county, Tenn. The incorporators are: R. L. Morris, W. H. Whorley, J. L. Holland, J. M. Hodges, M. S. Freeman, P. East, J. M. McDonald and S. M. Johnson.

Norfolk & Western.—The report of this company for the year ended June 30, 1911, shows that double-track work is in progress from Vivian, W. Va., 5.03 miles, including four tunnels. This work is expected to be finished about November, 1911. At the Kenova bridge over the Ohio river the grade on the east approach is being reduced from 0.5 per cent. to 0.3 per cent., and the viaduct and bridge will be double-tracked, removing 0.7 miles of gauntlet. This will be finished in 1912, and on completion of this work the company will have in operation between Lamberts Point, Va., and Columbus, Ohio, including as second-track the lines around Petersburg, Va., and Lynchburg and the Big Sandy line, 512.09 miles of double-track main line and 191.67 miles of single-track, including two gauntlets, 0.38 miles and 0.55 miles respectively. The Petersburg Belt Line extends from Poe, Va., to Addison, comprising 8.87 miles of main line, and 1.69 miles of connecting tracks with the Atlantic Coast Line and the Seaboard Air Line, and 4.06 miles of sidings. The main line was put in operation on June 29, 1911. The Dry Fork branch and connections has been extended to Operation No. 4 of the New River & Pocahontas Consolidated Coal Company. The total length in operation is 30.11 miles, and construction work is under way from the present end of track between Canebrake, W. Va., and the Beech Creek branch, on 1.04 miles. Work is also under way on the Beech Creek branch from the connection with the Dry Fork branch to a junction with the Indian Creek branch at the Virginia state line, 1.56 miles, and on the Indian Creek branch, from its junction with the Beech Creek branch at the West Virginia state line, to Cedar Bluff, Va., 12.22 miles, and Y connection 0.37 miles at Cedar Bluff. All this work is expected to be finished in 1912 and will complete a connection with the main line at Iaeger, W. Va., and the Clinch Valley district at Cedar Bluff, Va. Work is now under way on the North Fork branch of Tug Fork branch, from Jeanette, W. Va., 4.31 miles, and work has been finished on the Sycamore branch from a point 2.8 miles east of Williamson, W. Va., up Sycamore creek to the coal operation of the Sycamore Coal Company, 2.69 miles. The Winston-Salem Southbound has been finished from Winston-Salem, N. C., south to Wadesboro, 89 miles, where connection is made with the Atlantic Coast Line. This line was built jointly by the Norfolk & Western and the Atlantic Coast Line. Further progress has been made in securing right-of-way for the Guyandot

& Tug River Railroad and connections. The general plans relating to the union passenger station at Norfolk, Va., have been arranged and the Norfolk Terminal Company has entered into operation agreements with the Norfolk & Western, the Virginian Railway and the Norfolk Southern, under which these three companies will use the terminal facilities of the Norfolk Terminal Railway Company in Norfolk. A mortgage has been given by the terminal company to provide funds for the construction of the terminal. Land has been secured for the terminal facilities, and contracts have been let for the station and office building. It is expected that the terminal will be ready for use about the middle of 1912.

Norfolk Terminal Company.—See Norfolk & Western.

Panama-David.—Bids for the construction of the line from the city of Panama, in the republic of Panama, west to David, about 361 miles, with branches to the province of Los Santos and the town of Anton, have been rejected, as they did not comply with the specifications. Two weeks were allowed contractors to submit new bids. All the bidders represented American syndicates.

San Antonio, Rockport & Mexican.—Incorporated in Texas with $350,000 capital, and office at San Antonio, Tex., to build from San Antonio, south through Bexar, Atascosa, McMullen, Duval, Starr and Hidalgo counties, to a point on the Rio Grande, about 250 miles, with a diverging line from a point in the southern part of Atascosa county, southerly through McMullen, Live Oak, Bee, San Patricio, Refugio and Arkansas counties to Rockport, thence to Port Aransas, on Harbor island, 110 miles. A. L. Matlock, San Antonio, and residents of that place, are back of the project.

San Diego & Arizona.—A contract is said to have been given to Robert Sherer & Co., to build from Seeley, Cal., west to San Diego, about 80 miles, and work is to be started at once. E. J. Kalbright, chief engineer, Union building, San Diego.

St. Louis Southwestern.—This company began operating trains September 3, over the extension from Hamilton, Tex., to Comanche, 25 miles. (July 21, p. 159.)

Seaboard Air Line.—The Dunnellon branch has been extended from Dunnellon, Fla., south to Inverness, 18 miles.

South Carolina Western.—This road has been extended from Darlington, S. C., to Florence, 10 miles.

South Ontario Pacific.—See Canadian Pacific.

Springfield & Southwestern.—Incorporated in Missouri with $2,000,000 capital, to build from Springfield, Mo., west via Paris Springs, to Carthage, about 60 miles. D. H. Mackay, president; L. N. Smith, vice-president; J. P. McCammon, secretary, and J. T. Woodfill, treasurer, all of Springfield.

Terminal Railway.—Incorporated at Portland, Ore., with $200,000 capital, to build from Marshfield via North Bend and Empire to Sunset bay. J. W. Bennett, J. H. Flanagan, W. S. Chandler and A. Mereen, are incorporators.

Wasiota & Black Mountain.—See Louisville & Nashville.

Wheeling & Lake Erie.—The report of this company for the year ended June 30, 1911, shows that the improvements which were under way during 1910, including grade reduction work, removal of track from the C. & P. right-of-way bridge renewals, putting up new shops and other structures are about finished. In addition to the bridge work already carried out, contracts have been let for the construction of the piers, the abutments and putting up steel work for bridges, as follows: Over the Sandusky river at Fremont, Ohio, 387 ft. long; over the Huron river at Monroeville, 205 ft.; over the same river at Norwalk, 240 ft., and over the Vermillion river at Clarksfield, 164.9 ft. During the year the rails on 40 miles of track were taken up and used elsewhere as follows: 16.5 track miles between Pittsburgh Junction and Pine Valley, replacing lighter sections, and 12.78 miles on passing tracks, industrial sidings, etc. At Brewster a car repair yard with a capacity of about 100 cars was constructed. There was 7.1 miles of track laid at the Brewster terminal, including shop, car repair and coach tracks. A large amount of track renewal work will probably be carried out during the coming year on the main line and branches on a total of about 195 miles, and some new bridges will be put in to replace the present structures.

West Virginia Roads.—The Kanawha-Ohio Valleys Trade Promoting Co., with general offices at Parkersburg, W. Va., is planning to build about 300 miles of railway lines in West Virginia to be operated by electric and gasolene motor cars. One of the proposed lines run from Charleston, north via Sissonville, Cicerone, Ripley, Sandyville, Parkersburg, thence east to Weston, with a branch from Cicerone, east via Walton to Nicut, and eventually south to Summersville. A number of short branches are proposed west to Poca, Millwood, Ravenswood and Blennerhassett, also north to Boaz, and to Waverly. The plans call for a branch from the Weston line at Troy, south to Glenville, and another branch from the Nicut line at Walton, north to Spencer. A line is also projected from Newmartinsville, east to Hundred. Between Charleston and Parkersburg, 90 miles, there are three divides to cross, involving the piercing of three tunnels. Surveys are to be started about November 1. Kenner B. Stephenson, president, Parkersburg. Colonel A. E. Boone, Zanesville, Ohio, is interested in the project.

Wichita Union Terminal Railway.—This company has given a mortgage, the proceeds of which are to be used for elevating the tracks for about two miles of four railway companies through the city of Wichita, Kan., and to construct a passenger station on Douglas avenue. There will be a four-track main line, with additional tracks and spurs; and a large amount of new construction will be carried out. The Atchison, Topeka & Santa Fe, the Chicago, Rock Island & Pacific, the St. Louis & San Francisco, and the Kansas City, Mexico & Orient are interested in the terminal railway.

RAILWAY STRUCTURES.

Antioch, Ill.—The Minneapolis, St. Paul & Sault Ste. Marie has let the contract and started construction on a new passenger station.

Artesia, N. Mex.—The Atchison, Topeka & Santa Fe is having plans made, it is said, for putting up a new station at Artesia.

Atchison, Kan.—The Atchison, Topeka & Santa Fe has let the contract for building an extension to the present freight house and remodeling and enlarging its freight yard.

Auburn, Wash.—The Northern Pacific, it is reported, has let a contract amounting to $150,000 for building a 25-stall roundhouse, machine shop and coaling station.

Cementon, Pa.—See Meshoppen, Pa.

Chiloquin, Ore.—The Southern Pacific will build a new station, it is said, at Chiloquin.

Fullerton, Pa.—See Meshoppen, Pa.

Grafton, W. Va.—The Baltimore & Ohio is enlarging and remodelling the freight house at Grafton. A second story is being added to the building for the use of the clerical force, and the platforms of the freight building are being lengthened.

Hawkins, Pa.—See Wilmerding, Pa.

High Bridge, Ky.—The new high bridge of the Cincinnati, New Orleans & Texas Pacific, over the Kentucky river, was put in service September 11. This bridge spans the gorge of the Kentucky river. It is 31 ft. higher than the old bridge it replaces, and is one of the highest railway bridges in the world. The new bridge was built on the same foundation as the old bridge and without interfering with traffic; and, like the old bridge, was erected on the cantilever principle and is of steel throughout, with stone piers. It is 1,230 ft. long and the track level is 308 ft. above low water mark. Over 7,000 tons of steel and 178,500 field rivets were used. The new bridge is designed for double track, and much heavier locomotives can now be used. The increased height is to make easier grades north and south of the bridge. The Queen & Crescent has also been rebuilding 13 light bridges on the line between Danville and Cincinnati. (February 3, p. 261.)

Huachuca, Ariz.—The Southern Pacific, it is said, will build a new station at Huachuca.

Kelso, Wash.—The Northern Pacific has given a contract to

Thomas Brady, St. Paul, Minn., it is said, for putting up a station at Kelso. (March 3, p. 436.)

Leighton, Pa.—See Meshoppen, Pa.

Lexington, Ky.—The Kentucky Traction & Terminal Company has let contracts for a power house and equipment to cost about $500,000.

Meshoppen, Pa.—The Lehigh Valley is building three stations of terra cotta construction, at Meshoppen, Fullerton and Cementon. It is probable that similar stations will be built at Trumansburg, N. Y., and at Leighton, Pa.

Mexico, Mo.—The Chicago & Alton has let the contract for building a one-story brick and concrete freight house 28 ft. x 115 ft. The structure will have a cold storage room 10 ft. x 16 ft., a platform scale 5 ft. x 6 ft., a wooden platform 12 ft. x 127 ft., steam heat and electric light.

Moline, Ill.—The Chicago, Burlington & Quincy has let the contract for building a one-story brick freight house 50 ft. x 1,200 ft., to cost approximately $20,000.

Pasco, Wash.—The Northern Pacific will soon ask for bids, it is said, for putting up new terminal buildings at Pasco. The estimated cost of the work is $500,000. (July 14, p. 106.)

Portland, Ore.—The Portland Railway & Light Company has let the contract and started construction on its new car plant, where it will build all its own cars in the future. Foundations for the main building are now laid and work is being pushed as rapidly as possible. The plant will cover about 20 acres, and will cost $500,000.

Reedley, Cal.—The Atchison, Topeka & Santa Fe Coast Lines has given a contract to Sharp & Fellows, Los Angeles, for putting up a concrete and steel bridge over Kings river at Reedley. The bridge is to be 680 ft. long and will have two truss spans, each 175 ft.; three girder spans, each 100 ft., and one girder span, 30 ft. It is understood that the improvements will cost about $160,000. (June 30, p. 1715.)

San Diego, Cal.—The Atchison, Topeka & Santa Fe Coast Lines has given a contract to Sharp & Fellows, Los Angeles, at about $200,000 for putting up new freight terminals at San Diego.

St. Clair, Pa.—The Philadelphia & Reading is reported to have started construction on a new power house.

St. Maries, Idaho.—The Chicago, Milwaukee & Puget Sound will build a roundhouse and repair shops at this place. The contract for grading the yards and building the side tracks has already been let.

South Pasadena, Cal.—The Pacific Electric will build a new station at South Pasadena, it is said, to cost in the neighborhood of $50,000.

Sycamore, Ill.—The Chicago, Great Western, it is reported, will build a reinforced concrete coaling station at Sycamore to cost about $25,000.

Toronto, Ont.—Contracts have been given to the George A. Fuller Company, New York, to build the new office building for the Canadian Pacific in Toronto, to cost $1,000,000 also for building the new head for the Grand Trunk Pacific at Winnipeg, Man., to cost $1,250,000. (August 18, p. 358, June 3, p. 1675.)

The city of Toronto expects to ask for bids some time this month for constructing a double-track subway about three miles long. G. R. Geary is mayor, Toronto.

Trumansburg, N. Y.—See Meshoppen, Pa.

Vancouver, B. C.—The Great Northern has given a contract to W. H. Lowe, it is said, for constructing a dock at the foot of Campbell Avenue, in Vancouver. (June 23, p. 1675.)

Wichita, Kan.—See Wichita Union Terminal Railway, under Railway Construction.

Wilmerding, Pa.—The Pennsylvania Railroad is putting in new concrete and steel overhead bridges at Wilmerding and at Turtle Creek, on the Pittsburgh division, to replace the present structures.

Winnipeg, Man.—See Toronto, Ont.

Railway Financial News.

Denver & Rio Grande.—See comment on the annual report of this company elsewhere in this issue.

Eagle's Mere Railroad.—This property has been bought at foreclosure sale by the bondholders' committee for $20,000. This narrow gage road runs from Sonestown, Pa., to Eagle's Mere Park, 10 miles. (April 28, page 1017.)

Florida East Coast.—This company has declared a dividend of 4 per cent. on its general mortgage income bonds. This is an advance of one-half of one per cent. over the dividend declared in 1910.

Grand Trunk Pacific.—This company has sold privately in London an additional $3,000,000 of its 4 per cent. debentures.

International & Great Northern.—The Texas Railroad Commission has suspended all negotiations with the International & Great Northern in regard to a revaluation of the property until the road has been discharged from receivership. It is understood that this will not affect the commission's decision on the question of authorizing the issue of $11,000,000 5 per cent. bonds.

Iowa Central.—J. J. Slocum, representing the Russel Sage estate, has been elected a director, succeeding Charles W. Osborn, resigned.

See also Minneapolis & St. Louis.

Minneapolis & St. Louis.—Plans are under way for the leasing of the Iowa Central. (August 18, page 358.)

National Railways of Mexico.—Many papers of late have printed articles tending to show that the stock control of the National Railways of Mexico had passed from the Mexican government to certain banking houses in New York. An executive officer of the National Railways has made the following statement to the *Railway Age Gazette:* "Control of the National Railways of Mexico is now where it was when the merger of the Mexican Central and the National Railroad of Mexico was completed, namely, in the hands of the Mexican government. There is no move on foot of any nature to endeavor to have control passed to any group of New York bankers or to any financial interests elsewhere. English papers of late have intimated that railway conditions in Mexico are growing more serious each day. This is entirely erroneous. Conditions of the railways in Mexico are growing better each day, and so far as the National Railways of Mexico is concerned, this is strikingly borne out by the fact that since the revolution ended in May, there has been a rapid recovery in earnings of the company. In June, the month after the revolution was settled, earnings for this company showed a decrease of 2 per cent. from June of the preceding year. In July, earnings showed an increase over the previous July of almost 1 per cent., and in August of 3 per cent. over the corresponding month the year before. It should also be noted that earnings in July and in August a year ago were over $6,000,000 Mexican currency ($3,000,000 gold) each month, and these large figures were exceeded in July and August this year. At the present time the political situation is clearing itself rapidly and prospects for good earnings for railways are very bright."

New York & Harlem.—A semi-annual dividend of 2 per cent. has been declared on the stock of the New York & Harlem out of the money received as the rental from the receivers of the Metropolitan Street Railway, which leases the street railway property of the New York & Harlem. This dividend is an increase of 1 per cent. per annum, and puts the rental on the same basis that prevailed prior to the franchise tax litigation.

Western Pacific.—See comment on the annual report of this company elsewhere in this issue, also earnings and expense table for July earnings.

Wichita Union Terminal.—William A. Read & Company, New York, have bought the $2,500,000 30-year 4½ per cent. gold bonds of the company. They are guaranteed jointly and severally by the Atchison, Topeka & Santa Fe, the Chicago, Rock Island & Pacific, the St. Louis & San Francisco and the Kansas City, Mexico & Orient. The proceeds are to be used for track elevation of the four roads in Wichita, Kans., and for a union passenger station.

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GENERAL NEWS SECTION

THE Erie Railroad is to be congratulated on the existence of a very satisfactory situation in relations between its officers and its grievance committees—the committees which represent employees who, when penalized for errors or misconduct, appeal for a reversal or mitigation of their sentence. We are glad to print the letter of General Superintendent Stone, telling of this. But we must demur at his assumption or implication that all roads, or roads generally, are in the happy condition of the Erie, and that what we said about superintendents, dealing out just discipline, being overruled by higher officers, who are willing to subvert discipline to a certain extent, is based on an imaginary state of things. To a limited extent the difference of viewpoint between the division superintendent and his superiors means an irrepressible conflict. Bound to maintain his own reputation, he must resist every proposal of the general manager to mollify the committee by "giving them something"; and yet the general manager, considering all the divisions of the road, some having superintendents far from perfect, and considering also, perhaps, important elements of diplomacy for which the division officer is not responsible, may feel justified in sacrificing this particular superintendent in a single case. The superintendent has no remedy, of course, unless he deems the case important enough to warrant him in resigning his job. Happily, as we believe, no general manager deems it necessary thus to temporize except in rare cases. But, whatever the course of the superior, the only permanent attitude that the division superintendent can consistently maintain is that of defending all of his acts and insisting on full recognition of their justice. That he is a just and wise and competent superintendent is assumed. The task of measuring up that standard is another matter, not here under discussion.

AND it must be said that the Erie is different from many roads in one other thing: in having grievance committees that go away convinced in their minds and feeling pleasant in their hearts, which is the impression we get from Mr. Stone's letter. We know that many committees the exact opposite of this still flourish. Moreover, a spirit of discontent and disappointment is natural in a griever whose grieving has failed. We do not blame him. In a controversy in court both parties pay lawyers large sums not only to grieve loudly, but to keep up the grieving attitude for some little time after they are defeated. And just so far as a committeeman possesses the spirit of his grand chief he persistently avoids agreeing with the railway superintendent, for the reason that disagreements constitute one of the elements supporting his official life. They are his stock in trade. Even so, the committeeman who works for peace, quietness and economy holds a very useful place in the world, and every intelligent well-wisher of railway employees should rejoice to see his tribe increase. We know of other fortunate roads besides the Erie. On one of them the superintendent and the committee this very year are in such complete accord that the committee has offered to submit to a slight temporary reduction in pay to meet a temporary embarrassment of the company. There is one other railway employees' committee that has lately elicited our admiration; one which went through a serious and protracted negotiation with the manager concerning wages, yet never had a word of it printed in the newspapers. Thus, while the demagogic committeemen still flourishes, the candid and level headed are to be found also. Returning to our original subject, harmony between the superintendent and the general office is promoted if before taking final action in cases where the question of an employee's discharge is a matter of careful judgment, he reports the whole case to his superior, suspending the employee in the meantime. The superintendent's authority is not weakened; in most cases he acts summarily. But when the offence is not flagrant and the employee's whole record has a bearing on the question, not only is the higher officer better fitted to judge what is for the good of the service in such cases, being uninfluenced by personal contact with the employee, but he gets before him the facts before the grievance committee appeals to him. Also, it is desirable that the superintendent be present when the general manager receives the committee. It has a wholesome effect on the latter.

THE article on Farming Communities and Permanent Railway Labor, published in another column, takes up several interesting points, and the arguments based on them are sound. The Italian is a natural born track laborer; he likes to work with earth. Our need for good section foremen is now even greater than our need for laborers, and the Italian makes a first rate section foreman when handling men of his own nationality. He retains enthusiasm for his work without the hope of

advancement to a higher position, and perhaps the most important of his qualifications is his frugality, which, as pointed out by the author of the article referred to, enables him not only to live on the small wage our railways pay, but to save enough to invest in land or other property. It is worth while to encourage the supply of such labor, and the traffic to be derived from successful Italian farm communities is also worth working for. We have called attention several times during the last year to the figures of the last census, showing the drift of population toward the cities. We have pointed out that in this movement there is a gain in traffic revenue, caused partly through the increase in high class merchandise. But the Italian, in general, does not contribute to this when he lives in a big city. He neither produces nor consumes high class merchandise. At present we are losing more alien laborers than usual. In the three weeks ending September 13, 1911, only 36,000 third class or steerage passengers arrived in New York, as compared with 61,000 during the same period of 1910; while 29,000 left New York for Europe as compared with 24,000 last year. These figures are roughly typical of what has been happening since last winter. The cholera in Italy the past summer has had some effect on emigration from southern Italy to this country, but it has not apparently affected the numbers of Italians returning home.

AS we recently showed there has been about 52 per cent. increase during five years in the number of stockholders in 12 large dividend paying railway companies. The principle of actual redistribution is not much affected if a stockholder in one railway buys into another, for the main idea of fundamental confidence in the railways remains. Of more importance is to what extent the redistribution has come from large holders. Probably there has been some liquidation of considerable holdings, though this liquidation has, it is likely, affected speculative rather than investment ownership and has also affected much less the railways than the industrial group of stocks. Surely it is a desirable result where the speculative block of shares is divided into many smaller investment blocks; and even if the large investment block is similarly split up, is there, in general, anything worse to be inferred than an individual investor's timidity—or, it may be prudence, if he has too many investment eggs in one basket. But it is important that, whatever the number of railway stockholders who have sold, a larger number have bought; that this process has gone on during a period when railways were suffering; and that the result of the tendency has been a popularizing of the railway investment.

THE TRANSCONTINENTAL RATE CASES.

LIKE Banquo's ghost, the cases involving the rates of the railways to Spokane, Salt Lake City and other western intermountain points, will not down. The Interstate Commerce Commission has rendered numerous opinions in these proceedings. Its latest were made public about two months ago. Since then the lawyers and traffic men of the transcontinental lines have been in almost constant conference as to what to do about the commission's orders. The more they have conferred the more probable it has grown that the railways will not adjust the rates as desired by the commission without a struggle in the courts.

There are three possible ways of making logical rates to the Pacific coast terminals and to intermediate points, depending on the theory of the correct way to make rates in general, with which one starts as a premise. (1) One theory is that rates should be based solely on what the traffic will bear and some have in other words, that they should be based on the value of the service rendered to the shippers and communities. The traffic manager, acting exclusively on this theory, might be led to adjust the rates relatively that prevail between the existing rates, although the rates to the Pacific coast terminals might in some cases be reduced more or less, because the water-borne traffic is increasing, which shows that in a good many cases the railway rates are higher than the traffic by rail will bear.

(2) A second theory is that rates should be based entirely on the cost of the service. The cost of the service does not increase in proportion to distance, but it does increase with distance, and, therefore, on this theory all rates should increase with distance. If the cost of service principle be correct, even to charge as high a rate for a shorter as for a longer haul, is an unjust discrimination. The difference between charging a higher rate for a shorter haul than for a longer haul, and the same rate for a shorter as for a longer haul, is purely one of degree and not of kind.

(3) A third theory as to the correct way to make rates, is that ordinarily they should increase as the cost of the service increases, but that they should be based on the value of the service as well as on the cost of the service, and that, therefore, when the value of the service rendered in making a long haul is as small as, or smaller than the value of the service rendered in making a short haul, the railway should be allowed to make a rate for the longer haul as low as, or lower than the rate for the shorter haul. On this theory the railways would be permitted to make rates to the coast which would enable them to share in the traffic with the steamship lines, so long as they covered the direct, or "out of pocket" expenses of transportation. On the same theory, they would be allowed to make rates from the coast terminals back to the interior points and from the east to the interior points which, taking into consideration both the cost of the service and the value of the service, and regardless of the rates to the coast, would be reasonable in themselves. The rates as a whole, including both those to the coast and to the intermediate points, would yield sufficient revenue to cover total operating expenses and reasonable average net earnings. The rates to the coast would, no doubt, be less than the rates to the interior, but this would be justifiable on the ground that, owing to the presence of water competition at the coast, the value of the service of railway transportation there is less than it is to the interior, and that the roads have to charge the higher rates to the interior in order to cover their total expenses. There would undoubtedly be discrimination against the intermediate points, but it might be contended with great force that it was not undue discrimination. The interior points on this basis would have rates which were reasonable *per se*. Communities on the coast would have lower railway rates, but they would have them because of the dissimilarity in conditions created by the presence of water competition. If the railways did not make the lower rates to the coast the water lines would still make them, and the places on the coast would still enjoy the benefits of lower rates. The only difference in the conditions created by the course of the railways in making the lower rates to the coast is to enable them to divide with the steamship lines traffic which otherwise would move entirely by boat; and the interior points are not injured by the railways dividing this traffic with the boats.

The railways of the United States long have been the objects of severe criticism on the ground that they have not fixed their rates according to any logical method. These criticisms when directed against the transcontinental rate structure have been especially severe. The strictures that members of the Interstate Commerce Commission have passed on it, have not been the least drastic of all. The cases involving these rates have now been before the commission continuously since it was given its power to fix rates by the Hepburn act five years ago. Certainly this has been long enough to give it every opportunity to study all the theories that have been advanced as to the correct way to make rates and to familiarize itself with the conditions to which the rates of the transcontinental railways

apply. It would seem, therefore, that by this time it should be able to indicate a logical method according to which to revise these rates and even to suggest the exact rates to be applied. But it has not succeeded in satisfying the railways and communities affected that its conclusions are either logical or just. Some consideration of the commission's opinion may show why this is true.

The commission's opinion of June 22, 1911, in the Spokane case may be taken as typical of its latest opinions in all these cases. It is well known that the railways have, for some years, made practically all of their rates from the territory east of St. Paul and the Missouri river to the Pacific coast with a view to meeting water competition and that their rates to many intermediate points have been the sums of their rates to the Pacific coast terminals and the local rates back. The commission in its decision holds that from St. Paul and the Missouri river the railways may make no higher rates to intermediate points than they make to the Pacific coast terminals, and that from other parts of the country they make rates to the intermediate points no more than the following percentages higher than their rates to the coast: Mississippi river, 7 per cent.; Chicago, 7 per cent.; Detroit, 15 per cent.; Pittsburgh, 15 per cent.; New York, 25 per cent.

On what principle is it required that thees relations shall be established between these various rates? Obviously, not on the principle of what the traffic will bear. Nor are they based on the cost of the service. The proposed adjustment would, for example, allow the railways to charge a rate of $1 per 100 lbs. from both St. Paul and New York to Seattle, although the distance from St. Paul to Seattle is only 1,900 miles, while from New York it is 3,300 miles. Even the adjustment required from eastern points to intermediate points is not based on cost. Taking the mileage and the proposed rates from St. Paul to Spokane as 100 per cent., the mileage and rates from other eastern points to that city would compare as follows:

To Spokane, rates from—	Missouri River.	Mississippi River.	Chicago.	Detroit.	Pittsburgh.	New York.
	100 p.c.	107 p.c.	107 p.c.	115 p.c.	115 p.c.	125 p.c.
Distance from Spokane—						
	100 p.c.	115 p.c.	126 p.c.	146 p.c.	160 p.c.	193 p.c.

It will be seen that the distances increase very much faster in proportion than the rates. No one would say that an increase of 15 per cent. in the rate was in proportion to an increase of 60 per cent. in the length of haul, or that an increase of 25 per cent. in the rate was in proportion to an increase of 93 per cent. in the length of haul. The commission has not ordered that the rates to the interior be based even approximately on the cost of service.

A moment's consideration is enough to show that neither has it ordered the rates to be made according to the third method that has been mentioned as logical. In its decision in the Spokane case on February 9, 1909, it recognized the controlling force of water competition on the Pacific coast, conceded that therefore the roads must be allowed to make their rates there regardless of their rates to intermediate points, but held that their existing rates to intermediate points were excessive *per se.* and ordered certain reductions in them which it believed would make them reasonable *per se.* That decision could not be attacked on any ground of law or economics, except on the ground that, as a matter of fact, the reductions in intermediate rates ordered were unreasonable. But in its opinion of June 22 while still conceding the controlling force of water competition, the commission holds, not merely that the roads must make reasonable rates to the intermediate points, but that they must make rates to the intermediate points which will always bear certain percentage relations to their rates to the coast. As we have seen, it did not base these relations on the ground of differences in cost; it did not base them on what the "traffic will bear"; it did not base them on the principle that in no case should a higher charge be allowed for a longer than for a shorter haul, because from all points east of the Missouri river it allows higher rates to be charged for the shorter hauls.

Then, on what principle did it base them? We have studied its opinions carefully, almost prayerfully, and we have been unable to find out. The traffic managers of the railways have often been criticized for—as has been alleged—making rates merely according to their "guesses" as to what would be right. The commission has indulged in a good deal of such criticism. There is a lot of impassioned utterance on the subject, for example, in Commissioner Lane's opinions in the rate advance cases and in these Pacific coast rate cases. Commissioner Prouty, in his latest opinion in the Spokane case, expressly declares that the commission cannot make rates in the way sometimes attributed to railway men. "The commission," he says, "cannot act arbitrarily," in determining when and to what extent railways may charge lower rates for longer hauls; Congress "did not intend to leave this to the mere whim of the commission." But when the commission came to fix the relations between the rates it apparently forgot all about Mr. Lane's views regarding cost of service (see his opinion in the western rate advance cases), and all about the illegality of the commission making rates "arbitrarily," or according to "a mere whim," and suggested an adjustment of rates which would be wholly artificial and arbitrary—which would perfectly answer to the description that the commission itself gave of the adjustment to Spokane, which the roads once suggested—"founded upon facts which do not exist."

If evidence be wanted that the proposed adjustment of rates is founded on a "mere whim," let us compare it with the adjustments which the commission suggested in its other two opinions in the Spokane case. In its three opinions the commission has suggested the establishment of the following percentage relationships between the rates to Spokane from the East.

To Spokane from—	Missouri River.	Mississippi River.	Chicago.	Detroit.	Pittsburgh.	New York.
Feb. 9, 1909...	100 p.c.	116⅔ p.c.	116⅔ p.c.	No rates ordered,		
June 7, 1910...	100 p.c.	110 p.c	113 p.c.	118 p.c.	125 p.c.	135 p.c.
June 22, 1911..	100 p.c.	107 p.c	107 p.c.	115 p.c.	115 p.c.	125 p.c.

It may be said that the changes of opinion have been due to changes in conditions or in the law, or to the acquirement of additional information. But while the change in the law made by the Mann-Elkins act gave it more power to enforce the long-and-short haul section, that was no reason why it should hold on June 7, 1910, before the law was amended, that a reasonable rate from Chicago to Spokane would be 13 per cent. more than the existing rate from St. Paul, and then, on June 22, 1911, after the law was amended, that a reasonable rate from Chicago would be only 7 per cent. more than the rate from St. Paul. The commission had obtained some new information regarding the loss to the roads the proposed changes in rates would cause, but that was no cause for changing its proposed adjustment, because Commissioner Prouty said in his latest opinion, that of June 22, 1911: "We find nothing in these figures" (the figures made up by the railway since the previous opinion to show what reductions the proposed changes in rates would make in their earnings) "which would incline us to change our opinion as to the reasonableness of the suggested rates . . . . The loss is substantially what the figures which were before the commission when it rendered its decision had indicated." There had been a change in water competition to the coast, as the opinion of June 22 shows; but the change had been an increase in the amount of that competition, which, if it had exerted any influence on the commission, would have tended to cause it to leave to the railways more freedom of action in

dealing with water competition, not less. The changes in the commission's views as to the proper relations to be fixed between these rates confirms the impression that they are not based on any logical ground, and indicate that if its last opinion had been rendered the day before or the day after it was, or if on the day of rendering it the commission had eaten ham and eggs for breakfast instead of, possibly sausage and cakes, the adjustment required might have been quite different!

It may be said that the commission had to fix the rates to intermediate points so that they would vary with the rates to the coast in order to conform to the will of Congress as expressed in the provision that "the commission may from time to time prescribe the extent to which such designated common carrier may be relieved from the operation of this section." This provision, however, was in the law before it was amended by the Mann-Elkins act, and such an interpretation of it is the discovery of an entirely new meaning and potentiality. The commission concedes that the fourth section as it stands would be unconstitutional, but for the fact that a rule for guidance in administering it were prescribed in those other sections of the law which provide that rates must be reasonable and not discriminatory, and which authorize the commission when it finds rates unreasonable or unfairly discriminatory to fix reasonable maximum rates. The fourth section provides "that upon application to the Interstate Commerce Commission such common carrier may in special cases after investigation be authorized by the commission *to charge less for longer than for shorter distances* for the transportation of passengers or property." And immediately after this comes the phrase in which the commission is authorized to prescribe the extent to which such designated common carrier may be relieved from the operation of the section. Taking all these provisions together, it would seem that the full duty of the commission in these cases would be performed if first it fixed maximum reasonable rates to the intermediate points, and, second, determined to what extent the carriers might make lower rates for the longer hauls to the coast, its determination of how much lower these rates might be being based on the "out of pocket" expenses incurred by the railways in handling their business to the coast. When it had determined what would be reasonable rates to the intermediate points and how much lower the railways might make their rates to the coast, it would have carried out the letter and the spirit of the law.

The commission in its last opinion gives facts to show that water competition to the coast is increasing. It has repeatedly mentioned the fact that the Panama canal is under construction and that after it is finished the steamship lines will be able to make even lower rates than they do now. If the railways are to continue to meet water competition the boat lines they probably must in time further reduce their rates to the coast. So long as these reductions do not make the rates less than the "out of pocket" expenses of the service, it would be proper both legally and economically to make them. But, under the commission's order, if water competition should in future compel further reductions in rates to the coast, the railways would [illegible] further reductions in their rates to intermediate points. If other roads, the commission is trying to force the Gulf to Lake roads, to meet water competition to the coast by lower rates, and they meet it by reducing their rates to the coast, the intermediate rates [illegible] by the commission, unless these intermediate points can be shown to be [illegible]. In this respect the commission's orders [illegible]. It is impossible to square the rates either [illegible] the [illegible] which would yield more profit or [illegible] rates to intermediate points would, according to the commission's own decisions, [illegible].

The commission, having specifically affirmed certain rates to certain points to be reasonable, the roads could take these rates as a basis and fix rates to all other points, including those on the coast, which would be relatively the same in proportion to distance, as these rates which the commission has held to be reasonable. This, of course, would involve wholesale advances in their coast rates. It is rather hard to see on what rational ground they could be criticised if they adopted this policy. They would thereby eliminate the discrimination of which there is so much complaint; and they would make no rates which under the commission's rulings, would be unreasonable. The effect, however, would be to entirely change the relative advantages and disadvantages of different communities. The shippers on the Atlantic seaboard, who have water transportation, would be given a great advantage over those at Chicago, St. Louis and other points in the middle west in competing for business on the Pacific coast. It is probable, therefore, such a change would call down bitter denunciation on the heads of the railway managers. They would be charged with making the new rates in retaliation against the commission. But unless the roads shall be able to get the courts to restrain the commission from enforcing its order they will have to choose whether they will so adjust their rates that every reduction in rates caused by water competition will compel a proportionate reduction in rates to intermediate points, or so adjust them as not to fully meet water competition, or perhaps not to meet it at all. If they have to make this choice it would seem that to advance their rates to the Pacific coast, even though the certain effect would be to cause loss of a large amount of traffic, would be the wiser course.

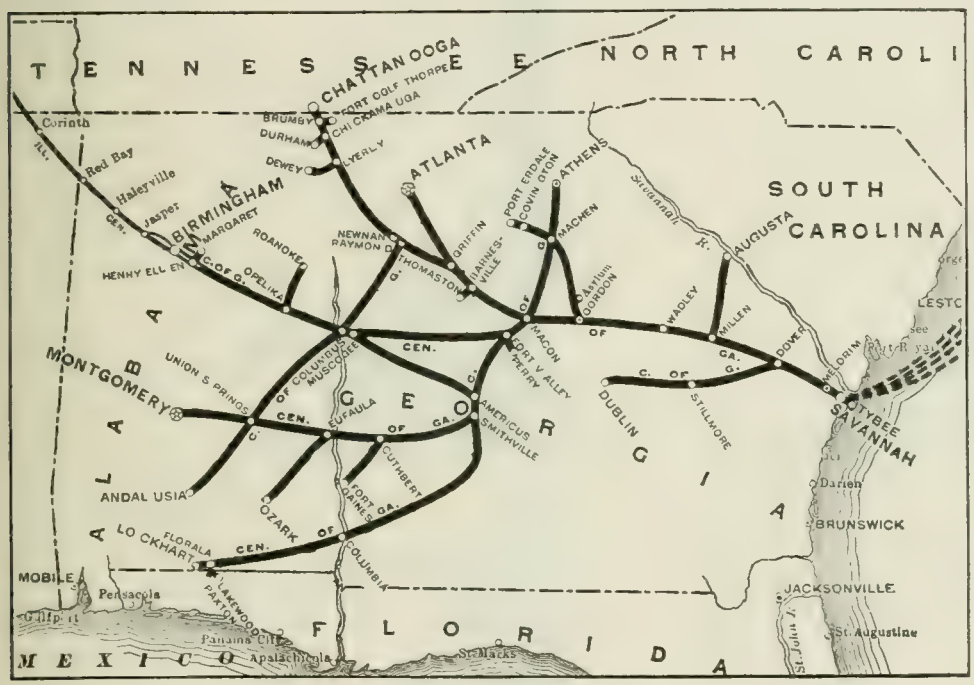
CENTRAL OF GEORGIA.

THE Central of Georgia is characteristic of southeastern roads. It has a great number of branch lines tapping agricultural districts and connecting industrial centers. It is dependent to a large extent on products of agriculture for its most profitable traffic, and it has had and still has a large proportionate mileage that was built cheaply to serve a territory producing only light traffic. With a fairly large capitalization per mile compared with its earning power per mile, the efforts of the management have been directed to rebuilding or strengthening the property in large part from earnings, and this policy has been made more than usually difficult in the case of the Central of Georgia, because the company has outstanding a total of $15,000,000 5 per cent. income bonds. The holders of these bonds have claimed that they were entitled to the payment of their interest before any profits were put back into the property. They have brought suits to enforce their claims and during the past year the courts have rendered a judgment partially granting their claim.

The Central of Georgia is now a Harriman line. It is the Atlantic coast outlet for the Illinois Central, connecting with the I. C. at Birmingham, Ala. It will be interesting to note what [illegible] the Harriman policies take on upbuilding a southeastern road where the character of the traffic, and more especially the character of the people, is so different from that to be found in the Northwest or Southwest. The Illinois Central, of course, [illegible] the Southwest, but the road itself is not typical of southeastern roads. When the Harriman interests gained control it was in a strategic position and in a physical condition that made it quite unlike other roads operating in the Southeast. Possibly it is too early yet to surmise as to what the general policy of those in control of the Central of Georgia will be but there seems to be one thing that may be safely assumed: the controlling interests intend to let the road be improved and brought up to Harriman standards by its own officers rather than by the operation of Illinois Central or Union Pacific officers. During the past year, Mason Harrison died and C. H. Markham, president of the Illinois Central, was elected also president of the Central of Georgia, but there was no other change in general officers, except certain changes in the traffic

department and so far as operation is concerned the road is managed directly from its general offices at Savannah, Ga. Moreover, of its 15 directors, four are of Savannah, two of Atlanta, and one each of Chattanooga, Macon, Birmingham and Montgomery.

The advantages enjoyed by the Central of Georgia through its control by the Illinois Central may be understood by a study of the accompanying map. The Central of Georgia benefits by being made almost the sole means for the distribution throughout the South of traffic moving over the Illinois Ceneral from the Northwest and North. There is, for instance, a considerable movement of grain from points on the Illinois Central, which grain is delivered to the Central of Georgia at Birmingham. Such distributing centers as Chattanooga, Atlanta and Montgomery receive merchandise both from the Middle West, especially from Chicago and St. Louis, and from New York. There is a large merchandise business which the Illinois Central is able to turn over to the Central of Georgia, which traffic, were there no financial relations between the two roads, would be divided probably among the Nashville, Chattanooga & St.



The Central of Georgia.

Louis, the Louisville & Nashville and the Central of Georgia. The Central of Georgia controls the Ocean Steamship Company, which makes regular sailings from New York and Boston to Savannah, and while the Illinois Central turns over merchandise to the Central of Georgia which is moved down from Chicago, the Central of Georgia turns over to the Illinois Central traffic which has been brought by water down to Savannah. Probably the Central of Georgia benefits by getting traffic which shippers desire to route by the Illinois Central, and it also probably gets a longer haul on such traffic and a better division of the rates than if it handled the business in connection with some road with which it had nothing but traffic relations. Cotton exported from points on the Central of Georgia might go eastward to the Atlantic ports, or westward out to the gulf ports, and with the Illinois Central as a connection to New Orleans, the Georgia road now gets some traffic moving to gulf ports which without this connection would go all the way by other lines.

The traffic of the Central of Georgia in 1911 was divided as follows: 20.38 per cent. was products of agriculture, 1.42 per cent. was products of animals, 23.77 per cent. was products of mines, 15.21 per cent. was products of forests, and 39.22 per cent. was manufactures. The total tonnage of freight carried was 5,165,488 tons, as compared with 4,973,801 tons in the previous year. The principal increases in tonnage carried were in manufactures and products of mines, while in 1911, 785,661 tons of products of forests were carried, as against 885,787 tons in 1910. The Central of Georgia last year hauled 192,460 tons of cotton and 255,004 tons of cotton seed and cotton seed meal, as against 181,629 tons of cotton and 258,484 tons of cotton seed and cotton seed meal in 1910. Presumably the melon crop was good last year. The Central of Georgia hauled in 1911, 46,197 tons of this product alone.

The average revenue per ton per mile is high, as might be expected from the character of the traffic carried and the comparatively short average haul of 147 miles. Last year the average ton mile rate was 1.096 cents, and in 1910, 1.069 cents. The average trainload, when compared with a road handling a large proportion of low grade traffic, is light; but considering the topography of the road and the character of the traffic it is quite respectable and has shown a marked improvement during the past few years. In 1907, when the company carried the greatest ton mileage in its history, the average trainload of revenue freight was 212 tons. In 1911 the average trainload was 264 tons, an increase of 52 tons over 1907 and of 9 tons over 1910. While the tonnage of revenue freight carried was greater by about 4 per cent. in 1911 than in 1910, revenue freight train mile was actually less, the total being 2,648,848 last year, as against 2,655,467 the year before. On the other hand, helping and light freight mileage amounted to 185,499, an increase of nearly 20 per cent. over 1910.

In the fiscal year ended June 30, 1911, the company earned $12,900,000 gross from operation. This is an increase of $855,000 over 1910; the greater proportion of this increase coming from passenger business. Total operating expenses amounted to $9,020,000, an increase of $550,000; so that, after the payment of somewhat higher taxes in 1911 than in 1910, operating income amounted to $3,400,000. After the payment of interest on its fixed charges, rents, etc., there was a balance of $575,000 in 1911, as against a little over $1,000 in 1910. On the other hand, about $170,000 less was spent or reserved for renewals and betterments. In 1911, $1,147,000 was spent on this account and charged to income. The company has reserved $608,000 for interest payable October 1 on its income bonds; so that the income account shows a slight deficit for the year 1911.

The company's balance sheet shows a decrease of $328,574 in cash on hand at the end of 1911 as compared with the end of 1910, there being on June 30, 1911, $1,616,925 cash in the treasury; but loans and bills payable were reduced during the year by $648,638, leaving but $351,362 loans payable at the end of 1911. The company has in addition $650,000 short term notes, dated March 1, 1907, falling due March 1, 1912; but outside of these notes, certain equipment obligations that mature in semi-annual or annual installments, and two small issues of bonds, each of which calls for semi-annual payments toward principal of $15,000, there are no bonds falling due before 1926, and for the retirement of this issue there are first mortgage bonds of the Middle Georgia & Atlanta division deposited with the Guaranty Trust Company, New York.

Some of the betterment and construction work that has been

done during the past year, or is now in progress, is mentioned in our railway construction columns.

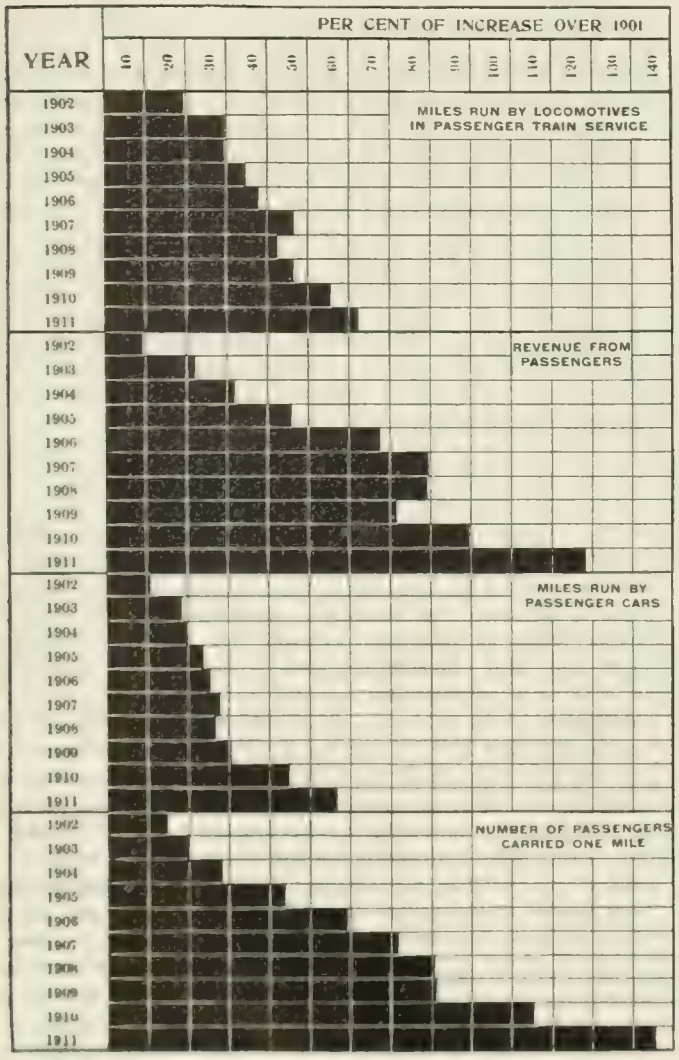
The Central of Georgia main line from Macon to Savannah is fully up to the standard of other heavy traffic main lines in that territory. It is laid with 80-lb. rail, has maximum grades of .58 per cent. against eastbound traffic and .55 per cent. against westbound traffic, is in good part straight line, and there are few, if any, curves more than 2 deg. The ballast is slag, cinders or stone.

The line which runs from Birmingham to Fort Valley, over which interchange freight with the Illinois Central is hauled, is laid largely with 80-lb. rail, has grades as high as 1.32 per cent. against eastbound traffic and 1.22 per cent. against westbound, and has some 8 deg. curves. The line from Macon to Montgomery has a maximum grade of 53 ft. to the mile against

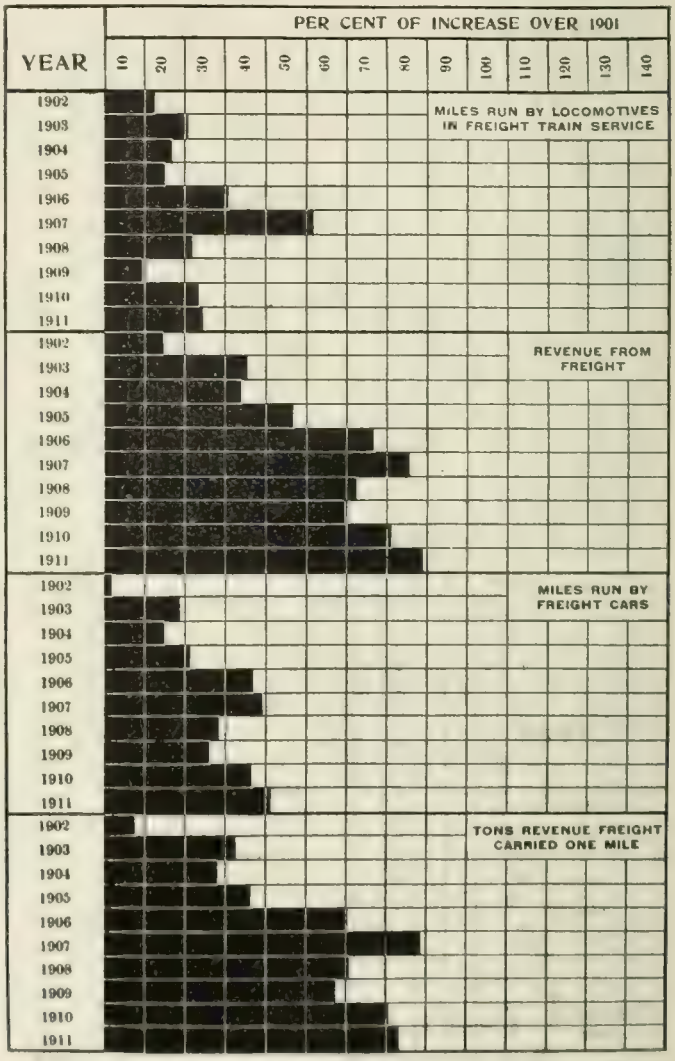
for depreciation of other track material, and $18,460 for depreciation of roadway and track, in addition to the actual amounts that were spent in repairs or renewals. If depreciation is to be figured and charged on equipment, it is certainly logical that it should be charged on roadway and track, where the problems of estimating the rate of depreciation are less complicated than in the case of a locomotive or passenger car.

In closing his remarks on the operation of the property for the year, President Markham says: "The board takes pleasure in acknowledging the fidelity, efficiency and splendid team work displayed by the officers and employees in the discharge of their duties during the past year."

Such an acknowledgment has a ring of human sincerity about it that is pleasing when contrasted with the rather formal thanks that usually form the close of a railway president's remarks.



Passenger Service and Traffic.



Freight Service and Traffic.

eastbound traffic and 80 ft. to the mile against westbound. The line to Chattanooga has maximum grades of 74 ft. to the mile against eastbound traffic and 72 ft. to the mile against westbound, with 6 deg. curves.

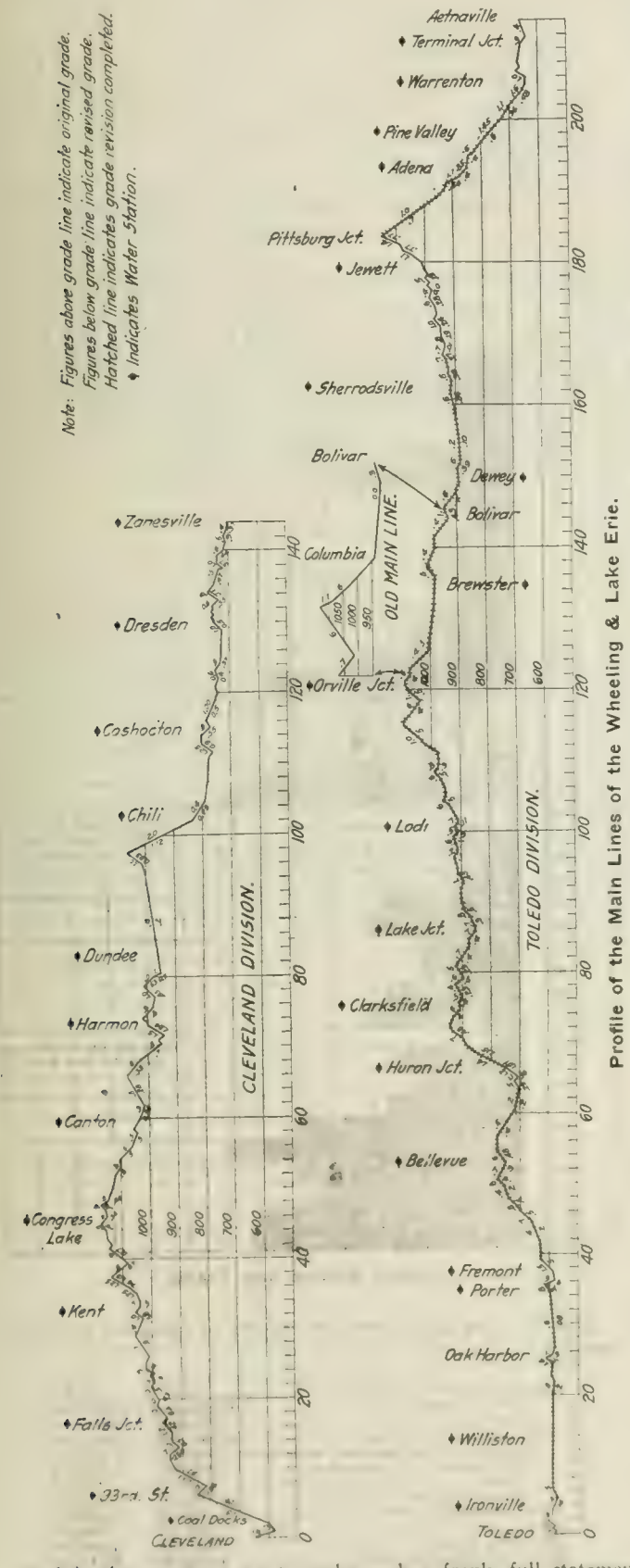
The latter are more comprehensive statements that are given in the 1911 annual report probably reflect both a tendency of the railway as a whole and the policy of the Harriman lines, which has been one of frankness and comprehensiveness in its annual statements to stockholders. It is interesting to note that the company has availed itself of the permission granted by the Interstate Commerce Commission to make a charge for depreciation of certain part of its ways and structures. In 1911 there was $192,74[illegible] charged for depreciation of rails, $12,961

The following table shows the results of operation in 1911 as compared with 1910:

	1911	1910
Average mileage operated	1,915	1,916
Freight revenue	$8,308,919	$7,961,474
Passenger revenue	3,484,189	3,095,847
Total operating revenue	13,966,288	12,015,286
Maintenance of way and structures	1,713,029	1,885,[illegible]
Maintenance of equipment	2,185,967	2,046,096
Traffic	397,613	377,013
Transportation	4,499,747	3,684,769
Total operating expenses	9,030,093	8,474,910
Taxes	570,121	540,619
Operating income	3,405,496	3,106,998
Gross operating income	4,124,666	3,847,180
Net corporate income	1,752,740	1,319,339
Expended or reserved for renewals and betterments	1,147,307	1,318,193
Surplus	$575,433	$1,146
Reserved for interest on income bonds	608,320	

WHEELING & LAKE ERIE.

THE statement made by the receiver of the Wheeling & Lake Erie for the fiscal year ended June 30, 1911, is the most graphic description of the rehabilitation of a railway property that has ever come to our notice. If the management of every road in the country were to make such a frank, full statement of what had been done each year and what was the condition of the property at the end of the year, railway investors would have little, if any, excuse to offer if they put their money into a property which was being allowed to run down or was failing to keep abreast of its competitors. A receiver of a railway, as a court officer, probably has a great deal of personal initiative as to what he shall give out to the general public in regard to the physical condition, operation and rehabilitation of the property under his charge, and for this reason all the more credit is due to Mr. Worthington, not only for what he has done toward bringing up to modern standards a property that was unquestionably in bad shape when he was appointed receiver, but also for the frankness with which he sets forth what still remains to be done.



The accompanying profile of the two main lines of the Wheeling & Lake Erie, which is reproduced from a drawing accompanying the annual report of the receiver, merits a careful study and describes better than a number of pages of text could do what has been accomplished toward putting the property in shape so as to operate more economically. Since June 30, 1907, $2,988,000 has been spent for equipment in addition to renewals and maintenance, of which $821,000 has been spent from income; and $2,386,000 for additions and betterments to roadway, of which $746,000 has been spent from income. The remaining expenditures for road were made from proceeds of receiver's certificates, and for equipment from receiver's certificates and equipment notes. The receiver's profit and loss account shows a net credit of $1,370,000 at the end of 1911 and the balance sheet shows $818,000 cash, which is included in $2,317,000 total working assets, with total working liabilities of $768,000. In 1911 Mr. Worthington estimates that $706,000 was spent for improvement of the property, which amount he divides: 34.7 per cent. as expenditures to promote economy in operation, 4.9 per cent. to promote earnings, 4.9 per cent. for car and locomotive shops and shop rehabilitation, and 55.5 per cent. as essential to safety and general rehabilitation of the property. As an example of what expenditures are classed under each of these subdivisions: grade revision work, costing $161,000, is classed as an expenditure to promote economy in operation; 14 new industrial sidings are classed under work to promote earnings; new machinery, ventilating fan, etc., for locomotive shops at Brewster, as work for car and locomotive shops and shop rehabilitation, and expenditure for draft gear on cars as an expenditure essential to safety and general rehabilitation of the property. Of this total $706,000, Mr. Worthington says that $148,116 had to be charged to maintenance of way and structures under the Interstate Commerce Commission's classification. While acknowledging, of course, that Mr. Worthington's intimate knowledge of the property of the Wheeling & Lake Erie makes him by far the best judge of what really is an expenditure on that property for betterment as distinguished from maintenance, we are inclined to believe that any expenditure properly coming under the Interstate Commerce Commission's classification of maintenance of way and structure expenses should be charged to expenses and not to income account, and that if extraordinary amounts have to be spent now for rail renewals it is because in the past the management of the property did not spend on this account the amounts that were necessary to keep the road in repair.

It is impossible in the limited space of these comments to mention more than a few of the improvements that have been made to the property during the year. Seventy-two miles of main track was ballasted with gravel; three new water stations were built, at Huron Junction, Harmon and Dewey respectively, the one at Harmon having a capacity of 100,000 gal., and the reservoir at Dewey a capacity of 4,000,000 gal.; two steel bridges, aggregating 543 ft., were rebuilt with heavier steel, all new steel work being designed for Cooper's E 60 loading. Contracts have been let for a bridge over the Sandusky river at Freemont, 387 ft. long; over the Huron river at Monroeville, 205 ft. long; over the Huron river at Norwalk, 240 ft. long, and over the Vermillion river at Clarksfield, 165

ft. long. Mr. Worthington says, in regard to future rehabilitation, that "it was anticipated that the company's affairs would be reorganized before certain other expenditures became necessary. The time has arrived now when these additional requirements will have to be provided for and as much of the work should be done gradually in order not to seriously interfere with traffic it should be started with as little delay as possible. . . . ." Summarizing this work, it is estimated that 114 miles of track should be relaid with new rail, 90-lb. rail taking the place of old, worn, lighter rail, and 79 miles of track should be relaid with second-hand 80-lb. rail. The total expenditure necessary is estimated at $1,175,000. In addition, it is estimated that $616,000 should be spent for reinforcing or replacing bridges, of which the two most expensive pieces of work will be the replacing of E 35 truss bridges with E 60 type between Brewster, Terminal Junction and Mingo, and replacement of principal wooden trestles with steel bridges and masonry between Toledo, Brewster and Terminal Junction. These two pieces of work, it is estimated, will cost $224,500 and $164,840, respectively. This work, the receiver thinks, should be done as soon as the money is available, in order to insure safety of operation with the present and prospective rolling stock. During the past year 40 miles of track was laid with heavier rail, and of this 40 miles, 16.5 miles of track, between Pittsburgh Junction and Pine Valley, was laid with 90-lb. ferro titanium rail.

The improvements and work which we have mentioned give some outline of what has been done, or needs to be done, on roadway and track. The receiver's report contains also tables showing the characteristics and age of locomotive and revenue freight car equipment, in detail. Such detailed information in an annual report is unusual, and its careful statement is certainly to be commended. Of the 35 switching engines, 15 are 18 years old or over; of the 139 road engines, 50 are 18 years old or over. The total car capacity as of June 30, 1911, is 5 per cent. less than on June 30, 1906. The total number of revenue freight cars has been reduced from 11,807 to 11,200 during the past year, and there is still in service a large proportion of freight cars that are of light construction and small capacity which should be replaced by heavier and more modern cars.

The Wheeling & Lake Erie is a small road, having a main line running from a point south of Pittsburgh to Toledo, and a line running from Zanesville through Canton to Cleveland. With the total length of main line operated in 1911 was only 517 miles, the road has an importance out of proportion to its mileage. In 1911 the road carried 1,060,000,000 tons of revenue freight and had a density, including company freight, of 2,460,000 ton miles per mile of road. Of the total tonnage of freight carried, 70.63 per cent was products of mines and 18.45 per cent manufactures. The average ton mile rate is at the very low figure of 4.78 mills. With as low a ton mile rate as this, it is easy to understand how essential it is that grades should be reduced to the standard set by the receiver, that is, 0.4 per cent against eastbound traffic and 0.5 per cent against eastbound traffic. The effect of the grade reduction work that has been done is reflected in the figures for the train load. The average train load of revenue freight was 640 tons in 1911, an increase of 20 tons over the average for 1910, and the 1910 figure was greater by 71 tons than the 1909 figure.

The following table shows the principal figures for the operation of the road in 1911, compared with 1910:

Total operating expenses	4,744,767	4,776,084

Letters to the Editor.

DISCIPLINE ON THE ERIE.

To the Editor of the Railway Age Gazette:

I have read with much interest your editorial on "Discipline of Enginemen," August 18. The article is properly intended to inspire courage in the administration of rigid discipline, and where such courage is lacking it should have that effect. It certainly takes "courage" to discharge a first-class passenger engineer of many years service and against whom there is no mark of discredit upon the records, because he has been caught over-running for a few feet a stop signal when the way in advance is plainly seen to be clear, and when all indications point to anxiety to make time as being the motive for taking the chance of the signal clearing before being reached. It is even difficult to give such a man a suspension of thirty days for his first offense. It is easier (and perhaps more profitable in the end) to discipline an engineer for such an offense by a heart-to-heart talk, assuming the proportions of a lecture and reprimand, together with a debit entry against his service record, to clinch the argument. The second offense involves no such embarrassment in meting out more severe discipline.

However, the particular point which I wish to speak of is the question which you propose to ask superintendents:

"Do you ever reinstate a discharged engineman because you lack the nut to convince the general superintendent that you are right?"

The inference I gather from this question, as well as other similar expressions which are found from time to time in your editorial columns, is that superintendents are being influenced by their general superintendent to reinstate men who have been dismissed for sufficient cause and whose services the company would better be without. It is my opinion that your suspicion is unfounded. In my experience I have never known of an instance where a superior officer urged a superintendent to reinstate a train employee who had been discharged for sufficient cause. As a matter of fact, the situation is quite the reverse, and many times it becomes necessary to disagree with the superintendents as to the propriety of reinstatement. The general officers of this road have no fears of the demands its grievance committees make for reinstatement of employees dismissed for proper cause and, personally, I have never met with a "demand" for such a reinstatement. Many appeals for leniency are made but there is never any undue pressure brought to bear, and refusal to accede to the request is taken graciously. My observation leads me to believe that the rank and file in train service prefer to work under officers who are strict disciplinarians, and will take no serious exception to disciplinary action so long as it is fair and impartial.

A. J. Stone,
General Superintendent, Erie Railroad.

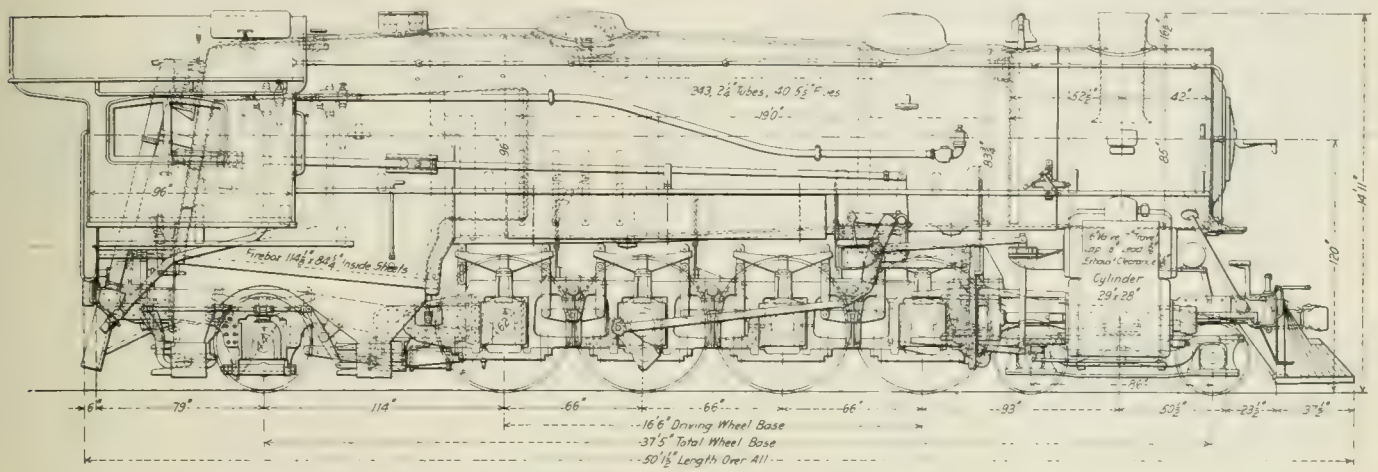
The Russian minister of ways and communications on August 24 reached the station of Surazhevka, where the Amur Railway crosses the Seia river. With the governor-general of the province of Priamur, he inspected the western and central portion of the lines, traveling on horseback. In the course of their journey they carefully noted the condition of the work, which was found to be proceeding very satisfactorily. There are 40,000 troops at work on the line, and 9,500 convicts. In the course of this year, rails will be laid over several hundred miles on the trunk line and branches. By the end of next year there will be a continuous railway line from Surazhevka on the Seia river, to the junction of the Amur and Transbaikal railways. Many villages have already been formed along the line; in some cases with populations of 2,000 inhabitants. The men are earning good wages and it is stated that each workman on returning home in the autumn will take with him from $60 to $90 of [illegible]

MOUNTAIN TYPE LOCOMOTIVES FOR HEAVY PASSENGER SERVICE.

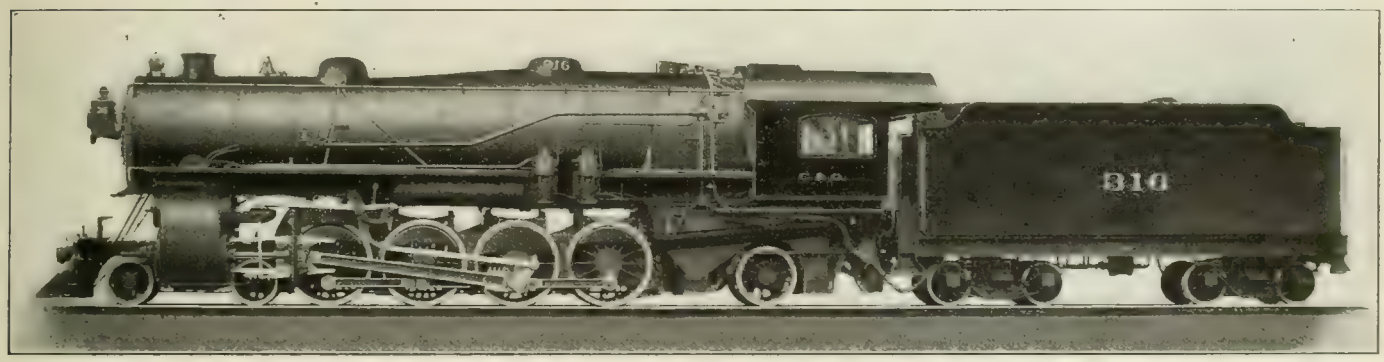
There have recently been built two locomotives whose design marks a step in locomotive development. They were made by the American Locomotive Company, New York, and are used in regular passenger service on the Chesapeake & Ohio over the mountain district of the Clifton Forge division, 96 miles in length. This is on the route to the White Sulphur and Virginia Hot Springs, over which there is heavy passenger traffic. These locomotives, hauling a 10 to 12-car train, replace 108-ton Pacific type locomotives which are able to handle only six-car trains. On account of their size and service they have been appropriately named the "Mountain" type.

Their construction is of the latest approved practice and the general detail is similar to the usual passenger design, with the weights and dimensions increased to meet the heavy conditions. They are equipped with the Schmidt type *A* superheater, which gives a superheating surface of 845 sq. ft. The firebox is provided with a combustion chamber 42 in. deep, and contains a Security Sectional brick arch.

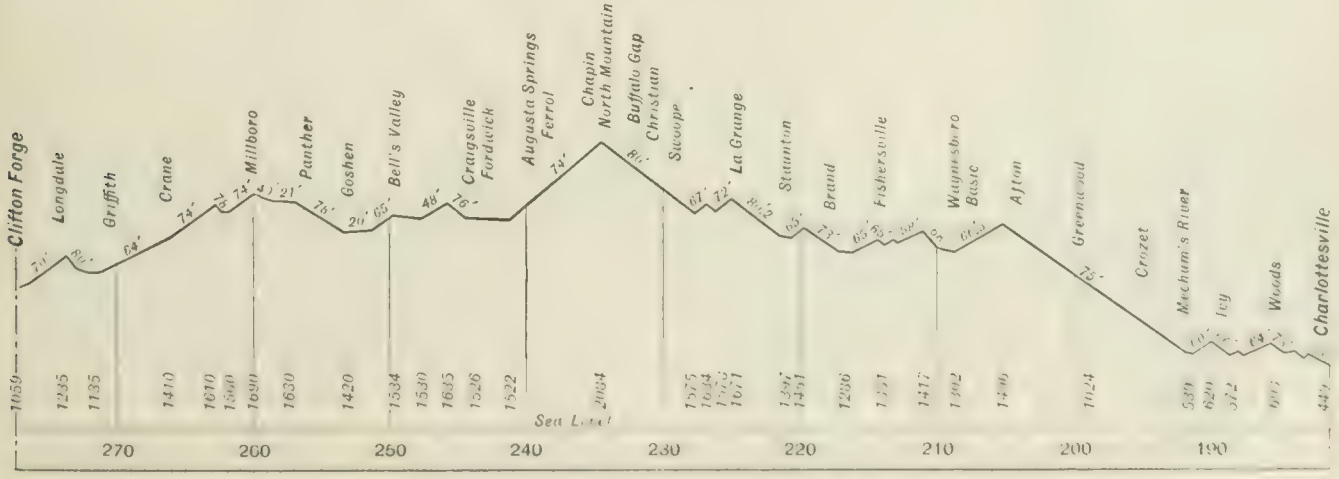
They are fired by a Street stoker and are provided with a power operated grate shaking system furnished by the Franklin Railway Supply Company, New York. With this device the fireman can easily shake the grates by simply moving the operating handle, which performs the functions of a three-way valve, backward and forward. The system is also arranged so that the power may be cut out and hand levers used. Its operation may be understood by referring to the accompanying drawing. The levers are all operated through shaft *B*, which is driven from the air cylinders by levers *C*, these having a square fit on the shaft. At either end, levers *D*, also having a square fit on



Elevation of Mountain Locomotive.



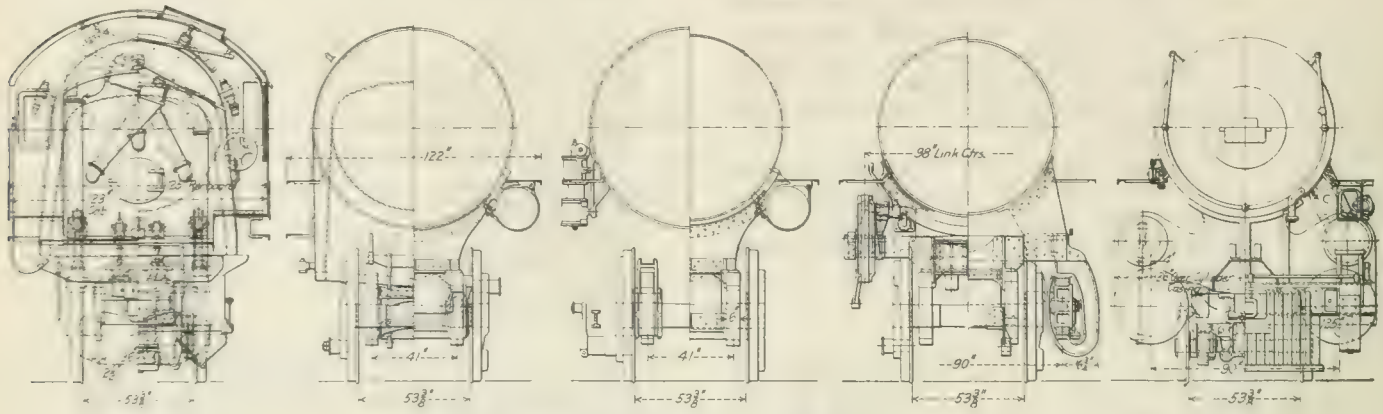
Mountain Type Passenger Locomotive.



Profile of Part of Clifton Forge Division; Chesapeake & Ohio.

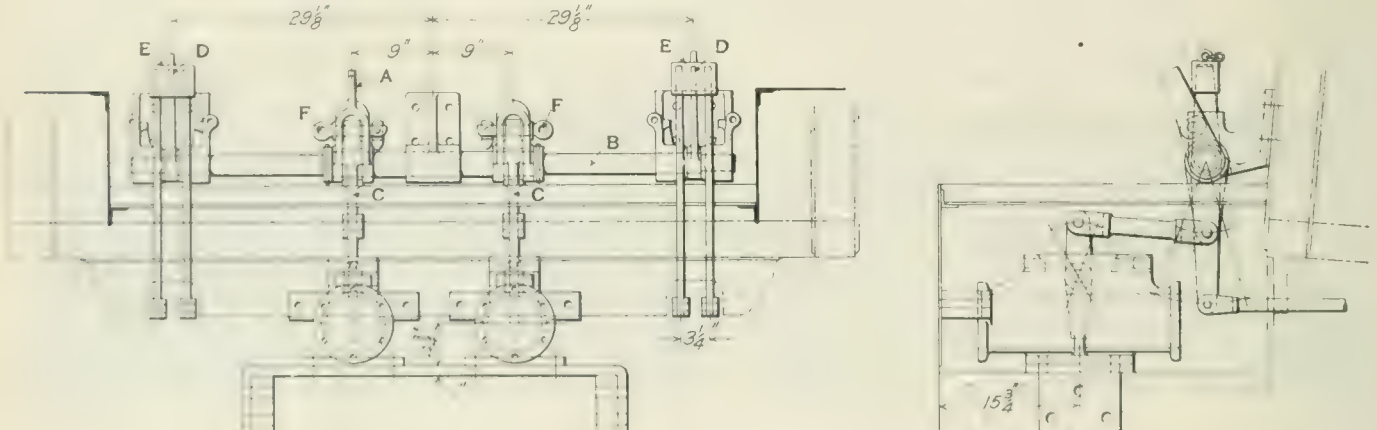
the shaft, drive the grate levers through the caps *E*. These caps may be set over either way, thus cutting out the front or back grate shaking lever as is desired. Thus by shifting these caps any portion of the grate may be shaken. When it is desired to shake the grates by hand, the pins *F* are removed and the extension handle placed on lever *A*; by operating the caps *E* as before, any portion of the grate may be shaken.

The ash pan is provided with six hoppers, as shown herewith. These too are opened and closed by power. Another interesting feature in these locomotives is the screw reverse gear, which was [illegible] with a good deal of apprehension by the enginemen when these locomotives were put into service; but having become familiar with them, and realizing the ease with which the reverse mechanism may be handled, it has become very popular. The gear is operated through a screw with a left-hand triple thread of 1⅜ in. pitch, and the mechanism is held in place by the latch *A*. The length of cut-off is shown on the scale *B*.

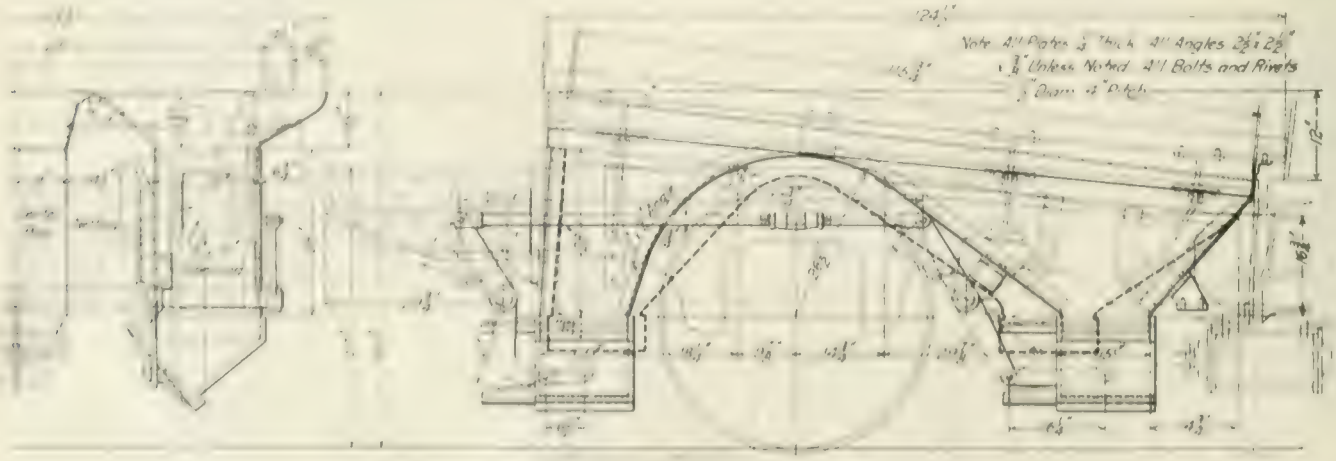


Sections of Mountain Locomotive.

These engines were built with the understanding that they would develop sufficient power to maintain a speed of 25 m. p. h. on a 75-ft. grade with a 600-ton train, and that they have accomplished these results is already shown by their performance. On July 16, engine No. 316, which is shown herewith, took a train weighing 600 tons eastward from Hinton, W. Va., to Clifton Forge, Va., 80 miles, in two hours and 17 minutes, or at an average speed of 35 m. p. h. On leaving Hinton it was 13 minutes late, and was 16 minutes late at Alderson, W. Va., but arrived at



Grate Shaking Device.



Six-Hopper Ash Pan for Mountain Type Locomotive.

Heavy dotted line represents the mobile ash pan.

Clifton Forge on time, the schedule time being two hours and 35 minutes. On this run the ruling grade is 16 miles long, ascending 30 ft. to the mile, and the engineman frequently had to apply the brakes on entering up-hill curves. On another occasion this same engine ran 2.4 miles over a level stretch in two minutes flat, making a speed of 72 m. p. h. The best performance, however, from the standpoint of sustained horse power was made in taking a train of 4,200 tons over a sustained grade of 15 ft. to the mile at an average speed of 23½ m. p. h. It was estimated that the engine developed 2,480 h. p.

The total weight of these engines exceeds that of any other locomotive of rigid frame construction; the weight on driving wheels being 239,000 lbs., or about 60,000 lbs. per axle. The cylinders, 29 in. x 28 in., are the largest ever applied to a simple expansion locomotive. The following is a table of the important ratios and dimensions of these engines:

General Data.

Type	4-8-2
Service	Passenger
Fuel	Bit. coal
Tractive effort	58,000 lbs.
Weight in working order	330,000 lbs.
Weight on drivers	239,000 lbs.
Weight of engine and tender in working order	503,400 lbs.
Wheel base, driving	16 ft. 6 in.
Wheel base, front truck	86 in.
Wheel base, rear driver to trailing truck	114 in.
Wheel base, total	37 ft. 5 in.
Wheel base, engine and tender	70 ft. 6 in.

Ratios.

Total weight ÷ tractive effort	5.69
Weight on drivers ÷ tractive effort	4.12
Tractive effort × diameter drivers ÷ heating surface	871.
*Tractive effort × diam. drivers ÷ equivalent heat. surf.	666.
Total heating surface ÷ grate area	61.9
Total equivalent heating surface ÷ grate area	81.
Firebox heating surface ÷ total heating surf., per cent.	7.5
*Firebox heating surface ÷ total equivalent heating surface, per cent.	5.74
Weight on drivers ÷ total heating surface	57.9
*Weight on drivers ÷ total equivalent heating surface	44.3
Volume both cylinders, cu. ft.	10.70
Total heating surface ÷ vol. cylinders	386.
*Total equivalent heating surface ÷ vol. cylinders	505.
Grate area ÷ vol. cylinders	6.24

Cylinders.

Kind	Simple
Diameter	29 in.
Stroke	28 in.

Valves

Kind	Piston
Diameter	16 in.
Travel	7 in.
Steam lap	1 in.
Lead, forward gear	3/16 in.

Wheels.

Driving, diameter over tire	62 in.
Driving, thickness of tire	3 in.
Driving journals, main, diameter	10½ in. x 14 in.
Driving journals, others, diameter	10½ in. x 14 in.
Engine truck, diameter	33 in.
Engine truck journals	6 in. x 12 in.
Trailing truck, diameter	44 in.
Trailing truck journals	9 in. x 14 in.

Boiler.

Style	Conical Connection
Working pressure	180 lbs.
Outside diameter of first ring	83¾ in.
Firebox, width and length	84 in x 114 in.
Firebox plates, thickness	⅜ in.
Firebox water space	5 in. and 4½ in.
Tubes, number and diameter	243 2¼ in.
Tubes, number and diameter (superheater)	40—5½ in.
Tubes, length	19 ft.
Heating surface, tubes	3,795 sq. ft.
Heating surface, firebox	310 sq. ft.
Heating surface, arch tubes	27 sq. ft.
Heating surface, total	4,132 sq. ft.
Heating surface, superheating	845 sq. ft.
*Heating surface, total equivalent	5,399.5 sq. ft.
Grate area	66.7 sq. ft.
Center boiler, above rail	10 ft.
Top smokestack, above rail	14 ft. 11 in.

Tender.

Tank, style	Water bottom
Frame	13 in. chan.
Wheels, diameter	33 in.
Journals	5½ in. x 10 in.
Water capacity	9,000 gals.
Coal capacity	15 tons

*Total equivalent heating surface equals total heating surface (4,132 sq. ft.) plus 1½ times superheating surface.

LETTERS FROM AN OLD RAILWAY OFFICIAL TO HIS SON, A GENERAL MANAGER.*

XVII.

PORTLAND, Ore., July 29, 1911.

MY DEAR BOY:—The man who is successful in the exercise of authority soon learns to be something of a buffer between his superiors and his subordinates. He learns to temper justice with mercy. In this little railway game of ours there has often been an unconscious departure from this rule of conduct. The word "why" should ask for an increased overtime rate in its next working schedule. Somebody at the top is peeved because a train comes in late. He asks the next man below, "Why?" Down goes the inquiry through the baskets of offices whose files contain the desired information, because it is so much easier to write another man a letter than to dig up one of our own. The final inquiry is to a man who has already rendered one report or explanation. It would be a pretty poor sort of recording angel that would register against this under-

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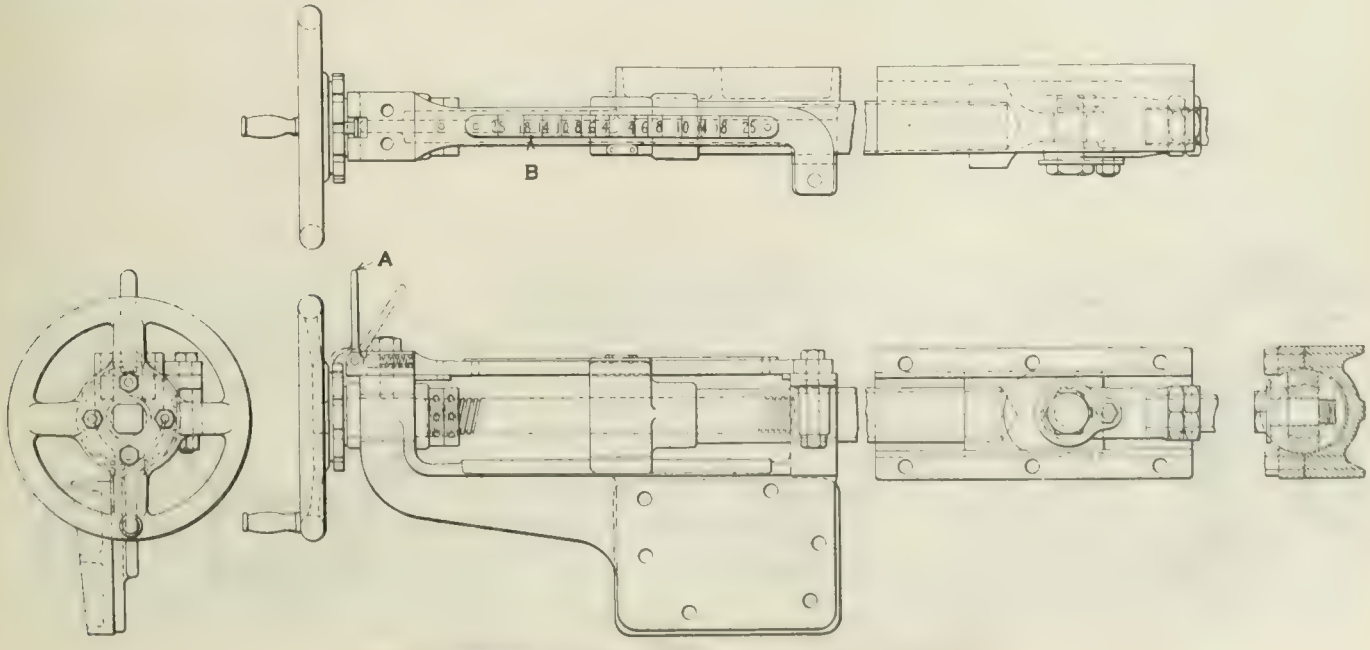


Screw Reverse Mechanism for Mountain Type Locomotive.

ling the more or less justifiable profanity in which he then indulges.

Up in this part of the country, where they do some mighty good railroading, is a big hearted general officer, who once, during a blizzard, directed his superintendents to order train and engine crews to disregard block signals forced out of commission by the elements. A section foreman went out to change a rail with the traditional one man who could not flag both ways. So the section foreman, with the rail out, relied upon the [automatic] block signal for protection. Along came the train with orders to disregard the signal—and the engine landed in the ditch. There was some official talk of discharging the section foreman. The big general officer faced the music and said, in effect, that if any enforced vacancies were to occur he himself must be the man. "Furthermore," he added, "we have learned something; if we are ever again tempted to disregard block signals, we will first notify everybody on the railway, including the section foremen." Such manliness is the rule rather than the exception among railway officers. It is a practical kind of honesty which counts in the great art of handling men.

The lesson to be drawn is that we should all be just as honest and considerate for the man below in the conduct of our offices as in the face to face contact of outside activities. The first thought of an official and of his chief of staff should be to avoid humiliating a subordinate. A letter demanding an explanation accumulates much momentum of censure while traveling, perhaps from the general offices, through the channels to an agent, a yardmaster, a conductor, or a foreman. The tendency of each office is to unbottle a little more of a never-failing supply of suppressed indignation. By the time the return explanations and apologies have trekked back across the plains to the starting point, the whole incident is often as much ancient history as the days of '49.

Yes, we must have explanations for certain irregularities. The taste for such office pabulum is more or less cultivated. It is a kind of diet which demands vigilant restraint of appetite. It does not increase the self-respect of a faithful old employee to write a schoolboy explanation of something that looked badly on paper in a distant office. Actual experience has demonstrated that discipline can be maintained, efficiency increased, and loyalty engendered by greater politeness and consideration in official correspondence. Instead of the superintendent or trainmaster writing to a conductor, "Why did you delay No. 1 at Utopia when you pulled out a draw-bar on the main track on the 32nd?", why not say, "It is claimed that quicker work on your part would have avoided delay to No. 1 when your train pulled out a draw-bar, etc." This leaves it open to the man to explain or to let the matter go by default. The employee who lets too much go by default is soon well known to his officers and his cases will receive the special treatment they deserve. Some officials devote more time to the grateful necessity of explanations than to a broad analysis which will prevent future irregularities. To some officials, papers on the desk are a nightmare. For the sake of a little more time [illegible] letter and pass the papers to the man below. The road will not go to pieces if many papers are held for a personal interview next trip. Because it is easy and thus desirable to hand some old hand [illegible] by not reporting the deep [illegible] a record in a mo[illegible] Did a similar petition where L. C. L. rule [illegible] [illegible] violation of rigid keeping post.

Among the many advantages of the chief of staff should be [illegible] to prepare explanations for higher authority to [illegible] reports it [illegible] without [illegible] a special reference of papers to [illegible].

Your chief [illegible] is the fact that he must frequently [illegible] to 2 paragraphs. Only when a transaction [illegible] to it letter [illegible] Usually, your [illegible] correct [illegible] The [illegible] suggested the phraseology by writing, "Please take *special* interest, etc."—see the difference?—which happy circumstance caused the conductor to come to the sickroom and express his undying devotion to the cause of locked switches. A personal interview with a conductor, however, is worth a dozen letters by a trainmaster.

These same observations apply to the general manager as well as to the trainmaster. The higher one goes, the more consideration must he cultivate. If you have something disagreeable to get out of your system and the typewriter is your only recourse, take it out on your superiors rather than your subordinates. It is better for the company to have you fired for insubordination than for you to demoralize the service by rawhiding men below. You must carry out the policies and instructions of your superiors. The success of your administration will depend upon the manner in which you execute the wishes of your superiors and upon the methods you pursue, as much as upon the inherent merits of the policies themselves. Flattering yourself, as you probably do, at being the happiest of the happy in the medium line, see how safe a middle course you can steer. It will take another generation to eradicate feudalism in railway administration. Those whom Fate, opportunity, or desire has landed in the railway game must abide by the existing rules. If out of accord with the policies of those above, be a good sport and resign like a gentleman. Before doing so, however, be dead sure that you have not mistaken some trifling inconsistencies of methods for real incompatability warranting voluntary separation.

A good friend and a good superintendent down south recently asked me to preach a little on the necessity for a more dignified tone in railway correspondence. He cited his correspondence with government offices as an example of dignified expression. Instead of saying, "Please advise me," or, "Kindly let me know," or "I wish to be informed," they use some such impersonal expression as, "Please advise this office," or "Kindly favor the department," or, "This bureau desires information concerning, etc." Some people say they like to have an official or an employee act as if he owned the property. I would not. A man will ride his own horse to death. When acting as trustee, guardian, or fiduciary, he will perhaps conserve the property entrusted to his charge more carefully than if it were his own. Is not a careful trustee better than a careless owner? Railway officials are trustees as well as hired hands. Through long traditions of service, the government officer, however hampered by certain limitations that are inherent in government administration, forms a habit of mind which prompts first attention to his employer rather than to himself. On railways we are equally loyal, but are cruder in our manifestations. We have the feudal conception of "*my* railway" rather than that of "the railway on which I have the honor to be employed."

Following the same reasoning, it is better for a man to sign, "John Roe, for and in the absence of the general manager," than "Richard Roe, General Manager, per John Doe." When John Doe acts in the place of Richard Roe, the former has become the representative of the company, rather than a facsimile of Richard Roe. The act of John Doe binds the company, and the papers should show on whom personal administrative responsibility must be fixed. The phrase, "For and in the absence of," explains to the recipient the departure from normal procedure, and to the company's future reviewer is John Doe's explanation or apology for seeming usurpation of the functions of higher authority.

Whenever you have signed a letter, no matter by whom suggested or prepared, it becomes your act for which you are responsible. Do not have its effect weakened by showing in the corner of the original the initials of the person dictating and typewriting. Whether or not such initials shall be shown on your file carbon for the sake of future reference is a matter of taste. Such carbon copy record can be made either by a rubber stamp or by typewriter. With the latter method some stenographers prefer to slip in a piece of heavy paper to blank the original and to save the trouble

of removing the outer sheet from the machine. The point is that, however desirable such information may be for your own office, it is no concern of the recipient of the letter. It is much more important that the carbon copy should show by rubber stamp or otherwise who actually signed the original and became responsible for that completed stage of the transportation.

The impersonal form of address used in government correspondence precludes the necessity for printing the names of officials on letter heads. Illegible signatures are a pretty poor excuse for attempting to issue an official directory in the form of a letter head. The working conception of the self-perpetuating corporation falls short if we must alter or reprint our stationery every time an official is changed.

We are wont to look upon government administration as typical of conservatism and circumlocution. Some things we do much better than the government. There are things the government does much better than we do. For example, an officer of the corps of engineers in the army does his own disbursing. He controls all the component functions of his particular activity, including supply and purchase. He is checked up after the fact by an auditor in Washington. A railway cannot pay most of its bills until six or seven persons sign a voucher. Number seven signs perfunctorily because Number six did. Number six likewise is the cat that killed the rat that ate the malt that caused the voucher in the house that Jack built. It all comes down to some responsible man who handled the matter in the first place. Why not trust him, and perhaps one other, checking them both after the bill has been promptly paid? A bank check is validated by only one genuine, creditable indorsement. If drawn to bearer or to self, only one signature is necessary. I am optimistic enough to believe that you will live long enough to see railways follow the example of the banks and the government and pay a legitimate bill with one, or at the most, two signatures. When this is done, however, I trust that due notice will be given, so that the seismograph stations may have fair warnings. If all the old time auditors turn over in their graves at the same time, the earth will tremble and the shock will be too great for delicate instruments.

Affectionately, your own, D. A. D.

A member of the Hungarian parliament recently set out to show why traffic in that country is handled so much more unsatisfactorily now than it used to be. The bottom reason he found in excessively low rates, beginning with the zone passenger tariff some 20 years ago. The effect on traffic has been marvelous. The amount of travel is several times as great, and freight traffic has increased 320 per cent. in 20 years. But not only have expenses increased so as to reduce the net earnings to a very unremunerative figure, but to keep down interest charges, wholly insufficient expenditures have been made for additional equipment, etc., as an instance of which he says that out of a total stock of 2,984 locomotives, not less than 579 are more than 35 years old. The working expenses have risen in 20 years from 55 to 80½ per cent. of the earnings.

SWISS AMBULANCE CAR.

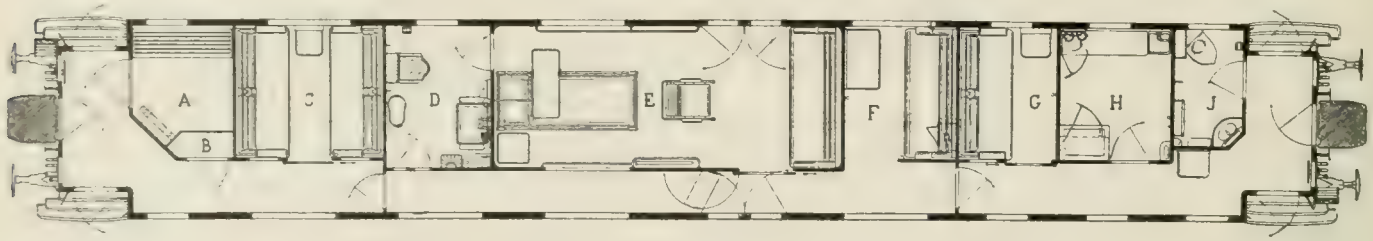
An ambulance car designed by the Industrie-Gesellschaft, Neuhausen, one of the leading Swiss car works, and intended for transporting sick and invalid travelers on long journeys is shown in the accompanying illustrations. It is fully equipped for use on the various European railways and is of the side passage type, mounted on the standard trucks of the Swiss Federal Railways. The length over buffers is 63 ft. 10 in.; the weight of the car when fully equipped is 46 tons. The end is made telescoping. In the middle of the car is a sick room *E*, which is designed for one patient only. All the fittings are in accordance with hospital practice, the walls, floor and furniture being such that they may be readily washed and disinfected. The walls are covered with enameled paint and the floor is laid in linoleum. Glass, porcelain, marble and nickel-plated metal are used for the rest of the fittings. At one end of the compartment is a double seat which may be used as an extra bed for a nurse. Motor fans, electric lamps and electric bed warmers are used, the electricity being furnished by a dynamo belt connected to one of the axles and by storage batteries.

Sick-Room of Ambulance Car.

The adjoining compartment *D* is a toilet room and contains an electric water heater which supplies the radiators throughout the car and keeps the compartments at an even temperature. When the car is stopped it is heated by the Pape-May hot air heater. The compartment *F* is for the physician and his aides. It has a double seat, a folding table and a closet for medical and surgical supplies. The compartments *C* and *G* are used for the patient's family, *C* providing accommodations for four people, and *G* for two, upper and lower berths being used. There is a well equipped kitchen at *H* which contains

Ambulance Car for Swiss Railways.

a large water tank holding 300 gal. The baggage room *A* is large enough to hold the hand baggage of the travelers and a transporting chair for the patient. *J* is a second toilet room, which also contains the supply of linen, as well as an extra mattress. A folding door gives easy access to the sick-room,



Arrangement of Ambulance Car for the Swiss Federal Railways.

there being also the usual end doors. The car is equipped with both the Westinghouse air brakes and the Hardy vacuum brake.

FARM COMMUNITIES AND PERMANENT RAILWAY LABOR.

BY ALICE BENNETT.

A railway wants an unbroken chain of prosperous communities, composed of farms and factories, or to put it differently, enterprise humming all along the line. Another important factor is permanent labor. Both of these can be attained by relating the one problem to the other. This conclusion was reached after several years' observation and study of southern Europeans settled in this country.

Railways employ special agents for the purpose of studying how to effect an economic distribution of population. Columns of our newspapers are devoted to this subject, and various commissions have burned up a good deal of time in its discussion. While these schemes sound well in print, when put to the test of use they fail like every thing else which has not a solid foundation, and go to swell the long procession of cremated visions to which most of us have contributed our quota. The mistake has been that the laws which govern human nature have been ignored. Any method which is going to make an effectual appeal to the land-hungry must have for its principle a policy which will enable them to find [illegible].

Human beings resent patronage. Anything which suggests paternalism conveys the impression of servitude and is bound either to arouse suspicion or to destroy initiative. It is right here that attempts to colonize have so often fallen down. The colonists are either on the alert for exploitation and ready to do the company before it has a chance to get back at them, or else they grow flabby and inert, assuming that the company [illegible] without exacting any return. Either result is pernicious and barren.

In New York City and in every thickly populated centre are hordes of the land-hungry, eminently fitted to make successful farmers and small fruit-growers. Everywhere land is standing idle, awaiting the development of her stored-up energy; obviously it is up to the railway to correlate these essentials to [illegible].

[illegible] than the Italian contadino. As a horticulturist and truck-farmer [illegible]. Sixty per cent. of the Italian immigration is farm-bred. Owing to a [illegible], they come to us congested city tenement [illegible] people [illegible]. They are terribly at a disadvantage in the city. On the other [illegible] the greatest [illegible] farm development.

Naturally the government of Italy prefers to have them remain [illegible] they are not likely to locate per-

manently or to become citizens of the United States. It should, however, be our policy to encourage them as land owners, as, wherever they go, land values increase, and they stand solidly for civic improvement.

I always inquire, when visiting an Italian farm settlement, into the story of its early beginnings. Invariably the history is repeated of two or three laborers who discovered in land near their work some parallel to that which they had tilled in the old world. Two or more of them had taken up small holdings and had established their families there, while they continued as day laborers till the farm was paid for and in such shape that it paid them more for their time than they could earn elsewhere.

Wherever Italians have found contentment, many more are bound to follow, and so in a short time the two or three farms first settled are multiplied many times over. As a by-product, small factories spring up which in time develop into large plants. I could cite numberless instances as examples. Not infrequently has it been true that a whole town in Italy was evacuated as the result of a letter from a fellow town's man, who had sent back a glowing account of his experiences in this country. It pays to treat the Italian well, for if he is happy he is sure to attract a large following, or if he is dissatisfied, to arouse a prejudice which will be difficult to overcome. Already the danger of a labor famine is being felt by the railways. It is more difficult today to secure Italian labor than formerly. The fault lies with the system pursued by labor contractors, whose sole interest is their own personal profit. The policy which they pursue as far as the railways are concerned, is simply killing the goose which lays the golden egg. The men are collected in ill-assorted groups, the inevitable result of which is discord and inefficiency. Furthermore, the men are boarded by the contractors, and with the Italian, who is a great home-lover, the manner of living makes all the difference whether his stay in a given place is permanent.

I would not speak dogmatically, but I believe that just here lies the crux of the question: Choose one Italian peasant of practical farm experience and let him select all the men required for his particular gang. He will get men from his own community, a homogeneous group, men whose interests are one and the same. Here you have, by a spontaneous method, the germ of a community—common ties, common interests, common joys in life. Wherever such a group is employed, wages will begin to be invested in small farms, and there their families will be established while the men will continue to work for the railway. News of the new born colony will spread, and friends will begin to join them from city tenements as well as from the old world. Such a community will always furnish the railway with permanent labor. Good schools and civic improvements are encouraged by such settlers. Let the same principle prevail throughout the entire system and you have inoculated that portion of the country through which the railway passes with all the desirable human elements.

In some instances it might pay the road to maintain a model farm where the best methods of crop growing for the particular locality could be demonstrated. This, however, should be carried on as a private enterprise, quite independent of the self initiated community. Italians are particularly quick at taking a hint, and

would soon adopt improved methods provided they were not forced upon them.

Inquiries come to me from many quarters in regard to Italians as farm hands. I do not believe this is practical, owing to the small wage paid by farmers and the American farmer's want of understanding of the Italian. The food question also adds to the discontent of the Italian in such a situation; he is not at home in any sense. The Italian's forte is in developing his own land, and this he will do provided he can do it under conditions which satisfy his nature.

John Carini cut ties for the New York, New Haven & Hartford. At the end of two years he had saved enough to buy a small abandoned farm and to send for his wife and children. Fourteen years later he owned 1,500 acres, and from this he clears annually from $10,000 to $20,000 on his peach crop. As a result, about seventy Italian farms have been taken up in that vicinity, and more peaches are shipped from there than from any other part of New England.

Two Italians once secured work in a canning factory in Fredonia, N. Y. They were grape growers from the province of Palermo, Sicily. They bought small farms near Fredonia on which they established their families. When I visited the place sixteen years later there were 1,200 Italians there; nearly every family owned a house with a well-kept garden; numbers of them owned large vineyards. Land had increased from $75 an acre to $250, and owing to their industrious habits the standard of farming had been raised in the whole section. There were six or seven factories where there had formerly been a single cannery. Three-hundred Italian children were in the public schools, ten were students in the normal college, and two had already entered professions. There is no reason why this history should not be repeated all over the country were there are fair opportunities for the successful development of land.

July 1 of this year the journal of the German railway union (*Zeitung des Vereins Deutscher Eisenbahnverwaltungen*) completed its fiftieth year. For fifteen years it has had a practical railway official for its chief editor and has had contributors in most countries of the world where there are railways and Germans. For information concerning railways on the continent of Europe nothing can compare with it. It gives, however, comparatively little purely engineering matter. For that the railway union publishes another periodical, the *Organ für die Fortschritte des Eisenbahnwesens.*

ALASKA NORTHERN RAILWAY.

Railway construction and operation in Alaska, contrary to general information, does not present any insuperable difficulties. Alaska is not, as some have imagined, entirely a land of icebergs and everlasting snow. The necessity for railways is very great, and it is probable that in the not very distant future numerous lines will be built to reach the mining districts and agricultural sections of that territory. The Alaska Northern is a good example of what can be accomplished in railway building in the far north. Its first division of 20 miles from Seward, the southern terminus, to Lake Kenai, was built at an average coast of $14,000 a mile, part of the track being laid in January at a temperature ranging up to 20 deg. Fahrenheit.

The terminus at Seward has an admirable harbor on Resurrection Bay, resembling a large bottle in shape, 11 miles long and 3 miles wide. The harbor has a depth of 500 ft., providing practical anchorage at the north end, is land locked by hills 2,000 to 4,000 ft. high, and is free of ice at all seasons. Nine years ago the site of Seward was a forest of spruce and hemlock. The town today contains more than a thousand people, is connected by cable with the outside world, and has weekly mail steamers from Tacoma and Seattle, a daily paper, three churches and schools, telephones and electric lights and daily passenger and freight trains to the interior. The accompanying photograph shows a view of the main street in Seward.

Main Street in Seward.

Leaving Seward the railway passes through a heavy timbered country, broken here and there by homesteaded farms, on which are raised all the northern cereals and vegetables. The track follows the valley of a small mountain stream up to the first summit of the coast range, ascending for 12 miles on a 2 per cent. grade. From this summit it descends to Lake Kenai valley. This region has become very popular with hunters and fishermen, as moose, mountain sheep and black silver tip and grizzly bears are found in abundance and the streams and lakes abound in salmon and trout of many varieties. From Lake Kenai the road ascends on a light grade through Trail Creek valley to a second summit of the Kenai mountains 45 miles from Seward. From this summit the road gradually descends to the Placer river valley through a section of seven tunnels, past huge cataracts, and along the edge of a deep gorge. Reaching the open valley of the Placer river the road winds along the foot of the Spencer Glacier for a mile. A number of the accompanying views show this glacier from different points. At a

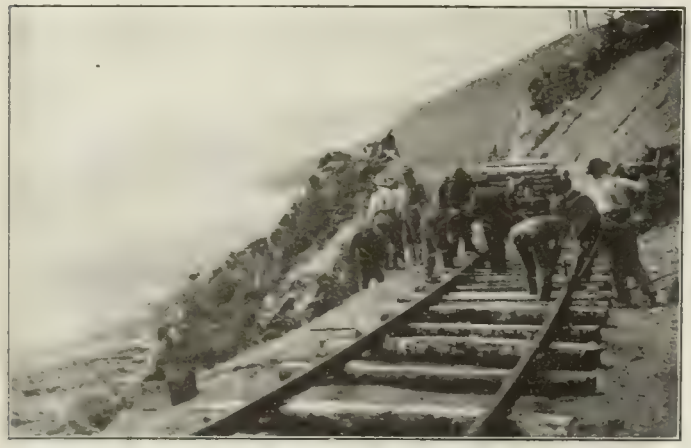
Construction Camp on Glacial Moraine.

Damage Done by an Avalanche; Alaska Northern.

Blasting New Channel for Underground Streams at Foot of Spencer Glacier.

Mouth of Subterranean Glacial River; Alaska Northern.

point 62 miles from Seward the line again reaches tidewater, touching the east end of Turn-again Arm on Cook's inlet. The present northern terminus of the road is 10 miles farther at



Track Laying; Alaska Northern.

Kern Creek, where the company is building a small tourist hotel on the beach.

The traffic resources of the country are being gradually developed, numerous small stamp mills having been built in the last two years with fairly good financial results. The whole

Motor Car Used in Passenger Service.

[illegible] split by numerous quartz veins carrying free milling gold. The [illegible]

Cutting Down to Glacial Fosse Before Dynamiting.

river, 457 miles from Seward. A branch line has been located up the Matnooska valley for 38 miles, leaving the main line at Muick Junction, 145 miles from Seward. Another branch is located to Iditarod, branching off the main line at Susitua station, 175 miles from Seward. The Matnooska branch passes through great coal fields for its entire length. The surface strata of coal in this region show 13 to 30 ft. thick, and it is said to be the best coking coal outside of Pennsylvania. Anthracite coal in this region is reported by the government and private experts to be of a high fuel ratio. This coal could be put into the railway's cars at a net cost of one dollar a ton, while the company has to pay $12 a ton for inferior grades of Japanese and British Columbia coal, since the government will not allow the development of the local coal fields on lands withdrawn from entry.

Alaskan railways can be operated throughout the year. There are a number of difficulties to be overcome, but all the problems connected with railway operation have already been suc-

Hydraulic Sluicing Through Snowslide.

[illegible] fully [illegible]. The annual snowfall ranges from one to ten feet, but there are no blizzards and very little drifting snow, so that a good rotary plow can easily maintain an open track throughout the most severe winter. The avalanches from adjacent mountains are most to be feared. The force of a large avalanche is almost irresistible, as shown in one of the accompanying photographs, where the track was carried out bodily 70 lb. rails being broken. Snow slides occur occasionally in March and April. At a point near mile 54 a slide which occurred last year covered the track for a distance of a quarter of a mile to a depth of 70 ft. One of the accompanying photographs shows this slide before the work of removing it had progressed very far. It was necessary to dynamite the snow in places and a great deal of it was removed by collecting a

convenient mountain stream in sluice boxes, as shown in another of the accompanying photographs.

One of the most difficult problems encountered was the caring for glacial streams at the foot of the Spencer Glacier. During the hot summer months of 1910 the glacial moraine was cut by many glacial streams from one to five feet deep and from 40 to 100 ft. wide. These streams are very treacherous, carrying dark brown water, with great masses of graveled debris

Snow Slide 100 Feet Deep.

and floating ice. The floating masses are carried down with great force and completely destroyed several miles of the new track before they could be properly cared for. The problem was to confine these numerous abnormal streams in a single channel which could be carried through an ample opening under the roadway. There is usually a deep underground channel called a fossé along the toe of the glacier, which is hollowed out below the glacial moraine by the force of the melting ice. The solution of the problem was to connect all of these underground fossés into one continuous channel. The location of these channels was determined by dropping analine dyes into surface streams at points where they discharged into

Clearing Line with Rotary Plow; Alaska Northern.

subterranean channels, one of which is shown in an accompanying illustration, and watching for the reappearance of the colored stream from underground channels. The underground channels when located were connected by dynamiting channels between them and the entire flow was diverted into a single stream. One of the illustrations shows a number of workmen cutting down to a fossé before dynamiting, and another shows the discharge of one of the dynamite blasts

There is no difficulty in securing labor in Alaska for railway construction and maintenance. The prevailing rate of pay is $2.50 to $4.50 a day for laborers and mechanics. A typical group of natives is shown in one of the photographs reproduced herewith, and two views of construction work are also shown. Provisions and supplies for building the new road were secured from Seattle and Portland, the ocean freight amounting to $5 to $10 a ton. Passenger rates on the Alaska Northern are

Natives in Copper River Country.

15 to 20 cents a mile, freight rates varying from $5 to $20 a ton for the 72-mile haul. One of the motor cars which is being operated in the local passenger service is illustrated herewith.

FOREIGN RAILWAY NOTES.

Work has been steadily pushed on the line of the Northwestern of Brazil from Bauru to Corumba on the boundary line between Matto Grosso and Bolivia. At the beginning of 1911 the line was in operation as far as Jupia, a distance of 125 miles.

The Pacific Railway, Costa Rica, extends from San Jose to Punta Arenas, on the Pacific coast, a distance of 69 miles. The connecting link between Cascajal and El Roble, a distance of 12 miles, was completed in October, 1910, thus affording through connection between the Atlantic and Pacific.

The total length of railways in operation in Brazil at the close of 1910 was about 13,279 miles. The total mileage added during the year was 1,162 miles, which is the greatest amount opened to traffic in any one year for a decade. The principal feature during 1910 was the consolidation of a number of the smaller lines or systems into larger groups. The Brazil Railway Company, formed by a combination of United States and Canadian capital with that of France, has secured control of the lines of the Cie. Auxiliare de Chemins de Fer au Bresil, and also the Sorocabana, Sao Paulo and Rio Grande, Parana and Thereza Christina. It also has a very important interest in the Paulista and Mogyana Railways, which cover about 1,600 miles. This system, when completed will establish a direct means of communication between the state of Sao Paulo, Parana, Santa Catharina and Rio Grande do Sul, and join up the railways of Brazil with those of Uruguay, Argentina and Paraguay. The total length of these lines in operation on April 1, 1911, not including the Paulista and Mogyana, was 3,102 miles, with 233 miles under construction and 1,540 miles to be constructed, so that when all the various roads are completed the system will cover a total extension of 4,875 miles. The Madeira-Mamore Railway in the extreme north, which forms the connecting link for the passage of the vast commerce of the rivers of Bolivia to those of Brazil, is also being operated by this company.

General News Section.

The Canadian Pacific has just opened its sixteenth hotel. It is at Balfour, British Columbia.

The Great Northern has put in use electric train staffs on its line between Skykomish and Leavenworth, Wash., 57 miles.

Mr. Stubbs of the Harriman lines announces that the date of his retirement from railway work will be January 1, 1912.

W. A. Garrett, former president of the Seaboard Air Line, has been offered the chairmanship of the General Managers' Association of Chicago.

According to an Altoona paper the Pennsylvania Railroad has put in service all of the freight cars which have been kept out of service during the past four years, with the exception of 5,000 cars needing repairs, which are still stored. These are to be sent to the shops.

The special committee on relations of railway operation to legislation has appointed an engineering committee, composed of L. C. Fritch, chief engineer Chicago Great Western, chairman; W. L. Darling, chief engineer Northern Pacific, and C. A. Morse, chief engineer Atchison, Topeka & Santa Fe, to aid it in its work.

The Sunset-Central Lines of the Southern Pacific have paid out $80,000 in claims for live stock killed or injured during the fiscal year ended June 30, 1911. Thornwell Fay, vice-president, in a circular to all the engine men of those lines, calls attention to the fact that no one was benefited by this loss to the roads and asks their co-operation in an endeavor to reduce to a minimum the amount of claims on this account during the present year.

The Chicago, Milwaukee & St. Paul, now using about 2,000 miles of telephone lines for train despatching, has decided to extend the use of telephones over about 390 miles additional; from Minneapolis to Montevideo; Benton Junction to Farmington; Montevideo to Aberdeen and Aberdeen to Mobridge. The Atlantic Coast Line is to introduce telephones between Savannah and Jacksonville; Jesup and Waycross and Waycross and Folkstone; an aggregate of 235 miles. Both the Milwaukee and the A. C. L. will use the Western Electric apparatus. The Chicago, Rock Island & Pacific is to use telephones for train despatching on its line between Caldwood, Kans., and Belleville, 210 miles, and will also use Western Electric selectors.

One of the large Mallet engines of the Santa Fe ran from Emporia, Kan., to Kansas City on September 9, hauling a train of 100 loaded cars. That part of the trip from Emporia to Argentine, a distance of 109 miles, was made at the rate of 14½ miles an hour. The train weighed almost 4,300 tons. After making the trip to Kansas City the same engine was put on the Santa Fe's demonstration train which is making a tour of the system, the object being to call attention to the progress made in car and engine construction during the past 30 years. A small engine built in 1880, having four drivers and a large smokestack, [illegible] made between old and new chair cars, coaches, flat cars, box cars, etc. A number of officers of the road accompany the train, and [illegible]

C. E. Taylor, general superintendent of the United States Express Company, in an address before the Chicago Trans[illegible] charged by the express companies, saying that 90 to 98 per [illegible]

Joint Operation in the Deschutes Valley.

The rival railway lines extending south from the Columbia river near The Dalles, Ore., are to be a joint line for the last 41 miles at the southern end, that is, Metolius to Bend; the two companies, the Oregon Trunk and the Oregon-Washington Railroad & Navigation Company, having signed a 999 year contract to this effect. The contract just signed provides that the Oregon-Washington shall use the track of the Oregon Trunk from Metolius to Culver Junction and from Redmond to Bend, an aggregate of about 22 miles. The remaining 19 miles is covered by a contract which was executed more than a year ago. Bend, the southern terminus, is 156 miles from the Columbia river.

Stock Offerings for Employees.

The terms of the offer of one thousand shares of its stock by the Union Switch & Signal Company to employees have been noted heretofore in the *Railway Age Gazette*. The period of subscription closed September 1, and it was found that 35 per cent. of the total payroll had subscribed for 2,747 shares. The company arranged that every subscriber should receive the full number of shares for which he made application.

In most cases the men applied for all that they were permitted to take under the rules of the subscription, and the applications run in amount from twenty shares down to one share.

Strike of Track Repairers.

On Monday morning last members of the International Brotherhood of Maintenance of Way Employees on the Delaware, Lackawanna & Western went out on strike, but the officers of the road say that less than half their trackmen obeyed the order to strike and that there has been no interruption of business. The president of the Trackmen's Union, who is at Scranton, wrote to the governors of New York, New Jersey and Pennsylvania asking them to assist in settling the dispute between the brotherhood and the railway company over the discharge of a foreman. The dismissal of this foreman appears to have been the principal or only cause of the strike.

Maintenance of way employees of the Cincinnati, Hamilton & Dayton, in a letter to the governors of Illinois, Indiana and Ohio, and to the general manager of the road have asked for an increase in wages and a reduction in the length of their working day to ten hours.

Investigation of British Strike Conditions.

The Royal Commission appointed by the British government to inquire into the differences between the railway managements and their employees has spent about three weeks in hearing the unions, and has now begun hearing the other side. The testimony of a half-dozen men from different roads, chiefly long-service employees, was against the recognition of the unions, on the ground that they are dominated by extreme socialists, who keep up an agitation for their own purposes. These men, whose service extended from 10 to 25 years, held that the workers were more likely to have their grievances remedied by a direct appeal to the directors than through the unions. The unions, they agreed, [illegible] but in England this no longer existed.

Sir Charles J. Owens, general manager of the London & Southwestern, whose road was the least affected during the recent [illegible] which "made the British railway the best in the world as regards [illegible] against the nation, Mr. Owens proposed legislation to make [illegible] make strikes they were powerless to stop them, as had been [illegible]

recognized the unions, had more trouble than the other lines in getting its men to return to work.

Lord Claude Hamilton, chairman of the Great Eastern, made a sharp attack on trades unionism, asserting that of the Great Eastern staff only ten per cent. belonged to the Amalgamated Society, whose officers, he said, depended for their maintenance on causing ill will and lack of discipline. Hardly had the seven-year conciliation plan of 1907 been concluded when the leaders of the unions realized that a long period of conciliation meant a loss of membership, and they immediately started a campaign for the repudiation of the compact. Lord Hamilton thought both directors and members of the unions who broke their agreement should be fined heavily or imprisoned. He held that the settlement of the recent strike by the appointment of the Railway Commission was inopportune. It was his personal desire to fight it out, and he was satisfied that four days more would have seen the termination of the strike, for as soon as the men were sure of protection, he said, they would desert the strike leaders and hurry back to work.

In no circumstances would he recognize the Amalgamated Society of Railway Servants, since the socialist element had obtained a majority in the executive councils of the trades unions.

Our Great Traveler.

The President of the United States is now engaged in making a journey which is to cover 12,945 miles of railway line (and 16 miles by steamer), having started from Boston last Friday night over the Boston & Albany. The first stop was at Syracuse on Saturday, where Mr. Taft gave an address at the state fair. The train consists of a baggage car, a coach, a Pullman private car, two compartment sleeping cars and a dining car. The coach is to be used principally on those occasions where local committees board the train. After leaving Syracuse some of the principal stops are, in their order; Erie, Detroit, Bay City, Marquette, Grand Rapids, Kalamazoo, Peoria, St. Louis, Kansas City, Council Bluffs, Des Moines, Sedalia, Omaha, Lincoln, Denver, Cheyenne, Salt Lake, Pocatello, Spokane, Tacoma, Seattle, Portland, Salem, San Francisco, Los Angeles, Butte (a jump of 1,216 miles), Billings, New Castle (Wyo.), Pierre, Aberdeen, Minneapolis, Milwaukee, Chicago and Pittsburgh.

The passenger department of the Boston & Albany has issued an artistic itinerary of the journey, which is notable not only for its neat design and execution, but for its modesty, only one representative of the road being mentioned by name. That is Charles E. Colony, Boston city passenger agent, who accompanies the President throughout the journey. The train will traverse parts of 26 railways and enter 24 states.

The finish will be in Washington, November 1. Of the 47 nights covered by the journey the schedule shows only 13 on which the President can sleep in a house, namely, at Marquette, Mich.; Seattle, Tacoma, San Francisco (two nights), Los Angeles, New Castle, Wyo.; Pierre, S. D.; Minneapolis, Milwaukee, Chicago (three nights).

American Society of Civil Engineers.

At the meeting of this society, held September 20, two papers were presented for discussion by members of the society as follows: Mule-Back Reconnaissances, by William J. Millard, and Economic Canal Location in Uniform Countries, by Lyman E. Bishop. Mr. Millard's paper was printed in the *Proceedings* for May, 1911, and Mr. Bishop's in the *Proceedings* for August, 1911.

Railroad Superintendents' Association.

The regular semi-annual meeting of the American Association of Railroad Superintendents was held on Friday, September 15, at the Planters' Hotel, St. Louis, Mo., with J. A. Somerville, president, in the chair.

In view of the feeling which some railways entertain, that the organization of the divisional bodies of this association, into a general body, is unnecessary, it was decided to discontinue the general organization as at present constituted and to substitute the individual member plan, practically along the lines of the American Railway Engineering Association, thus extending its scope to include the whole country.

For twenty-one years the general organization has printed the monthly proceedings of the divisional meetings and distributed them to all members of each divisional association. This plan, of course, saved expense so far as the divisional associations were concerned, but added to the expense of the general association, and some of the railways objected to the general expense. Under the new plan, it is presumed that the proceedings of the monthly meetings held at all the large interchange centers will be issued locally, and that they will be mimeographed instead of printed. Those who desire copies of the monthly proceedings, in order to keep in touch with the general situation, can doubtless secure them by applying to each city where the superintendents have meetings.

The association's committee on transportation presented elaborate information respecting the Joint Car Inspection and Interchange Bureau as operated at Pueblo, Colo., for upward of two years and recommended the plan to the association as a proper one to follow at all interchange centers. After considerable discussion the association went on record as heartily favoring the experiments that have been made by the combined committees of the Association of Transportation and Car Accounting Officers and the Master Car Builders' Association, to determine in a large way the practicability of combining the work of the mechanical and transportation departments in matters of car interchange.

A paper was presented by Charles Burlingame, superintendent of the Wiggins Ferry, St. Louis, urging the abandonment of the M. C. B. defect card in the interest of prompt car movement through terminals, pointing out that an inspection for safety should be made the only inspection required. The paper was discussed, and will be included in the minutes, but no formal action was taken.

The executive committee called attention to the changes made in M. C. B. rules, September 1, whereby the "set-back" of loaded cars in interchange is abolished, and urged that in view of this change all special agreements which are in any way contrary to the spirit of the M. C. B. rules, be immediately cancelled.

E. H. DeGroot, Jr. (C. & E. I.), St. Louis, was elected president, and L. N. Couder, Cincinnati, was elected secretary-treasurer.

Railway Financial Officers.

The Society of Railway Financial Officers held its annual meeting at St. Paul, Minn., on September 12, 13 and 14. In addition to routine business the following papers were presented: Modern Methods of Paying Dividends, by E. H. Alden; Is Uniform Legislation Possible in the Various States of the Union? by F. H. Hamilton; Legislation Concerning the Time and Manner of Payment of Railway Wages—the Burden and Its Prevention, by Arthur B. Jones; Men of Character in Railway Service, by D. K. Kellogg; The Treasurer as the Financial Expert of His Company, by T. H. B. McKnight; The Railroads of Chicago, by John E. Murphy; The Treasurer's Relation in the Railroad Company's Organization, by J. P. Reeves; The Railways of Canada, Their Growth and Trade, by S. L. Shannon; The Railroad Treasurer, the Office, the Man, by Odell S. Smith.

The report of the committee on extension of credit to shippers, which report was made in conjunction with a committee from the Association of American Railway Accounting Officers, was presented. Various matters, such as garnishments and assignments; quick payment of stock, fire and personal injury claims; acceptance of checks by agents in the payment of charges due; and the matter of placing the collection of bills under the treasury department, were presented and actively discussed.

The following officers were elected for the ensuing year: President, H. C. Ansley; first vice-president, Odell S. Smith; second vice-president, Joseph B. Lacy; secretary and treasurer, Carl Nyquist.

The following were elected to serve on the executive committee for the ensuing period of two years. Messrs. Ansley, Smith and Lacy; Arthur B. Jones and T. H. B. McKnight. The following members of the executive committee hold office until the annual meeting in 1912: H. F. Baker, secretary and treasurer, Lehigh & New England; George H. Crosby, vice-president, secretary and treasurer Rock Island Lines; F. H. Hamilton, secretary and treasurer, Frisco Lines; Frank Scott, treasurer, Grand Trunk.

Fairfax Harrison, president of the Chicago, Indianapolis & Louisville, and J. F. Titus, formerly assistant to the president of the Illinois Central, but not now engaged in railway service, were elected honorary members.

General Passenger Agents.

The annual meeting of the American Association of General Passenger and Ticket Agents was held at the St. Paul Hotel, St. Paul, Minn., September 19 and 20. A large party of the members of the association gathered in Chicago and were brought on a special train of the Chicago, Milwaukee & St. Paul, the train being in charge of F. A. Miller, general passenger agent, and W. J. Cannon and George B. Haynes, assistant general passenger agents.

At the opening session, addresses of welcome were made by C. E. Stone, chairman of the local entertainment committee, Ralph Wheelock, secretary to Governor Eberhardt of Minnesota, and Mayor Keller of St. Paul. The response was made by Samuel Moody (Pennsylvania Lines) president of the association. The resignation of C. M. Burt (Boston & Maine), for several years secretary of the association was received and a committee appointed to nominate his successor. The attendance was unusually large, being 125; about 25 new members were taken in.

The standing committee on association ticket paper made a report recommending the adoption of measures to safeguard tickets while in the hands of printers; this was approved by the association. The association also adopted the report of the ticket committee, recommending a form of multiform interline ticket by use of which numerous forms now in use could be dispensed with. The association recommended the form to territorial passenger associations for adoption. The secretary read letters of regret, because of inability to attend, from President McCrea and Vice-President McCabe, of the Pennsylvania, and Vice-President Daly, of the New York Central. Charles S. Fee, passenger traffic manager of the Southern Pacific, presented resolutions from officers of the Panama-Pacific international exposition and commercial organizations of San Francisco, asking associations to meet there during the exposition in 1914. On behalf of the association, Charles S. Fee presented President Moody with a handsome gavel.

Reports of associations co-operating with the Association of General Passenger Agents were received from Benton Quick (M. P.) representing the American Association of Baggage Agents and L. A. Bohrer (M. & O.), representing the American Association Traveling Passenger Agents and F. J. Burton, representing the International Association Ticket Agents. The constitution was amended to provide that special representatives to association meetings to represent members must be permanent employees of the passenger department. H. G. Elliott (G. T.) was appointed to represent the association at the meeting of the Canadian Ticket Agents at Sioux Ste. Marie, Ontario, October 4, 5 and 6. The question of the general adoption of a pro rata rate basis for the division of the interline rates was put over for consideration at the next meeting. A committee of six composed of the following officials was appointed to co-operate with the secretary in choosing subjects for discussion at the next meeting: A. Hilton (Frisco), W. J. Craig (A. C. L.), John Francis (C. B. & Q.), John J. Byrne (A. T. & S. F.), W. A. Russell (L. & N.), W. R. Calloway (M. S. P. & S. S. M.). A committee composed of O. P. McCarty (B. & O.), W. A. Russell (L. & N.), and C. A. Cairns (C. & N. W.), reported in favor of making subject to association control the compilation of compendium of digest of passenger fares and division rules. This work heretofore was done by private parties.

The following former passenger officials were proposed for honorary membership: W. B. Kniskern, George W. Vaux, J. W. Ivens, J. F. Lucas, F. I. Rentlin, S. J. Ellison and E. A. Ford. The following officers for the ensuing year were elected: President, C. A. Cairns (C. & N. W.); vice-president, R. H. Wallace (Erie); secretary treasurer, W. C. Hope (C. of N. J.); orator, George H. Smith (N. O. & N. E.); members of executive committee, Gerig Ford (U. P.), George H. MacRae (C. St. P. M. & O.); A. L. Craig (C. G. W.); C. L. Stone (M. P.).

Seattle, Wash., was chosen as the place of next meeting, the date to be fixed by the executive committee. Entertainment features Tuesday included a theater party for ladies and a ball and supper at the Country. Wednesday afternoon there was an automobile ride about St. Paul, and in the evening speeches were made by C. A. Cairns, president of the association, Howard Elliott, president of the Northern Pacific, W. J. Craig (A. C. L.), T. Kateley (G. A. Great Northern, of England), and A. G. Wand (G. P. & F. A., London & Northwestern). In his address on accepting the presidency of the association Mr. Cairns said in part:

"There are many problems of general interest which can be considered at our annual gatherings, and benefit of their discussion and action conveyed to various district associations for further discussion, and final disposition by such bodies.

"The plan of having addresses delivered at gatherings by men prominent in railway or commercial world should be encouraged, and members should see subjects of general interest placed on the docket, advertising is an all-absorbing problem in our particular department, and methods by which the best results might be secured, could well be made the subject of a few hours discussion with others having expert knowledge, and who no doubt would be pleased to appear before use. One of the large expenditures in a department lies in the issuance of time table folders, and, it would seem some method both economical and efficient, could be devised to make this item a much less fixed charge upon revenues. For a number of years there was printed by a Chicago printer a manual of coupon ticket agents which has been discontinued. A great many roads found information therein most desirable, and would it not be a good idea to have a publication of this kind issued semi-annually or at least annually by one of the district passenger associations under the auspices of the American Association, our members agreeing to subscribe for such number as each might require. From figures prepared by Chairman MacLeod, at my request, the expense would be very limited on a basis of, say, a thousand copies per issue, which number would undoubtedly be minimum."

There was to be an automobile trip around Minneapolis on Thursday. The visitors were to leave Thursday night on a special train, provided by the Northern Pacific for Duluth, and are to spend Friday in Duluth and leave there Friday night for Chicago on a special train, provided by the Chicago Northwestern.

Railway Signal Association.

Secretary C. C. Rosenberg (Bethlehem, Pa.), has sent out the notice of the annual meeting, which is to be held at Hotel Antlers, Colorado Springs, Colo., October 10, 11 and 12. The notice is in the shape of a supplement to the *Journal* of the association, volume 14, No. 3; and it is a thick pamphlet of 365 pages (besides advertisements) containing the committee reports in full. Each member desiring to give intelligent attention to the doings of the convention must take this pamphlet with him, as no committee reports will be distributed at the meeting.

The principal committee reports are entered on the program as follows: Tuesday forenoon, No. 2, Mechanical Interlocking; and No. 3, Power Interlocking. Tuesday afternoon, No. 4, Automatic Block Signals; No. 10, Electric Signals for Electric Railways; No. 11, Manual of Standard Practice, and the Special Committee on the Promotion of Signaling Education. Wednesday forenoon, No. 1, Signaling Practice and Standards; No. 6, Automatic Stops and Cab Signals; No. 7, Definitions; and the Special Committee on Storage Battery. Wednesday afternoon, no session. Thursday forenoon, Special Committee, Recording Signal Failures; No. 11, Wires and Cables; and No. 12, Contracts at Joint Interlockings. Thursday afternoon, Baseball Game. On Friday it is planned to go on an all day excursion to Cripple Creek.

Western Railway Club.

At the regular meeting of the Western Railway Club, held at the Auditorium Hotel, Chicago, September 19, George C. Floyd, chief mechanical engineer of the American Steel Foundries, presented a paper on Some Experiments with Trucks.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

Air Brake Association.—F. M. Nellis, 53 State St., Boston, Mass.

American Association of Demurrage Officers.—A. G. Thomason, Scranton, Pa.

American Association of General Passenger and Ticket Agents.—C. M. Burt, Boston, Mass.

American Association of Freight Agents.—R. O. Wells, East St. Louis, Ill.

American Association of Railroad Superintendents.—O. G. Fetter, Carew building, Cincinnati, Ohio; 3d Friday of March and September.

AMERICAN ELECTRIC RAILWAY ASSOCIATION.—H. C. Donecker, 29 W. 39th St., New York; October 9-13, 1911, Atlantic City, N. J.
AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York; November 15, 1911, Chicago.
AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W., Chicago; Oct. 17-19, 1911, St. Louis, Mo.
AMERICAN RAILWAY ENGINEERING ASSOCIATION.—E. H. Fritch, Monadnock Block, Chicago; annual convention, March 19-21, 1912, Chicago.
AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago.
AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—O. T. Harroun, Bloomington, Ill.
AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.
AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.
AMERICAN SOCIETY OF ENGINEERING CONTRACTORS.—D. J. Haner, 13 Park Row, New York; 3d Tuesday of each month, New York.
AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York.
ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.
ASSOCIATION OF RAILWAY CLAIM AGENTS.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 22, 1912, Los Angeles, Cal.
ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago; annual, November 6-10, Chicago.
ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.
ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 75 Church St., New York; December 12-13, Louisville, Ky.
CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.
CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.
CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.
CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York; 2d Thurs., in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.
CIVIL ENGINEERS' SOCIETY OF ST. PAUL.—D. F. Jurgensen, 116 Winter St., St. Paul, Minn.; 2d Monday, except June, July and Aug., St. Paul.
ENGINEERS' SOCIETY OF PENNSYLVANIA.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.
ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.
FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Richmond, Va.; annual Buffalo, N. Y.
GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.
INTERNATIONAL RAILWAY CONGRESS.—Executive Committee, rue de Louvain, 11 Brussels; 1915, Berlin.
INTERNATIONAL RAILWAY FUEL ASSOCIATION.—D. B. Sebastian, La Salle St. Station, Chicago.
INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—L. H. Bryan, D. & I. R. Ry., Two Harbors, Minn.
INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, Lima, Ohio.
IOWA RAILWAY CLUB.—W. B. Harrison, Union Station, Des Moines, Ia.; 2d Friday in month, except July and August, Des Moines.
MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York.
MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago.
MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOCIATION, OF UNITED STATES AND CANADA.—A. P. Dane, B. & M., Reading, Mass.
NEW ENGLAND RAILROAD CLUB.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.
NEW YORK RAILROAD CLUB.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.
NORTHERN RAILWAY CLUB.—C. L. Kennedy, C., M. & St. P., Duluth, Minn; 4th Saturday, Duluth.
OMAHA RAILWAY CLUB.—H. H. Maulick, Barker Block, Omaha, Neb.; second Wednesday.
RAILROAD CLUB OF KANSAS CITY.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.
RAILWAY CLUB OF PITTSBURGH.—C. W. Alleman, P. & L. E., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.
RAILWAY INDUSTRIAL ASSOCIATION.—G. L. Stewart, St. L. S. W. Ry., St. Louis, Mo.; annual, May 12, 1912, Kansas City, Mo.
RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Bethlehem, Pa.; annual, Oct. 10, Colorado Springs, Colo.
RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, Box C, Collinwood, Ohio.
RICHMOND RAILROAD CLUB.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.
ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—L. C. Ryan, C. & N. W., Sterling; September 10, 1912, Buffalo, N. Y.
ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.
SOCIETY OF RAILWAY FINANCIAL OFFICERS.—C. Nyquist, La Salle St. Station, Chicago.
SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.; annual, October 20, Atlanta, Ga.
SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.
TOLEDO TRANSPORTATION CLUB.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.
TRAFFIC CLUB OF CHICAGO.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.
TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.
TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.
TRAIN DESPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.
TRANSPORTATION CLUB OF BUFFALO.—J. M. Sells, Buffalo; first Saturday after first Wednesday.
TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.
TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.
WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.
WESTERN RAILWAY CLUB.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.
WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Wednesday in month except July and August, Chicago.
WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, B. & O., Baltimore, Md.; annual, January 16-18, Chicago.

Traffic News.

A press despatch from Washington says that agents of the government secret service have found in circulation more than one thousand counterfeit transportation orders purporting to have been issued by Rear Admiral Nicholson, head of the Bureau of Navigation, Navy Department.

In the United States District Court at Canandaigua, N. Y., last week, 78 suits were entered by the government against the Lake Shore and other New York Central lines, and two against the Erie, to recover penalties for violation of the law limiting the hours in which animals may be kept in cars.

The Southern Railway is taking measures to enlarge the live stock industry in the states traversed by its lines, and an agent of the company is now going among the farmers to see if he can get them to form county live stock associations. The work is in charge of F. L. Word, live stock agent, Atlanta.

The steamer Quincy arrived at New Orleans September 19 with 1,000 tons of freight from St. Louis. This is said to mark the resumption of river traffic between these cities after twelve years, and the event was considered of enough importance at New Orleans to warrant giving the officers of the boat a public reception, which was done by the commercial organizations of the city. The steamer also landed 75 passengers, but it is not said whether or not they came through from St. Louis.

During the period of special colonist rates, to and including Sunday, October 15, the Chicago & Alton will run a tourist sleeping car semi-weekly from Chicago to California. The route will be over the Alton to Kansas City, the Missouri Pacific to Pueblo, the Denver & Rio Grande to Salt Lake City and the Western Pacific to San Francisco, the car leaving Chicago on the "Hummer" at 6:30 p. m. Mondays and Wednesdays and arriving in San Francisco at 10 p. m. the fourth night out.

At a meeting of cotton men and bankers in New Orleans this week the central bureau validating plan for bills of lading was severely condemned. They resolved "to oppose said central bureau plan, not only by refusing to comply with the requirements thereof, but by organizing a militant resistance to the proposed reflection upon the honor of the southern cotton merchants." The remedy for the evils complained of by the English buyers, they say, is in enforcing more careful and discriminating business methods on the part of both buyers and carriers of cotton and not "in attempting to devise schemes whereby the carriers of cotton may continue to escape liability for the injurious and fraudulent acts of their agents and employees and whereby buyers may be protected in their indiscriminate and care free traffic with firms of doubtful standing."

Brooklyn Traffic Club.

The first regular monthly meeting after the summer vacation will be held at the club rooms, 81 Hanson place, September 22. At this meeting matters of a business and social nature will be discussed.

Traffic Club of New York.

The regular monthly meetings of this club will be resumed on September 26, at the Waldorf Astoria. Arrangements have been made for the use of the Astor gallery for this meeting, and practically all meetings during the year. This is to be a reunion meeting, and the nominating committee is to be selected.

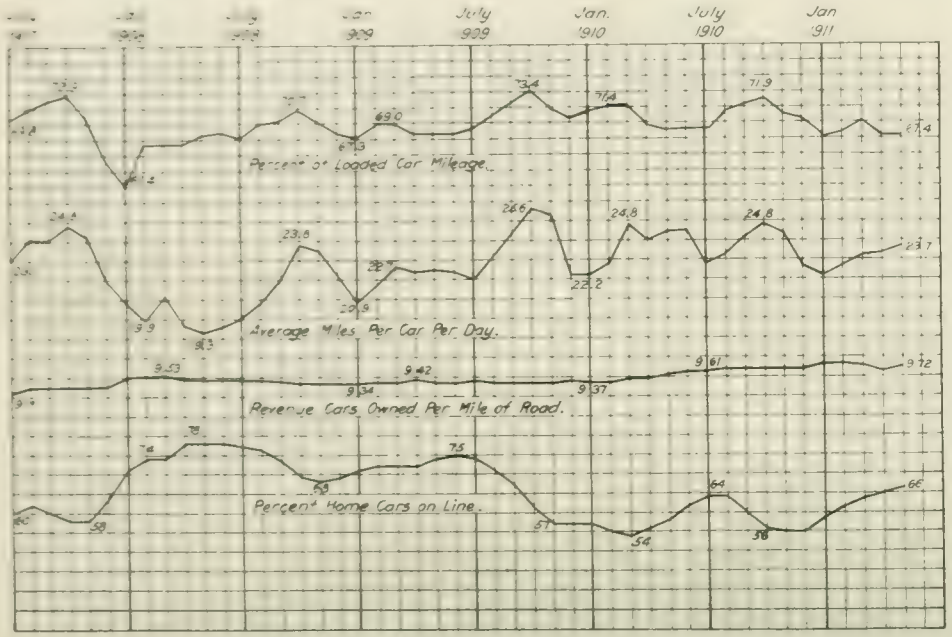
Freight Car Balance and Performance.

Arthur Hale, chairman of the committee on relations between railways of the American Railway Association in presenting statistical bulletin No. 104, covering car balance and performance for May, 1911, says:

"The averages show an improvement over April in all items of performance, excepting the per cent. of loaded mileage, which shows a slight decrease. Average miles per car per day increased

CAR BALANCE AND PERFORMANCE IN MAY, 1911.

Item	N. Y., N. J., Mich., Eastern Pa.	Ohio, Ind., Mich., Western Pa.	Va., W. Va., N. and S. Carolina	Ky., Tenn., Miss., Ala., Ga., Fla.	Iowa, Ill., Wis., Minn.	Mont., Wyo., Neb., Dakotas	Kan., Colo., Okla., Mo., Ark.	Texas, La., New Mex.	Ore., Idaho, Nev., Cal., Ariz.	Canadian Lines	Grand Total
			185,863	145,031	387,045	18,668	136,419	29,644	143,787	106,195	1,174,652
			115,783	108,891	289,133	8,098	98,137	24,847	67,840	77,223	1,113,817
			6,278	11,337	95,042	12,408	29,838	13,808	30,104	29,065	669
	84,845	684,060	76,803	150,223	384,175	20,503	128,165	38,650	117,944	106,785	1,115,150
						1,838		9,006		60	
	67	63	70	65	69	75	43	72	84	47	73	66
	48	37	34	37	36	24	66	22	46	38	7	31
	94	93	104	96	98	99	109	94	130	82	100	97
	2,058	41,370	11,150	3,586	5,944	13,635	1,418	5,584	3,124	12,275	2,633	103,643
				180,086	156,167	397,810	21,921	133,746	41,774	130,219	108,888	1,117,413
	6.41	7.66	8.88	7.78	9.39	7.67	6.96	10.33	6.46	5.65	6.03	7.83
		10,748	2,964	3,139	5,398	6,335	510	2,557	780	2,638	2,156	35,397
		67	70	58	65	63	43	52	83	49	51	63
			349,730,383	134,777,910	1,377,786	273,419,865	23,713,421	88,493,684	31,384,308	120,626,787	92,561,056	1,626,664,629
		4.0	20.5	24.1	25.6	22.2	34.9	21.3	24.2	29.9	27.4	23.7
		65.0	66.9	61.4	65.4	70.6	75.3	69.5	66.2	71.1	72.3	67.4
			2,107,384,916	1,900,517,713	1,538,701,914	2,272,724,294	361,341,496	1,164,163,762	361,710,890	1,290,686,661	1,211,036,810	20,967,955,584
		15.5	15.1	14.1	12.5	13.6	16.0	13.2	11.5	14.9	13.1	14.2
		23.3	22.6	23.0	19.1	19.5	21.2	19.2	17.3	20.9	18.2	21.2
		365	348	340	320	307	580	281	279	438	367	338
		$49,645,088	$12,631,203	$13,530,111	$10,907,599	$97,467,604	$2,871,926	$9,510,060	$3,000,227	$15,490,089	$8,901,928	$157,837,896
		$4.13	$1.89	$2.15	$2.12	$2.29	$5.10	$2.25	$3.26	$3.49	$3.70	$2.34
		1.34	1.81	2.34	2.31	2.31	4.66	2.39	2.50	4.24	2.70	2.43
		2.31	1.73	2.19	2.13	2.23	4.35	2.29	2.37	3.84	2.64	2.33


July 1907
Jan. 1908
July 1908
Jan. 1909
July 1909
Jan. 1910
July 1910
Jan. 1911
Percent of Loaded Car Mileage.
Average Miles Per Car Per Day.
Revenue Cars Owned Per Mile of Road.
Percent Home Cars on Line.
Ton Miles Per Car Per Day (- - - Excl. Surplus Cars)
Average Earnings Per Car Per Day - Dollars.

Freight Car Performance and Earnings in 1907 to 1911.

from 23.3 in April to 23.6 in May for all cars. The May average excluding surplus cars is 26.4.

"The ton miles per cars per day increased from 317 to 338 for all cars and from 353 to 382 for active cars. Earnings per car per day averaged $2.33, as compared with $2.19 in the previous month. The average earnings excluding surplus cars is $2.56."

The table gives the figures by groups for May, and the charts show performance and earnings in 1907 to 1911.

The Mount Jewett Route.

This is the name of a new freight line which has been announced by the Baltimore & Ohio and which is to be put in operation as soon as the line of the B. & O. from Foxburg northeast to Mount Jewett, Pa., can be put in order. This line is now narrow gage, but is to be made standard gage. Mount Jewett is about 30 miles south of the main line of the Erie and the Erie is a partner of the B. & O. in the new line. The Erie's branch running southward to Mount Jewett and Johnsonburg, leaves the main line at Carrollton, five miles east of Salamanca. The Mount Jewett line of the B. & O. connects with its main line at Callery Junction, 30 miles north of Pittsburg, and the distance from Callery Junction to Mount Jewett is 137 miles. The announcement says that the new route will be the shortest in existence to New England points from points on the B. & O. in Ohio. The length of the narrow gage line to be made standard is 94 miles. The material for this improvement has already been assembled and it is expected that the new route will accept freight by October 1.

Through Passenger Fares.

As the result of a controversy between the Chicago, Rock Island & Pacific and the Chicago, Burlington & Quincy on one hand and the Southern Pacific, the Western Pacific and the San Pedro, Los Angeles & Salt Lake on the other, over the divisions between the eastern and western roads of the through passenger fares from the Missouri river to California, the Rock Island and the Burlington were advised by the three western roads last week that the making of connections with them over the Denver & Rio Grande would be discontinued. The through rate from the Missouri river to San Francisco is $50, and previous to October, 1910, the divisions of this rate between the eastern and western roads had been made on the basis of 50 per cent., or $25 to each, the local rate having been $30 from the Missouri river to Ogden and the same amount from Ogden to San Francisco. Last October, however, the Interstate Commerce Commission reduced the local rate from Ogden to San Francisco to $23.58, and when this reduction was made the Burlington and the Rock Island asked that the division of the through rate be made on the basis of $28 to them and $22 to the western roads, which the latter refused to agree to. The western roads also refused the offer of the eastern lines to arbitrate the matter, on the ground that the reduction of the local rate should not affect the divisions of the through rate and that they have the right to say what revenue they should receive for business handled over their rails. The western roads at once arranged to route their through service over other lines. The Union Pacific will take the cars at Denver, and east of Omaha and Kansas City they will go by the Chicago & Northwestern, the St. Paul and the Wabash. There are three standard sleeping car runs each way daily and four tourist-car.

INTERSTATE COMMERCE COMMISSION.

The commission has suspended until January 13 tariffs which had been filed to take effect September 15 on soft coal from mines in Illinois to points in Kansas and Nebraska.

The commission has declined to suspend, pending an investigation, decreases in freight rates on flour made by the St. Paul, Minneapolis & Omaha. The railway has placed on file with the commission a reduction of rates on flour from 23 cents 100 lbs. to 21½ cents, effective October 5. Eastern carriers in trunk line territory protested to the commission against the decrease and asked permission to withdraw their concurrences in the proposed tariffs on short notice. The eastern lines say that the reduced rate will result in much loss of revenue to them, because the reductions will necessarily be followed by reductions in rates from related points. The new rates affect shipments of flour from Minnesota points, rail and lake via Duluth to New York and rail and lake via Chicago to New York.

In the hearings before the commission at Oklahoma City on rates on packing house products, Judge Cowan, who appeared as a witness for two cattle associations, said the rate to Oklahoma City from Texas points, with the exception of the Texas panhandle and other territory adjacent to Oklahoma City, should be approximately 15 per cent. lower than the rate to Kansas City, and that from the Texas panhandle and adjacent territory the rate should be two cents lower to Oklahoma City than to Fort Worth. A. W. McLaren, traffic manager for Morris & Company, Chicago, comparing the rates on dressed beef from Wichita, Kan., Fort Worth and other points with those from Oklahoma City, testified that the adjustment tended to discriminate against the latter point.

STATE COMMISSIONS.

Richard T. Higgins has been made chairman of the new Public Utilities Commission of Connecticut, and Henry F. Billings, secretary. C. C. Elwell has been appointed chief engineer.

The Florida Commission has entered suit at Tampa against the Seaboard Air Line, the Tampa Northern and the Atlantic Coast Line to recover a fine of $5,000 imposed on these roads by the commission for failing to build a Union station at Tampa, as ordered by the commission.

The Railroad Commission of Wisconsin has ordered the Chicago & North Western to restore its stoppage in transit privileges at certain stations. The commission found that the withdrawal of the stoppage in transit privilege resulted in an unwarranted increase in rates throughout the state on live stock shipments stopped to finish loading.

The Railroad Commission of Wisconsin has held that the single and double line rates for shipments of tile and brick in Wisconsin for less than 100 miles are higher than the cost to the carrier warrants, and the Chicago, Milwaukee & St. Paul *et al.* are ordered to put into effect a distance tariff on brick and tile less than is now in effect.

The state railway commission of Indiana has filed suit in the Indianapolis (Marion) Circuit Court against the Vandalia Railroad, to compel obedience to an order made a few weeks ago to have the company discontinue running freight engines backward between Indianapolis and Martinsville. The suit is to test the commission's authority to make and enforce such an order.

The Iowa Railway Commission, through George Cosson, attorney-general of that state, has forwarded a complaint to the Interstate Commerce Commission, alleging that all Iowa cities on the Mississippi river are discriminated against by the railways in that section in favor of Quincy, Ill., and St. Louis, Mo., and asking for reductions in freight rates in favor of the Iowa points.

The Shreveport Chamber of Commerce has asked the Railroad Commission of Louisiana to establish "reasonable rates and just joint through rates" on cotton to New Orleans. The Chamber of Commerce claims that the railways are diverting cotton raised in Louisiana to Galveston, thus working an injustice to Shreveport shippers who have trade connections in New Orleans and not in Galveston.

COURT NEWS.

Judge Smith McPherson of the federal court at Des Moines, Iowa, on September 16 dissolved the temporary order recently obtained by the express companies in that state enjoining the railway commission from enforcing its order fixing express rates. He held that the state commission has the right to fix express rates, and the new tariff, which provides for reductions of approximately 15 per cent. from the present rates, will become effective October 31.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

G. F. Tucker has been appointed auditor of the Gulf & Ship Island, with office at Gulfport, Miss., succeeding J. P. Pelham, acting auditor.

Horace W. Clarke, second vice-president and general manager of the Denver & Rio Grande, with office at Denver, Colo., has resigned on account of ill health.

W. J. Cunningham has been appointed auditor of disbursements of the Chicago Great Western, with office at Chicago, succeeding W. W. Vincent, resigned.

Operating Officers.

H. A. Hinshaw, traveling freight agent of the Oregon lines of the Southern Pacific at Portland, Ore., has been appointed assistant general manager of the Salem, Falls City & Western, with office at Dallas, Ore.

T. F. Hickey has been appointed district superintendent of the Pullman Company, with office at Kansas City, Mo., succeeding H. Tolson, transferred to Dallas, Tex., as agent. C. Z. Magnan has been appointed agent at Galveston, Tex.

A. W. Sullivan, general manager of the Missouri Pacific, having been granted a leave of absence, J. W. Higgins, assistant general manager at St. Louis, has been appointed acting general manager, succeeding Mr. Sullivan.

Charles W. Van Horn, chief clerk to the general superintendent of the Baltimore & Ohio, at Baltimore, Md., has been promoted to trainmaster of the Parkersburg branch, Monongah division between Parkersburg, W. Va., and Grafton, with office at Parkersburg.

Traffic Officers.

H. L. Richardson has been appointed fuel agent of the St. Louis & San Francisco lines, with office at Houston, Tex.

A. W. Raybould has been appointed passenger agent of the Western Pacific, with headquarters at Salt Lake City, Utah.

James Warrack, freight and passenger agent of the Union Pacific at Sacramento, Cal., has been appointed district freight and passenger agent, with office at Sacramento.

E. E. Peacock, commercial agent of the Trinity & Brazos Valley at Dallas, Tex., has been appointed general agent, with office at Dallas, and his former position has been abolished.

H. E. Heller, district freight and passenger agent of the Chicago, Burlington & Quincy at Philadelphia, Pa., has been appointed general agent, with headquarters at Philadelphia.

John W. Loud, freight traffic manager of the Grand Trunk and the Grand Trunk Pacific, with office at Montreal, Que., will be retired under the pension rules on September 30.

T. J. Wall has been appointed general agent in the passenger department of the Canadian Pacific, with office at Spokane, Wash., succeeding George A. Walton, transferred to Chicago.

T. C. Lutz has been appointed traveling freight agent of the Nashville, Chattanooga & St. Louis, with office at St. Louis, Mo., succeeding Anson T. Pratt, resigned to engage in other business.

J. R. Bodenhamer, soliciting freight agent of the St. Louis Southwestern of Texas at Houston, Tex., has been appointed traveling freight agent, with office at Houston, and William Gray succeeds Mr. Bodenhamer.

J. G. Bliss, soliciting freight agent of the Cincinnati, New Orleans & Texas Pacific at Cincinnati, Ohio, has been appointed chief of the solicitation department in the general freight office, with headquarters at Cincinnati.

George D. Hunter, general eastern traffic agent of the Texas & Pacific and the International & Great Northern, at New York City, has been appointed general passenger agent of the Texas & Pacific, with office at Dallas, Tex., succeeding L. P. Turner, resigned, effective October 1.

Russell S. Underwood, assistant division freight agent of the Erie Railroad, at New York City, has been appointed manager of the Mount Jewett Route, which will soon be put in operation by the Baltimore & Ohio and the Erie Railroad. Mr. Underwood's office will be at New York City.

A. C. Ketcham, commercial agent of the Ann Arbor Railroad at Toledo, has been appointed commercial agent, with office at Menominee, Mich., succeeding R. J. Wilda, resigned. E. W. Wells, contracting freight agent at Toledo, has been appointed traveling freight agent, with office at Toledo, succeeding Mr. Ketcham, and J. W. Brady succeeds Mr. Wells.

H. W. Landman, commercial agent of the Missouri, Kansas & Texas of Texas at Denison, Tex., has been appointed commercial agent, with office at Galveston, Tex., succeeding E. D. Chadick, resigned, and W. D. Morgan, commercial agent at Waco, Tex., succeeds Mr. Landman. Elbert Blair, traveling freight and passenger agent of the Texas Central at Waco, succeeds Mr. Morgan.

R. J. Daniels has been appointed commercial agent of the Chicago, Milwaukee & Puget Sound, the Gallatin Valley, the Idaho & Western and the Tacoma Eastern, with headquarters at Aberdeen-Hoquiam, Wash., succeeding to the duties of A. J. Hillman, traveling freight agent at Tacoma, Wash., promoted. Samuel Wilson has been appointed export and import agent, with office at Seattle, Wash.

F. R. Dunn, traveling freight agent of the Oregon-Washington Railroad & Navigation Company at Portland, Ore., has been appointed traveling freight agent of the Oregon lines of the Southern Pacific, with office at Portland, succeeding H. A. Hinshaw, resigned to accept service with another company. H. C. Oliver, traveling freight agent of the O.-W. R. R. & N. at Spokane, succeeds Mr. Dunn, and W. R. Skey, traveling passenger agent at Spokane, has been appointed traveling freight and passenger agent, with headquarters at Spokane.

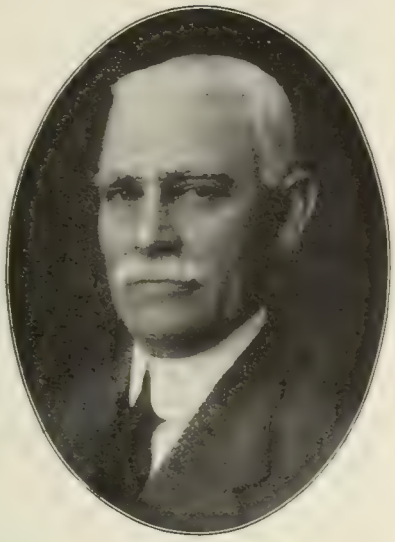
J. M. Breen, traveling freight agent of the Cleveland, Cincinnati, Chicago & St. Louis, at Pittsburgh, Pa., has been appointed traveling freight agent, with office in New York City, and P. G. Spence has been appointed traveling freight agent, with headquarters at Boston, Mass. Gordon Alexander succeeds Mr. Breen. J. H. Pepper has been appointed traveling freight agent, with office at Winston-Salem, N. C., and the following have been appointed westbound agents: W. J. McDowell at Chicago; H. C. Shaw at Kansas City, Mo., and A. S. Morrill at St. Joseph, Mo.

John B. Nessle, who has been appointed general coal and ore agent of the New York Central Lines, with office at Cleveland, Ohio, as was previously announced in these columns, was born June 20, 1869, in Mahoning county, Ohio. He received a common school education and began railway work on December 20, 1886, as a clerk and telegraph operator for the Pittsburgh & Lake Erie at Shannopin, Pa. The following year he was transferred with the same title to Struthers, Ohio, and on April 21, 1888, to Lowellville, Ohio. From 1889 to 1907, he was consecutively, agent at Struthers, Ohio; car tracer at Pittsburgh, Pa.; freight agent at McKeesport, Pa.; commercial agent at Brownsville, Pa., and general agent at Pittsburgh. He was promoted to assistant general freight agent on October 1, 1907, and in January, 1910, to general freight agent, with office at Pittsburgh, from which office he has just been promoted as above.

J. R. Veitch, who has been appointed assistant general freight agent of the Chicago, Milwaukee & Puget Sound, with office at Seattle, Wash., as has been announced in these columns, was born November 1, 1875, at Cambridge, Ohio. He received a high school education, and began railway work in April, 1892, as an operator on the Pennsylvania, and was subsequently relief operator on the Baltimore & Ohio between Chicago and Wheeling, operator in the office of the superintendent of the Chicago, Milwaukee & St. Paul at Kansas City, Mo.; chief rate clerk in the traffic department of the St. Paul at Kansas City; chief clerk to the general freight and passenger agent of the Des Moines Northern & Western, now part of the St. Paul system, at Des Moines, Iowa, and commercial agent of the Chicago, Milwaukee & St. Paul at Des Moines. In 1900 he was made general agent of the Iowa Central at Indianapolis, Ind., and the next year had his jurisdiction extended over the Minneapolis & St. Louis and was transferred to Chicago. He was made assistant general

freight agent of the Pere Marquette at Chicago in 1909, and later in the same year was appointed division freight agent of the Chicago, Milwaukee & Puget Sound at Portland, Ore., from which position he has recently been promoted as above.

C. W. Bassett, whose appointment as assistant to the passenger traffic manager of the Baltimore & Ohio, with office at Baltimore, Md., has been announced in these columns was born May 25, 1854, and began railway work in 1870. Previous to 1872 he was a telegraph operator at Youngstown, Ohio, on the Atlantic & Great Western, now a part of the Erie Railroad, and then for about two years was manager of the Western Union Telegraph office at Niles. From 1874 to 1884 he was ticket clerk of the New York, Pennsylvania & Ohio, and from 1876 to 1884, was also ticket agent of the Pittsburgh & Lake Erie. In August, 1884, he was appointed assistant general passenger and ticket agent of the Pittsburg & Western, now a part of the Baltimore & Ohio. He was promoted to general passenger agent of that road in January, 1886, and was appointed general passenger agent of the Baltimore & Ohio lines east of the Ohio river in June, 1902.



C. W. Bassett.

Engineering and Rolling Stock Officers.

J. B. Ingersoll, whose resignation as chief electrical engineer of the Spokane & Inland Empire at Spokane, Wash., has been announced in these columns, has been appointed electrical engineer of the British Columbia Electric Railway, with office at Vancouver, B. C.

OBITUARY.

F. H. Clarke, president of the Coos Bay & Oregon Central, which he had promoted to build a railway from Marshfield, Ore., to Roseburg, died at Portland, Ore., on September 12, at the age of 53 years. Mr. Clarke had been interested at different times in various railway projects, having organized the Oregon, Idaho & Eastern which was later absorbed by the company which planned to build the Coos Bay & Oregon Central.

Thomas M. King, formerly vice-president of the Baltimore & Ohio, died on September 14 at his home in Irvington-on-Hudson, N. Y. Mr. King was born in November, 1843, at Freeport, Armstrong county, Pa., and began railway work in 1858, as a clerk on the Allegheny Valley, now a part of the Pennsylvania Railroad, and was later baggage master and conductor on the same road. From 1861 to 1864 he was in the United States military railway service. He was superintendent of the Pittsburgh division of the Allegheny Valley from 1868 to 1881, and was subsequently general superintendent of the Baltimore & Ohio, president of the Pittsburgh, Southern, and the Pittsburgh Junction, which he built, and vice-president and general manager of the Pittsburgh & Western. From November, 1884, to November, 1899, he was second vice-president of the Baltimore & Ohio, and from August 1, 1893, to October, 1900, was also president of the Pittsburgh & Western. From March, 1890, to October, 1900, was also receiver of the same road. Mr. King, in addition to serving as president and general manager of a number of subsidiary lines of the Baltimore & Ohio, had the direction of extension and development of terminals in Pittsburgh, Philadelphia, New York, Chicago, Brunswick, Md., and Bellaire, Ohio; the construction of the Baltimore Belt Railroad and tunnel and the bridge over Arthur kill, connecting New Jersey with Staten Island.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

THE EAST BROAD TOP RAILROAD & COAL COMPANY has ordered one mikado locomotive from the Baldwin Locomotive Works

THE BANGOR & AROOSTOOK has ordered 6 ten-wheel locomotives from the American Locomotive Company.

THE CHICAGO, MEMPHIS & GULF has ordered one mogul and one American type locomotive from the Baldwin Locomotive Works.

THE WABASH, mentioned in the *Railway Age Gazette* of August 4 as being in the market for 15 consolidation and 5 switching locomotives, has ordered this equipment from the American Locomotive Company.

THE CHICAGO, INDIANAPOLIS & LOUISVILLE, mentioned in the *Railway Age Gazette* of September 15 as being in the market for nine mikado locomotives, has ordered this equipment from the American Locomotive Company.

THE LOUISIANA RAILWAY has ordered one 54-ton Perry type locomotive from the Baldwin Locomotive Works. The cylinders will be 17 in. x 20 in., and the driving wheels 44 in. in diameter. The tender is to be equipped with a cast steel underframe and Commonwealth trucks.

THE ST. LOUIS & SAN FRANCISCO, as mentioned in the *Railway Age Gazette* of August 18, has ordered 12 switching locomotives for the St. Louis & San Francisco, and eight Pacific type locomotives for the Chicago & Eastern Illinois, from the Baldwin Locomotive Works. The general dimensions and special equipment of these locomotives are as follows:

	Switching	*Pacific*
Simple or compound	Simple	Simple-superheater
Weight on drivers	154,500 lbs.	166,000 lbs.
Total weight	154,500 lbs.	260,000 lbs.
Cylinders	20½ in. x 26 in.	26½ in. x 28 in.
Diameter of drivers	51 in.	73 in.
Type of boiler	Straight top	Extended wagon top
Working steam pressure	185 lbs.	180 lbs.
Heating surface, tubes	1,800.3 sq. ft.	3,387 sq. ft.
Heating surface, firebox	107.7 sq. ft.	200 sq. ft.
Heating surface, total	1,908 sq. ft.	3,587 sq. ft.
Tubes, number	315	197 and 32
Tubes, outside diameter	2 in.	2¼ and 5½ in.
Tubes, length	11 ft.	21 ft.
Firebox, type	Wide	Wide
Firebox, length	72 in.	108 in.
Firebox, width	68 in.	61 in.
Firebox, material and maker	Otis steel	Otis steel
Grate area	33 sq. ft.	45 sq. ft.
Tank capacity	6,000 gals.	9,000 gals.
Coal capacity	10 tons	16 tons
Special Equipment.		
Axles	Steel	Steel
Bell ringer	Gollmar pneumatic	Gollmar pneumatic
Boiler lagging	Sectional magnesia	Ehret sectional magnesia
Brakes	New York air brake	New York air brake
Brake beams	Trussed beam	Creco
Brake shoes	Am. Br. Shoe & Fdy.	Am. Br. Shoe & Fdy.
Brick arch	.....	Security brick type "H"
Couplers	Latrobe	.....
Driving boxes	Cast steel	Cast steel
Headlight	Oil burner	Pyle National electric
Injector	Hancock lifting	Simplex
Journal bearings	Hewitt bronze	Hewitt bronze
Packing	United States	United States
Safety valve	Ashton	Ashton
Sanding devices	Brady	Leach
Sight-feed lubricators	Nathan	Nathan
Springs	Rwy. Steel-Spr. Co.	Rwy. Steel-Spr. Co.
Staying	Tate flexible	Tate flexible
Steam gages	Ashton	Ashton
Steam heat equipment	.....	Gold
Superheater	.....	Schmidt
Tires	Inter Ocean	Inter-Ocean
Tubes	Charcoal iron	Charcoal iron
Valve gear	Stephenson	Walschaert
Wheel centers	Cast steel	Cast steel

CAR BUILDING.

THE LONG ISLAND is making inquiries for 50 suburban coaches.

THE KOKOMO, MARION & WESTERN has ordered six interurban cars from the McGuire-Cummings Company.

THE PENNSYLVANIA is making inquiries for 1,150 freight cars and from 75 to 100 steel passenger and baggage cars.

THE CHICAGO, MEMPHIS & GULF RAILROAD has placed orders for 100 freight cars, 1 caboose and 1 passenger coach.

The Grand Trunk is said to have ordered 1,000 box cars from the Canadian Car Foundry, and is said to be in the market for 20 flat cars. This item is not yet confirmed.

The Chicago, Indianapolis & Louisville, mentioned in the *Railway Age Gazette* of September 8 as being in the market for 1,000 all steel gondola cars of the company's own design, has ordered this equipment from the American Car & Foundry Company. The cars will be 40 ft. long inside, will weigh 40,000 lbs., and will have a capacity of 100,000 lbs. They will be built at St. Louis. The specialties are as follows:

Axles	Steel
Bolsters, truck	Simplex
Bolsters, body	Simplex
Brakes	New York
Brake beams	Arax
Brake shoes	Am. Brake Shoe & Fdry.
Couplers	Ganney
Dumping device	National Dump Car Co.
Journal boxes	McCord
Springs	Pittsburgh
Trucks	Am. Steel Foundries
Wheels	Am. Car & Foundry

The Frisco Refrigerator Line, mentioned in the *Railway Age Gazette* of September 15 as having ordered 2,500 refrigerator cars from the American Car & Foundry Company will distribute them as follows: The Chicago & Eastern Illinois will use 1,000, the New Orleans, Texas & Mexico 1,000 and the St. Louis & San Francisco 500. The special equipment will be as follows:

Axles	4½ in. x 8 in.
Bolsters	Cast steel
Brakes	New York
Brake beams	Buffalo
Brake shoes	Streeter
Brasses	Howett
Couplers	Simplex
Draft gear	Cardwell
Dust guards	Wood
Journal boxes	McCord
Roofs	Wood
Springs	Railway Steel Spring Co.
Trucks	Arch bar
Wheels	Chilled

IRON AND STEEL.

The Canadian Pacific has ordered 1,200 tons of rails from the Illinois Steel Company.

The Baltimore & Ohio has ordered 6,500 tons of rails from the Carnegie Steel Company.

The Boston & Maine has ordered 280 tons of bridge steel from the Phoenix Bridge Works.

The Buchanan & Northern has ordered 4,500 tons of rails from the Carnegie Steel Company.

The Hummelstown & Campbelstown has ordered 1,000 tons of rails from the Pennsylvania Steel Company.

The Boston & Albany has ordered 4,000 tons of steel for the bridge at Worcester, Mass., from the Pennsylvania Steel Company.

The Pennsylvania Lines West are in the market for 5,000 tons of structural steel for grade separation work at Cleveland, Ohio.

The El Paso & Southwestern has ordered 16,000 tons of open hearth rails from the Colorado Fuel & Iron Company for laying the Fairbank-Tucson, Ariz., extension and for road repairs.

The Haskell & Barker Company, Michigan City, Ind., has ordered [illegible] tons of structural steel for the new power plant at Michigan City, mentioned in the *Railway Age Gazette*, of May 5.

The New York Central has divided orders among three manufacturers for 1,225 tons of structural steel, including 500 tons for the New York terminal, 300 tons for canal bridges, and 225 tons for the bridge at Watertown, N. Y.

General Conditions in Steel. It is believed that the steel trade for September will hold as good as last month, but it is not decided that reductions in prices will be made to get the business. Steel bars have already sold at $1.10, which is 15 cents below the official price, and one order of structural steel at $1.30 [illegible] reported. It is [illegible] that the [illegible] conference on the steel situation will result in anything definite as to prices, but [illegible] on account of the attitude of the [illegible] and attempt to control prices.

Supply Trade News.

The American Rolling Mill Company, Middletown, Ohio, has started up its new $4,000,000 East Side Works.

The International Oxygen Company, New York, has moved its offices from 68 Nassau street to 115 Broadway.

The Oregon Short Line has ordered 400 tons of culvert pipe from the U. S. Cast Iron Pipe & Foundry Company, New York.

The M. Mitshkun Company, Detroit, Mich., has purchased the old Blue Line Car Works, which occupy about eight acres of land.

The Electric Properties Company, New York, has moved its offices from 165 Broadway to 10 Bridge street, where Westinghouse, Church, Kerr & Company, of which it is the holding company, is now located.

James A. Lister, manager of the Chicago office of the Pittsburgh Testing Laboratory, Pittsburgh, Pa., has resigned, to become the manager of the bridge, structural steel and cement departments of the Hildreth-Jones Company, Chicago.

The American Car Seal Company, South Bend, Ind., has been incorporated with $40,000 capital stock to manufacture the "Duplax" car seals. The officers of the company are as follows: Barney C. Smith, president; Alfred K. Collins, first vice-president; Harry I. Lahr, second vice-president; Charles H. Jackson, treasurer; and Edward Collins, secretary.

TRADE PUBLICATIONS.

Electric Meters.—The Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has issued Folder 4217, describing its type *C* watt-hour meters; also Folders 4215 and 4216, describing switchboard meters for alternating and direct current service.

San Pedro, Los Angeles & Salt Lake.—The passenger department of the San Pedro, Los Angeles & Salt Lake has issued an illustrated folder entitled The Touring Two, describing in "travelogue" form, the points in southern California reached by the Salt Lake route.

Recording Instruments.—The Bristol Company, Waterbury, Conn., has issued catalog No. 160, which is a condensed catalog of its recording instruments for pressure, temperatures, electricity, speed, time, etc. It contains 64 pages, is well illustrated and gives the list prices of the instruments mentioned.

Clam Shell Buckets.—The Hayward Company, New York, has issued pamphlet No. 564, illustrating and describing its improved class "E" type of clam shell bucket. This company has also published pamphlet No. 575, containing a number of photographs showing some unusual feats being performed by its buckets.

Brake Staffs.—The U. S. Metal & Manufacturing Company, New York, has issued a small folder illustrating and describing the Feasible drop brake staff. This brake staff can be easily raised or lowered with the brakes applied or off, when lowered it does not extend beyond the stake pockets. It is adapted to the end sills of logging cars, and drop-end gondola cars.

Steam Turbines and Centrifugal Machinery.—The De Laval Steam Turbine Company, Trenton, N. J., has issued a 32-page booklet illustrating and describing briefly its single stage turbines; turbine-driven centrifugal pumps; velocity staged direct-connected turbines; multi-stage impulse geared and direct-connected turbines; motor and belt-driven centrifugal pumps; multi-stage centrifugal air compressors, and De Laval speed reduction gears.

Narrow Gage Locomotives.—The C. W. Hunt Company, West New Brighton, N. Y., has devoted its catalogue No. 115 to its narrow-gage storage battery locomotives, combination storage battery and trolley locomotives and trolley locomotives for handling trains of industrial railway cars. These locomotives are intended to be used in and around shops, foundries, etc., where heavy material is to be moved on cars, and where simplicity of operation and cheapness of maintenance are more desirable than speed. The regular gage is 21½ in., and the locomotives will easily run around curves of 12 ft. radius. Illustrations are included.

Railway Construction.

New Incorporations, Surveys, Etc.

Arizona Roads.—The Arizona & Nevada Copper Company is making plans, it is said, to build a 15-mile line from Hillside, Ariz., to the company's property in the western part of Yavapai county.

Atlantic, Okeechobee & Gulf.—A contract has been given to the W. K. Palmer Company, engineers, Kansas City, Mo., it is said, for preliminary work on this line, projected from Tampa, Fla., south to Fort Lauderdale. H. C. Ferriot, president, and H. M. McElroy, chief engineer. Tampa. (January 27, p. 183.)

California Roads (Electric).—A line is to be built, it is said, from Los Angeles, Cal., northwest to San Fernando, about 25 miles. H. J. Whitley is interested.

California Terminal.—Incorporated in California with $500,000 capital to build through Marin county to Sacramento. The proposed line, with branches, will be 118 miles long. The directors include C. W. Conlisk, W. M. Rank and R. A. Morton. R. M. Hotaling, San Francisco, is said to be back of the project.

Canadian Pacific.—According to press reports, this company will double-track the line from Adirondack Junction, Que., east via St. Johns to Farnham. The bridge crossing Richelieu river will be widened.

Central Railway of Canada.—An officer writes that a contract has been given to C. J. Wells & Son, 28 Victoria street, Westminster, England, to build from Montreal, Que., to Ottawa, Ont., and Midland. Track has already been laid on 13 miles. The work calls for putting up two steel bridges. The company has been given a land grant of 12,000 acres a mile for 110 miles, payable as each 20 miles of the railway is completed. The line is being built to carry grain, ore and lumber. A. Campbell, president, Ottawa, and Walter Shanley, chief engineer.

Central of Georgia.—The report of this company for the year ended June 30, 1911, shows that 113 new side and spur tracks, including additions to yards, aggregating 16.15 miles, were constructed, and 33 side and spur tracks extended, aggregating 2.94 miles, a total of 19.09 miles. During the year 1.72 miles of side and spur tracks were removed or shortened. (See Macon, Ga., under Railway Structures.)

Chicago, Lancaster & La Crosse (Electric)—The Twentieth Century Transportation Company has been incorporated in South Dakota with $1,000,000 capital, to build a double-track electric line from Chicago, Ill., northwest via Elgin, Rockford, Warren, Shullsburg, Wis., Platteville, Lancaster, Bloomington, Patchgrove and Bagley, thence across the Mississippi river, northwest to Decorah, Iowa, continuing north to Chatfield, Minn., then northwest via Zumbrota and Cannon Falls to Minneapolis, about 420 miles. Under the name of the Twin Cities & Dakota Southern, it is proposed eventually to build via Watertown, S. D., and Pierre to Rapid City, about 600 miles. The principal office will be at Pierre. E. Norwood, president, Winona, Minn. The incorporators include: J. A. Holmes, Pierre, S. D.; F. A. Wenzel, J. McDonald, F. S. Orton, J. Brenner and R. Baile.

Colorado Roads.—Plans are being made to build a line from Grand Junction, Colo., through Mesa county to the Paradox country. Carman Layton, associated with Denver and eastern capitalists, is back of the project.

Denver, Laramie & Northwestern.—According to press reports, all the right-of-way has been secured and construction work is to be started at once on the extension from Greeley, Colo., northwest to Severance, nine miles. (August 18, p. 356.)

El Paso & Southwestern.—An officer writes that a contract has been given to Lee Moore, El Paso, Tex., for reconstructing 10 miles of line between Lewis Springs, Ariz., and Fairbanks. Subcontracts have been let by MacArthur Brothers Co., New York, for work on the extension being built between Fairbanks, Ariz., and Tucson, 67 miles, as follows: To Vosburgh & Carlson; Reiwitz Construction Co., Foster & Doll; Blumenkranz & Meyser; Ely Construction Co.; Beisel & Glenn, and Crook, Allen & Co. (September 8, p. 493.)

Eufaula & Chattahoochee Valley.—According to press reports, the construction of this road is assured. The company has a capital of $100,000, and plans to build from Eufaula, Ala., north to some point in Russell county, where connection is to be made with the Seaboard Air Line. A line will also be built from Eufaula, south to points in Henry county to connect with the Atlantic Coast Line. J. P. Foy, president; A. H. Merrill, is vice-president, and W. L. Wild is secretary and treasurer, Eufaula.

Fairchild & Northeastern.—An officer writes that contracts are to be let soon to build an extension west into Trempeleau and Buffalo counties, Wis. The work includes putting up one 34-ft. steel bridge. The line is now in operation from Fairchild, northeast to Owen, 38 miles.

Great Northern.—An officer writes that as soon as the necessary right-of-way can be secured and arrangements are made regarding the location of the state highway, construction work will be started on the line from Wenatchee, Wash., northeast to Pateros, about 60 miles. The line from Oroville south to Pateros along the Columbia river has been built. Bids will be received at once to build a branch from the main line at Bluestem, Wash., northwest, via Peach, about 40 miles. (September 1, p. 453).

Georgia Railway & Power Company.—Incorporation has been asked for by this company in Georgia with $27,000,000 capital, to operate about 200 miles of railway in De Kalb and Fulton counties, Ga. The company plans to build or buy, lease and acquire lines of street and suburban railways with their franchises, in the cities and towns of Atlanta, East Point, Collegepark Haneville, Stone Mountain, Clarkston, Decatur, Eastlake, Lakeview, Oakhurst and Kirkwood. The incorporators include: Charles Magee, G. A. Kingston and R. Mathison, all of Toronto, Ont.; J. J. Spalding, G. W. Adair and A. C. King, of Atlanta and its suburbs.

Gilmore & Pittsburgh.—A contract has been given by this company for constructing large stock yards at Salmon City, Idaho. It is understood that yards will also be constructed at Gilmore, and Leadore, Idaho, and at Grant, Mont.

Grand Trunk Pacific.—According to press reports, a grading contract has been given to Rigby, Hyland & Plummer, Winnipeg, Man., to build from Harte, Man., southwest to Brandon, 23 miles.

Intercolonial Railway.—Bids are wanted by L. K. Jones, secretary of the Department of Railways and Canals, Ottawa, Ont., until October 2, for constructing a yard at Moncton, N. B., and cut-off for the Intercolonial Railway. Bids are wanted by L. K. Jones, Ottawa, until October 12 for building a branch from a point on the Intercolonial, near Alba, N. S., to Baddeck, 22.7 miles.

Kansas City & Memphis.—Financial arrangements are said to have been made to complete this road. The company now operates a line from Rogers, Ark., southwest to Siloam Springs, 31 miles, which is to be extended west to Wagoner, Okla., 65 miles. A line is also in operation from Cave Springs to Elm Springs, four miles, which is to be extended east to Memphis, Tenn., 280 miles, and the Eastern division, now in operation from Freeman, Ark., to Monte Ne, seven miles, is to be extended to Ovid, 19 miles.

Kansas City, Clay County & St. Joseph.—Organized in Maine with $5,200,000 capital, to build or acquire railways in Maine. Charles M. Hammond, president; W. B. Hammond, treasurer, and J. H. Brummond, clerk, all with headquarters at Portland, Me.

Kentucky Southwestern Electric Railway, Light & Power Company.—Incorporated in Kentucky to build an electric line from Uniontown, Ky., via Sturgis, Marion, Smithland, Paducah, Mayfield, Columbus, Clinton and Union City to Hickman; also, from Mayfield to Murray, in all, about 160 miles. Contracts are to be let next spring for grading, track laying,

etc. The line is expected to find a traffic in coal, tobacco, cotton and grain. H. C. Rhoades, president, and W. A. Calhoun, chief engineer, Paducah.

LARAMIE, HAHN'S PEAK & PACIFIC.—Track laying has been finished southwest of Fox Park, Wyo., it is said, to North Gate, Colo., 20 miles. It is expected that the line will be completed to Walden by October 1, and to Hebron, 50 miles from Fox Park this year. (August 4, p. 269.)

LARNED & NORTHWESTERN.—An application has been filed with the Public Utilities Commission of Kansas by this company to issue $5,000,000 in bonds for the purpose of beginning construction. The line is to be built from Almena, Kan., south to Coldwater, about 180 miles. Address T. V. Wardall, Pratt, Kan.

MIDLAND VALLEY.—According to press reports, work has been finished on the extension built under the name of the Wichita & Midland Valley, from Arkansas City, Kan., northwest to Wichita, 55 miles, and the line will soon be put in operation. (June 30, p. 1714.)

MISSOURI, AKLAHOMA & GULF.—Surveys have been made for an extension from Henrietta, Tex., to Oklahoma City, Okla., through Shawnee. The company will begin work surveying the proposed line to Pittsburg, Kan., to connect with the Kansas City Southern Railroad at once.

NATIONAL RAILWAYS OF MEXICO.—An officer writes that this company completed improvement work August 1 on the line from Acambaro, Guanajuato, to Uruapan, Michoacan. This work consisted of 140 miles of main line, of which 39 miles was new construction, owing to change in location, and 101 miles was change of gage from narrow to broad gage. In addition, the company has grade reduction work under way from Metepec, Hidalgo, to San Lorenzo, 25 miles, on the Interoceanic; 20 miles of the work was finished up to September 1.

Work is now under way on the following branch lines:

Durango, Durango to Llano Grande, 60 miles, track has been laid on 13 miles. This branch will open up fine tracts of pine timber.

Canitas, Zacatecas, to Durango, 230 miles, with a branch to Sombrerete, 5.5 miles.

Penjamo, Guanajuato, on the Guadalajara branch, to Ajuno, Michoacan, on the Uruapan branch, 85 miles, track has been laid on 12.5 miles.

Oaxaca, Oaxaca to Tlacolula, 20 miles, track has been laid on 16.5 miles. This is a branch of the Mexican Southern and is being built to open up a large lead mine country.

Mile post 12.5 on the Cerro Colorado branch of the Vera Cruz & Isthmus, to Cosamaloapam, 15 miles, track has been laid on 12.5 miles. The Cerro Colorado branch starts at Brisbin station. This extension is being built to develop a fine sugar country.

Rives, on the main line of the Vera Cruz & Isthmus, to San Andres Tuxtla, 45 miles, track has been laid on 24 miles. This line is being built to reach the tobacco growing district of Mexico.

[illegible] PACIFIC.—According to press reports, bids are to be asked for at once to build a branch from Glendive, Mont., to [illegible] about 60 miles.

[illegible] SOUTHWESTERN.—An officer writes that surveys are now being made from Watonga, Okla., northwesterly along the south side of the North Canadian river. The company was [illegible] to build from Oklahoma City, northwest to Woodward, about 150 miles, and will probably build through the towns of El Reno, Watonga, Canton, Seiling and Mutual. It has not yet been definitely decided whether steam will be used for the motive power or electric cars. Edward A. Wagener, president, Oklahoma City; W. H. Wood, chief engineer, Denver, Colo., and Watonga, Okla. (September 8, p. 493.)

[illegible] TERMINAL.—Bids are to be [illegible] an extension, it is said, from Coos Bay, Ore., south to Albany, about 30 miles, and the work will be started at once. The line is eventually to be extended further south to Eugene.

[illegible] WATERWAYS, RAILROAD & NAVIGATION COMPANY.—The South River extension from Centerville, Wash., south for about 12 miles, will be opened for traffic, it is said, on September 23.

PACIFIC ELECTRIC.—A contract has been given to Robert Sherer, Los Angeles, Cal., it is said, for building from a point near Watts to a connection with the Los Angeles-Redondo line near Los Angeles.

Construction work has been authorized on the line from Corona, Cal., to a connection with the present Riverside system, about five miles.

PACIFIC ELECTRIC.—This company was recently incorporated in California with $100,000,000 capital, and is a consolidation of eight existing lines. Extensions will be built from San Fernando valley to Santa Barbara, with a branch to San Fernando; from Santa Ana to San Diego; from Santa Monica to Ventura and many smaller extensions. W. F. Herrin and Epes Randolph, of the Southern Pacific are incorporators. (See an item in Railway Financial News.)

PACIFIC, TRANS-CANADA & HUDSON BAY.—Under this name a company will ask for incorporation in Canada to build from Edmonton, Alb., north to Athabasca Landing, thence via Wabasca to Fort Smith, on Slave river; also to build from Wabasca, east to Fort McMurray, on Athabasca river, thence to either Fort Churchill or Port Nelson, on Hudson bay, and from the crossing of the Wabasca river west of Peace river crossing, west via Laurier pass to Prince Rupert, B. C., or Portland canal, on the Pacific coast. Smith & Johnston, Ottawa, Ont., are solicitors for applicants.

QUANAH, ACME & PACIFIC.—Financial arrangements have been made to extend this road from Paducah, Tex., west via Roswell, N. Mex., to El Paso, Tex., about 308 miles. The line is now in operation from Quanah, west to Paducah, 43 miles. (April 14, p. 912.)

ST. LOUIS, IRON MOUNTAIN & SOUTHERN.—An officer is quoted as saying that the work of relaying the tracks of the water grade line between Memphis, Tenn., and Ferriday, La., with 85-lb. rail, widening the embankment and ballasting the roadbed, has been completed. This portion of the St. Louis-New Orleans line of the Iron Mountain will be used jointly by the Frisco and the Iron Mountain under a trackage agreement adopted some time ago. The new line extending from West Memphis, Ark., to Marianna is expected to be ready for operation by December 15.

SAN JOSE TERMINAL (Electric)—Incorporated in California with $25,000,000 capital, to build from San Jose, Cal., to tidewater at or near Alviso, eight miles. Also, to operate steamships or other vessels between Alvisco and San Francisco. M. J. Gardner, Stockton; H. H. McCloskey, San Francisco; J. A. Mehling, H. Center and V. Keech, San Jose, are directors.

SAN PEDRO, LOS ANGELES & SALT LAKE.—According to press reports, plans have been made to build about 100 miles of new line from San Bernardino, Cal., through the Cajon pass to Daggett. At present the company uses the Santa Fe tracks between these two places.

SKANDINAVIAN RAILROAD.—An officer writes that this company was incorporated to build through a part of Pipestone and Murray counties, Minn. Connection is to be made with the Great Northern at a point near Ruthton, from which place the line will be built east to a point near Lake Shetek, Murray county, about 20 miles. The prospects of building the line are good. The principal commodities to be carried are grain, dairy products and merchandise. John Bond, president; C. G. Peterson, vice-president; J. Hall, secretary, and A. Swanson, treasurer, all at Marshal, Minn.

SOUTHERN PACIFIC.—A contract has been given to Walter Condron, Marshfield, Ore., for construction work in connection with a change of route at Coquille.

[illegible] ROADS (Electric).—Plans are being made to organize a company to build a line from Jonesboro, Tenn., northeast to Johnson City, seven miles. A. P. Shipley, secretary of the board of trade, Jonesboro, may be addressed.

[illegible] ROADS (Electric).—A grading contract has been given by the Stone & Webster interests, it is said, for work on a line between Fort Worth, Tex., and Cleburne to the Texas Building Company, Fort Worth. The work is to be started at once and completed within 90 days. (July 7, p. 68.)

TWIN CITIES & DAKOTA SOUTHERN.—See Chicago, Lancaster & La Crosse (Electric).

WENATCHEE TRACTION.—A line is to be built, it is said, from Cashmere, Wash., south, following the Columbia river, to Beverly. The company plans to build about 100 miles of line. L. W. Pratt, president.

WICHITA & MIDLAND VALLEY.—See Midland Valley.

RAILWAY STRUCTURES.

ABERDEEN, WASH.—The Oregon-Washington Railroad & Navigation Company will put up freight stations, it is said, at Aberdeen and Hoquiam, to cost $30,000.

The Oregon-Washington Railroad & Navigation Company has finished work on the drawbridge over the Chehalis river at Aberdeen, and the structure is to be placed in service on September 23. The work cost about $200,000.

AUBURN, WASH.—The contract for putting up the coaling station, roundhouse and terminal buildings for the Northern Pacific, at Auburn, has been given to Kelly Brothers, Auburn, at about $100,000. (September 15, p. 545.)

BREWSTER, OHIO.—The annual report of the Wheeling & Lake Erie for the year ended June 30, 1911, shows that bridge reconstruction work to replace old structures of light design with bridges of heavier construction is to be carried out as follows: The reinforcement of E-35 truss bridges, also the replacement of E-35 truss bridges with E-60 type bridges, between Brewster, Ohio, Terminal Junction and Mingo; replacement of E-35 girder bridges with E-60 type bridges, also the replacement of principal wooden trestles with steel bridges and masonry, between Toledo, Brewster and Terminal Junction, and the replacement of miscellaneous steel bridges on the Cleveland division, including reconstruction of stone abutments now in poor condition. See comment on the annual report elsewhere in this issue.

CLEVELAND, OHIO.—The Cleveland, Cincinnati, Chicago & St. Louis is constructing a fruit auction house at Cleveland to cost approximately $30,000. The structure will be one and two stories high, of brick, concrete and steel construction and 44 ft. x 286 ft. over all. The first story will be used for the receipt and display of fruit, and the second story will contain the offices and auction room.

CONCRETE, WASH.—The Great Northern, it is said, will start work soon on a new station at Concrete.

CUMBERLAND, MD.—The Baltimore & Ohio has given a contract to P. Farrell, Cincinnati, Ohio, to remodel the Queen City hotel in Cumberland. The east end of the building is to be used for hotel purposes and the west end for a passenger station. A new baggage and express building is to be built in the rear and a subway will be constructed at Harrison street.

DENVER, COLO.—The Union Pacific, the Denver & Rio Grande, the Colorado & Southern, the Chicago, Burlington & Quincy, the Atchison, Topeka & Santa Fe and the Chicago, Rock Island & Pacific, the present tenants of the Union Depot & Terminal at Denver, propose to form a Union Depot Company for the purpose of enlarging and improving the present terminal, each company owning an equal interest. Estimates of the cost of the work have been completed and submitted to each company. Mr. Post of the Union Pacific has been appointed by the committee of engineers representing the railways, to prepare plans for the new work.

ELWOOD CITY, PA.—The Pittsburgh & Lake Erie and the Baltimore & Ohio are preparing plans for a joint passenger station to cost approximately $25,000.

GUTHRIE, KY.—The Louisville & Nashville is remodeling its passenger station at Guthrie. The work is being done by the company's force.

HARDMAN, W. VA.—An officer of the Baltimore & Ohio writes that the work at Hardman and Rowlesburg is part of the improvement plan now under way in West Virginia. At both these places helper stations and yard room for the helper engines are being installed. At Hardman a tipple will be erected to coal the engines and a small machine shop will be built for light repairs.

HOQUIAM, WASH.—See Aberdeen, Wash.

JEFFERSONVILLE, IND.—The state railway commission of Indiana has issued an order directing the Cleveland, Cincinnati, Chicago & St. Louis to build a passenger station at Jeffersonville.

KENNE, N. H.—The Boston & Maine is putting up a steel bridge at Keene.

MACON, GA.—The annual report of the Central of Georgia, for the year ended June 30, 1911, shows that new bridges were put up as follows: A 119-ft. deck riveted truss on old piers at Hatchet creek, and a 58-ft., also a 30-ft. deck plate girder erected on old masonry, and new creosoted piles and timber abutment built last year at A-38 between Columbus and Birmingham, Ala. Two new 60-ft. deck plate girders were erected on three concrete piers built last year at Upatoi creek, between Columbus and Americus. A 65-ft. through plate girder was erected on existing piers at Rock creek, between Chickamauga and Durham, and 8,166,619 ft. of timber (board measure), were used in repairing, renewing and constructing bridges and trestles. Twelve trestles, aggregating 1,386 ft. of track, or 0.262 miles, were filled with earth and suitable waterways provided, and another trestle was partly eliminated. The following structures were relocated: One 103-ft. and one 158-ft. deck truss, removed from Chattahoochee river between Columbus and Birmingham, Ala., were reinforced and erected on concrete piers built last year at Hard Labor creek, between Macon and Athens; two 158-ft. deck trusses removed from Chattahoochee river between Columbus and Birmingham, were reinforced and erected on concrete piers built last year, one 47-ft. deck girder removed from Ogeechee canal at Savannah, and five chords removed from the old Tallapoosa bridge between Columbus and Birmingham were erected on concrete piers at Apalachee river between Macon and Athens. A 150-ft. deck truss was removed from the Chattahoochee river and a 60-ft. deck plate girder removed from A-38, between Columbus and Birmingham, were reinforced and erected on concrete piers built last year at Oconee river between Macon and Athens. The new shops at Macon were completed and put in operation during the year.

MINGO, OHIO.—See Brewster, Ohio.

MINOT, N. DAK.—The Minneapolis, St. Paul & Sault Ste. Marie has completed plans and has asked for bids on a brick passenger station to cost about $75,000. The main building will be 56 ft. x 90 ft., two stories high; the baggage and express room 75 ft. x 30 ft., one story high; the covered way 80 ft. x 35 ft.; the building over all 250 ft. x 56 ft.

OMAHA, NEB.—The Chicago, St. Paul, Minneapolis & Omaha, it is reported, has let the contract for building a brick roundhouse in Omaha.

PALESTINE, TEX.—The shops of the International & Great Northern were damaged by fire with an estimated loss of $60,000.

PASADENA, CAL.—A new bridge is to be built jointly by the Atchison, Topeka & Santa Fe, the San Pedro, Los Angeles & Salt Lake, and the city of Pasadena, at Columbia street, to cost $16,000.

ROSS, WASH.—Plans are being made by the Northern Pacific, it is said, for building a bascule bridge with a 150-ft. open span, over the Lake Washington canal at Ross.

ROWLESBURG, W. VA.—See Hardman, W. Va.

TERMINAL JUNCTION, OHIO.—See Brewster, Ohio.

TOLEDO, OHIO.—See Brewster, Ohio.

WINNIPEG, MAN.—A contract has been given by the Canadian Pacific, it is said, to John Gunn & Son, Winnipeg, for putting up a brick and reinforced concrete annex to the Main street station at Winnipeg. The building is to be four stories high, 80 ft. x 300 ft. W. M. Kellogg & Co. has been given a contract for putting up a concrete stack.

Railway Financial News.

BAY OF QUINTE.—See Canadian Northern.

CANADIAN NORTHERN.—This company is making arrangements to acquire the Bay of Quinte Railway, which runs from Bannockburn, Ont., on the Central Ontario to Harrowsmith Junction, 63 miles, from which point it has trackage rights to Kingston, over the Kingston & Pembroke. It also owns a branch to Deseronto and one to Sydemham.

CENTRAL OF GEORGIA.—See comments elsewhere in this issue on the annual report for the fiscal year ended June 30, 1911.

CHICAGO-MILWAUKEE ELECTRIC.—The reorganization plan, it is said, has been completed, and it is proposed to form a new corporation under the laws of Illinois to buy the property of the old Illinois company and the old Wisconsin company. This new company will be authorized to issue $4,000,000 first mortgage 5 per cent. bonds, $4,000,000 4 per cent. first income bonds, $5,000,000 4 per cent. second income bonds, and $6,000,000 stock, all of one class.

CHICAGO, MILWAUKEE & ST. PAUL.—This company has bought for $681,541 the Duluth, St. Cloud, Glencoe & Mankato, which runs from Albert Lea, Minn., to St. Clair, 39 miles. It is understood that the St. Paul held a mortgage on the line for the full purchase price.

CINCINNATI, BLUFFTON & CHICAGO.—Judge Cook has denied the petition of the Union Trust Company of Indiana to reduce the upset price of $800,000, which was fixed for the foreclosure sale.

CINCINNATI, GEORGETOWN & PORTSMOUTH.—This company and the Ohio River & Columbus have been consolidated, and the Ohio River & Columbus, it is said, is to be electrified. The Cincinnati, Georgetown & Portsmouth runs from Cincinnati, Ohio, to Russellville, 49 miles, and the Ohio River & Columbus runs from Ripley, Ohio, to Sardinia, 23 miles.

CINCINNATI, HAMILTON & DAYTON.—An attachment against this company has been granted by Judge Gavegan for $200,000, said [illegible] the Indiana due for commission on the sale in 1904 to the Cincinnati, Hamilton & Dayton of 100,000 shares of stock of the Pere Marquette.

DELAWARE & EASTERN.—The bondholders' organization plan, which has been submitted to the New York Public Service Commission, Second district (state), provides for the organization of a new company, the Delaware & Northern, with [illegible] per cent. cumulative preferred. Bondholders are assessed 25 per cent. of the par value of their bonds and are to receive [illegible] It would appear that bondholders are also to receive preferred [illegible]

DELAWARE & NORTHERN.—See Delaware & Eastern.

DENVER & RIO GRANDE.—A special meeting of stockholders is to [illegible] directors from nine to 11.

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

NEW ORLEANS, TEXAS & MEXICO.—See St. Louis & San Francisco.

OHIO RIVER & COLUMBUS.—See Cincinnati, Georgetown & Portsmouth.

PACIFIC ELECTRIC.—This company has taken over and consolidated the lines of the Pacific Electric; Los Angeles & Interurban; Los Angeles Pacific; Los Angeles & Redondo; San Bernardino Interurban; San Bernardino Valley Traction; Riverside & Arlington, and the Redlands Central. The capital stock of the new company is authorized to the amount of $100,000,000. The company now operates about 875 miles of track in the vicinity of Los Angeles.

PLACERVILLE & LAKE TAHOE.—This company, which operates a lumber road from Placerville, Cal., to Camino, about 7 miles, has been sold under foreclosure to C. D. Danaher for $450,000. This price includes the assets of the Eldorado Lumber Co., which controlled the railway.

ST. LOUIS & SAN FRANCISCO.—The Guaranty Trust Company, New York, is offering at par and interest 5 per cent. equipment trust series *S* notes of October 1, 1911, being part of an authorized and outstanding issue of $1,776,000. The notes are secured on 500 refrigerator cars, 55 passenger cars and 32 locomotives. The same bankers are offering at par and interest 5 per cent. equipment trust series *B* notes of September 15, 1911, of the New Orleans, Texas & Mexico. These notes are guaranteed, principal and interest, by the St. Louis & San Francisco and the amount authorized and outstanding is $1,344,000. They are secured on 1,250 freight cars and 4 gasolene motor cars. These two issues are the same notes that were sold to Speyer & Company, New York, last month. (August 18, page 358.)

ST. LOUIS SOUTHWESTERN.—Middendorf, Williams & Co., Baltimore, Md., who have been asking proxies in the name of R. Lancaster Williams, of their firm, and George F. Taylor for use at the annual meeting on October 3, have given out a statement in part as follows: "This movement is not intended to be a fight on the present management of the St. Louis Southwestern. Those interested in the movement are substantial holders of the securities of the company, and believe that its prosperity will be better promoted by having representation on the board by the minority interests in the property."

It was in R. Lancaster Williams' name that proxies were solicited for the Missouri Pacific annual election just before the appointment of President Bush.

SOMERSET RAILWAY.—This subsidiary of the Boston & Maine, which operates 94 miles of road, the main line running from Portland, Me., to Kineo Station, 91 miles, earned gross in 1911, $342,777, as against $330,064 in 1910. Total operating expenses amounted to $253,018 last year, as against $253,003 the year before. After the payment of taxes and fixed charges there was a deficit for the year of $48,783, as against $53,976 in 1910. The ton mileage of freight last year totaled 8,983,512, as against 9,056,553; the average haul being 29.7 miles in 1911 and 28.7 miles in 1910. The average revenue per ton per mile for this company was 2.497 cents in 1911, and 2.356 cents in 1910. Passenger mileage last year totaled 3,484,942, as against 3,439,329 the year before; and the average revenue per passenger per mile was 2.96 cents last year and 2.97 cents the year before. Of the total 302,187 tons of freight [illegible] 1911, 120,498 tons was manufactures, which included 90,064 of wood pulp, and products of forests furnished a tonnage of 93,073. The following table gives the expense account:

	1911	1910
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	1,168	1,869
[illegible]	[illegible]	[illegible]

The average train load last year was 113 tons, as against [illegible] for the year before.

[illegible] Pacific.—The company has decided not to issue new [illegible] certificates with dividend coupons attached, but to pay [illegible] dividends by check to the registered owner, as is done [illegible] case of nearly all other railway stocks.

[illegible] & Long Island.—See comment elsewhere in this issue [illegible] annual report for the fiscal year ended June 30, 1911.

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GENERAL NEWS SECTION 603

THE annual convention of the American Association of General Passenger and Ticket Agents at St. Paul, Minn., last week was one of the best meetings this organization has ever held. There is, we suspect, a belief in some quarters that its gatherings are in the nature of junkets. If this ever was the case, it is not now. There are many problems connected with the passenger service which can be better solved by co-operative study and investigation by the passenger officers of all the roads than by them individually, and to a number of these problems the association has been addressing itself with good results. A disposition to attempt in this way the solution of more numerous problems was indicated by the tone of the St. Paul meeting and by the inaugural remarks of the new president of the association, C. A. Cairns of the North Western. Among the matters mentioned by Mr. Cairns to which he thought the association should give attention, is that of making changes in advertising methods which would render railway advertising no less effective but more economical, and that of having printed annually or semi-annually a manual of coupon tickets. One very important subject which was on the docket for this year's meeting, but consideration of which was postponed to next year, was that of charging extra fares for extra passenger service. The subject may have been suggested by the announcement of the Atchison, Topeka & Santa Fe that it will this winter put in service from Chicago to California a new "train de luxe," on which an extra fare of $25 will be charged. In order to make sure that all the important problems which the association should consider will be brought before it, a committee was appointed at the suggestion of President Cairns to co-operate with the secretary in preparing the docket for next year's meeting. The developments of recent years have increased the importance of the passenger business in the eyes of railway men. The earnings from it have on the average grown slightly more in proportion than the earnings from the freight business, and, at times, when the freight business has violently declined, the passenger business has stayed as good as before, or become better. There can be no serious question that it does not contribute to railway earnings in proportion to what it costs, but it seems probable that as population throughout the country becomes denser and more uniform the ratio of passenger to freight earnings will steadily increase. If this be true the proper solution of problems relating to its satisfactory and economical handling will grow more important, and the importance and usefulness of the work of the principal association studying these problems will likewise increase.

THE subject suggested by the decision of the Santa Fe to put in service an excess fare train is one of the most important to which the passenger men can give consideration. It is a remarkable fact that while there has been for years a progressive differentiation in the kind of passenger service rendered by the railways of the United States, there has been no corresponding differentiation in the charges made for it. On most roads there is one rate for the passenger who rides in the day coach. If he should choose to ride in a sleeping or parlor car he pays in addition the sleeping or parlor car rate. If an observation car be added the passengers in the standard sleeping cars get the use of it without any additional charge. If, further, a buffet smoking car be added they get the use of it also without any additional charge. On most roads the passenger likewise pays the same rate whether he rides in a sleeping car on a slow train which has neither an observation nor a buffet smoking car or travels on a much faster train on which there are both of these kinds of cars. The only roads on which excess fares heretofore have been charged for extra service are the lines between Chicago and New York, the extra fares in these cases being based on differences in schedule time. Obviously, the passenger on the fast train equipped with an observation car, a buffet smoking car, a valet, a barber, a maid, a victrola, etc., and who, perhaps, is served a table d'hote dinner which costs the railway a good deal more than he pays for it, is given a service which costs the railway more, and is worth more to him than is that given on an ordinary and much slower train; and there is no logic in charging the same rates on both. The United States is the only leading country in the world where the flat passenger rate has obtained. In England there are three classes of passenger service and rates, not including working men's rates, etc. In Prussia there are four classes of rates and service, and in France, three classes. In Hungary and Austria there are three classes of express trains and three classes of accommodation trains, on all of which the rates are different. The result of the charging of flat passenger rates in the United States has been that for some service more has been charged than it has been worth, and in other cases more service has been given than has been charged for. A more scientific differentiation of passenger charges could be made which would bring in greater revenue to the roads, and at the same time more nearly give to all persons service of the kind and cost that they want.

THE RAILWAYS AND DEFEATED RECIPROCITY.

WHEN trade, whether within or across national boundary lines, increases, the railways get a large part of the increase. The political avalanche in Canada has swept into the future trade reciprocity between two industrious and cognate people. Directly and immediately the future loss has fallen on the border railway systems. But the remoter railway traffic would probably have been considerable. Take such staples alone as grain, cattle and lumber affected by the reciprocity agreement, saying nothing of such products as those of the smaller fields and the dairy. Such traffic has obviously a far wider distribution than border territory. Allowance must also be made for prospective natural development of railway business to and from a country which in 1910 had a railway single trackage of 31,429 miles, a capital cost of $1,719,069,401, and which has largely expanded her railway system during the past year. All these possibilities have been much impaired, if not destroyed, by a sentimental campaign cry and the raising of the ghost of "annexation." But the loss is fortunately potential instead of actual. Both countries lose something which they had not yet obtained.

There remain also still the natural conditions which make for railway extension between the two countries. Governments may desire theoretically to protect their own railway corporations against invading interests, and the electorate, in the doctrinal sense, may share the same view. But in such cases local interests are almost certain to be controlling. No central authority can set itself up for long—even if autocratic—against the local advantages of a community seeking urgently a new railway, even if such a new line does not break a monopoly; and on each side of our northern boundary line there is not an autocracy, but a federation of states or provinces. The New Haven has practically already, without resistance, pushed its way into Canada. On the other hand, the Grand Trunk's invasion of New England has been warmly and officially welcomed in Massachusetts and Rhode Island. If this is the case in such old communities, it is even more true of the western boundary where the Hill lines and the Canadian Pacific are rivals for the new wheat fields, and where the staple and almost exclusive product must seek by the railway a distant market. No community rejects a new railway line unless it has to tax itself for construction—not very often even then. The rejection of reciprocity may retard the criss-crossing of the border by new railway lines. It is very far from checking it, but the new lines may have to wait longer for profitable traffic.

Turning from the international aspects of the subject to Canada herself, there would be a very interesting situation disclosed if politics and partisanship really "meant business," and the parliamentary utterances of the coming premier, Mr. Borden, and other opposition leaders, forecasted genuine policies. Reading past debates in the Canadian parliament, it would seem as though the incoming Conservatives were committed to a [illegible] quibbling on the details of the old government policy. In connection with the building of the Grand Trunk Pacific, no accusation was too severe to charge against the Laurier administration. As now recalled, special stress was laid on the failure of the Laurier cabinet to compel the Grand Trunk to seek and develop terminals in the maritime provinces rather than transfer business to New England. But all this was before election. And did railway questions a delicate subject for each party to handle on the stump—figure in the canvass, nor have we thus far seen any reference to them as in[illegible] the railroad bill ready at the polls. Conditions now [illegible] and extreme, if it stood at all against the elements of a general policy of government railway promotion to which [illegible] committed will come from the new opposition and Liberal side. They may be made attempt of the Conservative party in office to repeat old shortcomings in the lavish railway policy, but even that is unlikely when the party in power is entrenched behind a large working majority of the Commons—and, if the Canadian precedent is followed, likely to be entrenched for a good many years.

Indeed, it seems more than probable that the Conservative leaders will surpass their outgoing rivals in their policy of subsidies and rapid railway development, especially in the Canadian West, in which, as a whole, the Conservatives have been weak, and where low tariff sentiment, as against the high tariff policy for the benefit of the East, must be placated. In that great and growing region of the wheat farms there is a political and party motive to encourage railway expansion. But there is also a more general motive. During the campaign "Canada for the Canadians" was a slogan. The outlined Liberal policy, that is to say, has been acutely nationalistic, and with that policy rapid railway extension obviously squares. If there are new railway issues to spring up in Canada they are much more likely to arise from the rivalries of the Canadian Pacific and the Grand Trunk than from any deviations of governmental programs.

THE GOVERNORS AND THE MINNESOTA RATE CASE.

THE state governors who met recently at Spring Lake, N. J., appointed a committee headed by Governor Harmon of Ohio to appear before the Supreme Court of the United States when the Minnesota rate case comes before that body. Its duty will be to defend states' "rights" from the destruction which the governors would have us believe would result from an affirmance by the Supreme Court of the decision rendered by Judge Sanborn of the United States Circuit Court in the case mentioned.

In order to comprehend just what Judge Sanborn's decision means, and just what would be meant by such a decision as the committee of governors will try by extra judicial pressure to get from the Supreme Court, it is necessary to consider both the legal and economic aspects of the Minnesota case. The federal constitution empowers Congress to regulate interstate and foreign commerce. There is reserved to the states the power to regulate commerce within their borders—an authority which it repeatedly has been held must not be so exercised as to burden or interfere with interstate commerce.

The state traffic of railways is a relatively small part of the total. For many reasons it costs more per ton mile and per passenger mile to handle than interstate traffic does, the principal of these reasons being that state hauls are on the average much shorter than interstate, and are more commonly made on branch lines where operating expenses are high in proportion to the amount of traffic. Because it does ordinarily cost more to handle state than interstate traffic, the state rates should ordinarily be higher per ton per mile than the interstate rates. The state rates cannot ordinarily be reduced below the interstate rates without forcing reductions in the interstate rates. A traveler going from a point in Illinois to a point in Missouri, or from a point in Minnesota to a point in South Dakota, would not pay an interstate rate of 3 cents a mile if the several states had fixed a rate of 2 cents a mile. He would pay 2 cents a mile to St. Louis, for example, get off there and buy a new ticket, paying 2 cents a mile to his destination. For similar reasons it is impossible to long maintain interstate freight rates higher than state freight rates.

The legislature and railway commission of Minnesota fixed both passenger and freight rates which were lower than the interstate rates. The result was to compel the railways either to reduce their interstate rates, or, if they maintained them even temporarily, unfairly to discriminate against interstate commerce. They reduced them. Judge Sanborn held most explicitly that the states have a right to regulate rates within their borders so long as they do not burden or interfere with interstate commerce, but that when, as in this case, the necessary effect of state regulation is to compel reductions in interstate rates, or discrimination against interstate commerce, the regulation burdens and interferes with interstate commerce, and is unconstitutional.

It would be uncivil to assume the governors were ignorant of

the fact that Judge Sanborn explicitly held that the states will have, as they always have had, the power to regulate rates within their own limits when such regulation does not interfere with interstate commerce. Their protest against his decision must then mean one of two things:

(1) It may mean that they do not believe that a reduction of state rates below the corresponding interstate rates necessarily pulls down the latter, and think that the states have a right to make state rates lower than the corresponding interstate rates. If this is the case, their position is that the states have a right to compel the railways to accept lower rates for the more costly state transportation than they receive for the less costly interstate transportation. In other words, while the state commissions uniformly take the position that the railway may not entirely disregard cost in fixing rates, the governors take the position that the states may, in fixing rates, make a lower rate for the more expensive state haul than Congress and the Interstate Commerce Commission permit the railways to charge for the less expensive interstate haul.

(2) If, on the other hand, the governors recognize the fact that a reduction of state rates below the corresponding interstate rates will compel a reduction of the latter, then they are contending that the states have a right to reduce state rates even when the direct and necessary effect will be to compel reductions in interstate rates. It may be said that if it can be shown that on the existing state rates the railways are earning more than a fair return, the states should have a right to reduce them regardless of the effect on interstate rates. But while it has been held that rates, either state or interstate, may not be so reduced as to deprive railways of a fair return, it has not been held that railways may not be permitted to earn as much more than the so-called fair return as the regulating authority may deem expedient. Therefore, Congress and the Interstate Commerce Commission have authority to let the railways earn from their interstate business not merely 6 per cent., or 7 per cent., but much more, if they regard this as in the public interest. In the exercise of the authority given it by Congress the interstate commission has fixed rates from Atlantic seaboard points and Chicago to the Missouri river and to Denver, from Chicago and numerous points to the southwest, and is now trying to fix rates from all points in the United States on and east of the Missouri river to Spokane, Salt Lake City, Reno, Phoenix and other so-called intermountain points. In other words, the commission has fixed, or is fixing, rates which cover almost the entire United States. These rates have been ordered in pursuance of a policy which the commission as the agent of Congress believes to be right. Now, obviously, if each state may reduce the rates within its borders, and the reduction of the rates of each state compels reductions in interstate rates, it necessarily follows that the states may compel reductions in all the rates which the Interstate Commerce Commission has fixed as reasonable, thereby completely nullifying the policy of regulating interstate commerce, which has been constitutionally adopted by the commission and by Congress.

It appears, then, that the position of the governors is that the states have a right to regulate their internal commerce as they please, regardless of the extent to which this regulation may discriminate against or interfere with interstate commerce, and regardless of the extent to which it may nullify the policy that the federal government adopts for the regulation of interstate commerce. But it has always been held that the power of the nation to regulate interstate commerce is supreme and exclusive. Therefore to say that in assuming the attitude they are the governors defending states' "rights"—that they are trying to prevent usurpation of the power of the states by the federal government—is wholly incorrect. What they are seeking to do is to establish states' "rights" with reference to interstate commerce which never existed and to secure for the states powers which they never possessed. This being the case, if the Supreme Court makes short work of their representations nobody who understands the true situation will be much surprised—not even the lawyers among the governors themselves.

ILLINOIS CENTRAL.

HAVING set its house in order, the Illinois Central turned to and, in the fiscal year 1911, earned $3,500,000 surplus after the payment of 7 per cent. dividends, as compared with a surplus of $180,000 in the previous year; this despite uncertainty in general business conditions, increased wages and increased fuel costs. Gross earnings in 1910 were the largest in the history of the company, but in 1911 the road earned $60,980,000, or 5.34 per cent. more than in 1910.

To turn to history for a moment it was natural that, after such a bitter fight for control as that which took place on the Illinois Central in 1907 and after the displacement of Stuyvesant Fish, who had been in such complete control of the property and so close to its operation, there should be a period of uncertainty and disorganization in the affairs of the company. Even if Mr. Harriman himself had become president of the Illinois Central, it is probable that he would have needed some time to gain the entire loyalty of the officers. The lack of strong control and co-operation among all the officers was manifest in various ways, the most glaring of which was the organized scheme by which certain officers of the road were able to steal money from their company through the expenditure made for car repairs. This had a far reaching effect that was possibly even more detrimental in its indirect consequences than in the direct loss of money to the company. In 1910 the company cleaned house, and the principles of operation which have done so much to make the Union Pacific what it is were introduced on the Illinois Central. It is inconceivable that the extraordinarily good results shown this year are not due in part to the new operating head of the company who received his training on the Union Pacific.

The property itself, as well as the annual report for 1911, is testimony to this fact. It is manifest in the property in innumerable small ways, even to the straightening of the toe line; it is evident in the greater frankness of the annual report in the inclusion of detailed figures for maintenance and transportation figures, figures which are even more detailed than those required by the Interstate Commerce Commission's classification.

The problem on the Illinois Central in recent years has been to handle the traffic that offered itself for carriage. The main north and south line of the Illinois Central runs from Chicago to New Orleans; the western lines, so-called, run from Sioux Falls, Sioux City, Onowa and Omaha to Chicago. It has been the habit in speaking of the Union Pacific to say that its own lines end at Omaha, its principal interchange of traffic for Chicago being with the Chicago & North Western. As a matter of fact, of course, the Illinois Central's western line is the eastern end of the Harriman Lines running directly from San Francisco to Chicago. The Chicago & North Western, with its double-track road, can offer facilities of interchange on passenger traffic that makes it more advantageous for the Union Pacific to send its through passenger trains to Chicago over this road; but there is a very large volume of freight business exchanged between the Illinois Central and the Union Pacific at Omaha.

It is, however, on the north and south line that the principal efforts of the management to increase the facilities have been bent. The details of these efforts do not permit even of outlining in these comments. Last year $3,580,000 was spent for addition and improvements, of which $165,000 was charged to income. The results, however, are plain to read in the company's report for this year.

The company, operating 4,563 miles, earned from freight revenues in the fiscal year ended June 30, 1911, $40,680,000, an increase of $1,900,000 over the previous year. The company earned $12,930,000 from passengers last year, an increase of $1,040,000 over the year before. The increase in freight revenue was due to a longer average haul and to a higher average revenue per ton per mile and not to a greater amount of freight carried. The increase in passenger revenue was due to an increased number of passengers, a slightly longer haul and a slightly higher average revenue. The tons of revenue freight carried in 1911

totaled 27,490,000; in 1910, 27,590,000. The average haul was 243 miles last year, and 238 miles the year before; the average revenue per ton per mile was 0.609 cents in 1911, and 0.589 cents in 1910. The number of passengers carried totaled 26,800,000 in 1911, and 25,240,000 in 1910. The average haul in the two years was 26.10 miles in 1911, and 25.76 miles in 1910; the average revenue per passenger per mile was 1.848 cents last year, and 1.827 cents the year before. The increase in passenger business, while probably in part due to the more active work of the traffic department, is quite surely also due to the better facilities which the operating department provided, the fewer delays to trains, and the elimination of delays at Chicago.

The longer haul for freight and the higher revenue per ton per mile are accounted for by the considerably greater activity in the traffic department last year, as evidenced by the establishment of a new commercial agency at Minneapolis, Minn.; a freight and passenger agency at Sacramento, Cal.; the addition of contracting and soliciting forces at the agencies at New York, Boston, Mass.; Pittsburgh, Pa.; Evansville, Ind., and Portland, Ore.; and the appointment of an assistant industrial and immigration agent to represent the company in the South. The success of these efforts was made possible by the improvement in the operating department, the more prompt handling of freight, and the elimination of congestion. Of course, weather conditions helped this year as compared with the year before, but added facilities and an actual improvement in the handling of trains over the road went even further than mild weather to obtain the results shown.

In 1911 the Illinois Central carried 4,980,000 tons of products of agriculture. This is 18.14 per cent. of the total tonnage, and compares with 4,910,000 tons carried in 1910. The 1910 tonnage of agricultural products was 17.79 per cent. of the total tonnage in that year. The tonnage of miscellaneous commodities not coming under any of the five heads usually used for classification, totaled 2,750,000 tons last year, or 10.02 per cent. of the total tonnage, as against 1,740,000 tons, or 6.32 per cent. of the total tonnage in 1910. The tonnage of products of mines last year amounted to 9,640,000, or 35.06 per cent. of the total tonnage, and in 1910 to 10,120,000 tons, or 36.70 per cent. of the total tonnage. Lumber furnished 4,630,000 tons, or 16.86 per cent. of the total tonnage last year, and 4,980,000 tons, or 18.04 per cent. of the total tonnage the year before.

When a company shows an increase of but 1.24 per cent. in operating expenses in a year when a considerably larger ton and passenger mileage is handled, and when the rate of wages of not only trainmen, enginemen, telegraph operators and other transportation employees was increased, but also the wages of laborers on maintenance of way on the northern and western lines, and the wages of section foremen, bridge and building foremen, and waterworks foremen over the entire system, it is worth while making a study of the details of the expense account. In the case of the Illinois Central, naturally the first items to be examined are those showing cost of maintenance of equipment. Repairs of freight cars in 1911 cost $4,840,000, as against $7,400,000 in 1910; a saving of $2,560,000 in this one item. And apparently nearly as much work was done in 1911 as in 1910; 54,466 freight cars receiving medium repairs in 1911, as against 53,576 in 1910, and 30,435 cars receiving heavy repairs last year, as compared with 36,574 the year before. A new policy has been [illegible] in regard to the charge for depreciation of equipment, as shown rather strikingly by a charge of $1,160,000 for depreci[illegible] of [illegible] in 1911 as against a charge of $269,000 for this account in 1910. This alone would be a fairly good indication that the savings effected in expenses were economies [illegible] a reduction of maintenance.

[illegible] the south of Cincinnati, the higher wages [illegible] the second half [illegible] the increase in rates of wages are evident; but, notwithstanding this and the greater traffic [illegible] $1,720,000 [illegible] $1,720,000 [illegible] the year as compared [illegible] $1,720,000 [illegible] the year before.

In 1911 the Illinois Central sold $10,940,000 refunding 4 per cent. bonds of 1908-1955. The Indianapolis Southern, which has heretofore been operated separately, but control of which was owned by the Illinois Central, was sold under foreclosure and bought in by the Illinois Central.

The balance sheet of the company is a cross section of the company's affairs that is consistent with the rest of the showing in the annual report. Cash on hand at the end of 1911 amounted to $15,140,000, as compared with $2,220,000 on hand at the end of 1910. Total working liabilities amounted to $7,480,000 at the end of 1911, and to $7,310,000 at the end of 1910. There has been an investment of $19,160,000 in road and equipment for capital expenditures since June 30, 1907.

The following table shows the figures for operation of the Illinois Central in 1911 as compared with 1910:

	1911.	1910.
Average mileage operated	4,563	4,551
Freight revenue	$40,682,197	$38,777,758
Passenger revenue	12,925,004	11,881,014
Total operating revenues	60,977,031	57,884,721
Maintenance of way and structures	7,523,295	7,607,891
Maintenance of equipment	12,317,364	13,502,250
Traffic	1,334,163	1,246,382
Transportation	21,333,835	19,734,911
Total operating expenses	43,856,228	43,320,730
Taxes	2,671,290	2,524,899
Net operating income	14,393,049	12,004,674
Gross corporate income	21,135,487	17,289,283
Net corporate income	11,315,344	7,833,198
Additions and betterments	164,847	.....
Dividends	7,650,720	7,650,720
Surplus	3,499,777	182,478

LEHIGH VALLEY.

THE Lehigh Valley is both a hard coal and a trunk line, but a trunk line without connections of its own west of Buffalo. The increase of $1,520,000 in gross revenue shown in the fiscal year ended June 30, 1911, as compared with the previous fiscal year was due, however, to a greater tonnage of hard coal moved and not, apparently, to any improvements in its trunk line business. Total operating revenue amounted last year to $37,690,000, and, of this total, revenue from coal freight amounted to $17,160,000, an increase of $1,330,000 over 1910; while the revenue from merchandise freight, which amounted to $14,690,000 last year, was slightly less than the year before. Notwithstanding, however, the increase in gross revenue, the company was able to save but $14,280,000 net in 1911, as compared with $14,480,000 net the year before; the operating ratio thus increased from 59.95 per cent. in 1910 to 62.11 per cent. in 1911. On the other hand, through an increase of $283,000 in miscellaneous income (the total for 1911 being $711,000) and through a decrease of $500,000 in interest charges on funded debt, the company was able to show a net corporate income of $7,520,000 available for dividends, or $226,000 more than in 1910; this in addition to charging to income $981,000, or $137,000 more than was charged in the year 1910, for the additions and betterments.

The annual report gives no explanation of the increase in miscellaneous charges, but the decrease in the interest charges on the funded debt was due to the retirement or purchase of $6,000,000 second mortgage 7 per cent. bonds, and the purchase of $572,000 preferred stock of the Morris Canal & Banking Company, which called for dividends at the rate of 10 per cent.

During the year the company sold 403,338 shares of additional stock to stockholders at par, receiving $20,166,900. The company was left, therefore, at the end of 1911 with a large amount of working capital and small working liabilities. Cash on hand at the end of 1911 amounted to $20,620,000, and working liabilities amounted to but $3,720,000, although the dividends, amounting to $3,030,000, declared prior to the close of the fiscal year and paid July 15, were not included as a liability.

The increase in operating expenses referred to above amounted to $1,720,000, and was largely accounted for by an increase of $1,[illegible]000 in transportation expenses, these expenses totaling $[illegible],000 last year. The increase in transportation expenses [illegible] apparently due both to the increased wages paid employees

and to the greater train movement resulting from the larger tonnage carried. In 1911, $15,300,000, or 56.84 per cent., of total operating expenses, including outside operations, was paid directly to labor. This compares with $13,860,000, or 56.90 per cent., of total operating expenses which was paid to labor in 1910.

It should be noted that although the gross amount paid to labor has considerably increased, apparently labor costs have not increased out of proportion to the rest of operating expenses, and the Lehigh Valley was able to make some reduction in its operating force. There was an average of 21,554 employees during 1911, as against 22,469 employees in 1910. President Thomas says: "The operations for the year under review have felt the effects of the high rates of wages paid employees. To this single fact may be ascribed almost entirely the increase in operating expenses apart from that naturally resulting from the transportation of a greater volume of traffic." In making this statement, presumably Mr. Thomas includes in the higher costs of wages the higher sums spent for superintendence in all departments and the larger sums paid last year by the Lehigh Valley both to general officers and to clerks and attendants. Superintendence under maintenance of way and structures cost $190,000 in 1911, an increase of $24,000 over 1910; under maintenance of equipment, superintendence cost $135,000, an increase of $7,000; under traffic expenses, superintendence cost $172,000, an increase of $22,000; and under transportation, superintendence cost $320,000, an increase of $25,000; while under general expenses, the salaries and expenses of general officers cost $128,000, an increase of $33,000; and salaries and expenses of clerks and attendants cost $320,000, which was an increase of $27,000.

It may be assumed that an increase in the tonnage of coal traffic, without a corresponding increase in the tonnage of any commodity which may furnish a back haul, considerably increases the percentage of empty car mileage to loaded car mileage. In 1911 the Lehigh Valley carried 15,590,000 tons of coal and coke, an increase of 11 per cent. over the tonnage in 1910. Freight and coal locomotive mileage totaled 8,980,000 miles in 1911, an increase of 243,000 miles over 1910. Freight and coal loaded car mileage totaled 215,250,000 miles in 1911, an increase of 6,121,000 miles over 1910, while freight and coal empty car mileage totaled 100,800,000 miles in 1911, an increase of 10,000,000 miles over 1910.

There was a considerable increase during the year in light locomotive mileage, which totaled 1,492,000 miles in 1911 and 1,345,000 miles in 1910; but there is a decrease of 114,000 miles in mileage of switching locomotives, the total for 1911 being 5,371,000 miles. This saving in switching mileage is reflected in economies in operating expenses, which, although slight when compared with total expenses, nevertheless show the result of more efficient operation.

The average train load of revenue freight last year was 544 tons, as compared with 542 tons the year before. The average distance hauled was 171 miles, as against 174 miles. The average revenue per ton per mile was 0.652 cents in 1911, and 0.646 cents in 1910.

Of the total 28,500,000 tons of revenue freight carried by the Lehigh Valley, 12,600,000 tons was anthracite coal; 2,990,000 tons was bituminous coal and coke; 1,600,000 tons was stone, sand and other material; and 1,830,000 tons was cement, brick and lime. The Lehigh Valley does not carry a very large proportion of grain, the total tonnage of grain during the year 1911 being 938,000 tons, a decrease of 47,000 tons from the year before.

Last year the company spent $3,350,000 for additions and betterments, as against $5,200,000 spent in 1910. The more expensive of these additions and betterments last year were: grading, which cost $468,000; bridges, trestles and culverts, which cost $267,000; and for new locomotives and passenger and freight cars.

The following table shows operation figures for 1911 as compared with 1910:

	1911.	1910.
Average mileage operated	1,432	1,440
Coal freight revenue	$17,155,534	$15,821,798
Merchandise freight revenue	14,687,291	14,757,799
Passenger revenue	4,568,030	4,330,172
Total operating revenue	37,687,403	36,167,398
Maintenance of way and structures	3,620,176	3,462,903
Maintenance of equipment	6,003,287	5,995,810
Traffic	1,010,675	918,720
Transportation	11,979,278	10,593,565
Total operating expenses	23,407,318	21,684,147
Taxes	1,145,477	1,106,762
Operating income	12,814,438	13,230,156
Total corporate income	14,490,176	14,636,614
Net corporate income	6,538,909	6,449,647
Additions and betterments	980,549	843,877
Dividends	4,245,759	2,430,718
Surplus	1,312,601	3,175,052

THE BROOKLYN RAPID TRANSIT AND THE INTERBOROUGH RAPID TRANSIT.

HERETOFORE the urban railways of Manhattan have not competed to any great extent with the railways of Brooklyn, although, since the opening of the Interborough Rapid Transit's subway from the lower end of Manhattan through a part of Brooklyn to the Flatbush avenue station of the Long Island Railroad, there has been some competition in Brooklyn between the Interborough Rapid Transit and the Brooklyn Rapid Transit. The Interborough Rapid Transit operates the 26 road miles of subway and the 38 road miles of elevated lines in Manhattan and the Bronx; the Brooklyn Rapid Transit operates the 33 road miles of elevated lines and 240 road miles of surface lines in Brooklyn and Queens. Heretofore the attitude of the Brooklyn company has been to regard any extension of the Interborough into Brooklyn as rather an advantage, since the easier of access Brooklyn was made, the more people would live there, and the greater would be the Brooklyn company's earnings.

During the year, however, the extension of the subway in Brooklyn and the building of a new system of subways in Manhattan have been definitely decided on, and the Brooklyn company has undertaken to extend its operations to include the building and operation of a great system of subways connecting the boroughs of Manhattan, the Bronx, Queens and Brooklyn. The total contract was approved of for the Brooklyn company after the part of it which had been offered to the Interborough Rapid Transit had been rejected by that company. It is rather interesting to make certain comparisons or contrasts between the operations, capitalization, etc., of the two companies before they became active competitors.

It must be carefully borne in mind, however, whenever any comparison is made, that the Brooklyn company operates a system of surface roads as well as elevated, and the Interborough operates no surface roads but a system of subways as well as elevated roads. Operating statistics or any kindred figures to show efficiency cannot be compared as between a subway and a surface railway. However, certain gross figures of these two great city railway companies can properly be contrasted.

The mileages of the two companies has already been given. Gross operating revenues of the Interborough in 1911 amounted to $29,770,000, an increase of 2.69 per cent. over gross of the previous year. Gross operating revenues of the B. R. T. amounted to $21,990,000 last year, an increase of 4.8 per cent. over the previous year. Operating expenses of the Interborough last year amounted to $12,370,000, an increase of $1,360,000 over 1910; and operating expenses of the B. R. T. amounted to $12,170,000 last year, an increase of $429,000 over 1910. After the payment of interest, rentals and sinking funds, the Interborough had a net corporate income of $5,140,000 for 1911, a decrease of $942,000 from the net income of the previous year. The Brooklyn Rapid Transit had a net income of $3,150,000 in 1911, an increase of $537,000 over the previous year. These figures and the good showing made last year by the Brooklyn Rapid Transit as compared with the year before strongly tend to bear out a prophesy made by the B. R. T. management at the time that the Interborough's Brooklyn extension was opened that this extension would temporarily take from the Brooklyn

company possibly $2,000 a day of business, but would within a year or two so develop Brooklyn that the B. R. T. would materially benefit.

In 1911 the Brooklyn Rapid Transit carried 571,880,000 passengers, which included passengers riding on transfers. In the same year the Interborough carried 578,150,000 passengers, which does not include any passengers riding on transfers. If we compare figures of earnings and expenses on a unit basis of per passenger carried, the figures derived are misleading unless it is kept in mind that one company is including a transfer passenger and that the other company has no transfer passengers, except that there are a few that buy 3-cent tickets good at interchange points between the subway and elevated lines.

The B. R. T. has total earnings of 3.89 cents per passenger; the Interborough has total earnings of slightly over 5.1 cents per passenger. Operating expenses on the B. R. T. consume 2.14 cents per passenger, exactly the same as on the Interborough. Taxes on the B. R. T. take 0.26 cents per passenger, and on the Interborough 0.33 cents. Interest and rentals take 0.96 cents per passenger on the B. R. T., and 1.84 cents on the Interborough. The Brooklyn company's interest and rentals make a particularly good showing over a series of years. In 1902 these charges consumed 1.16 cents per passenger carried. Since then they have decreased, until in both 1910 and 1911 the charges were 0.96 cents. In comparing the interest and rental figures as between the two companies, it should be pointed out that the Interborough is including in its figures the payment of $300,000 toward the sinking fund on the 45-year bonds of its own and 1 per cent. of the amount of bonds issued by the city to pay for the building of the subway in addition to the interest on these bonds.

Considerable space is devoted in the annual reports of both companies to a discussion of the approval by the board of estimate of the city plans for building the new subways. Naturally the subject is discussed in quite a different way by the company which accepted the city's terms than by the company which rejected the city's offer and saw approval given to the plan of another company.

The history of the Brooklyn Rapid Transit in recent years has been the story of an uphill fight to overcome the prejudices of the people that it served, engendered by mistakes of former managements, and by the almost unavoidable friction that comes from the handling of such great crowds by employees, who are only human and who are not a very highly paid class of humans at that. The Interborough has had only its own mistakes to rectify and the unavoidable friction arising from the handling of the great crowds under pressure. There is still plenty of friction between employees and passengers on both companies' lines, but on both there seem to be evidences of some improvement. The Interborough has established a separate complaint office with the object of reducing avoidable neglect or misconduct on the part of its employees; it has lengthened the express station platforms so as to accommodate ten-car express trains; it has put fans in a number of its cars so as to lessen the discomfort of travel in the subway in summer; it has provided its guards with [illegible] it had begun a spirit of trying to please the public [illegible] to be steadily forced into it that has [illegible] and is to be commended.

The Brooklyn Rapid Transit last year spent for maintenance and new construction $4,850,000, a large number of small improvements being made. For instance, 10,000 ft. of elevated structure was reinforced, [illegible] were built at Brighton Beach and Ocean Parkway stations, 73 miles of overhead trolley wire was renewed with wire of large capacity, seven snow sweepers and two sprinkling cars were added to the company's equipment, an anti-telescoping device was installed on all elevated [illegible] and [illegible] were made in the substitution of [illegible] for coal [illegible] At the end of the year, 77 per cent. of the total number of [illegible] were of [illegible]

We have not attempted in these comments to discuss the merits of the subway proposals of the Brooklyn Rapid Transit, but there is one paragraph in Colonel Williams' report discussing the general situation, which is of special interest to railway men. At the time the plans for the subway were announced, there was considerable criticism of the fact that no provision was made for a line up Seventh avenue, which should provide rapid transit facilities for the new Pennsylvania station in New York. Colonel Williams says: "It should be borne in mind, however, that without any extension on Seventh avenue, the lines already comprised in the new rapid transit system will bring within a short distance of the Pennsylvania station several millions of people of Greater New York who cannot reach it at all by rapid transit except with change of cars and for two fares. The train platforms in the Pennsylvania station will be only 500 ft. farther from the proposed Broadway subway than the train platforms in the new Grand Central (New York Central) station will be from the present subway at Forty-second street."

How serious a problem passenger injury claims are to a street railway company as well as to steam railways is well brought out in this year's report of the B. R. T. At the end of 1910 the company had nearly cleaned up its damage and injury claims. The policy had been to either settle these claims promptly or to bring them to trial at once, and it was hoped that by this policy a material reduction in the amount of these claims could be made. Notwithstanding this policy, damages cost $751,000 last year, an increase of 14.37 per cent. over the year before; and legal expenses in connection with damages were $233,000, an increase of 16.95 per cent. over the year before.

The following table compares certain figures of earnings and operation of the B. R. T. and the Interborough in 1910 and 1911:

	B. R. T.		Interborough.	
	1911.	1910.	1911.	1910.
Passenger earnings, elevated division	$8,377,966	$8,130,820	$15,094,333	$14,723,224
*Passenger earnings, subway or surface division	12,976,397	12,346,325	13,829,604	13,443,805
Total earnings	21,986,543	20,979,515	29,767,352	28,987,648
Operating expenses	12,166,367	11,737,111	12,368,982	11,013,143
Net corporate income	3,148,479	2,611,595	5,140,037	6,082,147
Betterments	88,535	108,560	.....	.....
Dividends and old accounts written off	2,413,585	2,178,414	3,150,000	3,150,000
Surplus	646,359	393,806	1,990,037	2,932,147

*Surface division on the B. R. T. and subway division on the Interborough.

NEW BOOKS.

Railroad Studies. By Charles F. Speare. Published monthly, *New York Evening Mail.* Single copies, 15 cents; subscription price, $2.00 per year.

This series of articles takes up separate roads and summarizes their recent history, describes their traffic possibilities and discusses their earning power. The articles are thoroughly readable and give an excellent picture of the properties which they describe. The author shows a broad knowledge of his subject and a personal acquaintance with many of the properties which he describes. There is a general optimism which pervades the descriptions, but it does not seriously affect their real value. The articles on certain groups of roads or those articles making a comparison of two or more roads are especially good, and the descriptions of the strategic moves of railways to gain an outlet for a new territory are thoroughly well worth reading.

Laws of Porto Rico. Issued by the Executive Council of Porto Rico, 80 pages.

This pamphlet contains the Acts of the Congress of the United States and of the Legislative Assembly of Porto Rico relative to the regulation of public service corporations, the granting of franchises, etc., and the condemnation of private property.

HEAVY MIKADO LOCOMOTIVES FOR THE ILLINOIS CENTRAL.

The fifty mikado locomotives recently built for the Illinois Central by the Baldwin Locomotive Works are of special interest, because of their design and capacity, and also because of the increasing use of this type of engine in heavy freight service. The principal work of the new locomotives will be to handle the coal traffic between Centralia, Ill., and Chicago, and Freeport, Ill., and East St. Louis. They have about 30 per cent. more tractive effort than the consolidation locomotives heretofore used in this service. Superheated steam is used in single expansion cylinders, and the tractive effort developed, with a mean effective pressure equal to 85 per cent. of the boiler pressure, is 51,700 lbs.

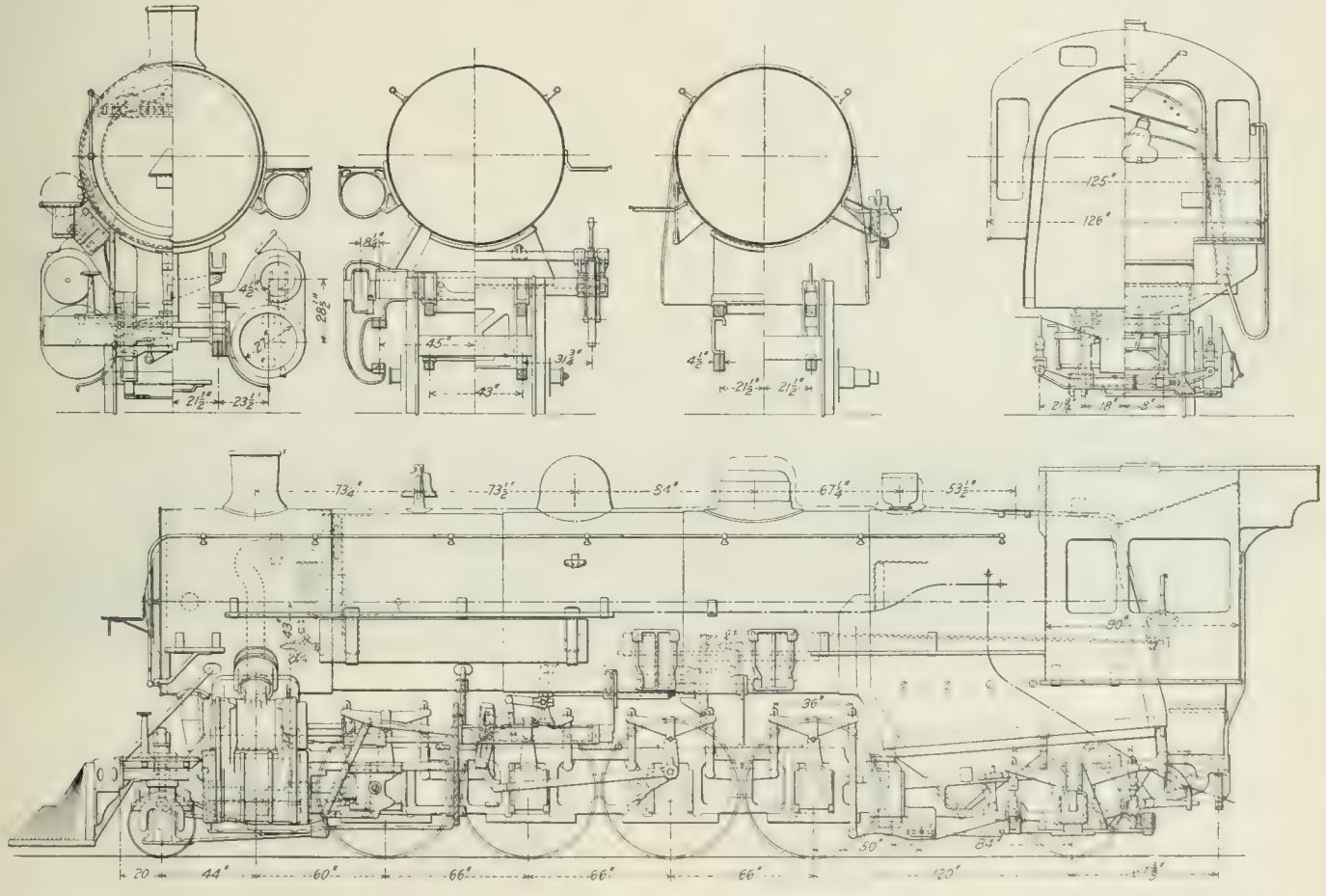
The boiler has a straight top and is built with diamond-shaped longitudinal seams. The firebox crown sheet is stayed by radial staybolts, with two tee-bars in front; 400 flexible bolts are used in the side, throat and back sheets. No brick arch is used, but provision is made for blowing four steam jets into the furnace on each side, approximately on a level with the bottom row of tubes. The steam supply for these jets is drawn from the turret in the cab, and the nozzles are located in 2-in. tubes, placed in the side of the water legs.

A Schmidt superheater of the top header type is used and is composed of 36 elements, located in 5⅜-in tubes. The steam pipes deliver directly to the top of the steam chests. A steel flange is bolted to the exterior of the smoke-box on each side, and to this flange is secured a malleable iron sleeve forming an air-tight joint with the steam pipe boss on the cylinder casting. The steam pipe passes through the flange and sleeve. With this arrangement of piping there is comparatively little obstruction in the smoke-box, and the superheater and tube ends are readily accessible.

The cylinders have bushings ¾ in. thick, which are inserted from the front and line the barrel as far back as the rear counterbore. The steam distribution is controlled by 15-in. piston valves. These are set for a maximum travel of 6½ in., a lead of ¼ in., a steam lap of 1¼ in., and are line-and-line on their exhaust edges. No circulating valves are used on the cylinders, but a vacuum relief valve is tapped into the outer wall of each steam chest above the live steam compartment. The valve motion is of the Walschaert type, and is controlled by the Baldwin power reverse mechanism.

The frames are of cast steel, 4½ in. wide, with double front rails and separate rear sections. The guide yoke is bolted to a steel casting which is placed between the first and second pairs of driving wheels, and has a long bearing on the top frame rails. A second casting located ahead of the main drivers, supports the link bearings. These are placed outside the wheels, and are bolted in front to the guide yoke. In this way, those structural parts which support the motion work also assist in bracing the frames. The front pedestal legs at the main and rear pedestals are braced by deep steel castings, and midway between the main and rear pairs of wheels a broad casting braces the top frame rails and serves as a support for a waist sheet. A heavy cross-tie is also located under the front end of the firebox, where the rear frames are spliced to the main sections. The front and back deck plates are of cast steel, and the front bumper is of the same material.

The equalization system is divided between the second and third pairs of driving wheels. The rear truck is of the Hodges type, and is fitted with a centering spring. The latter is mounted in pockets which are cast in one piece with the back transverse equalizer. The thrust bar of the spring is mounted between



Heavy Mikado Locomotives; Illinois Central.

lugs bolted to the truck frame. When the engine enters a curve, the thrust-bar is displaced and the spring is thrown into compression, thus tending to restore the alinement.

The main driving axle is made of heat treated steel, while the remaining axles are of open hearth forged steel. Standard rolled steel wheels are used in the engine truck and the tender trucks. The tender frame is composed of 12-in. steel channels, weighing 40 lbs. per ft., and the end sills are of cast steel. The tank has a water bottom and carries 9,000 gals. of water and 15 tons of coal. The principal dimensions and ratios are given in the following table:

General Data.

Type	2-8-2
Service	Freight
Fuel	Soft coal
Tractive effort	51,700 lbs.
Weight in working order	283,850 lbs.
Weight on drivers	218,300 lbs.
Weight of engine and tender in working order	455,000 lbs.
Wheel base, driving	16 ft. 6 in.
Wheel base, total	35 ft. 2 in.
Wheel base, engine and tender	65 ft. 1⅜ in.

Ratios.

Total weight ÷ tractive effort	5.48
Weight on drivers ÷ tractive effort	4.22
Tractive effort × diameter drivers ÷ heating surface	801.
*Tractive effort × diameter drivers ÷ equivalent heating surface	570.
Total heating surface ÷ grate area	58.2
*Total equivalent heating surface ÷ grate area	81.8
Firebox heating surface ÷ total heating surf., per cent.	5.78
*Firebox heating surface ÷ total equivalent heating surface, per cent.	4.11
Weight on drivers ÷ total heating surface	53.5
*Weight on drivers ÷ total equivalent heating surface	38.2
Total weight ÷ total heating surface	69.7
*Total weight ÷ total equivalent heating surface	49.6
Volume both cylinders, cu. ft.	12.98
Piston displacement per stroke, cu. ft.	10.5
*Total equivalent heating surface ÷ vol. cylinders	288.
Grate area ÷ vol. cylinders	3.57

Boiler.

Heating surface, total	4,068 sq. ft.
Heating surface, superheater	1,093 sq. ft.
*Heating surface, total equivalent	5,707.5 sq. ft.
Grate area	70 sq. ft.
Center boiler above rail	120½ in.

Tender.

Tank, style	Water bottom
Wheels, diameter	33 in.
Journals	6 in. x 11 in.
Water capacity	9,000 gals.
Coal capacity	15 tons

*Total equivalent heating surface equals the total heating surface (4,068 sq. ft.) plus 1½ times the superheating surface.

Mikado Locomotive for Heavy Freight Service; Illinois Central.

Cylinders.

Kind	Simple
Diameter	27 in.
Stroke	30 in.

Valves.

Kind	Bal. Piston
Diameter	15 in.
Greatest travel	6½ in.
Outside lap	1¼ in.
Lead, forward gear	¼ in.

Wheels.

Driving, diameter over tire	63 in.
Driving, thickness of tire	3½ in.
Driving journals, main	11 in. x 12 in.
Driving journals, others	9 in. x 12 in.
Engine truck, diameter	30½ in.
Engine truck journals	6 in. x 10 in.
Trailing truck, diameter	45 in.
Trailing truck journals	8 in. x 14 in.

Boiler.

Style	Straight
Working pressure	175 lbs.
Outside diameter of first ring	82 in.
Firebox, length and width	84 in. x 108 in.
Thickness of tube sheets	½ in.
Thickness of crown sheet	⅝ in.
Thickness of side sheets	⅝ in.
Thickness of back sheet	⅝ in.
Water space, front	6½ in.
Water space, sides	5 in.
Water space, back	5 in.
Tubes, number and outside diameter	344 sq. in.
Tubes, length	20 ft. 6 in.
Heating surface, tubes and flues	3,833 sq. ft.
Heating surface, firebox	235 sq. ft.

SCIENTIFIC DEVELOPMENT OF AMERICAN RAILWAYS.

S. M. Felton, president of the Chicago Great Western, prepared a paper on Scientific Management of American Railways, for the Congress of Technology, held at Boston, Mass., on April 10, under the auspices of the Massachusetts Institute of Technology. Mr. Felton was one of the earliest graduates of this school. For incorporation in his paper he collected, at a great deal of trouble and expense, a large number of drawings of typical locomotives and cars used on American railways during the last half century or more. He also compiled some statistics to illustrate the reductions that have been made in the costs of railway operation and in the cost of transportation to the public.

The most remarkable of these statistics relate to the Pennsylvania Railroad. Mr. Felton had several reasons for choosing the Pennsylvania as affording good examples of the results of scientific management extending over a long period of years. One of these was that it has been the policy of the Pennsylvania from the very beginning to entrust its management to men of scientific training. Another, no doubt, was that Mr. Felton is himself a scientifically educated railway officer and received part of his training on the Pennsylvania Railroad. Furthermore, the magnitude of the Pennsylvania's business makes comparisons of its present with its past particularly interesting.

Diagrams are presented herewith showing the tonnage and revenue per ton mile of freight traffic, and the number of passengers transported one mile and the revenue per passenger per mile on the Pennsylvania for the period 1865 to 1910. It will be noted that the average receipts per ton mile in 1910 were only one-sixth of what they were in 1865, and that a heavy reduction, although not so great a one, has taken place in the revenue per passenger per mile. If the average rate had been the same in 1910 as it was in 1865 the freight earnings in 1910 would have been $551,602,000, while the actual freight earnings in that year were $118,203,000, the difference being $433,399,000. This is more than 50 per cent. of the total operating net income, after deduction of taxes, of all the railways in the United States in the year ended June 30, 1910, the operating income less taxes in that year having been $832,227,864. As will be seen from one of the diagrams, Mr. Felton has computed that the saving to the public

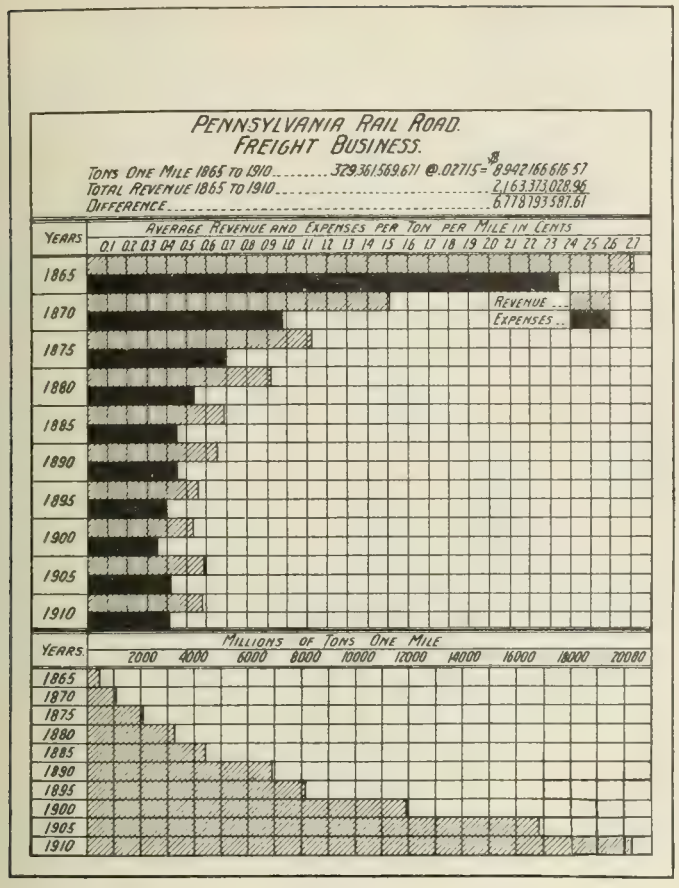


Fig. 1.

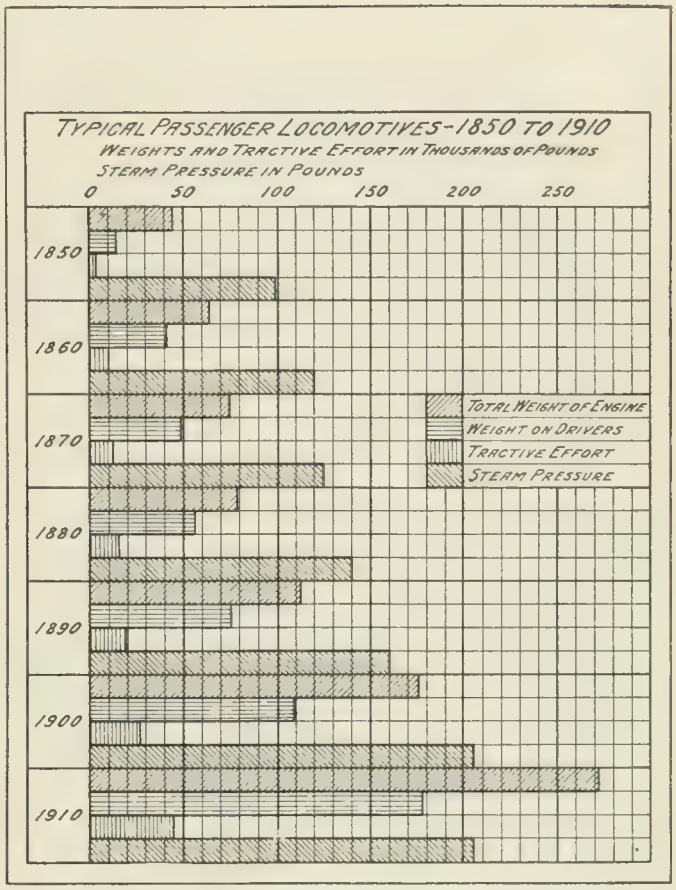


Fig. 3.

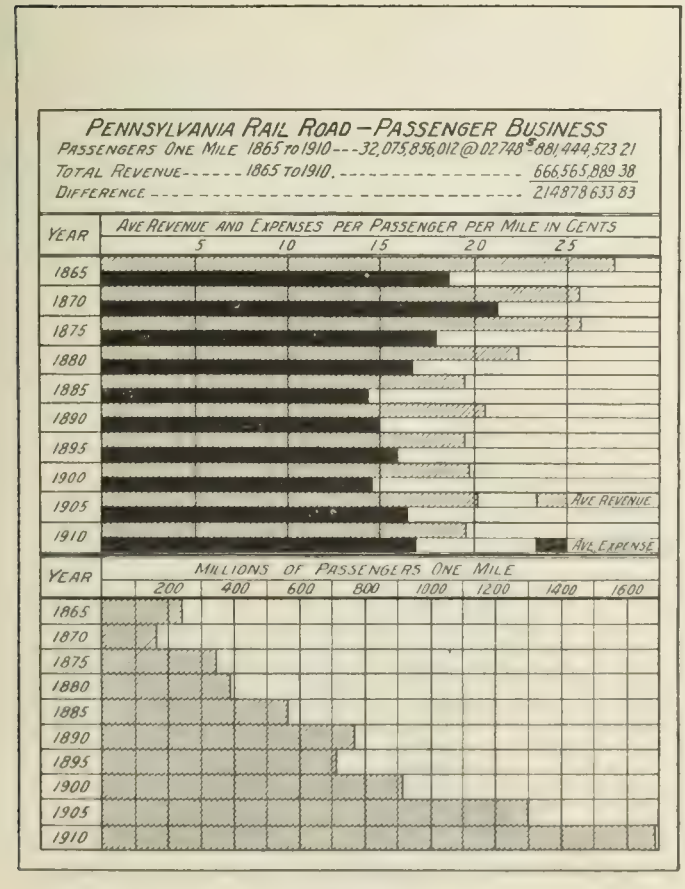


Fig. 2.

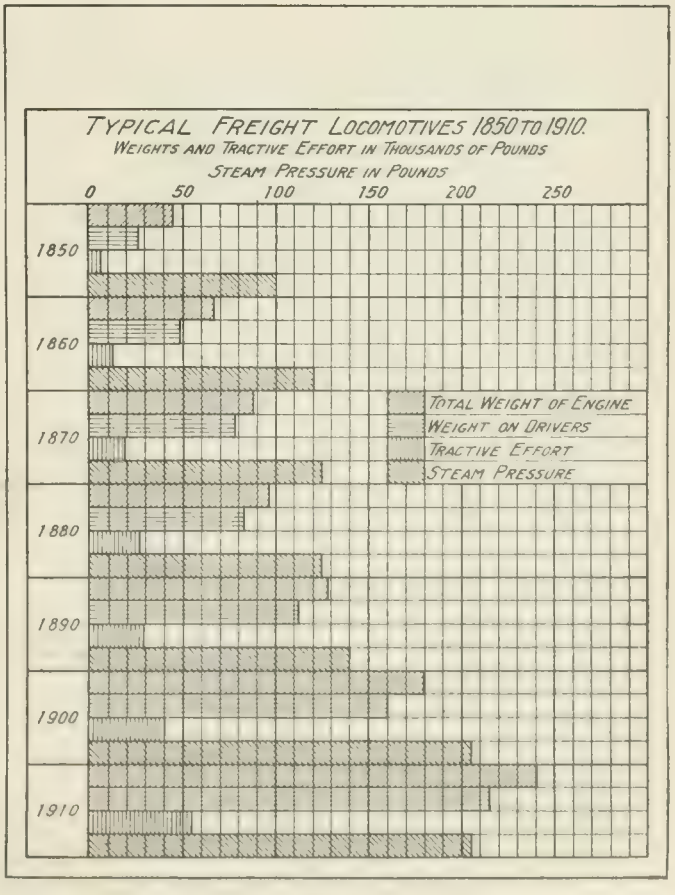


Fig. 4.

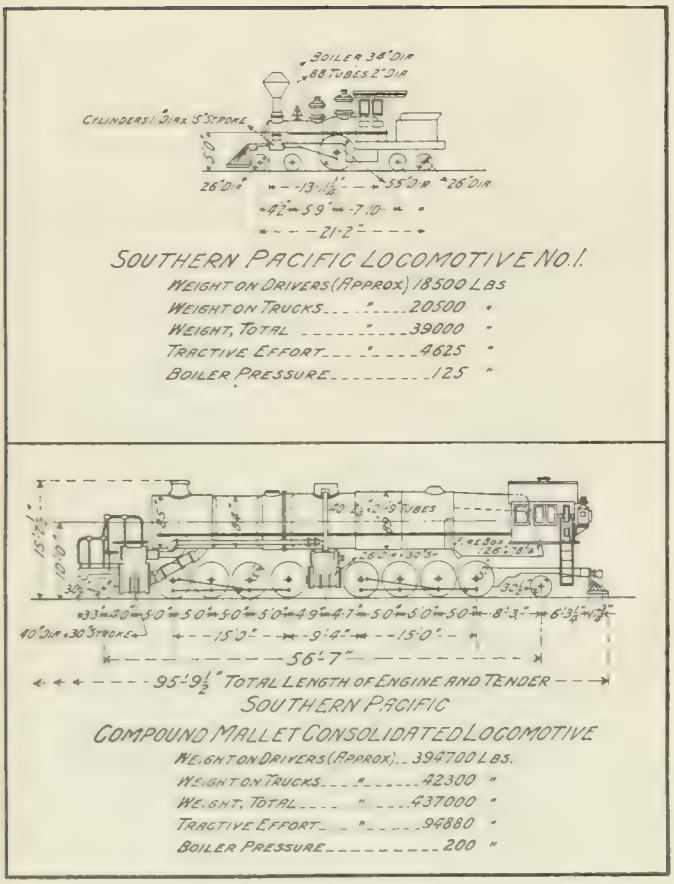

SOUTHERN PACIFIC LOCOMOTIVE NO. 1.
WEIGHT ON DRIVERS (APPROX) 18500 LBS
WEIGHT ON TRUCKS 20500 "
WEIGHT, TOTAL 39000 "
TRACTIVE EFFORT 4625 "
BOILER PRESSURE 125 "
SOUTHERN PACIFIC
COMPOUND MALLET CONSOLIDATED LOCOMOTIVE
WEIGHT ON DRIVERS (APPROX) 394700 LBS.
WEIGHT ON TRUCKS 42300 "
WEIGHT, TOTAL 437000 "
TRACTIVE EFFORT 96880 "
BOILER PRESSURE 200 "

Fig. 5.

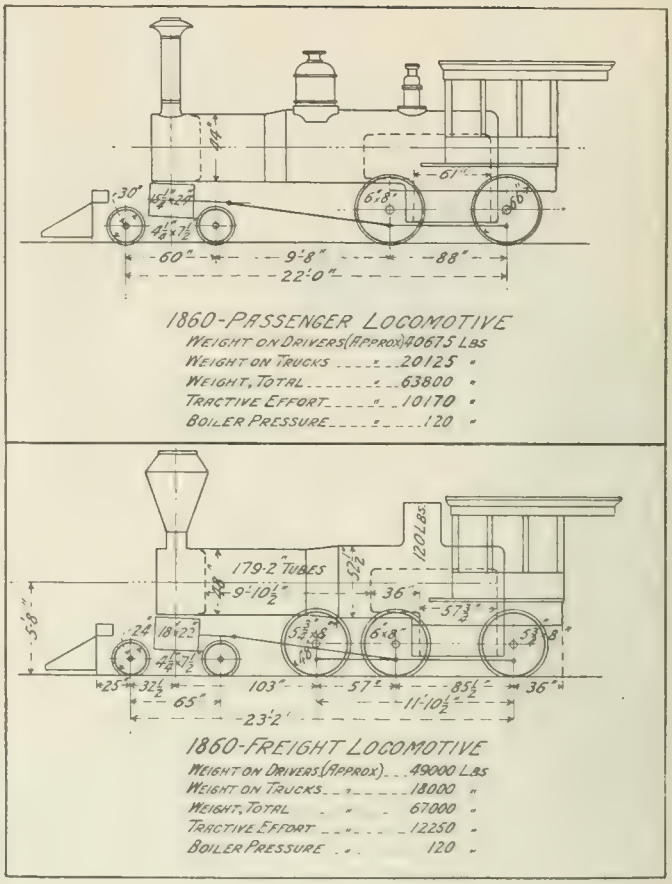

1860-PASSENGER LOCOMOTIVE
WEIGHT ON DRIVERS (APPROX) 40675 LBS
WEIGHT ON TRUCKS 20125 "
WEIGHT, TOTAL 63800 "
TRACTIVE EFFORT 10170 "
BOILER PRESSURE 120 "
1860-FREIGHT LOCOMOTIVE
WEIGHT ON DRIVERS (APPROX) 49000 LBS
WEIGHT ON TRUCKS 18000 "
WEIGHT, TOTAL 67000 "
TRACTIVE EFFORT 12250 "
BOILER PRESSURE 120 "

Fig. 7.

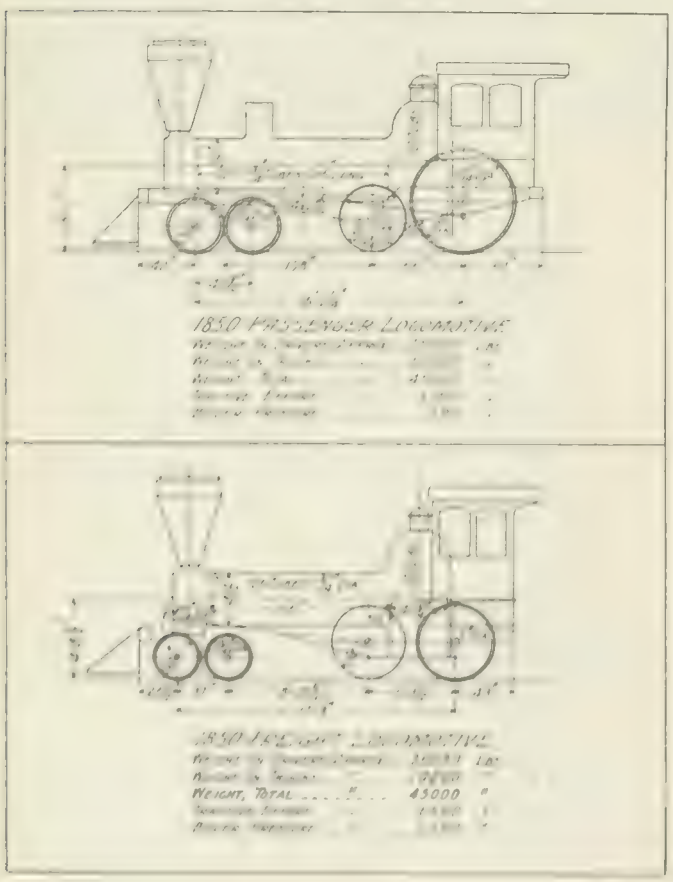


Fig. 6.

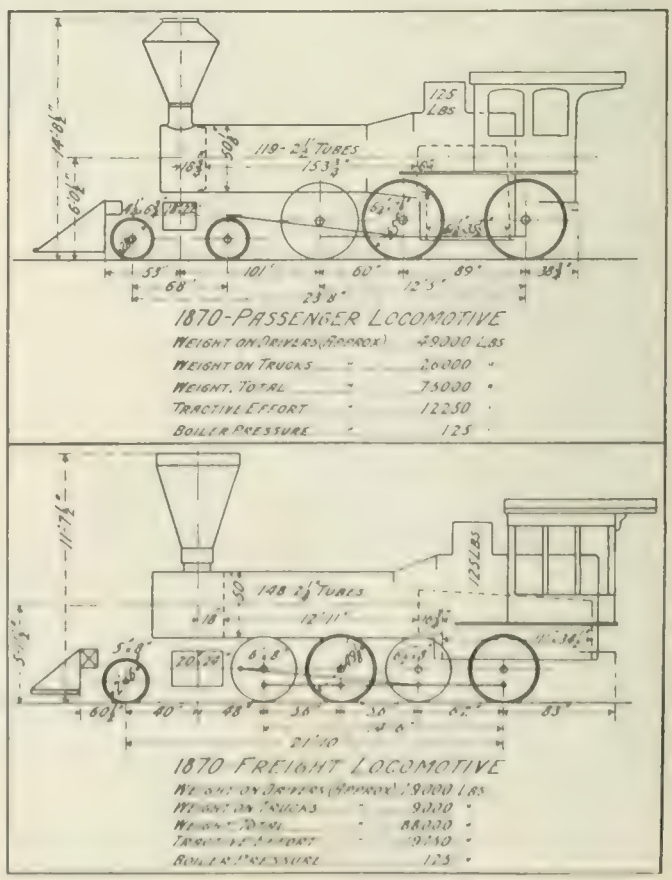

1870-PASSENGER LOCOMOTIVE
WEIGHT ON DRIVERS (APPROX) 49000 LBS
WEIGHT ON TRUCKS 20000 "
WEIGHT, TOTAL 75000 "
TRACTIVE EFFORT 12250 "
BOILER PRESSURE 125 "
1870 FREIGHT LOCOMOTIVE
BOILER PRESSURE 125 "

Fig. 8.

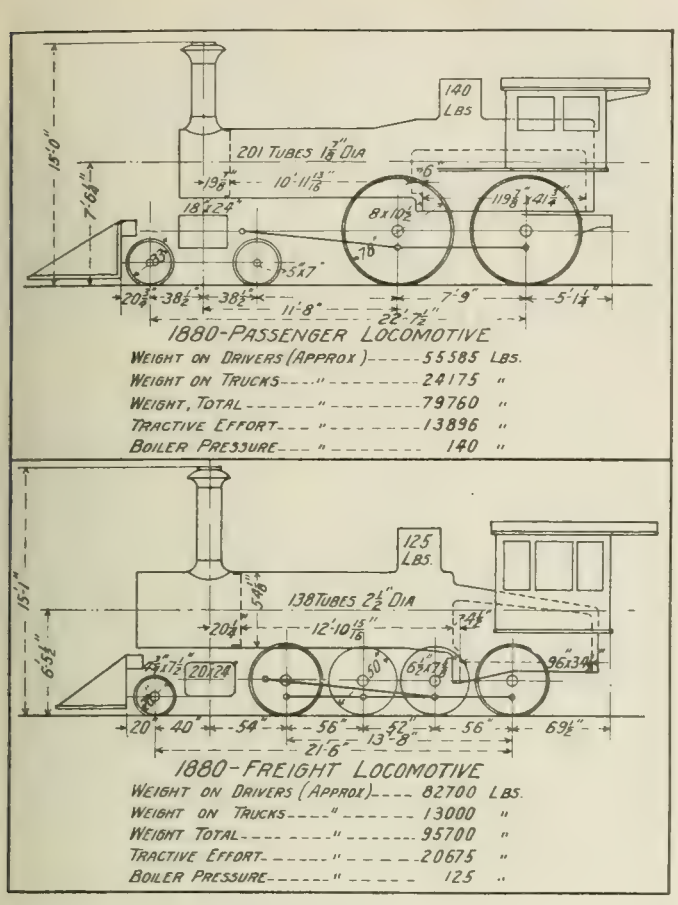


Fig. 9.

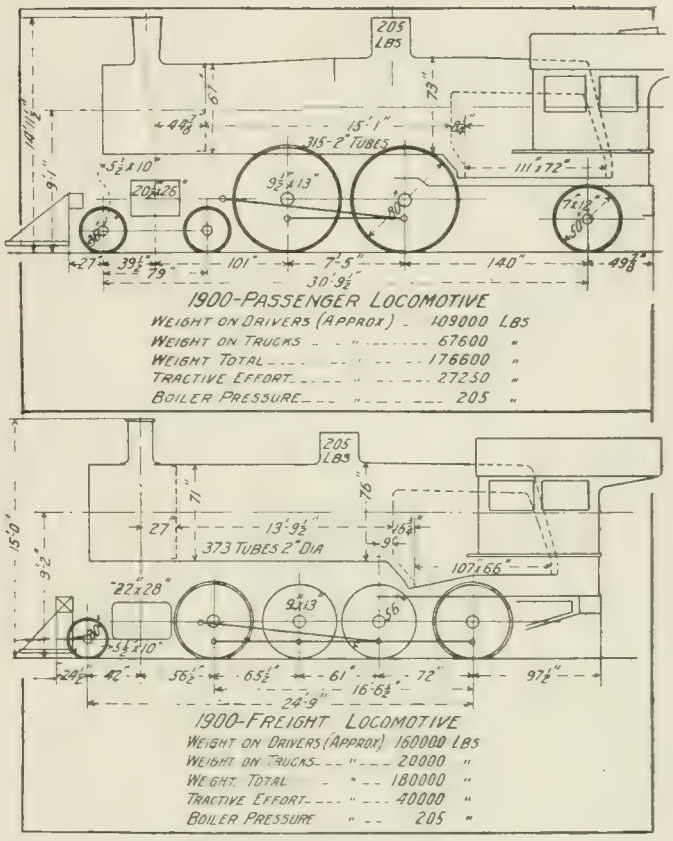


Fig. 11.

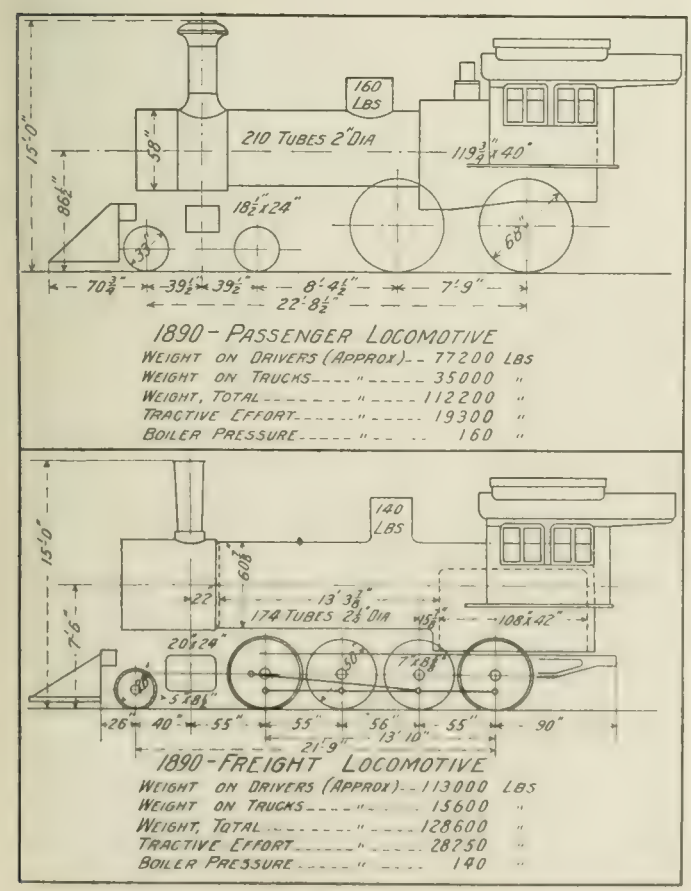


Fig. 10.

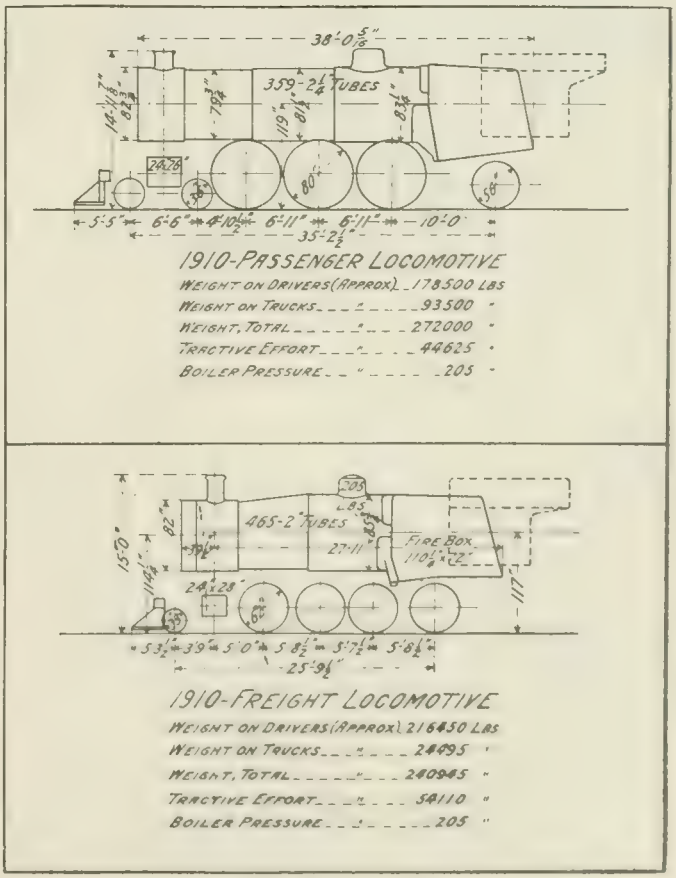


Fig. 12.

through the decrease in freight rates on the Pennsylvania Railroad in the 45 years from 1865 to 1910, was $6,778,793,587.61. This is about ten times the present capitalization of the Pennsylvania Railroad Company, and is 47 per cent. of the total net capitalization of the railways of the United States outstanding in the hands of the public on June 30, 1910 which amounted to $14,338,575,940. Mr. Felton also estimates that the saving to the public during this period through the reduction in the Pennsylvania's average rate per passenger per mile amounted to $214,878,633.83.

Regarding the freight traffic he gives the following figures:

	1865.	1910.
Tons of freight moved one mile...	452,183,478	29,279,992,323
Average gross receipts per ton mile	2.715c.	.583c.
Average expenses per ton mile....	2.347c.	.412c.
Net receipts per ton mile.....	.368c.	.171c.

It will be noted that he estimates that the average cost of moving one ton one mile was reduced from 2.347 cents to .412 cent,

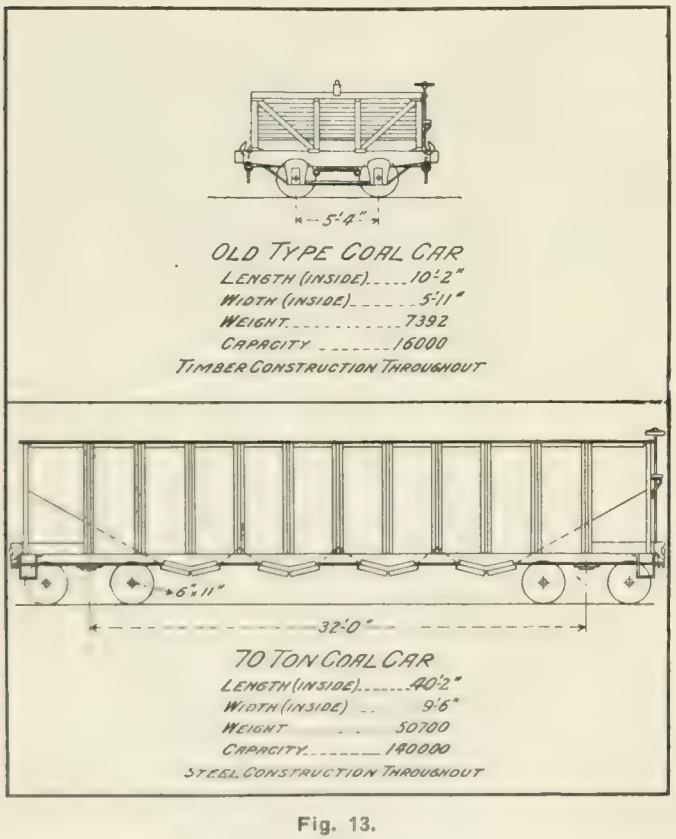


Fig. 13.

of over 82 per cent., and that the net receipts per ton mile were reduced from .368 cent to .171 cent.

Illustrations given herewith, for which the *Railway Age Gazette* is indebted to Mr. Felton, show the development of freight and passenger locomotives on the Pennsylvania by decades from 1850 to 1910. The following tables illustrate the extent of the development in locomotives that has taken place:

Passenger Locomotives

	1850	1910
Weight on drivers (approx.)	17,000 lbs.	171,700 lbs.
Weight, total	26,000 lbs.	241,400 lbs.
Weight, coal	11,000 lbs.	25,000 lbs.
Tractive effort	4,140 lbs.	44,675 lbs.
Boiler pressure	100 lbs.	205 lbs.

Freight Locomotives

Weight on drivers (approx.)	27,000 lbs.	216,440 lbs.
Weight, total	45,000 lbs.	241,400 lbs.
Weight, coal	11,000 lbs.	25,000 lbs.
Tractive effort	6,000 lbs.	54,170 lbs.
Boiler pressure	100 lbs.	205 lbs.

There are also included illustrations of the first locomotive on the Pennsylvania Railroad and of a Mallet compound locomotive now in service on the same road. Charts are given herewith showing in graphic form the development of typical passenger and freight locomotives on the Pennsylvania Railroad from 1850 to 1910.

Illustrations are also given showing an old type coal car of the year 1848 and one of the enormous modern 70-ton coal cars which are coming into use on some of the large eastern coal-carrying roads. The former were of timber construction throughout, while the latter are of steel construction throughout. It would be impossible to find in service on any standard gage railway in the United States a freight car comparable to the old coal car of 1848 herewith illustrated, but it would not look so strange on a European railway where the normal capacity of freight cars is from 10 to 15 tons.

LETTERS FROM AN OLD RAILWAY OFFICIAL TO HIS SON, A GENERAL MANAGER.*

XVIII.

Spokane, Wash., August 5, 1911.

My dear Boy: Someone has asked me how far up and how far down the principles of the unit system and the chief of staff idea can be applied. It is too bad the answer is so easy. Otherwise we might inaugurate a guessing contest and offer prizes. The unit system is applicable to every phase of modern organization. When its principles are better understood, you will see develop in the great financial centers some such important title as vice-chairman, in order that rank and authority may be conferred superior to that of the presidents of the constituent properties. Both the chairman and the president need a senior vice-chairman and a senior vice-president, respectively, to act as chief of staff. The New York Central once had a senior vice-president, W. C. Brown, and the St. Louis & San Francisco created the same position for Carl Gray. When these two able men became presidents, their former positions were discontinued. Puzzle: Find the reason. Answers to be sent to the Puzzle Editor, Louis D. Brandeis, Boston, Mass.

A prominent railway executive, who is also a distinguished bridge engineer, said to me, "You must be patient until railway people can measure this big idea in their own little half bushels. I did not see it clearly until I thought it through in terms with which I am familiar. I reverted to my graphic statics and measured organization as a bridge truss. This showed the chief clerk as a short ordinate between the longest, the head of the unit, and the next longest, the official second in rank. We would never design a bridge that way, for the short ordinate in between would break under the strain. You interpose the chief of staff and diminish your strains logically to suit the decreased resisting power. Why don't you show the old telegraph men and the electric people the same idea in terms of things with which they are most familiar? They should see that you can not step down your potential through an undersized transformer."

Railway administration is usually said to be divided into four real departments, namely: the executive, including legal and financial, the traffic, the operating, including maintenance and construction, and the accounting. Most railways place each of these departments in charge of a vice-president. I think that this is usually a mistake. Experience has demonstrated the practicability of the same man being a division master mechanic, for example, and at the same time performing some of the broader duties of an assistant superintendent. Likewise an assistant general manager can act as the head of the mechanical bureau in the general office. When we reach so high as to go beyond the heads of real departments we find our old friend, volume of business, and his bastard brother, unbalanced administration, to demand more balance wheels. The unit has become of too large a size for a single governor. If you don't believe this, watch somebody try to transfer a bureau, freight claims for example, from the department under one vice-president to that of another.

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When I incorporate and organize that ideal railway it will have a president, a senior vice-president and as many other vice-presidents as may be necessary. The vice-presidents will be real assistant presidents, not heads of departments. Each will be an expert graduated from some particular department. Such graduation will depend more upon the man being big enough for a vice-president and possible president than upon the department itself. Since volume of business warrants separation of the financial and the corporate from the legal, and of passenger from freight traffic, I shall have seven departments, under seven general officers, namely, the general inspector (who will also be comptroller), the secretary, the general treasurer, the general manager, the freight traffic manager, the passenger traffic manager, and the general counsel. Each of the seven departments will have its own office file. All of the vice-presidents will have one consolidated office file in common with the president.

Trusting that these few lines will restrain you for a brief period, which is Boston & Albany for hold you for a while, let us consider the application of the unit system to a humbler sphere, that of roadmaster or track supervisor, who is the head of a highly important sub-unit of maintenance organization. The roadmaster's clerk is usually paid less than a section foreman. As a result such clerk is either a callow youth looking for speedy transfer or an old man married to the job. In the latter case, after one change in roadmasters the clerk probably dominates the office. He puts so much fear of paper work in the minds of the section foreman that few aspire to be roadmasters. Instead of a clerk, why not have an assistant roadmaster, a real understudy, promoted from section foreman at a slight increase in pay and allowances? Get the working atmosphere of the section into the roadmaster's office. Perhaps some of the section foremen are not relatively as stupid as some superiors who take snap judgment on possible qualifications. Some people deny the necessity for a roadmaster's office. Is it not rather difficult to hold a man responsible without giving him access to first hand records of performance? An assistant superintendent or an assistant general manager can and should come to his own headquarters where there are clerks to furnish him necessary information. A roadmaster away from division headquarters cannot gain such contact without deserting the subdivision for which he is responsible night and day. He cannot well take the section foreman from work to compile statistics.

When the word superintendent is eliminated from all higher titles so that it means the head, and a real head, of an operating division, there will be a bigger return for that item of operating expenses known as "superintendence." If the notion still lingers that operation is merely train movement, and that it is enough for a superintendent to be a high class chief despatcher, the idea of real management can be driven in by calling the head of a division a "manager." In such case, the title general manager would have a logical meaning. The title district manager would fit the case where subdivision into such territorial units became unavoidable.

When the telegraph, the telephone, and the phonograph were invented the Greek language was consulted and new words were scientifically coined to express a new necessity of linguistic expression. The automobile and the aeroplane are founding whole families of new words. As society and industry become more highly organized it may be necessary to coin new words to convey the full idea of the rank and duties of the human elements in a large organization. Critics of the unit system deplore the uniformity of titles as tending to merge individual identity. This is not the fault of the system but of the poverty of the English language which lacks varying terminations of root words to express different shades of meaning. If necessary to meet this view helps can be sought from such highly inflected languages as Greek and Esperanto, and new words coined. Thus the same word with a slightly different ending would mean, "assistant superintendent in charge of maintenance of way and structures as classified by the Interstate Commerce Commission," or, "assistant superintendent in charge of maintenance of equipment, including an allowance for depreciation at the legal and constitutional ratio of sixteen to one, expiating the crime of 1873 and glorifying the Hepburn Act of 1906."

Many practical things in this world escape attention because they are so close as to be inside the focal distance. The persons most concerned are often too close to a proposition to observe what should be distinctly obvious. I uncover my headlight to the fellow down East who recently showed us all that green flags can be replaced by the night markers. For the over-specialization of perishable day indicators he substituted the all-round day and night marker. The supply people should not kick at the decreased demand for their product. They should be thankful, rather, that railway officials did not wake up sooner to changed conditions. The new practice is worth the price of admission if it only serves to do away with the delay and inconvenience of loading and unloading the time-honored and cumbrous train box which still roams wild in some region covered by the Spokane rate decision.

Among the other simplifications which time will bring is a logical method of designating extra trains. Today we tell a man than an engine number means little, because the train indicator says that it is train so-and-so. The numbers on the engine and on the train indicator are different and have no relation. Tomorrow the engine runs extra and the two numbers must be identical. When we adopt the train indicator, should we not banish numbers from the outside of our engines and tenders? Should not the number be inside the cab to be consulted for reports and statistics, including the train sheet? This would mean that extras would be numbered consecutively in a series higher than the numbers on the regular trains. Extras, like regular trains, would lose their running rights in twelve hours. In this connection, did you ever figure that, except possibly in the case of extras, the distinctions "A. M." and "P. M." are superfluous on train orders? Should P. M. come before the order is fulfilled, the A. M. train is dead.

The proposed change would force regular trains to be numbered in lower series, regardless of divisions and branch lines. This would make for safety. The more figures in a number, the greater the possibilities of error in reading a train order. A man is much more likely to confuse 2347 with 2345 than 47 with 45. If the motive power bureau must recognize the high numbered union for classification purposes, let us avoid having the blooming series federate with the train despatcher's order book.

The magnificent distances of this western country are reflected in increased difficulties in railway operation. Perhaps no branch of the railway service is more affected thereby than the dining car service. American travelers, as the colored soldier said about the Cubans, are the "eatin'est lot of people." The long haul for cars and supplies renders supervision more difficult and deficits correspondingly greater. The dining car man on most, if not all, western roads is attached to a losing game. When poverty comes in at the door, love flies out at the window. The dining car superintendent is kept busy retaining the affections of the management in the face of red figures.

A dining car is about the most complex proposition in its operation that we have on the railway. It will be the hardest to bring under the supervision of the division superintendent and his assistants. The difficulties of so doing are many, but are not insurmountable. The dining car, because it moves on wheels, is an incident to the manufacture and sale of transportation. It is not, as a few dining car people suppose, merely a traveling hotel to which the railway is an incident. Originally the dining cars were under the passenger traffic department. Later it was realized that they are logically a part of operation. So they have been placed under the general manager and his subordinate, the superintendent of dining cars. We say nonchalantly that the superintendent and the train conductor can instruct the so-called conductor of the dining car. Let a passenger conductor report a dining car conductor. The former's superintendent will probably find himself helpless to defend his man against the momentum of a correspondence bureau located in the general offices. As

a result, the superintendent and the passenger conductor soon lose interest. They are not looking for trouble and possible censure. The outcome is long-range supervision of a centralized activity. The man in charge of the dining car should be called steward, because he cannot conduct a car even to a side track. He should be under the control of the train conductor, whom the superintendent can hold responsible for the entire train performing proper public service. A good, honest passenger conductor can secure and retain more business for the company than two traveling passenger agents. The conductor cannot do this if the dining car man is unwilling to send promptly a pot of coffee to the shabby little sick woman in the chair car whose daughters are going to buy tourist tickets next year. In the days of simpler organization the good old passenger conductor would unload on the prairie a shorter-sighted sleeping car or dining car man and let the latter walk home. Because this cannot be done today is one of the reasons for the lack of initiative on the part of the train conductor. The lack of courtesy sometimes shown by employees is not infrequently the fault of heads of would-be departments whose tenacity for departmental lines leaves subordinates with an unbalanced notion of the necessity for real courtesy and consideration. Bowing and scraping do not alone constitute politeness.

One of the best dining car superintendents in the country is Tom Clifford of the Erie, a graduated division superintendent and passenger conductor. Because they are general officers, the dining car superintendents of the future should be assistant general managers, and should come up from the grade of division superintendent, in order to acquire a more comprehensive knowledge of operation. Just how to work out all the details is, I confess, perhaps the hardest operating problem that I have yet tackled. Pullman employees have a home terminal and a home district to whose superintendent certain reports are made and complaints referred. This works well, although Pullman cars may run over several of their superintendents' districts. The fact that dining cars run over more than one division is not of itself a sufficient reason for the employees being under the immediate direction of a general officer. Volume of business, density of traffic, shortness of runs, and other causes may warrant varying applications of the underlying principle. Above all, we should avoid those hard and fast rules which even the Medes and Persians never attempted to make applicable to dining cars.

Affectionately, your own

D. A. D.

FOREIGN RAILWAY NOTES.

Plans have been made for a deviation of the line of the Dominican Central Railway, Dominican Republic, from a point at the base of San Marco Hill, near Puerto Plata, to Bajabonico. This will obviate the necessity of using the rack system which is now in operation on a portion of that line.

The total mileage of railways in operation in Argentina at the close of the year 1910 was 18,166 miles. The mileage of railways opened to traffic during the year was 2,140 miles, which is the greatest new mileage recorded in any one year in the history of the country and is more than twice that for the year 1909. While the greater part of this new mileage consisted of extensions and branches of existing roads, a considerable portion pertained to entirely new lines, a number of which are being constructed through the national territories in the north and south. The new road from Rosario, the second city of the republic, to Puerto Belgrano on the Atlantic coast east of Bahia Blanca, a distance of 456 miles, was opened to traffic at the close of the year. It traverses a fertile agricultural region in the provinces of Santa Fe and Buenos Aires and connects with all of the large roads in that region. The lines completed in the Chaco zone between Resistencia and Puerto Esperanza, in Resistencia, capital of Chaco, by the province of Salta, will open up the fine agricultural territory

TONNAGE RATING OF LOCOMOTIVES ON THE BURLINGTON.*

BY M. H. WICKHORST.

In establishing a tonnage rate for an engine it is the aim to load the engine to near its maximum pulling capacity and yet not load it so heavily that it will stall on any of the hills, or be on the road an excessive length of time.

The work of engine rating consists of: (1) Determining the maximum working tractive force the engine can maintain under average conditions over the ruling grade; and (2) balancing this with an equal amount of total train resistance, on the ruling grade. There are tractive force formulæ and curves of train resistance from actual tests which are worked up into tables convenient for use in this work.

The tonnage rater, in rating a division, must first get an

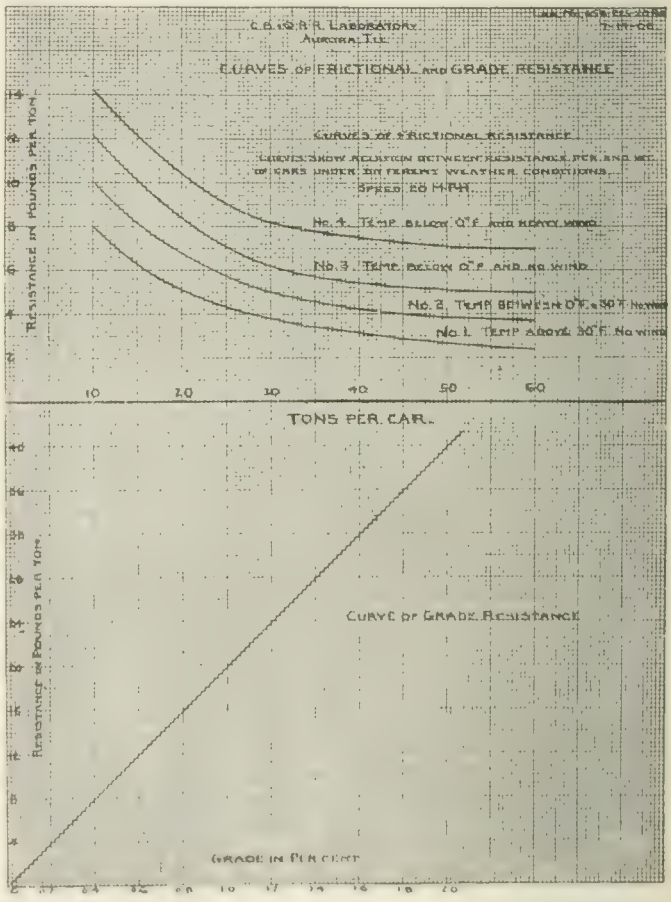

C. B. & Q. R. R. LABORATORY
AURORA, ILL.
CURVES OF FRICTIONAL AND GRADE RESISTANCE
CURVES OF FRICTIONAL RESISTANCE
CURVES SHOW ACTION BETWEEN RESISTANCE PER AND WT. OF CARS UNDER DIFFERENT WEATHER CONDITIONS
SPEED 60 M.P.H.
No. 4. TEMP. BELOW 0° F. AND HEAVY WIND
No. 3. TEMP. BELOW 0° F. AND NO WIND
No. 2. TEMP. BETWEEN 0° F. & 30° F. No wind
No. 1. TEMP. ABOVE 30° F. No wind
RESISTANCE IN POUNDS PER TON
10
20
30
40
50
60
TONS PER CAR.
CURVE OF GRADE RESISTANCE
RESISTANCE IN POUNDS PER TON
GRADE IN PER CENT

Fig. 1—Curves of Train Resistance, Frictional and Grade.

alignment and grade profile of the division and make a careful study of the grades, curves, etc., for the purpose of determining the ruling grade and estimating about what percentage of the maximum tractive force an engine can consistently maintain and get over the road in good time and without stalling. There is also the question of momentum grade as affecting the ruling grade.

He should also, if consistent with operating conditions, divide the main runs of the division into rating divisions whenever there is a sufficient change in ruling grade to warrant two different rates. For instance, one run on the Galesburg Division of the Chicago, Burlington & Quincy is from Quincy to Galesburg; from Quincy to Bushnell is 70 miles, with a ruling grade of 0.7 per cent.; from Bushnell to Galesburg is 30 miles, with a ruling grade of 0.3 per cent. At Bushnell is a point where there is a

*Paper presented before the Western Railway Club, August, 1911.

great deal of freight to fill up with, there should be two rates for the Quincy-to-Galesburg run. If there were no important points where freight originated between Quincy and Galesburg, a straight through rate from Quincy to Galesburg would probably be made.

Having settled on these, the rater will consult the equated tonnage tables for the grade in question, and using the predetermined tractive force as the train resistance, he will get a trial rate.

The next step is to ride engines hauling this trial rate and see how the estimate works out in practice. There are many local influencing conditions which cannot be seen on the profile chart, such as differences in roadbed, speed limits, some grades being protected from winds by trees or cuts, overworking of firemen, etc. Very often sidings or the approach to them will be on a heavy grade, so that if an engine had to stop to head in at one of them, it would be unable to start the train again. The approach to crossovers, home semaphores, or any place where trains have to be stopped under ordinary operating conditions, are similar instances that have to be considered in making the rate. If, however, to consider such a point would lower the rate very materially and if the point in question were such that wise despatching would eliminate most of the stops at the place, it should be ignored in making the rate. These will show up on the trial trips, and the rater can, in a few trips, check up his rates and readjust, if necessary, for the final rating.

If a train averages less than ten miles an hour between terminals (except on runs of less than 100 miles), the engine and train crew are on the road an excessive length of time. In practice we find that ordinarily if an engine is loaded so that its average speed *in motion* is twenty miles an hour, the average speed between the terminals will not fall under ten miles per hour.

Outside the ability of the engine to handle her train, density of traffic and efficiency of despatching are factors to be considered. The question of speed is an important one, and the engine rater should keep accurate record of stops and time on the road on his trial trips, and rate accordingly.

The length of the division is another influencing factor. On a short division, of say, 60 miles in length, it is economy, traffic permitting, to load the engines a little more heavily; whereas, on a 160-mile division the rate should be lowered on account of excessive time on the road, the possibility of heavy or clinkered fires, etc.

SAMPLE DATA SHEET AND METHOD OF CALCULATION.

EQUATED TONNAGE RATES

GRADE 0·5%. RESISTANCE 20,000 #

RATE A. TEMP. ABOVE 30°F. AND NOT MUCH WIND. RATE B. TEMP. BETWEEN 0°F AND 30°, OR STRONG HEAD OR SIDE WIND, OR FROSTY RAIL.
RATE C. TEMP. BETWEEN 0° AND 30°F AND STRONG HEAD OR SIDE WIND, OR TEMP. BELOW 0° AND CALM. RATE D TEMP. BELOW 0° WITH HEAD OR SIDE WIND.

TONS PER CAR	FRICTION AND GRADE RESISTANCE PER TON.	RATE A		RATE B		RATE C		RATE D		CARS	RATES.			
		TONS	CARS	TONS	CARS	TONS	CARS	TONS	CARS		A	B	C	D
10	17·9	1117	111·7	1042	90	930	91·5			100	1160			
11	17·5	1143	103·8	1060	85	960	83			95	1180			
12	17·1	1170	97·4	1080	81	980	78 8			90	1200	1040	935	
14	16·5	1212	86·6	1100	76	995	74·6			85	1220	1060	950	855
16	15·9	1257	78·6	1120	72	1010	70·6			80	1245	1080	970	870
18	15·5	1290	71·7	1143	67	1033	66 4			75	1270	1100	990	890
20	15·1	1324	66·2	1170	63	1053	62·2			70	1300	1125	1010	910
25	14·4	1389	55·6	1200	58	1080	58·1			65	1330	1150	1035	930
30	13·9	1439	48·0	1222	54	1105	53·9			60	1360	1180	1060	955
40	13 2	1514	37 9	1255	49	1130	49·8			55	1395	1210	1090	980
50	12·8	1565	31·3	1285	45	1160	45·6			50	1430	12 50	1125	1010
60	12·5	1600	26·7	1320	40	1185	41 5			45	1465	1285	1160	1045
				1350	36	1215	37·4			40	1500	1320	1195	1075
				1380	31	1245	33·2			35	1535	1360	1230	1105
				1415	27	1275	29			30	1575	1400	1270	1140
				1455	22	1305	24·5			25	1615	1440	1310	1180
						1340	20·7			20		1490	1350	1215
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

T_A = RESISTANCE PER TON FOR RATE A CONDITIONS.

T_B = RESISTANCE PER TON FOR RATE B CONDITIONS.

T_C = RESISTANCE PER TON FOR RATE C CONDITIONS.

T_D = RESISTANCE PER TON FOR RATE D CONDITIONS.

RATIO OF TONS AND CARS WITH A CONDITIONS TAKEN AS 100.

GRADE PERCENT	$\frac{T_A}{T_B}$	$\frac{T_A}{T_C}$	$\frac{T_A}{T_D}$ *	GRADE PERCENT	$\frac{T_A}{T_B}$	$\frac{T_A}{T_C}$	$\frac{T_A}{T_D}$	GRADE PERCENT	$\frac{T_A}{T_B}$	$\frac{T_A}{T_C}$	$\frac{T_A}{T_D}$
·0	·76	·61		·8	·93	·86	·80	1·5	·96	·91	·87
·1	82	·68		·9	·93	87	·82	1·6	·96	·92	·88
·2	·84	·74		1·0	·94	·88	·83	1·7	·96	·92	·88
·3	·86	·77		1·1	·94	·89	·84	1·8	·96	·92	·89
·4	·89	·81		1·2	·95	·90	·85	1·9	·96	·93	·90
·5	·90	·83		1·25	·95	·90	·85	2·0	·97	·93	·90
·6	·91	·84	·76	1·3	·95	·90	·86				
·7	·92	·85	·78	1·4	·95	·91	·87				

Fig. 2—Method of Calculating Equated Train Resistance in Tons of Trains.

Following is the method of arriving at the equated tonnage rates:

TRACTIVE FORCE.

The method of figuring the maximum tractive force that an engine may develop at the tender drawbar on level track and of correcting this value for grades and for special conditions affecting train resistance to secure the net working tractive force, was explained in a former article by Mr. Wickhorst published in the *Railroad Gazette* of March 27, 1903, page 234.

TRAIN RESISTANCE.

Train resistance consists of three primary resistances, as follows:

(1) Acceleration resistance.
(2) Grade resistance.
(3) Friction.

The composition of this resistance is shown below:

- Resistance Train
  - Acceleration Resistance, depends on tonnage only. — 20 lbs. per ton for 1 per cent. grade, or about .4 per lb. for each foot per mile of grade.
  - Grade Resistance, depends on tonnage only. — 20 lbs. per ton for 1 per cent. grade, or about .4 per lb. for each foot per mile of grade.
  - Friction
    - Journal. Depends on design and lubrication.
    - Rolling. Depends on solidity of roadbed.
    - Flange.
    - Curve
      - Sliding of one tread, in each pair, on the rail.
      - Flange Friction.
      - Varies from 2½ to 12 lbs. per ton.
    - Side bearings and center plates cause flange friction.
    - Wind
      - Wind against body of car.
      - Flange Friction.

Note.—Flange friction consists of that due to curves, side bearings and center plates, winds, etc.

(1) *Acceleration Resistance.*

In rating slow freight trains acceleration resistance need very seldom be considered, except on momentum grades. . Here it

sistance of freight cars at speeds of 20 miles per hour. These curves show the relation between the gross weight per car in tons plotted horizontally, and the resistance per ton in pounds plotted vertically for four different weather conditions, as follows:

(1) Temperature above 30 deg. Fahrenheit, and not much wind.

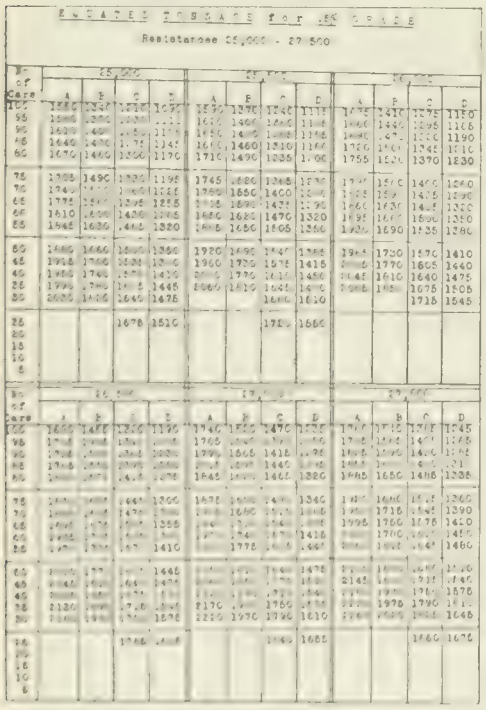
(2) Temperature between zero and 30 deg. Fahrenheit, *or* strong head or side wind, *or* frosty rail.

(3) Temperature between zero and 30 deg. Fahrenheit *and* strong head or side wind, *or* temperature below zero and not much wind.

(4) Temperature below zero with strong head or side wind.

The curve showing resistance of freight cars in summer weather (above 30 deg. Fahrenheit) is the result of dynamometer tests by the Pennsylvania Railroad, and various results obtained by the Burlington agree well with this curve.

The curve showing friction of freight cars for the third weather condition is one obtained by the Burlington from dynamometer tests during the winter of 1900-1901. This curve was formerly used for the resistance of cars in 10 deg. Fahrenheit



EQUATED TONNAGE for .55 GRADE

Resistance 25,000 - 27,500

No. of Cars	25,000 A	25,000 B	25,000 C	25,000 D	25,500 A	25,500 B	25,500 C	25,500 D	26,000 A	26,000 B	26,000 C	26,000 D
100	1580	1530	1470	1370	1530	1470	1340	1115	1475	1410	1275	1150
95	1585	1530	1465	....	1535	1465	1340	1115	1480	1405	1275	1150
90	1620	1560	1495	1170	1570	1495	1370	1145	1515	1435	1305	1180
85	1640	1580	1515	1195	1590	1515	1390	1165	1535	1455	1325	1200
80	1670	1605	1535	1220	1615	1535	1410	1190	1560	1480	1345	1220
75	1705	1640	1570	1245	1650	1570	1440	1215	1595	1510	1375	1245
70	1740	1675	1605	1275	1685	1605	1470	1240	1625	1540	1400	1270
65	1780	1715	1640	1305	1720	1640	1505	1270	1660	1575	1430	1295
60	1820	1750	1675	1335	1760	1675	1535	1295	1700	1610	1465	1325
55	1865	1795	1715	1365	1805	1715	1570	1325	1740	1650	1500	1355
50	1910	1840	1760	1400	1850	1760	1610	1360	1785	1690	1535	1390
45	1960	1890	1805	1435	1895	1805	1650	1395	1830	1735	1575	1425
40	2015	1940	1855	1475	1945	1855	1695	1435	1880	1780	1615	1465
35	2070	1995	1905	1515	2000	1905	1740	1475	1930	1830	1660	1505
30	2130	2050	1960	1560	2060	1960	1790	1515	1985	1880	1705	1545
25	2190	2110	2015	1605	2120	2015	1840	1560	2045	1935	1755	1590

No. of Cars	26,500 A	26,500 B	26,500 C	26,500 D	27,000 A	27,000 B	27,000 C	27,000 D	27,500 A	27,500 B	27,500 C	27,500 D
100	1535	1470	1340	1115	1595	1530	1405	1180	1655	1590	1470	1245
95	1540	1470	1340	1115	1600	1530	1405	1180	1660	1590	1470	1245
90	1580	1510	1380	1155	1640	1570	1440	1215	1700	1630	1505	1280
85	1600	1530	1400	1180	1660	1590	1460	1235	1720	1650	1525	1300
80	1625	1555	1425	1205	1685	1615	1485	1255	1745	1675	1545	1320
75	1660	1590	1455	1230	1720	1650	1515	1280	1785	1710	1575	1345
70	1695	1625	1490	1255	1755	1685	1545	1305	1820	1745	1605	1370
65	1735	1665	1525	1285	1795	1720	1580	1335	1860	1785	1640	1395
60	1775	1705	1560	1315	1840	1765	1620	1365	1905	1830	1680	1420
55	1820	1750	1605	1350	1885	1810	1660	1400	1955	1875	1720	1455
50	1870	1795	1650	1385	1935	1860	1705	1435	2005	1925	1765	1490
45	1920	1845	1690	1420	1990	1910	1750	1475	2060	1980	1815	1530
40	1975	1895	1740	1460	2045	1965	1800	1515	2120	2035	1865	1570
35	2035	1955	1790	1505	2110	2025	1855	1560	2185	2100	1925	1620
30	2100	2015	1850	1555	2175	2090	1915	1610	2255	2165	1985	1670
25	2165	2080	1910	1605	2245	2155	1980	1665	2325	2235	2050	1725

Fig. 3—Sample Page of Equated Tonnage.

TONNAGE RATING OF ENGINES—AURORA DIVISION

	Class of Engine	R-4 and R-5			
	Diam of Drivers	69			
	Steam Pressure	210			
	No. of Cars	A	B	C	D
CLYDE TO AURORA	100	1635	1490	1390	1105
	95	1680	1510	1315	1185
	90	1705	1535	1350	1205
	85	1730	1555	1375	1225
	80	1755	1580	1400	1245
	75	1785	1615	1428	1265
	70	1835	1645	1450	1285
	65	1875	1675	1478	1308
	60	1905	1710	1500	1325
	55	1935	1740	1535	1360
	50	1965	1770	1580	1400
	45	1995	1795	1620	1440
	40	2030	1825	1660	1400
	35	2065	1860	1700	1540
	30			1740	1590

	Class of Engine	R-4 and R-5			
	Diam of Drivers	69			
	Steam Pressure	210			
	No. of Cars	A	B	C	D'
SHABBONA TO CLYDE MENDOTA TO CLYDE AURORA TO MENDOTA	100	2060	1785	1610	1460
	95	2095	1815	1635	1470
	90	2130	1845	1665	1500
	85	2165	1875	1695	1525
	80	2200	1905	1725	1555
	75	2235	1935	1765	1580
	70	2270	1970	1795	1615
	65	2300	2000	1830	1645
	60	2335	2025	1865	1680
	55	2370	2055	1905	1715
	50	2410	2090	1945	1760
	45	2450	2125	1980	1780
	40	2490	2160	2030	1820
	35			2080	1855
	30				

	Class of Engine	R-4 and R-5			
	Diam of Drivers	69			
	Steam Pressure	210			
	No. of Cars	A	B	C	D
MENDOTA TO GALESBURG	100	1705	1615	1440	1260
	95	1820	1540	1460	1285
	90	1845	1680	1480	1310
	85	1870	1690	1500	1330
	80	1895	1705	1525	1350
	75	1920	1730	1550	1375
	70	1950	1755	1575	1395
	65	1980	1780	1600	1415
	60	2010	1810	1625	1435
	55	2040	1835	1655	1455
	50	2070	2005	1685	1500
	45	2100	1890	1715	1520
	40	2140	1935	1750	1560
	35	2175	1960	1785	1585
	30			1825	1620

	Class of Engine	R-4 and R-5			
	Diam of Drivers	69			
	Steam Pressure	210			
	No. of Cars	A	B	C	D
AURORA TO SAVANNA HELPER OREGON TO POLO	100	1230	1130	1050	...
	95	1265	1160	1090	...
	90	1280	1190	1078	995
	85	1295	1170	1090	1010
	80	1310	1180	1105	1025
	75	1325	1195	1120	1040
	70	1345	1215	1135	1055
	65	1365	1230	1155	1070
	60	1385	1250	1175	1085
	55	1405	1265	1195	1100
	50	1425	1285	1215	1115
	45	1450	1310	1235	1135
	40	1475	1330	1255	1160
	35	1500	1356	1275	1180
	30	1525	1375	1300	1200
	25	1550	1400	1325	1225

	Class of Engine	R-4 and R-5			
	Diam of Drivers	69			
	Steam Pressure	210			
	No. of Cars	A	B	C	D
SAVANNA TO SHABBONA	100	1395	1220	1110	1025
	95	1370	1230	1135	1040
	90	1385	1245	1150	1055
	85	1400	1260	1165	1070
	80	1415	1278	1180	1088
	75	1470	1290	1195	1100
	70	1450	1305	1215	1115
	65	1470	1325	1235	1130
	60	1490	1345	1260	1150
	55	1510	1368	1280	1165
	50	1530	1385	1300	1185
	45	1550	1405	1320	1205
	40	1580	1425	1340	1225
	35	1605	1445	1360	1250
	30	1630	1470	1385	1275
	25			1410	1300
	20			1435	1325

	Class of Engine	R-4 and R-5			
	Diam of Drivers	69			
	Steam Pressure	210			
	No. of Cars	A	B	C	D
GALESBURG TO MENDOTA	100	1045	1785	1500	1350
	95	1855	1715	1535	1375
	90	1900	1740	1645	1390
	85	2025	1775	1585	1425
	80	2060	1810	1615	1455
	75	2095	1845	1650	1485
	70	2130	1880	1685	1515
	65	2165	1905	1720	1550
	60	2200	1945	1755	1580
	55	2235	1975	1790	1610
	50	2275	2000	1830	1645
	45	2315	2030	1870	1680
	40	2355	2066	1900	1710
	35	2400	2110	1940	1745

RATE "A"—Temp. above 30 degrees F. and not much wind.
RATE "B"—Temp. between zero and 30 degrees F., OR strong head or side wind, OR frosty rail.
RATE "C"—Temp. between zero and 30 degrees F. AND strong head or side wind, OR temp. below zero and not much wind.
RATE "D"—Temp. below zero, with strong side or head wind.

Fig. 4—Sample Tonnage Rates Shown in Time Card.

[illegible] as tangent resistance, and will be considered later under the head of compensation grades.

(2) *Grade Resistance.*

This, generally, is the largest component of the freight train resistance, and is dependent only on the tonnage on any given grade. The grade resistance per ton may be figured by the following formula:

$$r_g = 20G$$

Where r_g = grade resistance in lbs. per ton
and G = grade in per cent.

(3) *Friction.*

As stated above, the frictional resistance varies considerably. The friction expressed in pounds per ton drawbar pull increases [illegible] the speed increases, decreases as the gross weight of a car and its freight increases, and increases in a general way, as the temperature of the air decreases. It varies for freight cars at freight speeds between limits of about 2 lbs. per ton and 12 or more lbs. per ton. Fig. 1 shows some curves of friction re-

to 30 deg. Fahrenheit weather, but we found that there was too wide a gap between the winter rates derived from this curve and the summer rate; i. e., for calm winter days an engine could easily take considerably more than the old winter weather rate, especially on the low-grade division. Accordingly, between these two curves was placed another curve for calm winter weather, *or* windy summer weather, and road tests indicated that rates derived from this curve were about right.

The curve for very severe winter weather was obtained by arbitrarily adding 2 lbs. per ton to the No. 3 curve. This seems to give the right result for grades 0.6 per cent. or over; for grades of 0.5 per cent. of lower, 10 per cent. is deducted from the No. 3 or "C" rate to get the "D" rate. This diagram also gives a curve of grade resistance based on the above formula.

Knowing the grade, the gross weight of a car, and the general weather condition, the total resistance per ton is found by adding together the grade and friction resistances per ton as found from these curves.

MOMENTUM GRADES.

Where the grade is not too long, the momentum, or the work stored in the train as motion, can often be used to help get the train over the grade. A body in motion has an amount of work stored in it dependent upon its speed, and this stored work can be used to overcome the force of gravity, or in other words, take a train a certain distance up a hill. The amount of work so stored increases as the square of the speed. A body moving 30 miles per hour has sufficient work stored in it to carry it vertically upward about 30 ft.; one moving 60 miles per hour sufficient for 120 ft., etc. Therefore, a train approaching a hill at 30 miles per hour could be taken a vertical distance of 30 ft., due to the momentum, provided the friction were otherwise taken care of. On a grade 30 ft. to the mile this distance along the track would be one mile; on a 60-ft. grade, one-half mile, etc. Where this momentum is to be expended, or to run out, in a given distance, the propelling force can be expressed as a pull of so many pounds per ton, or as a certain total drawbar pull at the head end of the train, or as so much negative grade, thus cutting down the actual grade and producing a lower virtual grade. For our purpose the simplest method is to express momentum as so much negative grade and its value may be figured by the following formula:

$$G_m = 3.5 \frac{V^2}{x}$$

Where G_m = equivalent grade in per cent.
V = speed in miles per hour
x = distance traversed during retardation, in feet.

Where a minimum speed of five miles per hour at top of grade is assumed, the equivalent grade would be determined as follows:

$$G_m = 3.5 \frac{V^2 - 25}{x}$$

For convenience a curve is used from which can readily be obtained the equivalent grade in per cent., having the speed of approach and length of grade, based on this formula. Having the actual grade and the momentum expressed as equivalent grade, the virtual grade is equal to the actual grade minus the momentum grade. The actual resistance of the train is, then, that due to the virtual grade plus the friction.

TRACTIVE FORCE AT SPEED.

Where the speed is above 8 or 10 miles per hour, the maximum tractive force cannot be sustained on account of the inability of the boiler to furnish sufficient steam, and when calculating tonnage rates on momentum grades, it is necessary to determine the average tractive force from the bottom to the top of the hill. It might be well to mention here that some engines are a bit over-cylindered; i. e., their tractive force figured from the cylinders is higher than the boiler can maintain, even at lower speeds. On the low-grade lines, where the train has to run at a considerable speed over the ruling grade, such engines should really be rated on their boiler capacities. This falling off of tractive force due to limit of boiler is calculated for all engines at speeds up to 40 miles per hour and plotted on a set of curves for convenient use.

The tractive force shown on these curves as limited by the boiler is obtained by the formula:

$$\text{Tractive Force} = \frac{375 \times .43 H}{S} - R$$

Where H = heating surface in sq. ft.
S = speed in miles per hour
R = the total resistance in pounds of the engine and tender.

The expression .43 H gives the maximum cylinder horsepower of the locomotive assuming an evaporation of 12 lbs. of water per square foot of heating surface per hour, and cylinder water rate of 28 lbs. of water per horsepower hour. This is a formula given by Professor Goss and the results of our locomotive tests agree well with it, so it has been adopted. The expression $\frac{375 \times .43 H}{S}$ converts horsepower into cylinder tractive force.

Now to convert this cylinder tractive force into drawbar tractive force we must subtract R, the total resistance of the engine and tender. R is obtained by multiplying the weight in tons of the engine and tender with one-half its load of coal and water by the resistance per ton at the given speed.

The tractive force shown on these curves, at the average speed, will generally be found satisfactory. In figuring on a momentum grade it is necessary to know the speed limit of the division for freight trains, and whether there are any permanent slow orders at foot of hills due to bad curves, crossover, etc. It is hardly safe to regard as a momentum grade any grade over 1½ miles long or one that has several reverse curves on it.

EQUATED TONNAGE TABLES.

Having the total resistance per ton of any given train and the maximum working tractive force of the engine, the thing is now to get sufficient tonnage to just make the total train resistance balance this tractive force. The number of tons that will give this total resistance will, of course, vary with the load per car and the weather conditions, increasing as the load per car increases, and decreasing as the weather conditions become more severe. For operating use a rate table is prepared showing the number of tons for a various number of cars in the train and for four weather conditions, namely:

Rate "A"—Temperature above 30 deg. Fahrenheit and not much wind.

Rate "B"—Temperature between zero and 30 deg. Fahrenheit, *or* strong head or side wind, *or* frosty rail.

Rate "C"—Temperature between zero and 30 deg. Fahrenheit, *and* strong head or side wind, *or* temperature below zero and not much wind.

Rate "D"—Temperature below zero, with strong head or side wind.

The method of obtaining these tables is shown in detail in Fig. 2.

EXPLANATION OF METHOD.

The various tonnages shown in Fig. 2 all have the same drawbar resistance of 20,000 lbs., and are calculated for a 0.5 per cent. grade at freight car weights from 10 tons to 60 tons, column 1. In column 2 is shown the resistance per ton of cars of the various gross weights. This includes the grade and the friction resistances per ton. Next 20,000 is divided by the resistance per ton, to get column 3, showing the various tonnages having the total train resistance of 20,000 lbs. Then by dividing the number of tons by the gross weight per car column 4 is obtained, showing the number of cars in the train corresponding to the various tonnages. The columns of tons are then interpolated to the nearest even figure divisible by 5 and corresponding to an even number of cars divisible by 5 and placed in column 12, which is the column as finally used in rate schedules. Having column 12, the columns 5 to 10, inclusive, are obtained from columns 11 and 12 by multiplying by a suitable factor. For example, columns 5 and 6 are the intermediate steps in getting the "B" rate, and are obtained by the use of the factor .83, the ratio of resistance per ton of a 40-ton car on a 0.5 per cent. grade in warm weather, to the resistance per ton of a 40-ton car on a 0.5 per cent. grade in zero to 30 deg. Fahrenheit weather. This ratio or factor would vary slightly between the 10-ton car and the 60-ton car; the factors shown are obtained by taking an average of the ratios for the cars of the following weights: 10, 11, 12, 14, 16, 18, 20, 25, 30, 40, 50 and 60 tons. The tons and cars thus obtained are interpolated to even figures, and the tonnage placed in column 13, opposite the proper number of cars. The other columns are obtained similarly by using the suitable factor selected from the table shown.

Tables have been made showing the tonnages for grades from

0.3 per cent. to 1.6 per cent., and for total train resistances from 10,000 to 35,000 lbs. (See Fig. 3.) When, therefore, we have decided on the maximum working tractive force for a given grade, we simply select from the set of tables the suitable schedule and give this as the tonnage rate schedule for the engine. For practical use the rates thus decided upon are made out on tonnage rating sheets for each division, which show the number of cars and tons for the different rating divisions and for all classes of engines on that division. A page from the time-card of the Aurora Division of the Chicago, Burlington & Quincy Railroad, showing engine rates on that division, is shown in Fig. 4.

THE PASSENGER MAN AND THE PUBLIC*

Every man working for a railway today has a great responsibility—greater than ever before—and the passenger man, because of his position, his training and experience, is qualified to assume his share of that responsibility.

For many years, and particularly in the last few, there has been agitation about the so-called railway question or problem. Through lack of complete information about the railways, there has arisen some antagonism toward them, and it is important to explain the real situation, because the American people, when they know the truth, are not likely to be unjust to any one class of people or to any one business.

Upon one hand there is a critical public. Upon the other, the railways are struggling with forces which are causing rates to remain stationary, or to decline; causing wages to rise or to remain stationary; bringing demands from a prosperous and luxurious people for increasingly expensive facilities and service, and causing taxes to rise at an alarming rate.

These four forces are all at work reducing the margin between income and outgo and making it more and more difficult for the owners of railway properties to keep their lines in suitable condition to carry the business of the country, and to obtain a return commensurate with the risk of the business and sufficient to attract further investment.

Railway officers have been less active than they should have been in keeping in touch with the public. The railway stockholders have not realized how strong the forces affecting their properties are. This condition has changed and the modern railway owner, officers and employees, should and do realize that it is necessary to maintain cordial and friendly relations with the public and by their personal efforts and example to give full information about the business, and to build up a constantly better feeling towards the transportation machine of the United States.

It is no doubt true that little things—the abruptness of an agent or a trainman, a lack of proper courtesy, inattention to complaints of the public, dilatoriness—often caused quite as much criticism from the public as things of greater importance. This irritation and criticism can be reduced by adjusting the relations between the railways and the public at the point of contact. The passenger men and their representatives in 1909 came in contact with each one of nearly nine hundred million users of railways. In [illegible] can lead a chance [illegible] and to affect just a little the attitude of the people toward the transportation business. Nine hundred million instances of courtesy and attention, [illegible] with a feeling that the railway was interested in their comfort and pleasure, would constitute a great leverage, moving public sentiment into better channels.

The passenger man cannot only build up cordial relations in [illegible] the public [illegible] an increasing amount of work in placing before the people the real [illegible]

* Abstract from an address by Howard Elliott, president Northern Pacific Railway, before the Passenger Department of the Chicago Association of Commerce, December 20, 1910.

growing influence in showing a majority of the American people, who are only unfair because they do not fully understand this question, that the railways cannot indefinitely provide increasingly good service at rising costs, which the public demands and should have, and survive, unless there is more reason in directing and controlling the four forces I have mentioned.

There is plenty of information at hand about the railway business. No form of business in the United States is conducted so openly and in none are the facts and figures so available. This information does not reach the everyday citizen who is interested, but lacks ready sources of information, to the degree that it should. The passenger man can do a great work by seeing that it does.

The press of the United States reaches the people. In 1909 there were 22,603 publications issuing a total of 10,600,000,000 copies per year. The press can help the relations between the public and the railways by giving correct information, and, if approached properly, will usually manifest a fair attitude. The passenger man has a responsibility in this respect and with his more intimate knowledge of the business he can help the newspapers to avoid misstatements and false conclusions.

The drift of population in the United States is away from the country and into the cities. In 1840, slightly more than one-fifth of our people were engaged in commerce, manufacturing, mining and transportation, and in 1900 more than two-fifths were so engaged. Agriculture claimed 77½ per cent. of our people in 1840, and in 1900 but 35½ per cent. Four-tenths of our people are living in cities of 8,000 or more.

Passenger and immigration men and those in charge of exploitation can do a great national work in helping along the movement toward the land, and in aiding the people to get out of the crowded cities, breeding discontent, socialism and great suffering. The Bureau of Immigration reports that about 1,000,000 people a year come to the United States from Europe, and for the year ending with June, 1910, only 140,129 went west of the Mississippi river. It is better for the newcomer that he avoid the crowded industrial centers and live where he can produce food and wealth out of the ground, making a profit under good living conditions and increasing national production rather than to increase the horde of consumers in the crowded manufacturing districts.

The passenger man can make money for his railway by helping the movement of people back to the land, and at the same time perform a patriotic service to his country.

Steadily increasing public expenditures in this country are increasing all forms of taxation, which in turn bear heavily upon the railway investment and affect the daily lives of every man who is employed by a railway company. From 1900 to 1908, the ordinary expenses of the United States government grew 121.4 per cent., and in 30 selected states the public expenditures increased 201.6 per cent.

The passenger man, in addition to the regular duties of his office, can lend his influence toward checking the national tendency toward extravagance and can set an excellent example by care in the administration of the duties entrusted to him, by checking waste in all forms, and he can protect the owners of the property he represents by seeing to it that while the public is furnished clean, safe and regular transportation, it is not being given a service which is costing more than the users pay for it.

The National Monetary Commission estimated the annual expenditures of those who visit Europe at $200,000,000. The editor of the London *Statist* places the figures at $170,000,000. Some [illegible] in discussing the matter with well posted French financial authorities, thought the total was nearly $400,000,000. There is sufficient evidence that the amount is between $200,000,000 and $400,000,000. This immense sum is annually taken out of this country and spent abroad, by people who have gone away from home in search of health, rest and pleasure, which they might easily find nearer by.

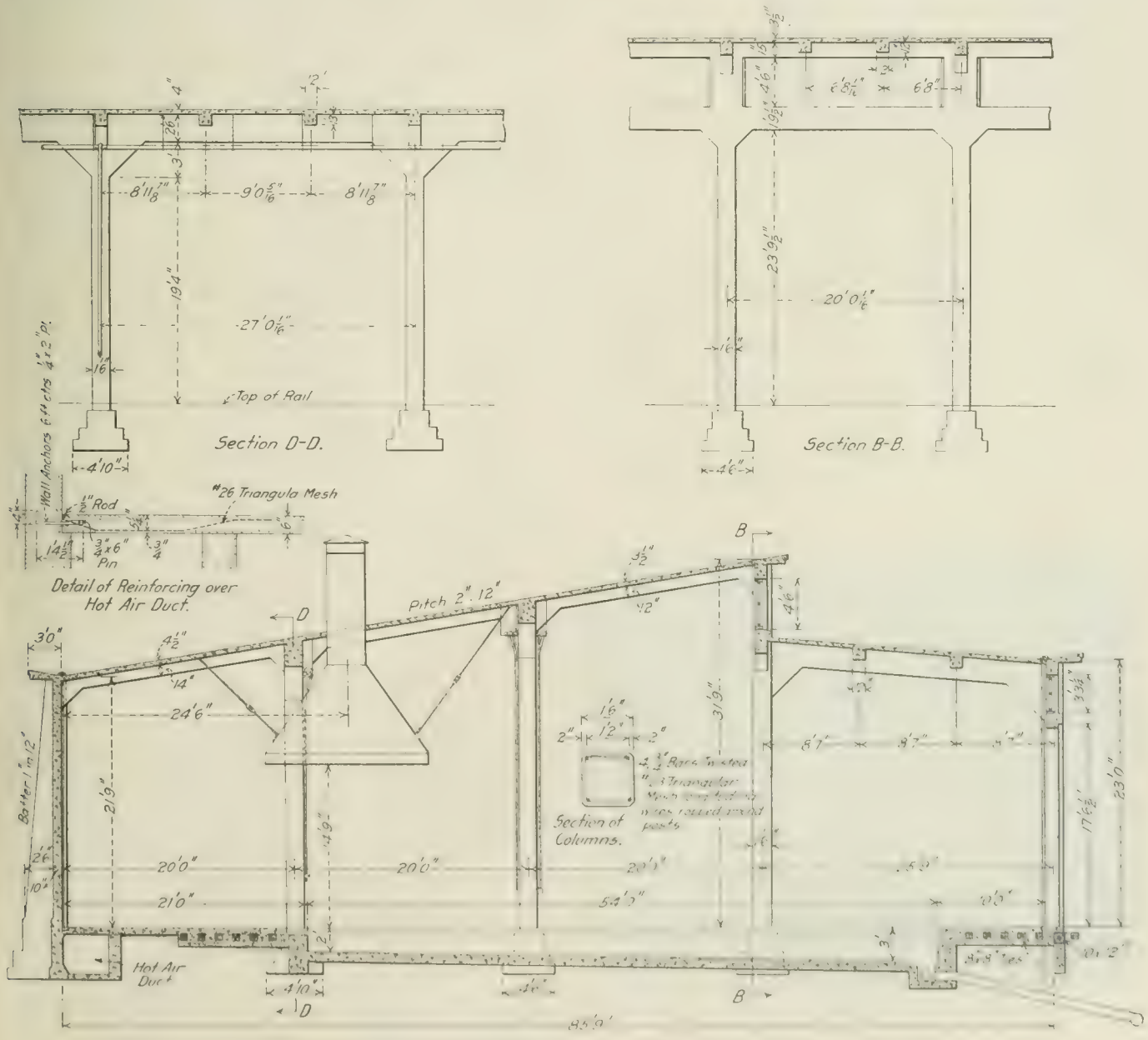
If our own land were better known much of the economic

loss could be stopped, and the passenger man has an attractive field of work in so placing before the average American citizen the beauties and advantages of his own country that he will spend an increasing share of his travel time and these enormous sums in this country, thus keeping American money at home, and aiding in the development of the regions which offer so much, not only to the tourist, but to the homeseeker. We have mountains, scenic wonders and an out-doors comparable with anything Europe can offer. Each dollar diverted from Europe to our home regions assists in giving them continually better facilities for the accommodation of travel. Much of what we have to offer is unique and can be seen by the traveler in no other country.

So, I repeat, we in the railway business have a greater responsibility than ever before; not only the responsibility of doing our best, whatever may be our position in the service, but the responsibility of telling the people the real facts about the railway business—the responsibility of using our opportunities to aid the nation by helping the movement to have a greater proportion of our population live in the country than in the cities—the responsibility of directing the attention of the tourist to the beauties of America, so that the money now going to foreign lands will remain here and help to increase the balance of trade in our favor—and last, but not least, the responsibility, which today is a great one to every American and to every railway employee, of encouraging the practice of those habits of industry, thoroughness and thrift, which are not so common in the last twenty-five years as they were when our country began its work of becoming a great nation.

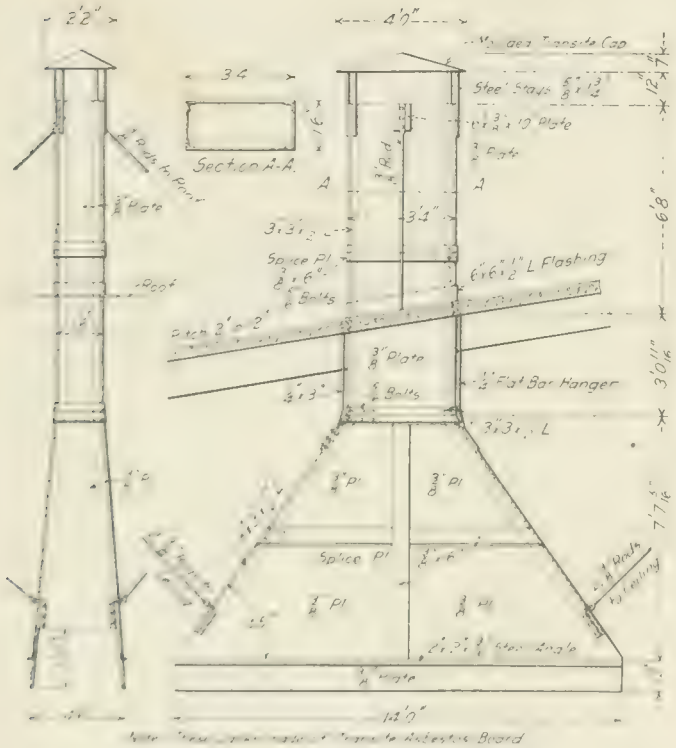
CONCRETE ENGINE HOUSE; ELGIN, JOLIET & EASTERN.

The Elgin, Joliet & Eastern has recently completed a concrete engine-house at its new terminal at Joliet, Ill. The house contains 17 stalls and is 85 ft. 9 in. wide inside the walls. The roof is supported by three rows of concrete columns. The three outer sections are 20 ft. spans and the inner one is 25 ft. 9 in. wide. There is a small extension 23 ft. x 24 ft. for the heating equipment. The walls of the house are 10 in. thick and are reinforced with buttresses having a batter of 1 in 12 and a width of 2 ft. 6 in. at the bottom. The cross section of the house clearly shows its construction. The roof is arranged to provide a space for light and ventilation above the flat portion of the inner section. The outside wall is constructed with paper joints under the windows and horizontal overhead joints between the windows, so that if a locomotive should run through and knock out the wall only a narrow portion would be damaged. The



Details of Concrete Engine House; Elgin, Joliet & Eastern.

Concrete Engine House; Elgin, Joliet & Eastern.

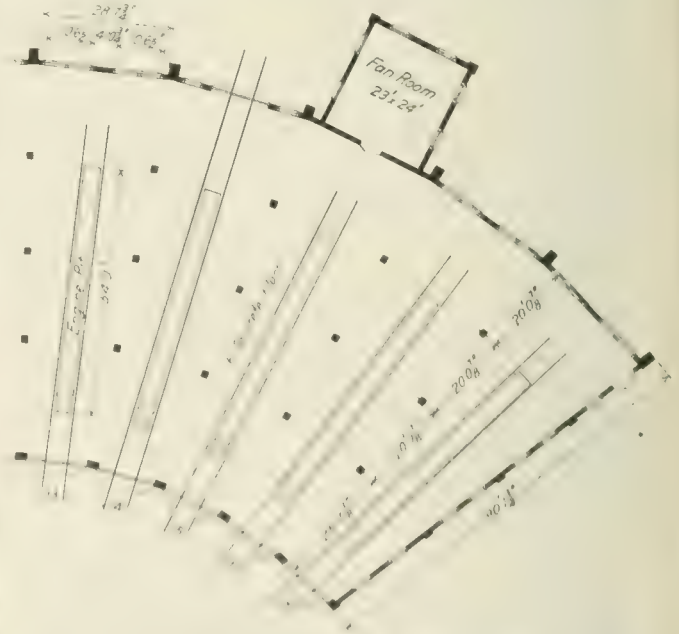


Smoke Jack for Concrete Engine House.

Interior of Engine House, Showing Concrete Columns and Roof Construction.

reinforced concrete beam above this joint is made of sufficient strength to support the roof when this portion of the wall is removed.

The roof is a monolithic slab varying from 3½ in. to 4½ in. thickness and is supported by reinforced concrete beams. It has a wide concrete projection at the cornice which is inclined upward so as to form a gutter. The necessary hangers and thimbles for the fixtures, including the electric conduits and piping, were inserted as the concrete work was formed, and the use of extension bolts for supports was avoided. The American Steel Wire Company's woven wire reinforcement was used in the roof. The general design of the smoke jacks is shown in the drawing. They are made of Johns-Manville Transite, the



Part Plan of Concrete Engine House.

asbestos plates being ¼ in. thick. The floor is made of concrete 6 in. thick. The plant for washing out boilers was installed by the W. J. Miller Company, Chicago. The turntable, which was built by the American Bridge Company, is 80 ft. long, and is operated by an electric tractor furnished by Geo. P. Nichols & Bro., Chicago. In the construction of the building 150 tons of reinforcing steel and 1,400 barrels of cement were used. The contractors were the Cook-Lund Engineering & Construction Co., Chicago, and the design was worked out by A. Montzheimer, chief engineer of the Elgin, Joliet & Eastern.

Surveys are under way for a line in Brazil to connect the ports of São Francisco, Florianopolis, and Porto Alegre, and construction will be commenced as soon as they are completed.

THE EXPRESS SERVICE.*

BY C. E. TAYLOR,
General Superintendent, United States Express Company.

The express companies of today have attained their prominence in the transportation world solely by reason of the service they render, the time they make, and the care and attention they give to the individual shipper's business. They have kept fully abreast of the times in the conduct of their growing business, and their slogan today is, "Give the public the service," to such an extent as their income will justify to prudent business men. These companies in the past sixty years have made money; have saved money; have not turned all profits back to the owners and shareholders as earned; but all to a greater or less extent have put some of the profits back into the business and some to surplus, even to the extent of passing dividends, so that today they have a stronger financial standing in accordance with their capitalization than any other line of business known to me. Think of it—sixty years of existence, and the failure or bankruptcy of an express company unknown simply because of their business determination of saving some of the profits as a nest egg and ready money surplus immediately available to meet any emergency that ever has come up.

As to the character of the express service, I quote from the Interstate Commerce Commission's first annual report on express companies, as follows:

"The express service in and of itself is not a transportation service, although it is closely related to transportation, and the question of express rates involves the question of transportation rates. . . .

"The chief service rendered by express companies consists in collecting shipments intrusted to their care at points of origin, in safeguarding such shipments in transit, and in delivering them to consignees at destination. Transportation proper is furnished by the railway and other carriers over whose lines the express companies conduct operations, and the expense of such transporation is included in the operating expenses of those carriers."

The business of today, while similar to the business of the past, as to operation, is much curtailed as to the net earning power of the companies. This has been caused in the past decade by the continuous and gradual increase of salaries of employees, and of the cost of paraphernalia used in the express business; by the gradual—if slight—decrease in rates; and most emphatically by the faster and faster passenger train schedules put in force, which mean a larger percentage of the express earnings must go to the railway companies to meet such increased expense if the public is to be served by the fastest mode of transportation through its express companies. These various increased expenses to the express company are not as yet overcome by the growth in the volume of business, and, as a result, some express companies are making a hard struggle to earn enough net today to pay modest dividends to their stock or shareholders, and not dig into their surpluses nor impair their high financial standing.

The express business is peculiar to itself in that out of every gross dollar the companies charge the public for service, they immediately pay out in the form of wages, rents, horse-board, renewals of equipment, taxes, payments to railways, claims, general expenses, etc., from 90 to 98 cents. If some express companies can make net from three to five cents out of a gross dollar charge, they are doing well.

The rates in effect by express companies today are reasonable, we believe, based upon the cost of handling the business.

There are two ways to put the express companies out of business: One way is to raise the rates from 50 per cent. to 200 per cent., i. e., make them prohibitive to the public needing such service. That is the quickest way by reason of the kind of contracts obtaining between railway and express companies. The other way is to reduce the rates most materially, which could have but one outcome, namely, the ceasing of the carrying of express on passenger trains. You certainly must know that if express rates were made the same as freight rates, or the same as freight rates plus the cost of picking up and delivering, there would be no freight service, as the transportation would all be for movement by express on passenger trains. The traveling public will not stand for mixed trains today, but demand the fastest passenger service. Perhaps some of you have not thought of it before, but it is a fact that on the larger systems of railway it is a question of serious moment how they are to handle the express on passenger trains if its volume continues increasing, and the volume is increasing under the present rates, even in the face of the extremely good service offered by the freight departments of railways in the form of their fast freight lines and package cars of recent years. There is one thing certain to me and that is, that the reasonable rates charged by express companies today cannot be materially raised, nor materially lowered without detriment of the shipping public, as well as to the express companies, and I verily believe that this will be the conclusion reached by the Interstate Commerce Commission after the very thorough investigation of express matters upon which it is now engaging.

If you learn that the government postal department, in order to facilitate the more rapid movement of mails, causes a fast mail train to be run between such prominent business centers as Chicago and St. Paul, you will find the express company operating over such railway lines, will have one or two through express cars on the train, even though passengers are not carried, and the express cars will not run empty. These fast trains carrying express matter are sometimes profitable and sometimes not, but the express companies are keeping abreast of the times, and, to the extent of their ability and earnings as derived from the express rates in effect, giving to the public the best service possible, and continually working with the end in view of improving the service and making themselves more indispensable to the American shipping public.

I had intended to close this short talk with the foregoing, but have been asked to say something specifically as to the reasonableness of express rates because of its being prominently in the newspapers of today; I will speak of this only from an operating man's point of view. I am not a traffic man, and you must know that the traffic department and the operating department of railways and express companies are distinctly separate, and are conducted each by experts of their own, although the experts of each must have a general insight into the work of the other departments.

There are various kinds of contracts between express companies and railways, but the one most universally in use, particularly upon railway systems of any considerable mileage, is the percentage contract, by means of which of all express earnings accruing upon such railway, about 50 per cent. are paid over to the railway. It is true there are contracts where even a greater percentage is paid to railways, and likewise true that a lesser percentage is paid to railway companies. This percentage, however, in the past decade is gradually and surely increasing by reason chiefly of the claim of railways of the increased cost of furnishing continually better, i. e., faster and faster, express passenger train service.

Express companies, of course, have the cost of maintaining their general offices, tariff departments, auditing and accounting departments, their division superintendence, their messenger service accompanying the goods in transit, and their transfer expenses at junction points, but the greatest outlay of all is the terminal expense in cities of 10,000 population up to millions—the cost of picking up and delivering goods over such extensive areas.

The express companies do not and cannot, with the present terminal service furnished by them and demanded of them, make any money on short haul matter. They make their money on long haul matter. They carry any amount of short haul matter today at their present rates at a positive loss.

Example: You wish to go visiting to Aurora, Joliet, Elgin or Zion City and take your trunk, weighing 100 pounds, with you.

*From an address before the Chicago Transportation Association, Chicago, September 18, 1911.

The railways carry it free for you over their lines on your ticket, but you pay fifty cents to have a baggage company pick it up at your residence and take it to the Union Station, and you pay at the other end of your journey from 25 cents to 50 cents to have it delivered to your friend's house; and you do not consider the charges exorbitant.

The express rates from Chicago to the points named are from 50 cents to 60 cents per 100 pounds, and the express company will pick up your trunk within its delivery limits in Chicago and deliver it within its delivery limits at the points named, pay to the railways 25 cents or 30 cents of the 50 cents or 60 cents charge, leaving it from 12½ cents to 15 cents at each end of the line. You must know that even though the number of trunk shipments might be considerable, this is done by the express company at a positive loss where the area of free service is so large as in Chicago.

Now, if a trunk of such weight were going to St. Paul, Kansas City, Omaha, rate $2, distance 500 miles—more or less—the express company, after paying the railway $1, would have left 50 cents for each end of its line, and this transaction could, as a general thing, be done possibly at a profit, at least not at a loss.

If the trunk were going to Denver, Wichita, Fort Worth, or some other place where the rate was $5, after paying the railway its $2.50, the express company would have $1.25 for each end of the line, and it would make good net money out of the transaction after paying the terminal and messenger and transfer expenses.

Take a one-pound package of merchandise from Chicago to the points named: The charges are 25 to 30 cents. Pay 12½ to 15 cents to the railway, and do you suppose for a moment that the 6¼ to 7½ cents at each end of the line is enough to take care of the terminal charges, collect the charges upon delivery and pay line and overhead expenses?

Take a 7 pound package to the points named: Charges will be from 30 cents to $1, i. e., for express company, 7½ cents to 25 cents at each end of the line.

Take a 25-pound package to the points named: Charges will be from 35 cents to $1.85, i. e., 8¾ cents to 46¼ cents at each end of the line.

This sounds big, but it will not seem so when I tell you on the authority of the Interstate Commerce Commission's first annual express report that the average weight of a piece of express, weighing 100 pounds or less, is twenty-five and fifty-seven hundredths pounds, and the average revenue on same is forty-four and forty-seven hundredths cents. Further, the number of pieces of express weighing 100 pounds or less was over 95 per cent. of the total number of pieces handled. We have in this as concise and accurate a basis as can be arrived at. It is very hard to determine to a nicety what it costs to pick up a one-pound package at No. 50 State street, Chicago, and a 25-pound package at No. 52 State street, and a 100-pound package at No. 54 State street, all by the same wagon force on the same trip, or by different wagon forces on different trips; and there are no better statistics available as yet than these Interstate Commerce figures, each package weighing 100 pounds or less regardless of distance to be transported, average about 44½ cents, and the weight aver-

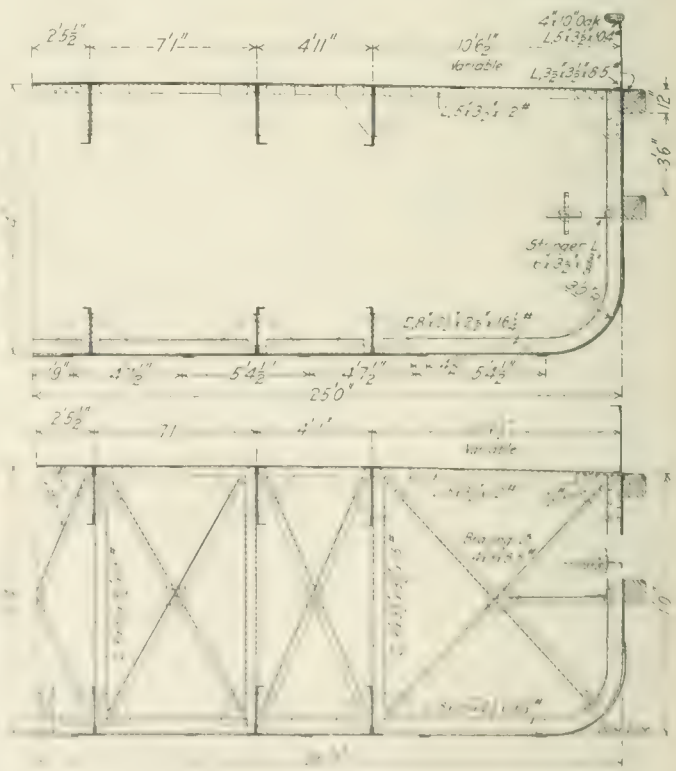
Now with the railway getting 22¼ cents, there is left to the express company 11½ cents for each end of the line for terminal

of short haul business, and so far as the greatest item of cost to an express company is concerned, namely, the terminal expense, it costs us just as much to pick up a piece of a given weight, whether it is to be transported a few miles at a 50 cent rate, 500 miles at a $2.50 rate, or 2,500 miles at an $11.50 rate. The result is obvious. We cannot stand any reduction on our short haul rates except at the cost to our long haul patrons.

I do not believe there is any express company which could operate over all the mileage in the state of Illinois and over absolutely no other mileage than in the state of Illinois, under the express rates in effect today and give the service the companies are giving except only at a continual loss.

STEEL BARGE MASTODON; MORGAN'S LOUISIANA & TEXAS.

The steel barge Mastodon was built by the New York Ship Building Company, Camden, N. J., for Morgan's Louisiana & Texas Railroad & Steamship Company, and it has been in service for over a year, transferring passenger and freight trains across the Mississippi river at New Orleans. She is said to be the largest steel barge in America. The barge takes over 16 passenger trains every 24 hours, and between these regular passenger trips she handles on an average about 3,200 freight cars per month. The boat has proved to be very satisfactory for the purpose, as she handles quicker and tows easier than the



Half Mid-Ship Sections.

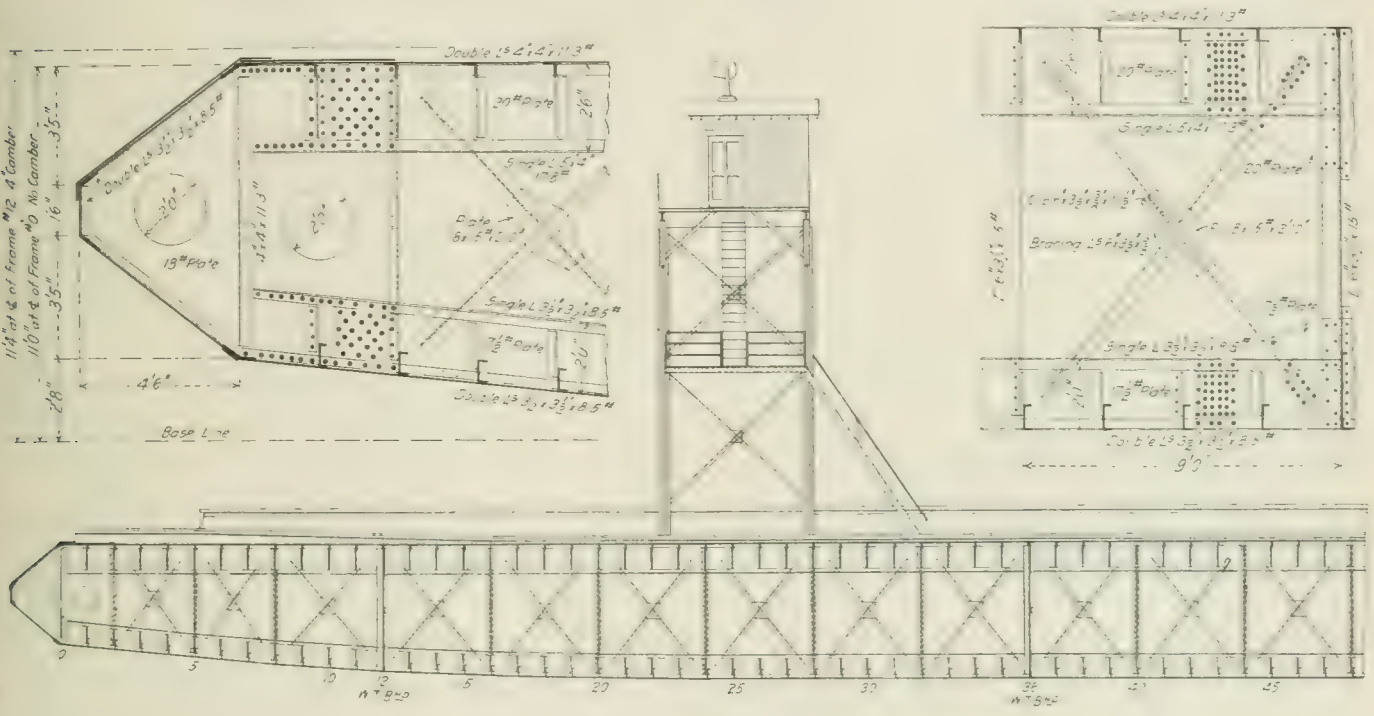
old wooden boat now replaced, which was of smaller dimensions.

In ordinary conditions, when the current of the river is not particularly swift, one tug boat of about 1,000 h. p. is used to handle the barge. Under adverse weather conditions, or when the current of the river is unusually strong, an auxiliary tug of about 600 h. p. is employed.

The trip from Camden, where the barge was built, to New Orleans took nine days. At the Delaware breakwater she was taken in tow by the Southern Pacific steamer El Paso, and towed around Hatteras down the Atlantic ocean, through the Straits of Florida, and across the Gulf of Mexico to the mouth of the Mississippi river. The journey down the Atlantic and

through the Straits was made under average weather conditions, at a speed of ten miles per hour. In the Gulf bad weather was encountered, but on arrival at New Orleans the barge was carefully examined and not a single loose rivet was found. The Mastodon was built extra strong, not only on account of the heavy loads of the trains to be carried, but also because it was necessary to tow her such a long distance in the open sea.

She is of steel throughout and carries three parallel tracks on 12 ft. centers. Under each rail there is a longitudinal girder running the entire length of the boat. This girder construction is designed so as properly to carry the heavy loads which are imposed when the locomotive first comes on the barge tracks.



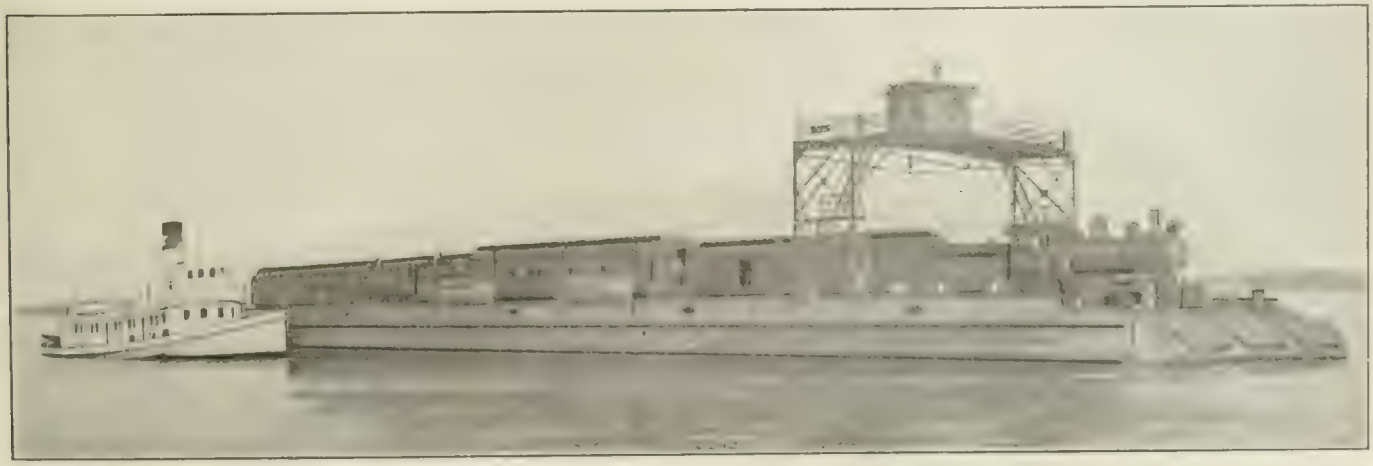
Framing of Steel Barge.

The following are the general dimensions of the boat: Length over all, 368 ft.; width of hull, 50 ft.; depth at center, 11 ft. 4 in. The general construction is shown in the drawings. The pilot house is located on a truss bridge 50 ft. from one end and 22 ft. 6 in. above rails. There is one continuous 15-lb. steel deck, and there are six water-tight bulkheads. The frame bars consist of 8-in. 16¼-lb. channels. The three longitudinal deck girders are 30 in deep, and the three bottom ones 24 in. deep. Those under the deck have a 30-in., 20-lb. web plate, with double 4 in. x 4 in., 11.3-lb. angles, and one 4 in. x 5 in., 17.8-lb. angle at bottom. The bottom longitudinals are composed of 24-in. 17½-lb. plates, connected to the shell by double 3½ in. x 3½ in. 8.5-lb. angles, and one continuous angle of similar size on the upper edge.

All bottom plating is steel weighing 18 lbs. per sq. ft. The upper shell sheets are 22 lb. and the lower ones 20 lb. throughout, and the shell generally has double riveted edge landings and triple lap butts. Other principal figures relating to the construction are shown on the drawings.

A set of bell and whistle signals are placed on the after part of the barge and wires in a conduit lead from the pilot house to the signals. A search-light 14 in. in diameter is mounted on the roof of the pilot house, with necessary apparatus for manipulation from within. Electric current for the search-light and signaling is obtained from a generator on the tug, and steam pipes for the capstan and whistles are connected to the tug boiler.

We are indebted to Guy Hopkins, operating engineer of Morgan's Louisiana & Texas Railroad & Steamship Company, for the drawings, photograph and information relating to this large car transport



Steel Barge Mastodon; Morgan's Louisiana & Texas.

ARGENTINE RAILWAYS.

The official report of the Argentine Ministry of Public Works for 1909 shows that the railway mileage of the country increased during the year 651 miles, making a total of 15,402 miles at the end of the year. Of this 524 miles was double-track road. Of the total, 9,519 miles was of 5 ft. 6 in. gage, 1,318 of standard (4 ft. 8½ in.) and 4,565 of metre gage. There were 400 inhabitants per mile of railway—a little more than in this country. The capital invested was $56,673 per mile, against $59,259 in this country. The state owned 1,894 miles in Argentina, all of metre gage. The rolling stock was at the rate, per 100 miles of railway, of 18.4 locomotives, 16.1 passenger cars and 408 freight cars; while in the United States there were 24.3 locomotives, 19.3 passenger cars and 881 freight cars per 100 miles. The average weight of the Argentine passenger cars was 27 tons; of 8-wheeled freight cars, 29,000 lbs. on the broad gage, 23,000 lbs. on the standard, and 17,600 on the metre gage.

This average locomotive mileage was 26,800; only 65 per cent. of which was train mileage, and 30 per cent. credited to switching. The average mileage made by passenger cars was 36,434 miles; by freight cars, 9,087.

The traffic was at the rate, per mile of road, of 82,494 passengers and 278,073 tons per mile of road, or, more intelligibly, to 113 passengers and 381 tons of freight moved each way daily over the entire system, which may be compared to the daily movement in this country of 189 passengers and 1,493 tons per mile. Argentina resembles, so far as traffic is concerned, our Middle West at an earlier day; its production being almost exclusively agricultural, and growing rapidly as the pampas are brought under cultivation, and stock growing extends in the previously uninhabited districts to the south. In 1909 live stock made up 9.3 per cent. of the total freight carried; farm products, 31.5 per cent.; building materials, 17.2 per cent.; manufactures (nearly all flour, sugar and spirits), 10.5 per cent. Coal made but 2¼ per cent. of the whole, and was not half the weight of the firewood and charcoal carried.

The importance of Argentina in the world's markets is due not so much to the quantity of grain and stock produced, but to the fact that, the population being small, by far the larger part of it is exported. Argentina has little more than 6,000,000 inhabitants; but in 1909 its railways carried 156,500,000 bushels of wheat, 106,000,000 of corn, and over 31,000,000 of flaxseed. And while here by far the larger part of our corn is fed at home, in Argentina only 286,550 hogs were carried in 1909 (against 4,500,000 cattle and 10,300,000 sheep).

That year was an unfavorable one in Argentina, however. The year before 19 per cent. more sheep, 17½ per cent. more wool, nearly 40 per cent. more wheat, and 25 per cent. more flaxseed was carried. The pampas are liable to droughts and to visitations of locusts, which make the production very uneven.

The average rates received in 1909 were 1.89 cents per passenger mile, and 1.71 cents per ton mile, against, in the United States, 1.928 cents per passenger mile and 0.763 cent per ton mile. Gross earnings in Argentina were $6,452 per mile, working expenses 61 per cent., and net earnings $2,620. In the United States, gross earnings were $10,356, working expenses 66 per cent., and net earnings $3,505 per mile, or railways having carried 69 per cent. more passenger and nearly three times as much freight per mile as the Argentine roads.

The number of employees per mile was 6.81 in Argentina and 6.38 in the United States. The traffic effected per employee was 12,114 passenger miles and 40,833 ton miles in Argentina; 19,953 passenger miles and 149,527 ton miles in the United [illegible]

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THE CONDITION OF THE EGYPTIAN RAILWAYS.

In a communication by M. P. Arminjon, in the *Revue Economique Internationale* there was given recently a general resumé of the Egyptian railway situation. According to Prof. Arminjon, the railways owned and operated by the Egyptian government have a total length of 1,975 miles. In 1880, the first year of the reign of Tewfik Pasha, there were but 888 miles so owned. Even 10 years later the system had only grown by 61 miles. In 1902 construction was vigorously pushed and the purchase from the Keneh Assonan Railway of the 186 miles of line which it was operating raised the figure to 1,447 miles. Since then the government acquired, in 1906, 392 miles of standard gage track from the Sucveries company and, in 1909, bought from the Corporation of Western Egypt 122 miles, connecting Fashut, in upper Egypt, with the grand oasis of Khargeh in the Libyan desert.

The Egyptian treasury now realizes a remunerative revenue from its railways. This is shown by the following table, taken from the latest financial statement:

Year.	Gross Receipts.	Disbursements.	Net Receipts.
1905.....	$15,504,589	$8,627,213	$6,877,376
1906.....	16,887,917	9,536,191	7,351,726
1907.....	18,481,167	10,125,375	8,354,792
1908.....	17,809,378	10,794,286	7,015,092
1909.....	16,918,907	10,228,032	6,690,875

It will be seen from the above that the operating expenses run at from 61.35 to 64 per cent. of the gross receipts.

The following table gives the growth of the capital invested:

Year.	Capital.	Year.	Capital.
1902.....	$105,665,472	1906.....	$120,568,800
1903.....	108,176,032	1907.....	125,639,424
1904.....	110,319,667	1908.....	130,123,657
1905.....	114,048,000	1909 (provided).	130,429,440

For the past ten years a number of private companies have been busily engaged in the construction of secondary narrow gage lines in the Delta and the province of Fayoum. For the most part they are well built, and collectively they contribute almost as much traffic as that which is drawn from the standard railway of the state. In 1907 the Egyptian Light Railway operated 573 miles; the Lower Egypt Railway, 68 miles; the Fayoum Light Railways, 104 miles; the Salt & Soda Company, which has a concession of the valley of Wady Natroum, 31 miles. The Daira of the khedive has at last built a road along the west coast of the Mediterranean, which has been carried as far as Fuka, 133 miles, of which 99 miles is of standard gage, as far as Debba, and which will eventually be extended, without doubt, in the direction of Tripoli. The total length of the Egyptian railways is, therefore, about 2,480 miles. If we consider that the superficial area of the country, disregarding the desert, is but 12,665 square miles, including the Nile and the canals, which reduce the habitable area of the country to 11,072 square miles (about the area of Belgium or Sicily) and to about 800 square miles of arable land, it is seen that these figures of railway mileage make a very creditable showing.

The main line which serves Egypt from Alexandria to the first cataract, and from which all the others branch, crosses the two arms of the Nile to Kafr-el-Zaiat and Benha, where a branch connects for Zagaziz and Ishmailah at Port Said and Suez. From Tantah, which is located almost at the center of the Delta, another line runs to Damietta and Mansourah; reaching Cairo, it again crosses the Nile, from which place it is on the left bank. At Nag-Hamadi it crosses to the right (east) bank. At 417 miles from Cairo, starting from Luxor the gage is narrowed to 41.75 in. for the remaining 136 miles to Assouan, the terminus. The gages of the Egyptian Railways are as follows: State, 4 ft. 8.5 in.; Khargeh Oasis, 29.5 in.; Delta Light Railways, 29.5 in.; Fayoum, 29.5 in.; Luxor-Assouan, 41.75 in.

One of the reasons for the remarkable development of the Egyptian railways is the complete absence of country roads, up to a recent period, and the inability of the main highways, started in 1890, to meet the growing demands of the population. Up to that time, the Nile, the canals and the irrigating basins, with a few miles of roads laid out about the principal cities, supplied the only means of inland communication.

General News Section.

The Office of Public Roads, of the Agricultural Department, has issued bulletin No. 38, describing methods of examining bituminous road materials.

The plans for building new subways in Boston are said to be now in condition to be carried out; the state legislation and the city government having taken final action preparatory to the beginning of work.

The government has begun suit at Los Angeles against the San Pedro, Los Angeles & Salt Lake for violation of the hours-of-service law, in requiring certain telegraphers to work more than nine hours a day.

The educational bureau of the Illinois Central, since the announcement of its establishment on July 1, has received 5,000 applications for membership from employees of the road. More than 2,300 employees are regular students of one or more of the different courses offered.

The Great Northern Railway is to install telephones for use in train despatching on 119 miles of its lines in the state of Washington, having ordered selectors from the Western Electric Company. This road now has nearly 4,000 miles of telephone lines in use for train despatching.

The "California Limited" of the Atchison, Topeka & Santa Fe, running between Chicago and Los Angeles, and which was put on in the month of May last, has passed Albuquerque on time every trip but two; and the westbound train has arrived in Los Angeles on time every trip but two.

An airship built for the British government was wrecked at Barrow-in-Furness, England, last Sunday, the first time it was taken out of its shed. This balloon is said to have cost $400,000 and the wreck appears to have been the result largely of improper design of the framework.

Officers of the Nashville, Chattanooga & St. Louis were called before the Governor of Georgia this week to answer to charges of having exacted illegal charges on the Western & Atlantic division of the road, which is owned by the state of Georgia and operated under contract by the N. C. & St. L.

It has been announced that within a short time the Texas & Pacific will use oil instead of coal for fuel on all of its locomotives, and that on the Texas and Arkansas divisions of the St. Louis Southwestern also oil is to be used exclusively, the supply for these two roads to be obtained from the Caddo oil fields in Louisiana.

The victory of the conservative party in the recent election in Canada is expected to cause a change in the status of the Hudson Bay Railway. Construction of this railway has already been begun by the Laurier government and it was the intention to lease it to one of the large companies; but the conservatives, in their campaign speeches, promised that the road should be not only owned, but operated by the government.

On the line of the Canadian Pacific last Sunday, telephone conversation was carried on between Montreal and Fort William, 995 miles over a No. 9 iron telegraph wire, grounded; and, according to the reports, the experiment was a marked success. The instruments used are of a new design, invented by David H. Wilson of Chicago. The apparatus is said to be well adapted to use on composite circuits—telegraph and telephone.

Figures compiled from the records of 32 of the leading Texas railways show that during the fiscal year ended June 30, 1911, a total of $2,505,084 was paid out by them in the settlement of personal injury cases, being an average of $184.68 for every mile or road operated and included in the compilation. This amount was 2.63 per cent. of the total operating revenue of the roads and 3.4 per cent. of the total operating expenses for the same period.

High heels and hobble skirts are responsible for a large proportion of the injuries sustained by women while getting on and off trains and mounting and descending stairways in stations. The Pennsylvania Railroad in three months had 73 such cases. The reports read: "Heel caught on step of coach and tore off"; "High heel caught while descending stairs, wore hobble skirt", and so on. And the claim agent, with all his philosophy can only sigh, and observe that "women of all times have followed styles that are dangerous to life and limb."

Clerks, weighmasters and warehouse employees of the Illinois Central and the Yazoo & Mississippi Valley, at Memphis, Tenn.; New Orleans, La., and Jackson and Vicksburg, Miss., went out on a strike on September 25, between 600 and 700 men being involved. The strike order is said to have been issued because the roads refused to recognize the union and arrange a system contract, and because three members of the organization holding union cards were discharged at East St. Louis, Ill. The officers anticipated no trouble in filling the places of the striking clerks. At New Orleans on the 27th, according to a press despatch 410 sheet metal workers and locomotive firemen struck, in sympathy with the clerks.

Between 1,500 and 1,600 car shop men and inspectors on the Missouri, Kansas & Texas went out on a strike on September 23 following a disagreement with the officers regarding a new schedule of wages. The employees asked that officers grant a joint conference to the men on the lines in Texas and those on the other parts of the system, which, according to the legal department of the railway, cannot legally be done under the law of Texas, requiring corporations doing business in Texas to maintain their separate identity. President A. A. Allen said that officers of the Missouri, Kansas & Texas Railway and of the Missouri, Kansas & Texas of Texas are willing to meet the workmen of each corporation, but they cannot meet Texas workmen in conference with workmen not employed by the Texas corporation. The principal shops of the system at Sedalia, Mo., and Denison, Tex., were closed when the strike order was issued.

The strike of track-repair men on the Delaware, Lackawanna & Western appears to have been a complete failure. The officers of the road say that in New York state the places of the men who left work were readily filled, and that in Pennsylvania only one-third of the men joined in the strike. In New Jersey none of the men left their work; yet the appeal of the leader of the strikers to the governor of that state elicited from him a letter, which was published, saying that in his opinion the men seemed to be making a just and reasonable demand; that officers of the railway company were unwisely hostile and that the head of the New Jersey Department of Labor ought to co-operate with the authorities of New York State, with a view to helping the strikers. State Labor Commissioner Bryant called on President Truesdale of the railway, but reported that his visit had been fruitless. On Tuesday of this week special officers armed with rifles were reported in service along the Bloomsburg division of the road and also the trains of that division. Assaults on some of the trackmen led to the conclusion that special guards were necessary.

Pennsylvania Trains in the Hudson Terminal.

The Pennsylvania Railroad announces that beginning October 1 passenger trains will be run through between Manhattan Transfer 6.4 miles west of Jersey City and the Hudson Terminal, Church and Cortlandt streets, New York, using the Hudson river tunnel of the Hudson & Manhattan Railroad. Thus passengers by the Pennsylvania traveling to or from lower New York City will change cars at Manhattan Transfer instead of at Jersey City, and in the case of trains which run to or from the Thirty-second street (uptown) station, passengers will have to change only once, instead of twice as at present. This six-mile section of the New York division has been electrified and is to be made a separate despatching division because of the use of it by the electric trains of the Hudson & Manhattan. New automatic block signals have also been put in. These are upper-quadrant three-position, the same as those on the new line to the Pennsylvania terminal, at Thirty-second street. The Hudson & Manhattan tunnel tracks emerge and join the tracks of the Pennsylvania at a point a short distance east of Shanley's Cut, between Jersey City and Marion, and about one mile from the

river. The time of trains from Hudson terminal to Manhattan Transfer will be 16 minutes, the same as that of trains from the uptown terminal.

A special train with officers of the Hudson & Manhattan and the Pennsylvania Railroad ran through from the Hudson Terminal in Manhattan to the Manhattan Transfer in New Jersey, on September 27, over the new line of the Hudson & Manhattan, which is to be completed to Newark, N. J. The run was made in 15 minutes and 15 seconds, which is a minute and a quarter faster than the schedule time for regular trains. The Pennsylvania Railroad will continue its shuttle trains between Manhattan Transfer and Jersey City, and there will be 10 incoming trains and five outgoing trains, which now use the Jersey City station, which will hereafter arrive at and depart from the Pennsylvania station, in New York City. The road from Manhattan Transfer on to Newark is finished, except about 50 ft. of viaduct. The fares through the tube and on to Newark will be the same as the Pennsylvania charges for the same trip at present. About two-thirds of the way the trains will run over Pennsylvania tracks, and the Pennsylvania paid for about 60 cars. They are labeled with the name of Hudson & Manhattan, but are painted Pennsylvania red. On the completion of the line to Newark, the Hudson & Manhattan will run trains from New York to Newark.

Railway Schooling in Pittsburgh.

The Evening School of Economics of the University of Pittsburgh will this year give special courses in transportation and allied subjects. The courses will be given Thursday evenings. The plan will provide systematic study of the origin and development of American railways, their present ownership and control, the organization of the railway company and how it does its work, financing, the freight, passenger and mail service, regulation by the federal and state authorities, the work and decisions of the Interstate Commerce Commission, the principles of rate making, and government ownership. Attention also will be given to the inland waterway question and merchant marine, subsidies, etc.—*Pittsburgh Times.*

Inspectors of Safety Appliances and Hours of Service.

The United States Civil Service Commission announces an examination on November 6-7, 1911, to secure eligibles from which to fill positions of inspectors of safety appliances and inspector of hours of service for the Interstate Commerce Commission, unless it shall be decided in the interest of the service to fill such vacancies by reinstatement, transfer, or promotion. It is expected that approximately six appointments will be made to the position of inspector of safety appliances and four appointments to the position of inspector of hours of service. The salary of the position of the former is $1,800, the latter, $1,500. The duties of the safety appliance inspectors will comprise the making of inspections and reports as required by the safety appliance acts; the duties of the hours of service inspectors will be the making of inspections and reports as required by the hours of service law. Both safety appliance and hours of service inspectors may be required to investigate accidents as required by the [illegible] of May 6, 1910.

Applicants for the position of inspector of safety appliances must have had at least eight years' experience in steam railway service as conductor, engineman, trainman, yardman, fireman, or yardmaster, or at least five years' such experience as manager, general or division superintendent, trainmaster, master mechanic, master car builder, general car foreman, road foreman of engines or air-brake supervisor, and must, within two [illegible] preceding the date of the examination, have been in active service in one or more of the capacities mentioned, or [illegible].

[illegible]

No person interested either directly or indirectly in any patented article required to be used on any locomotive or car under inspection shall be eligible for appointment to either of these positions.

The scope of the practical questions to be given applicants for the position of inspector of safety appliances will be generally the equipment of locomotives and cars as prescribed by the United States safety appliance standards, and train operation and rules (comprising practical questions relating to the construction, repair, operation, and inspection of locomotives, cars, and their appurtenances).

The applicants for the position of inspector of hours of service will be given practical questions on standard train and block-signal rules, on the operation of trains, the manner of keeping train sheets, time records, and block-signal records, etc.

A Problem in Psychology.

A paragraph in the court news of a New York paper says that a lawyer, who died in 1906, and whose estate has just been settled, had 751,860 shares of worthless mining stocks. Surely this is an awe inspiring record. Was he an altruist, buying up these securities so as to remove temptation from the innocent public? Or was he merely a selfish collector, carried away by his enthusiasm as a connoisseur of engravings?

A Disciple of Brandeis.

A fireman was up for examination for promotion. He passed a fair test on the rules and machinery, but during all of it the examiner was constantly lecturing him as to the need of economy in the use of fuel and oil, so that by the time he finished his examination it was pretty well on his nerves.

Having finished the technical part the examiner put to him this question: "Supposing you are the engineer of a freight train on a single track, and you see that a collision with a passenger train is imminent and you know that you could not stop your train, what would you do?"

The man, unstrung by the vigorous instruction he had received as to economy, replied: "Why, I would grab the oil can in one hand and a lump of coal in the other, and jump."—*Atchison Globe.*

Equipment Note.

The passenger traffic on the Morristown & Erie has increased 30 per cent. within the last year, yet the company has not added to the carrying capacity of the road. The same old car (which previous to its installation on the line, was one of the venerated relics of the Erie) is the only accommodation. But there are rumors that the company is going to double its capacity; is going to procure another car—one made after the Civil War, not before—and if this is a fact it may deter patrons from making an appeal to the state railway commission.—*New York Commercial.*

U. S. Steel.

To quiet unfounded rumors, the directors of the United States Steel Corporation, after a meeting on Tuesday last, issued the following statement, signed by Messrs. J. Pierpont Morgan and Elbert H. Gary, Committee of the Board:

"No negotiations whatever have taken place between the Steel Corporation and the Department of Justice looking to the dissolution or disintegration of the corporation. The corporation was organized for business reasons and purchased its various plants to promote such business and not to restrain trade or obtain a monopoly. In all its operations the company has scrupulously observed the law and recognized the just rights of its competitors and the consumers of its products. So far as its directors are aware, no complaint has ever been made against it by either of these interests. The directors are advised by its counsel that its existence is not in violation of the Sherman act as interpreted in the recent decisions of the Supreme Court.

"In view of this record and this advice the directors feel that their duty to their stockholders, their employees and the public requires that they should set at rest all rumors to the effect that they are contemplating any voluntary dissolution or disintegration of the corporation, or have any belief that it is subject to such dissolution or disintegration by legal action. We believe that the organization is legal and that its management is proper

Its properties are of immense intrinsic value and the corporation is of benefit to the public interest."

Another statement given out was to the effect that customers are buying only for immediate requirements. "Nevertheless, strange as it may seem, the volume of prompt business is larger than usual, specifications running upwards of 30,000 tons a day. Of the 4,500,000 tons on the books, of which 920,000 tons is inter-company business, it may be said, from the standpoint of mill operations, it is better business than an old time contract order book of double the tonnage, inasmuch as it represents active business capable of specifications in sufficient volume as required to operate our mills on the present basis for some months to come."

Railway Strike in Ireland.

Railway traffic has been seriously disturbed in Ireland since September 16, when large numbers of the employees of the Great Southern & Western went out on a sympathetic strike. Freight traffic was almost completely suspended throughout the lines of the three principal roads, and the passenger train service was badly disorganized for several days. Press despatches received the middle of last week indicated that the strike was spreading and the food supplies of the larger cities were becoming short; but later reports seem to indicate that the companies have got the better of the strikers. The strike was neither for higher pay nor shorter hours, but was to compel the companies to refuse to carry timber shipped by merchants whose employees had struck. There were the usual reports of hostile demonstrations against the "strike breakers," and of the activities of pickets in persuading new men not to go to work. In general, however, there was little violence. Troops were called out to guard some of the lines.

Los Angeles Traffic Association.

The Los Angeles Traffic Association held its annual dinner at the Angelus Hotel in that city, September 18. The president of the association for the ensuing year is E. L. Blair; secretary, C. E. Cline. The semi-monthly luncheons of the association will be resumed beginning October 2. On October 20 members of the association will go to San Francisco on invitation of the traffic club of that city.

Cleveland Engineering Society.

At the meeting of this society held September 26, a paper on Smoke Prevention was presented by Paul F. Bird, of the Commonwealth Edison Co., formerly chief smoke inspector of the city of Chicago.

Northern Railway Club.

At the meeting of this club in Duluth, Minn., on September 23, a paper on Engine Failures was presented by George S. Stewart, superintendent of the Great Northern.

Railway Business Association.

The third annual dinner of the Railway Business Association will be given on Wednesday, November 22, at the Waldorf-Astoria, New York.

Applications for seatings by wire will be honored. Tables will be of two sizes, seating ten and eight. The price is $10 per plate. All companies who are members of the association are entitled to subscribe for as many seats as they desire for themselves and friends. Announcement will be made at an early date of the names of the speakers. Frank W. Noxon is secretary, 2 Rector street, New York.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

Air Brake Association.—E. M. Nellis, 53 State St., Boston, Mass.

American Association of Demurrage Officers.—A. G. Thomason, Scranton, Pa.

American Association of General Passenger and Ticket Agents.—C. M. Burt, Detroit, Mich.

American Association of Freight Agents.—R. O. Wells, East St. Louis, Ill.

American Association of Railroad Superintendents.—O. G. Fetter, Carew building, Cincinnati, Ohio, 3d Friday of March and September.

American Electric Railway Association.—H. C. Donecker, 29 W. 39th St., New York, October 9-13, 1911, Atlantic City, N. J.

American Railway Association.—W. F. Allen, 75 Church St., New York; November 15, 1911, Chicago.

American Railway Bridge and Building Association.—C. A. Lichty, C. & N. W., Chicago; Oct. 17-19, 1911, St. Louis, Mo.

American Railway Engineering Association.—E. H. Fritch, Monadnock Block, Chicago; annual convention, March 19-21, 1912, Chicago.

American Railway Master Mechanics' Association.—J. W. Taylor, Old Colony building, Chicago.

American Railway Tool Foremen's Association.—O. T. Harroun, Bloomington, Ill.

American Society for Testing Materials.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.

American Society of Civil Engineers.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

American Society of Engineering Contractors.—D. J. Haner, 13 Park Row, New York; 3d Tuesday of each month, New York.

American Society of Mechanical Engineers.—Calvin W. Rice, 29 W. 39th St., New York.

Association of American Railway Accounting Officers.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.

Association of Railway Claim Agents.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 22, 1912, Los Angeles, Cal.

Association of Railway Electrical Engineers.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago; annual, November 6-10, Chicago.

Association of Railway Telegraph Superintendents.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.

Association of Transportation and Car Accounting Officers.—G. P. Conard, 75 Church St., New York; December 12-13, Louisville, Ky.

Canadian Railway Club.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.

Canadian Society of Civil Engineers.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

Car Foremen's Association of Chicago.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

Civil Engineers' Society of St. Paul.—D. F. Jurgensen, 116 Winter St., St. Paul, Minn.; 2d Monday, except June, July and Aug., St. Paul.

Engineers Society of Pennsylvania.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

Engineers' Society of Western Pennsylvania.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

Freight Claim Association.—Warren P. Taylor, Richmond, Va.; annual Buffalo, N. Y.

General Superintendents' Association of Chicago.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

International Railway Congress.—Executive Committee, rue de Louvain, 11 Brussels; 1915, Berlin.

International Railway Fuel Association.—D. B. Sebastian, La Salle St. Station, Chicago.

International Railway General Foremen's Association.—L. H. Bryan, D. & I. R. Ry., Two Harbors, Minn.

International Railroad Master Blacksmiths' Association.—A. L. Woodworth, Lima, Ohio.

Iowa Railway Club.—W. B. Harrison, Union Station, Des Moines, Ia.; 2d Friday in month, except July and August, Des Moines.

Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York.

Master Car Builders' Association.—J. W. Taylor, Old Colony building, Chicago.

Master Car and Locomotive Painters' Association of United States and Canada.—A. P. Dane, P. & M., Reading, Mass.

New England Railroad Club.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

New York Railroad Club.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

Northern Railway Club.—C. L. Kennedy, C., M. & St. P., Duluth, Minn; 4th Saturday, Duluth.

Omaha Railway Club.—H. H. Maulick, Barker Block, Omaha, Neb.; second Wednesday.

Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

Railway Club of Pittsburgh.—C. W. Alleman, P. & L. E., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

Railway Industrial Association.—G. L. Stewart, St. L. S. W. Ry., St. Louis, Mo.; annual, May 12, 1912, Kansas City, Mo.

Railway Signal Association.—C. C. Rosenberg, Bethlehem, Pa.; annual, Oct. 10, Colorado Springs, Colo.

Railway Storekeepers' Association.—J. P. Murphy, Box C, Collinwood, Ohio.

Richmond Railroad Club.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

Roadmasters' and Maintenance of Way Association.—J. C. Ryan, C. & N. W. Sterling; September 10, 1912, Buffalo, N. Y.

St. Louis Railway Club.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

Society of Railway Financial Officers.—C. Nyquist, La Salle St. Station, Chicago.

Southern Association of Car Service Officers.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.; annual, October 20, Atlanta, Ga.

Southern & Southwestern Railway Club.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

Toledo Transportation Club.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

Traffic Club of Chicago.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.

Traffic Club of New York.—C. A. Swope, 290 Broadway, New York; last Thursday in month, except June, July and August, New York.

Traffic Club of Pittsburgh.—D. L. Wing, Box, Pittsburgh, Pa., meet [illegible]

Train Dispatchers Association of America.—J. P. Mackey, 704 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.

Transportation Club of Buffalo.—J. M. Sells, Buffalo, 1st Saturday [illegible] Wednesday.

Transportation Club of Detroit.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.

Traveling Engineers' Association.—W. O. Thompson, N. Y. C. & H. R., [illegible] N. Y.

Western Canada Railway Club.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man., 3d Monday, except June, July and August, Winnipeg.

Western Railway Club.—J. W. Taylor, Old Colony building, Chicago, 3d Tuesday of each month except June, July and August.

Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago, 1st Wednesday in month, except July and August, Chicago.

Wood Preservers' Association.—F. J. Angier, B. & O., Baltimore, Md., annual, January 16-18, Chicago.

Traffic News.

At a meeting of officers of the different lines belonging to the Chicago Demurrage Bureau, which for 20 years has handled for the Chicago railways matters relating to the collection of demurrage and car service, it was decided that it would be more economical for each road to assume for itself the assessment and collection of these charges, and the bureau will, therefore, be abolished on September 30.

An automobile service has been established in Chicago by the Chicago Motor Company between the new Chicago & North Western passenger terminal and the retail store of Marshall Field & Company. Four coaches are used in the service, and more will be added as the demand for them increases. The first coach leaves the Clinton street entrance of the station at 7:45 a. m., and it is expected that they will run at regular nine-minute intervals from the station throughout the day, the last one leaving at 5:47 p. m. On the return trip passengers are left at the Madison street entrance of the station. The coaches are intended for the convenience of suburban patrons of the road who shop in Chicago.

The rate on flour from Minneapolis to New York for domestic consumption, by rail to Duluth, boat to Buffalo, and thence by rail, has been reduced from 23 cents per 100 lbs. to 21½ cents, the new tariff to go into effect October 5. Shortly after the tariffs were filed with the Interstate Commerce Commission, the eastern roads concluded that they wished to withdraw their concurrence in them, but on application to the commission for leave to do this, on short notice, they were met with a refusal. The commission says it is not believable that Congress intended that the power to suspend rates should be exercised when rates are voluntarily reduced by a carrier, and where undue discrimination does not appear on the face of the tariff.

"It is asserted in the protest of the trunk lines that the reduced rates will result in much loss of revenue to them, because the reductions necessarily will be followed by reductions in rates from belated points. This may be, but the matter thus appears to be one for adjustment between the interested carriers and not properly by the commission under the law." Permission to withdraw concurrences in the tariffs on short notice was denied by the commission, because such action would withdraw the through routes and joint rates, thus resulting in much higher charges than are now effective. Such a condition, in the opinion of the commission, would be worse than that for which the protest is made.

Car Surpluses and Shortages.

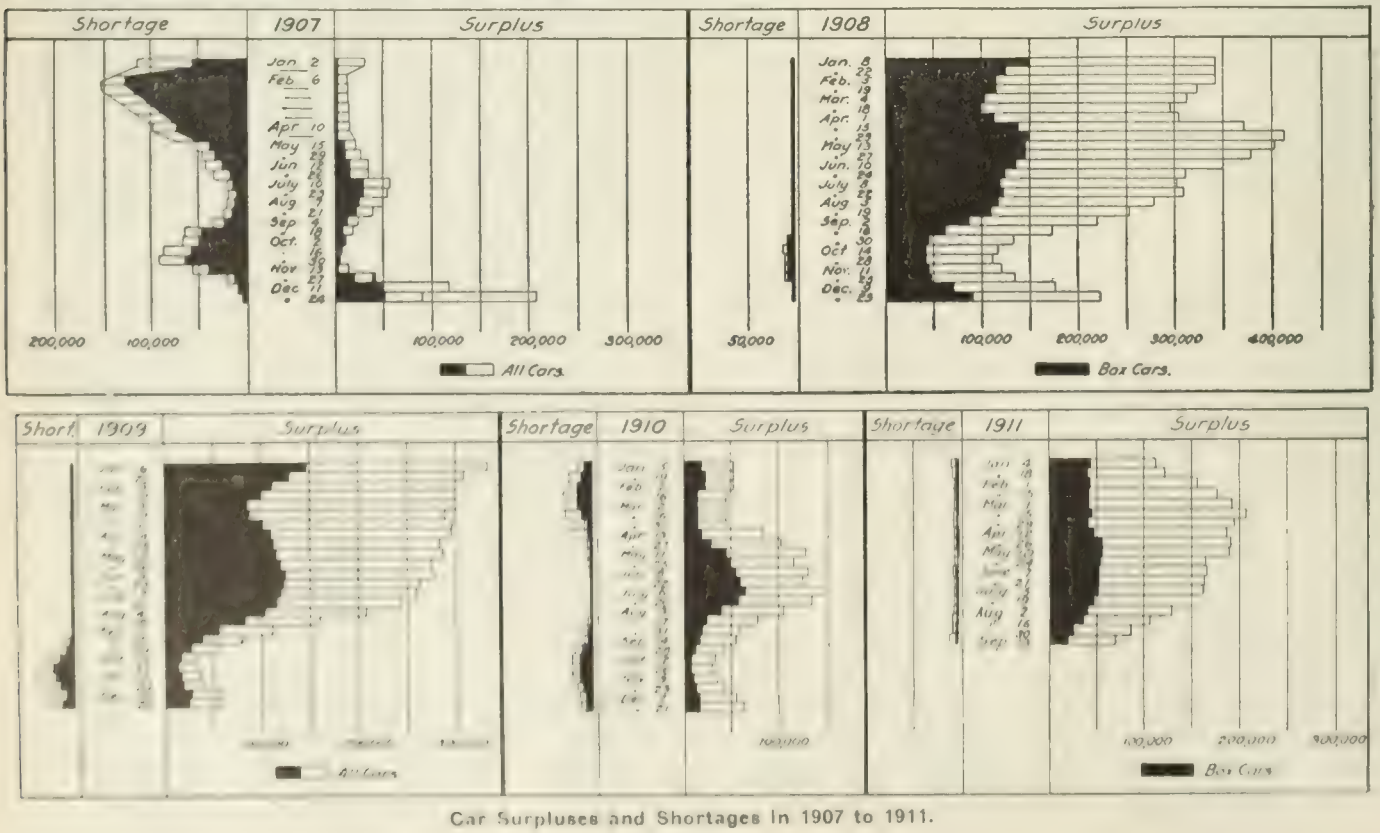
Arthur Hale, chairman of the committee on relations between railways of the American Railway Association in presenting statistical bulletin No. 103, giving a summary of shortages and surpluses by groups from May 11, 1910, to September 10, 1911, says:

"The total surplus reported for the period ended September

Car Surpluses and Shortages.

Date.	No. of roads.	Surpluses: Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.	Shortages: Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.
Group *1,—September 13, 1911	7	0	473	1,252	327	2,052	662	126	250	0	1,038
" 2.— " 13, 1911	25	1,137	60	5,514	2,178	8,889	104	3	316	5	428
" 3.— " 13, 1911	25	1,893	237	8,393	2,320	12.843	307	100	582	85	1,074
" 4.— " 13, 1911	10	136	90	458	1,391	2,075	247	411	500	0	1,158
" 5.— " 13, 1911	17	461	35	1,094	1,056	2,646	12	0	0	0	12
" 6.— " 13, 1911	24	7,869	813	2,119	4,819	15,620	98	0	1	2	101
" 7.— " 13, 1911	4	446	47	87	640	1,220	0	0	0	0	0
" 8.— " 13, 1911	17	3,331	403	2,153	3,363	9,250	250	22	0	0	272
" 9.— " 13, 1911	11	1,020	170	502	832	2,524	30	319	0	0	349
" 10.— " 13, 1911	22	2,078	841	1,364	6,635	10,918	357	0	0	15	372
" 11.— " 13, 1911	4	1,048	78	859	700	2,685	1,385	141	0	109	1,635
Total	166	19,419	3,247	23,795	24,261	70,722	3,452	1,122	1,649	216	6,439

*Group 1 is composed of New England lines; Group 2—New York, New Jersey, Delaware, Maryland, and Eastern Pennsylvania lines; Group 3—Ohio, Indiana, Michigan and Western Pennsylvania lines; Group 4—West Virginia, Virginia, North and South Carolina lines; Group 5—Kentucky, Tennessee, Mississippi, Alabama, Georgia and Florida lines; Group 6—Iowa, Illinois, Wisconsin, Minnesota and the Dakotas lines; Group 7—Montana, Wyoming and Nebraska lines; Group 8—Kansas, Colorado, Missouri, Arkansas and Oklahoma lines; Group 9—Texas, Louisiana and New Mexico lines; Group 10—Oregon, Idaho, California and Arizona lines; Group 11—Canadian lines.



Car Surpluses and Shortages in 1907 to 1911.

13, 1911, is 70,722 cars, a decrease of 18,144 cars as compared with the previous period, and is the lowest figure reported since December 21, 1910. Of the decrease of 18,144 cars, 8,689 are box cars, 5,454 are coal cars and 4,414 are miscellaneous. Flat cars show an increase of 413 cars. The decrease in all classes of cars is heaviest in group 2 (New York, New Jersey, Delaware, Maryland, Eastern Pennsylvania), 3 (Ohio, Indiana, Michigan, Western Pennsylvania), and 10 (Oregon, Idaho, California, Arizona). Groups 9 (Texas, Louisiana, New Mexico), and 11 (Canadian Lines) show a slight increase.

"The shortage increased from 4,325 cars on August 30, 1911, to 6,439 cars on September 13, 1911, an increase of 2,114 cars."

The accompanying table gives the figures for surpluses and shortages for the last period covered by the report and the chart shows total bi-weekly surpluses and shortages in 1907 to 1911.

Burlington Agricultural Pamphlets.

The industrial department of the Chicago, Burlington & Quincy has issued and distributed five pamphlets concerning the growing of wheat, corn, oats, alfalfa, orcharding, dry farming, farming under irrigation and soil fertility in the states of Illinois, Iowa, Missouri, Nebraska, Colorado and Wyoming. The pamphlet intended for each state has been prepared by members of the faculty of the agricultural college of that state, and relates to the principal farm products of that state. For Illinois, how to increase crop production and improvement of soil and seed are discussed by James H. Pettit, professor of soil fertility, and Louie H. Smith, professor of plant breeding at the University of Illinois. For Iowa, discussions of whether winter wheat is profitable, facts for the corn grower, soil fertility, fruit and potatoes, alfalfa, and "Is the Iowa Farmer a Robber?" have been prepared by Professors P. G. Holden, M. L. Mosher and G. R. Bliss of the Iowa State College, and E. R Shoemaker, editor of *Kimball's Dairy Farmer*. For Missouri, the soil, rotation of crops, production of the corn crop, oat production, wheat production and tobacco growing are discussed by F. H. Demaree of the college of agriculture of the state university. For Nebraska, corn culture, oats culture, soil fertility, orcharding, wheat culture and alfalfa are discussed by Professors Montgomery, C. W. Pugsley and V. V. Westgate of the University of Nebraska. In a single pamphlet devoted to Colorado and Wyoming, scientific soil culture, farming non-irrigated lands and farming under irrigation are discussed by Professor H. W. Campbell of Lincoln, Neb., and Professor W. H. Olin of Denver, Colo. Copies of the pamphlets may be obtained by addressing E. A. Howard, real estate and industrial commissioner at Chicago, or E. M. Westervelt, assistant real estate and industrial commissioner, at Lincoln, Neb.; or from local agents or division freight agents of the company.

INDEX OF PAGE NUMBERS IN THE RAILWAY AGE GAZETTE ON WHICH EARNINGS AND EXPENSES HAVE BEEN REPORTED.

	1910.						1911.					
	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March.	April.	May.	June.
Alabama & Vicksburg	477	756	1092	1201	253	428	874	1081	1292	1706	194	297-8
Alabama Great Southern	553	756	1020	1201	137	428	808	1011	1183	1440	98-9	260
Ann Arbor	477	756	1092	1201	253	428	808	1011	1292	1706	194	*
Arizona Eastern	553	806	1092	1277	253	428	808	1081	1292	1706	194	297-8
Atchison, Topeka & Santa Fe	477	705	938	1124	179	298	517	917	1126	1327	56	297-8
Atlanta & West Point	553	....	....	57	....	473	....	....	....	....	....	*
Atlanta, Birmingham & Atlantic	553	756	980	1163	137	365	808	1011	1183	1440	98-9	352
Atlantic & St. Lawrence	594	....	....	57	....	473	....	....	1292	....	....	*
Atlantic City	594	806	1020	1277	253	473	....	....	....	1706	194	*
Atlantic Coast Line	477	705	938	1124	137	298	517	917	1126	1327	56	297-8
Baltimore & Ohio—System	594	806	980	1201	97	331	517	917	1183	1440	98-9	297-8
Baltimore & Ohio Chicago Terminal	553	....	....	....	....	....	....	....	....	....	....	297-8
Bangor & Aroostook	477	665	980	1163	137	298	808	1011	1183	1440	98-9	297-8
Belt Ry. Co. of Chicago	594	....	....	....	....	....	....	....	....	....	....	*
Bessemer & Lake Erie	477	665	1020	1201	137	365	....	1081	1183	1440	98-9	260
Boston & Maine	477	705	938	1124	97	298	517	917	1126	1327	56	352
Buffalo & Susquehanna R. R.	....	....	1092	57	....	473	874	....	1292	1706	194	*
Buffalo & Susquehanna Ry.	....	....	....	....	....	473	874	....	1292	1706	194	*
Buffalo, Rochester & Pittsburgh	....	665	980	1163	137	298	706	962	....	1440	98-9	260
Butte, Anaconda & Pacific	553	....	....	57	....	473	....	....	....	....	....	352
Canadian Pacific Lines in Maine	....	....	....	....	....	....	....	....	....	....	....	*
Carolina, Clinchfield & Ohio	477	806	1092	1277	253	428	874	1081	1292	1706	194	352
Carolina, Clinchfield & Ohio of S. C.	....	....	....	1277	253	428	874	1081	1292	1706	194	352
Central New England	553	665	1020	1277	179	365	874	1081	1183	1440	98-9	352
Central of Georgia	553	705	980	1163	97	298	706	962	1183	1440	194	*
Central of New Jersey	....	705	938	1124	97	331	517	917	1126	1327	98-9	*
Central Vermont	553	756	1020	1163	137	428	808	1011	1183	1440	98-9	*
Charleston & Western Carolina	477	806	1092	1277	253	365	808	1011	1292	1706	194	297-8
Chesapeake & Ohio	553	705	980	1163	97	298	517	917	1183	1327	56	352
Chesapeake & Ohio of Indiana	553	806	1092	1277	253	365	874	1081	1183	1327	56	352
Chicago & Alton	....	806	1020	57	179	331	706	917	1183	1327	56	352
Chicago & Eastern Illinois	477	705	980	1124	97	331	706	962	1126	1440	98-9	352
Chicago & Erie	477	665	1020	1201	179	365	808	1081	1183	1440	98-9	260
Chicago & North Western	477	665	938	1124	253	298	706	917	1126	1327	56	260
Chicago, Burlington & Quincy	477	705	938	1124	179	298	706	917	1126	1327	56	352
Chicago Great Western	553	705	980	1124	137	331	706	962	1126	1440	56	297-8
Chicago, Indiana & Southern	477	756	1020	1277	179	428	808	1011	1183	1440	98-9	297-8
Chicago, Indianapolis & Louisville	553	756	980	1163	97	365	808	962	1183	1440	194	*
Chicago, Milwaukee & Puget Sound	553	705	938	1124	179	331	517	917	1183	1327	98-9	297-8
Chicago, Milwaukee & St. Paul	553	705	938	1124	179	331	517	917	1183	1327	98-9	297-8
Chicago, Peoria & St. Louis	553	806	1092	1277	253	473	874	1081	1292	1706	194	352
Chicago, Rock Island & Gulf	553	756	1020	1277	137	365	874	1011	1183	1440	98-9	297-8
Chicago, Rock Island & Pacific	477	705	938	1124	137	298	517	917	1126	1327	56	297-8
Chicago, St. Paul, Minneapolis & Omaha	477	665	938	1124	179	298	706	917	1126	1327	56	260
Cincinnati, Hamilton & Dayton	553	665	980	1124	137	298	706	962	1126	1440	98-9	260
Cincinnati, New Orleans & Tex. Pac.	553	756	1020	1201	97	428	808	1011	1183	1440	98-9	260
Cincinnati Northern	477	756	1092	1277	253	473	....	....	....	....	....	352
Cleveland, Akron & Columbus	477	665	1020	1277	253	365	874	1081	1183	1440	98-9	260
Cleveland, Cincinnati, Chicago & St. Louis	477	705	938	1124	97	331	517	917	1183	1327	56	297-8
Colorado & Southern	553	806	980	1163	97	331	706	962	1183	1440	98-9	297-8
Colorado Midland	553	756	1092	1201	253	365	874	1081	1292	1706	194	260
Cumberland Valley	477	665	1020	1277	179	365	874	1081	1183	1440	98-9	260
Delaware & Hudson Co.—R. R. Dept.	....	705	938	1163	137	331	517	917	1183	1440	56	260
Delaware, Lackawanna & Western	477	665	938	1124	179	298	517	917	1126	1327	56	297-8
Denver & Rio Grande	553	705	938	1163	97	298	517	962	1126	1327	98-9	297-8
Denver, Northwestern & Pacific	594	806	1092	1277	....	473	....	....	....	....	....	297-8
Detroit & Mackinac	553	....	....	57	....	473	....	....	....	....	....	297-8
Detroit, Grand Haven & Milwaukee	594	806	1092	57	253	473	874	1081	1292	1706	....	*
Detroit, Toledo & Ironton	477	756	1092	1201	253	428	808	1011	1292	1706	194	297-8
Duluth & Iron Range	....	756	1020	1201	179	473	....	1081	1292	1440	98-9	260
Duluth, Missabe & Northern	553	665	1020	1201	179	473	....	1081	1292	1440	98-9	260
Duluth, South Shore & Atlantic	477	756	1092	1201	137	365	808	1011	1183	1440	98-9	297-8
El Paso & Southwestern Co.	477	665	980	1163	179	331	706	962	1183	1440	98-9	297-8
Elgin, Joliet & Eastern	477	756	980	1163	179	331	706	962	1183	1440	98-9	260
Erie	477	665	938	1124	179	298	517	917	1126	1327	56	260
Evansville & Terre Haute	477	756	1020	1277	137	365	874	1011	1183	1706	98-9	352
Florida East Coast	477	756	1020	1163	179	365	808	962	1183	1440	98-9	297-8
Fort Worth & Denver City	477	665	1092	1163	179	365	808	1011	1183	1440	98-9	260
Galveston, Harrisburg & San Antonio	553	756	980	1163	97	298	706	962	1183	1440	98-9	297-8
Georgia	553	756	1092	1201	137	365	808	1011	1183	1440	98-9	297-8
Georgia Southern & Florida	594	806	1092	1201	179	428	808	1081	1292	1706	....	*
Grand Rapids & Indiana	477	665	980	1163	137	298	808	1011	1183	1440	98-9	260

	1910.						1911.					
	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March.	April.	May.	June.
Grand Trunk Western	554	806	1020	1201	179	428	808	1081	1292	1706	....	*
Grand Trunk	477	705	938	1124	97	298	517	917	1126	1327	56	297-8
Gulf & Ship Island	553	806	1092	1277	....	428	874	1081	1292	1706	194	352
Gulf, Colorado & Santa Fe	477	705	938	1124	97	331	706	962	1126	1327	98-9	297-8
Hocking Valley	554	665	1092	1201	253	428	808	1011	1183	1440	98-9	352
Houston & Texas Central	477	756	980	1163	137	365	706	1011	1183	1440	98-9	297-8
Houston, East & West Texas	477	....	....	....	....	473	....	....	....	....	....	297-8
Illinois Central	594	806	980	1201	97	331	517	962	1183	1440	56	352
Internat. & Great Northern	553	....	....	....	....	....	....	....	....	....	....	297-8
Interurban Railway	....	....	....	57	....	473	....	....	....	....	....	*
Iowa Central	594	806	980	1201	253	428	706	962	1183	1706	194	352
Kanawha & Michigan	....	806	....	1201	253	428	706	962	1183	1440	98-9	297-8
Kansas City Northern	594	806	1020	1201	253	428	....	1081	1183	1440	98-9	297-8
Kansas City, Mexico & Orient	....	....	....	57	253	428	874	....	1292	....	....	*
Kansas City Southern	553	665	980	1124	97	331	706	962	1126	1440	98-9	260
Lake Erie & Western	477	756	980	1124	97	331	706	962	1183	1440	98-9	297-8
Lake Shore & Michigan Southern	477	705	938	1124	97	331	517	917	1126	1327	56	297-8
Lehigh Valley	553	....	....	57	....	473	....	....	....	....	....	352
Long Island	477	665	938	1124	253	298	517	917	1126	1327	56	*
Maine Central	477	756	1020	1277	137	365	808	1011	1183	1440	98-9	260
Michigan Central	553	806	1092	1277	....	473	874	1081	1292	1706	194	297-8
Minneapolis & St. Louis	594	806	1092	1277	253	428	874	1081	1292	1706	194	297-8
Minneapolis, St. Paul & Sault Ste. Marie	553	756	1092	1277	253	428	874	1081	1292	1706	194	297-8
Missouri, Kansas & Texas	477	705	938	1124	137	298	517	917	1126	1327	56	352
Missouri Pacific	594	705	938	1163	253	331	706	962	1183	1440	98-9	*
Mobile & Ohio	....	....	....	1201	253	331	706	962	1183	1440	98-9	297-8
Morgan's La. & Tex. R. R. & S. S. Co	553	705	980	1163	97	428	517	1081	1183	1706	98-9	*
Nashville, Chattanooga & St. Louis	553	....	....	....	....	298	706	962	1183	1440	98-9	297-8
New Orleans & Northeastern	553	806	980	1163	97	....	....	....	....	....	....	260
New Orleans, Mobile & Chicago	594	....	....	57	....	331	874	1011	1183	1440	98-9	297-8
New York Central & Hudson River	553	756	1020	1201	253	428	706	962	1183	1440	98-9	352
New York, Chicago & St. Louis	477	665	1092	1277	....	428	874	1081	1292	1706	194	*
New York, New Haven & Hartford	....	....	....	....	....	428	....	....	....	....	....	*
New York Central & Hudson River	477	705	938	1124	97	331	517	917	1126	1327	56	297-8
New York, Ontario & Western	554	705	980	1163	179	473	706	962	1183	1440	98-9	260
Norfolk & Western	477	665	938	1124	97	298	517	917	1126	1327	56	352
Northern Pacific	477	705	980	1163	97	298	517	917	1126	1327	56	297-8
Pere Marquette	477	665	1020	1201	179	365	874	1081	1183	1440	98-9	260
Pittsburgh & Lake Erie	477	665	1020	1201	179	365	808	1011	1183	1440	98-9	260
Pittsburgh & Shawmut	477	665	1020	1201	179	365	808	1011	1183	1440	98-9	260
Pittsburgh, Shawmut & Northern	477	665	938	1124	179	298	517	917	1126	1327	56	260
Pittsburgh & West Virginia	477	665	1020	1124	137	365	808	1011	1183	1440	98-9	260
Rutland	477	705	938	1277	179	298	517	917	1126	1327	56	352
St. Louis & San Francisco	553	806	1020	1201	179	365	874	1011	1292	1706	98-9	*
St. Louis Southwestern	....	....	....	....	....	331	706	917	1126	1706	56	297-8
San Antonio & Aransas Pass	553	806	1092	1277	253	331	....	....	....	....	....	....
Seaboard Air Line	553	705	980	....	97	331	....	....	....	....	....	....
Southern Pacific	553	705	980	1163	97	331	706	917	1126	1327	56	297-8
Southern Railway	553	....	....	57	....	473	....	....	....	1706	194	297-8
Texas & Pacific	477	665	938	1124	137	298	517	917	1126	1327	56	260
Toledo & Ohio Central	477	665	938	1124	137	298	517	917	1126	1327	56	260
Toledo, St. Louis & Western	477	756	1020	1277	179	365	808	1011	1183	1440	98-9	297-8
Union Pacific	477	665	938	1124	137	298	706	917	1126	1327	56	260
Virginian	....	705	980	1277	97	331	706	962	1183	1440	98-9	*
Wabash	477	665	938	1124	137	331	517	917	1126	1440	98-9	260
Western Maryland	477	756	1020	1277	179	365	808	1011	1183	1440	56	297-8
Western Pacific	553	806	1092	1277	137	473	874	....	....	....	....	352
Wheeling & Lake Erie	....	....	....	....	....	....	....	....	....	....	....	*
Wisconsin Central	553	....	....	....	....	473	....	....	....	....	....	352
Wrightsville & Tennille	477	756	1020	1277	179	365	808	1011	1183	1440	98-9	260
Yazoo & Mississippi Valley	553	806	1092	1277	137	365	874	1081	1292	1706	194	297-8
Yazoo & Mississippi Valley	553	806	980	1163	137	331	517	917	1126	1440	194	352
Yazoo & Mississippi Valley	553	806	1092	1277	137	365	808	1011	1183	1440	98-9	297-8
Yazoo & Mississippi Valley	....	....	....	1201	....	428	517	1081	1183	1706	98-9	*
Yazoo & Mississippi Valley	....	....	....	....	....	....	....	....	....	....	....	352
Yazoo & Mississippi Valley	....	....	....	57	....	473	....	....	....	....	....	297-8
Yazoo & Mississippi Valley	477	705	980	1163	97	331	808	962	1183	1440	98-9	297-8
Yazoo & Mississippi Valley	553	705	980	1163	97	331	808	962	1183	1440	98-9	260
Yazoo & Mississippi Valley	553	756	1020	57	179	428	706	1011	1292	1440	194	*
Yazoo & Mississippi Valley	553	705	980	1201	97	428	706	962	1183	1440	98-9	352
Yazoo & Mississippi Valley	553	756	1020	1277	253	428	874	1011	1292	1706	194	297-8
Yazoo & Mississippi Valley	594	806	980	1163	97	298	517	962	1183	1440	194	352
Yazoo & Mississippi Valley	553	705	938	1124	97	298	517	917	1126	1327	56	260
Yazoo & Mississippi Valley	....	....	....	57	....	473	....	....	....	....	....	352
Yazoo & Mississippi Valley	553	806	1092	1201	253	428	808	1011	1183	1440	98-9	297-8
Yazoo & Mississippi Valley	....	....	....	....	....	....	....	....	....	....	....	297-8
Yazoo & Mississippi Valley	....	....	....	....	....	....	....	....	....	....	....	297-8
Yazoo & Mississippi Valley	553	705	938	1124	97	331	517	917	1126	1327	56	297-8
Yazoo & Mississippi Valley	477	705	938	1124	137	331	706	962	1126	1440	98-9	297-8
Yazoo & Mississippi Valley	477	756	1020	1277	253	428	874	1081	1292	1706	194	297-8
Yazoo & Mississippi Valley	....	....	....	....	....	473	....	....	....	....	194	*
Yazoo & Mississippi Valley	477	....	....	1163	137	365	808	1011	1183	1440	98-9	260
Yazoo & Mississippi Valley	477	....	....	1124	137	331	517	917	1126	1327	56	297-8
Yazoo & Mississippi Valley	....	....	....	....	....	....	....	....	....	....	....	352
Yazoo & Mississippi Valley	477	665	1020	1163	137	365	874	1011	1183	1440	98-9	260
Yazoo & Mississippi Valley	553	806	1092	1201	137	331	706	962	1292	1706	194	*
Yazoo & Mississippi Valley	....	....	....	57	....	....	....	....	1292	....	....	*
Yazoo & Mississippi Valley	553	....	....	1163	....	428	....	1011	....	1440	....	*
Yazoo & Mississippi Valley	....	....	....	....	97	....	517	....	....	1327	....	....

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF JUNE, 1911. (SEE ALSO ISSUES OF AUGUST 4, 11 AND 18.)

Name of road.	Mileage operated at end of period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
		Freight.	Passenger.	Total, inc. misc.	Maintenance: Way and structures.	Maintenance: Of equipment.	Traffic.	Transportation.	General.	Total.					
Ann Arbor	291	$101,086	$46,751	$158,086	$19,620	$18,332	$4,546	$53,055	$7,246	$102,800	$55,286	—$2,069	$13,300	$39,917	$28,509
Atlantic City	166	69,331	132,614	207,904	35,994	19,067	3,160	90,590	1,041	149,852	58,052	—4,101	3,072	50,879	5,602
Atlanta & West Point	93	43,229	37,725	90,614	11,799	18,272	4,945	28,407	5,022	68,445	22,169	113	8,519	13,763	2,656
Atlantic & St. Lawrence	166	72,630	26,616	109,784	57,996	19,873	3,703	43,682	4,543	129,815	—20,031	.....	cr. 13,072	—6,959	12,160
Belt Ry. Co. of Chicago	21	.....	.....	208,400	21,117	23,893	753	71,922	5,569	123,254	85,146	.....	5,500	79,646	17,938
Buffalo & Susquehanna R. R.	265	137,538	8,923	151,308	20,679	30,003	2,332	50,444	6,057	110,115	41,193	.....	2,600	38,593	.....
Buffalo & Susquehanna R.	91	52,109	9,020	63,334	6,397	31,016	751	22,636	2,489	63,290	44	32	1,400	— 1,324	.....
Canadian Pacific Lines in Me.	233	33,719	15,733	55,375	31,376	14,010	6,042	35,196	3,395	90,019	- 34,644	.....	27,895	— 62,539	—38,347
Central of Georgia	1,915	510,745	295,604	889,825	127,992	165,065	37,752	305,429	37,878	674,116	215,709	7,474	57,227	165,956	70,979
Central of New Jersey	634	1,686,697	413,923	2,239,868	247,664	344,717	31,192	597,749	57,363	1,378,685	961,183	31,400	cr. 186,718	1,179,301	711,634
Central Vermont	171	243,447	94,908	379,606	39,823	56,339	8,017	119,916	7,952	233,048	147,558	755	13,596	134,717	53,427
Chicago, Indianapolis & Louisville	276	344,717	129,858	526,493	69,216	78,077	17,050	182,960	18,889	366,192	160,301	.....	20,945	139,356	10,960
Detroit, Grand Haven & Milwaukee	150	104,148	19,819	180,085	16,855	21,483	7,300	82,486	12,770	141,044	39,041	—67	1,459	37,515	33,670
Georgia Southern & Florida	343	93,657	62,830	185,894	17,088	32,932	7,869	74,722	9,208	141,819	44,075	.....	9,157	34,918	17,791
Grand Trunk Western	347	330,463	192,354	557,100	23,177	87,221	19,571	238,974	29,974	396,916	160,184	- 744	30,951	128,489	31,279
Indianapolis Southern	179	59,496	19,319	82,349	20,803	14,261	2,296	35,632	1,755	74,747	7,602	.....	5,647	1,955	-13,176
Kansas City, Mexico & Orient	764	90,921	27,578	127,427	25,981	36,368	8,891	72,734	8,521	152,495	—25,068	.....	6,750	31,818	—3,274
Lehigh Valley	1,119	3,117,700	456,290	3,687,671	284,881	416,556	101,103	1,036,264	94,985	1,933,789	1,763,882	21,640	78,577	1,663,665	333,812
Mahoning Valley	53	60,615	37,326	104,245	cr. 6,915	19,304	3,342	36,391	5,213	57,335	46,910	196	5,581	41,519	36,423
Midland Valley	253	60,615	37,326	104,245	cr. 6,915	19,304	3,342	36,391	5,213	57,335	46,910	196	5,581	41,519	36,423
Minn., St. Paul & S. S. Marie System	3,666	1,147,637	485,498	1,757,474	240,509	271,511	54,568	633,212	39,730	1,239,531	517,893	13,975	124,319	407,549	- 293,590
Missouri Pacific	3,946	1,330,433	419,774	1,953,892	987,354	521,527	80,200	1,211,836	184,508	2,985,315	1,031,433	—4,931	73,508	—1,109,873	—1,519,835
Nevada Northern	165	115,010	12,634	130,767	89,975	13,933	749	19,153	4,083	119,193	11,574	.....	5,401	6,173	—79,627
New Orleans Great Northern	81	104,835	29,816	143,388	16,968	16,068	3,847	47,298	6,919	86,100	57,288	—124	2,000	55,164	6,036
New Orleans, Mobile & Chicago	104	108,376	25,378	138,441	22,035	12,282	2,443	36,963	7,237	80,980	57,461	.....	2,268	55,193	775
New Orleans, Texas & Mexico	264	69,837	14,451	91,450	18,066	11,711	3,545	32,542	3,860	76,774	14,736	.....	1,809	12,917	2,545
Northwestern Pacific	376	109,164	197,627	327,608	48,840	37,502	5,448	105,134	9,487	206,179	121,429	.....	15,000	106,179	—10,665
Pennsylvania & Reading	1,077	3,925,561	586,992	3,690,337	493,040	597,178	48,751	1,151,855	64,623	2,355,448	1,334,889	38,091	185,914	1,186,996	35,408
Phila. & Reading	91	79,840	.....	81,991	10,364	252	32	21,831	86	32,565	49,396	3,378	5,203	47,571	60
Pitts. Shawmut & Northern	83	60,615	37,326	104,245	cr. 6,915	19,304	3,342	36,391	5,213	57,335	46,910	196	5,581	41,519	36,423
St. L. & S. F. Rocky Mountain & Southern	3,313	1,481,810	526,126	2,170,887	626,117	431,593	74,687	1,015,616	96,324	2,244,337	—73,150	—7,804	127,291	—208,545	—890,170
San Antonio & Aransas Pass	727	909,058	93,685	1,111,744	119,376	cr. 11,329	4,859	118,906	9,621	241,433	81,311	.....	14,985	66,326	23,215
Southern & Pacific Empire	177	91,998	54,662	82,099	14,069	12,761	1,708	26,006	8,295	62,339	19,760	6,149	4,200	21,709	—28,485
Spokane, Portland & Seattle	550	237,648	182,592	506,681	45,804	58,170	7,974	96,154	10,787	215,389	291,292	91	42,200	249,183	231,245
Tonopah, Pioche & Western	247	64,751	34,307	111,223	19,574	18,494	2,758	39,068	3,411	83,256	27,967	.....	4,248	23,719	20,404
Trinity & Brazos Valley	129	61,332	39,001	105,468	49,851	9,967	3,365	38,316	2,954	104,353	1,115	100	2,162	—947	—29,783
Union Pacific	543	501,670	80,158	666,951	94,854	78,923	13,106	198,887	11,839	396,719	270,232	2,940	21,000	192,672	—11,890
Western Maryland	124	1,323,943	490,487	1,934,616	259,444	245,415	48,581	666,734	85,194	1,305,368	629,248	—8,185	167,827	453,235	74,852
Western Ry. of Alabama	133	47,987	37,590	94,881	36,362	25,729	4,967	31,584	8,096	106,738	11,857	947	9,497	21,602	—35,285
FISCAL YEAR ENDED JUNE 30, 1911.															
Ann Arbor	291	$1,323,943	$490,487	$1,934,616	$259,444	$245,415	$48,581	$666,734	$85,194	$1,305,368	$629,248	—$8,185	$167,827	$453,235	$74,852
Atlantic City	166	743,039	1,177,491	2,070,598	254,507	182,400	32,437	972,302	15,279	1,556,925	463,673	- 59,164	80,072	324,437	74,086
Atlanta & West Point	93	632,219	467,290	1,198,212	149,867	211,680	58,989	356,951	55,575	833,062	325,150	2,132	59,338	317,944	61,723
Atlantic & St. Lawrence	166	939,048	298,929	1,372,654	360,070	251,152	49,015	697,953	40,943	1,394,133	—21,479	.....	79,904	- 101,383	—336,308
Belt Ry. Co. of Chicago	21	.....	.....	3,644,891	209,497	307,588	5,909	1,050,183	73,637	1,646,814	998,077	.....	63,891	924,186	426,928
Buffalo & Susquehanna R. R.	265	1,538,337	99,130	1,702,657	308,692	327,681	21,958	611,594	68,179	1,347,404	355,253	.....	20,371	335,882	.....
Buffalo & Susquehanna R.	91	543,319	110,937	688,130	79,835	343,508	8,596	285,664	33,211	787,734	- 70,604	159	18,299	89,762	.....
Canadian Pacific Lines in Me.	233	749,704	337,451	1,171,496	313,001	181,170	58,562	516,033	38,600	1,107,316	64,180	.....	82,895	—18,715	—60,213
Central of Georgia	1,915	8,308,919	3,414,389	12,007,788	1,745,033	2,18,,967	397,613	4,196,247	495,743	9,070,093	3,887,695	77,856	560,135	3,405,416	298,428
Central of New Jersey	634	18,749,450	4,733,074	24,799,234	2,498,265	3,733,033	364,132	7,103,640	499,996	14,198,995	10,600,239	75,86	769,681	9,905,844	590,912
Central Vermont	171	2,684,941	1,035,302	4,006,433	453,504	606,519	86,154	1,777,081	104,309	3,027,567	978,761	6,611	133,133	847,189	20,655
Chicago, Indianapolis & Louisville	276	3,674,115	1,576,659	6,186,878	799,007	878,772	201,556	2,193,184	181,693	4,257,163	1,929,716	.....	268,145	1,661,271	14,181
Detroit, Grand Haven & Milwaukee	150	1,117,917	547,309	2,046,680	264,943	282,809	78,863	1,043,941	67,711	1,733,166	313,514	809	34,589	278,046	- 171,196
Georgia Southern & Florida	343	1,001,703	786,133	1,899,397	253,846	478,274	74,785	914,571	107,617	1,829,093	570,304	.....	11,459	457,845	35,863
Grand Trunk Western	347	3,013,063	1,919,784	6,339,113	654,601	951,933	221,318	2,739,612	173,077	4,739,880	1,599,76	—14,360	379,03	1,205,981	249,714
Indianapolis Southern	179	581,787	533,858	1,111,705	227,199	177,969	29,978	444,096	21,757	901,639	210,076	..	40,559	169,517	57,660
Kansas City, Mexico & Orient	764	1,178,194	410,633	1,818,479	327,804	365,813	96,784	879,737	95,579	1,845,107	—26,627	.....	66,361	66,089	98,365
Lehigh Valley	1,119	21,442,127	4,548,099	37,687,302	3,670,176	6,003,787	1,010,675	11,979,278	703,502	23,407,318	14,280,084	3,0,170	1,145,177	13,134,437	—415,718
Mahoning Valley	53	857,760	418,158	1,383,607	227,741	210,422	39,078	404,357	20,831	952,489	431,118	2,783	65,812	361,619	9,767
Midland Valley	253	857,760	418,158	1,383,607	227,741	210,422	39,078	404,357	20,831	952,489	431,118	2,783	65,812	361,619	9,767
Minn., St. Paul & S. S. Marie System	3,666	17,157,876	4,971,488	21,568,640	2,359,609	3,154,184	543,463	8,140,994	496,560	14,694,810	6,868,830	105,901	1,46,074	5,578,165	- 3,318,142
Missouri Pacific	3,946	17,306,157	4,700,852	24,004,771	4,574,765	4,272,038	727,085	12,213,847	961,145	23,748,880	1,456,901	35,528	978,008	446,355	.....
Nevada Northern	165	1,398,649	138,690	1,468,005	167,640	167,673	4,775	311,99	43,991	696,8	771,877	.....	58,098	719,469	- 173,603
New Orleans Great Northern	81	1,196,438	360,270	1,698,773	245,560	231,195	36,848	495,078	65,031	1,076,705	622,068	- 1,056	23,511	597,451	21,887
New Orleans, Mobile & Chicago	104	1,275,609	336,647	1,826,135	254,193	151,539	33,730	544,377	66,618	1,080,417	745,688	.....	50,319	695,369	95,402
New Orleans, Texas & Mexico	264	307,513	172,995	1,166,715	206,805	130,251	42,650	503,877	88,993	972,575	194,140	.....	8,655	187,485	.....
Northwestern Pacific	376	1,358,562	1,758,343	3,366,259	501,515	502,344	88,076	1,54,936	111,28	2,96,059	871,800	..	137,700	734,100	- 113,069
Pennsylvania & Reading	1,077	37,380,947	6,995,801	44,367,447	4,077,261	8,095,783	511,153	14,181,314	815,3	27,675,843	16,689,603	325,791	1,113,002	15,903,392	1,063,890
Phila. & Reading	91	3,113,389	.....	3,114,243	90,309	2,154	329	344,146	1,464	438,451	2,675,792	64,924	43,703	847,013	81,558
Pitts. Shawmut & Northern	83	857,760	418,158	1,383,607	227,741	210,422	39,078	404,357	20,831	952,489	431,118	2,783	65,812	361,619	9,767
St. Louis & San Francisco	3,313	9,337,387	6,317,498	28,567,890	4,409,367	4,011,483	683,695	10,531,561	911,980	20,581,056	7,986,764	—59,554	1,005,780	6,930,430	- 1,470,874
San Antonio & Aransas Pass	727	836,115	1,089,514	4,164,819	603,521	521,448	61,321	1,571,530	133,738	3,150,561	984,258	.....	133,085	851,273	—108,539
Southern & Pacific Empire	177	991,690	670,887	1,080,045	169,355	119,161	17,587	339,58	80,917	736,878	343,167	1,382	50,400	415,049	—11,397
Spokane, Portland & Seattle	550	3,117,015	1,297,695	4,819,464	545,495	377,733	62,000	1,189,859	147,000	2,322,127	2,497,337	3,771	479,400	2,064,167	1,183,482
Tonopah, Pioche & Western	247	778,344	449,558	1,993,562	224,147	257,832	28,163	487,583	38,746	1,036,475	957,087	.....	57,149	199,938	13,366
Trinity & Brazos Valley	129	717,775	355,379	1,132,929	177,719	144,925	20,558	460,536	30,301	834,039	298,890	783	38,469	251,211	- 69,813
Union Pacific	543	6,938,495	963,698	7,900,933	857,880	856,039	109,707	2,457,000	156,667	4,440,227	2,760,706	576	240,000	2,521,282	.....
Western Maryland	124	1,323,943	490,487	1,934,616	259,444	245,415	48,581	666,734	85,194	1,305,368	629,248	—8,185	167,827	453,235	74,852
Western Ry. of Alabama	133	724,640	460,334	1,293,371	274,397	237,136	61,405	360,870	78,879	1,012,687	280,584	2,217	57,338	221,139	- 56,448

Mileage operated on June 30, 1910: [1] 667 miles; [2] 335 miles; [3] 740 miles; [4] 3,532 miles; [5] 3,883 miles; [6] 3,287 miles; [7] 429 miles; — indicates Deficits, Losses and Decreases.

Note: This table covers all the June reports delayed in filing because of annual closing and checking of accounts.

INTERSTATE COMMERCE COMMISSION.

The commission has declined to suspend the proposed reductions in rail and lake rates on flour from Minneapolis transfer points to New York via Duluth, and has refused to permit the eastern roads to withdraw their concurrences in the reduced rate.

The commission has assigned October 4 as the date for a hearing in the proposed advance in the minimum rate for a single shipment of freight. This advice was proposed by the railways after the commission had held that railways could not refuse to accept as a single shipment combined packages of freight belonging to various consignors, but shipped by one consignor to one consignee.

STATE COMMISSIONS.

The Railroad Commission of Wisconsin has orderd the Chicago, Milwaukee & St. Paul and the Minneapolis, St. Paul & Sault Ste. Marie to put in effect on sash, doors and blinds from Wausau to Soo Line stations north of Marshfield and west of Abbotsford joint class rates which are slightly higher than single line distance rates, but based largely on these rates. The carload rates are one cent higher than the carload rates on lumber as fixed by the commission.

The Board of Public Utility Commissioners of New Jersey has disapproved of the plans of the Pennsylvania Railroad for its station at Summit avenue, Jersey City. The board finds that the station as planned will not have elevators and other conveniences, such as the protection of platforms their full length, and finds that the defense of the railway company, that the station is a temporary one is not a good defense, because there is no evidence that the company ever intends to build any other kind of a station.

J. Heron Crosman, a commuter on the New York, New Haven & Hartford, has filed a complaint with the New York Public Service Commission, second district (state), asking that that railway be required to refund full amount of conductor's receipt for cash fare which is collected from commuters who have forgotten their commutation ticket. The present practice of the company is to charge five cents in excess of the cash fare and give to the rider a cash receipt redeemable for five cents. Mr. Crosman asks that the ticket agents refund the full amount paid by commuter upon receipt of the conductor's receipt and the exchange of coupon from the commutation ticket.

The Board of Public Utility Commissioners of New Jersey has ordered the New York & Long Branch to restore a bridge over its right of way in substantially the same condition as it existed before its removal. The testimony of F. E. Degraw, a resident of South Amboy for over 50 years, showed that the road now called Main street, which was carried over the railway bridge, "extended down to the hotel beyond where the railway now is." The commission says that after the removal of the bridge, an additional aggravation was perpetrated by the raising at the end of Main street, by the Pennsylvania Railroad, of a high board barrier fence bearing the sign "This street closed for repairs." This it is declared "only emphasizes the utterly indefensible character of this invasion of the right of the city of South Amboy in this matter."

The city of Lackawanna, Erie county, New York, has six railways, but only one station, a building only [illegible] and the citizens have asked the State Public Service Commission to require the railways to treat them a little better. Lackawanna is best known to railway men as West Seneca Junction, being on the Lake Shore & Michigan Southern. The Lake Shore maintains the station referred to, and the other roads apparently ignore the town, although [illegible] the population now numbers 15,000. Another grievance is that the [illegible] Lackawanna to change cars at the station through [illegible] a waiting room to get out of the cold to [illegible] Another town, with the same number of inhabitants, Watervliet, complains to the commission that it has no telegraph office, though the Western Union enjoys valuable rights along the ways of the city.

Charles Clement Elwell has been appointed engineer of the Connecticut Board of Public Utilities, as heretofore announced in these columns. Mr. Elwell was born in 1855 in Maine and graduated from the University of Maine with the degree of civil engineer. He began railway work when he was about 26 in the civil engineer's office of the New England Railroad, now part of the New York, New Haven & Hartford. Three years later he went to the Wilmington & Northern, now also part of the New Haven, on construction and maintenance work. Later he went to the Baltimore & Ohio, remaining with that company until 1893. From 1893 to 1895 he was roadmaster on the New York division of the New York, New Haven & Hartford, and was then made superintendent first of the Norwich & Worcester, then of Air Line & Northampton, and later of the Shore Line division. Mr. Elwell has been for the past three years engineer of the Connecticut Company, the New York & Stamford and the Westchester Street Railways Company. The Connecticut Company is the New Haven's subsidiary which controls its street railway properties in Connecticut. Mr. Elwell was one of the eight delegates that were sent to Europe by the New Haven in 1895 to study railway methods abroad. He is a member of the American Society of Civil Engineers.

COURT NEWS.

The supreme court of the state of Washington has affirmed the order of the state railway commission, directing the Seattle-Tacoma Interurban Railway to reduce passenger fares to certain non-competitive points.

FOREIGN RAILWAY NOTES.

The Dominican Central Railway, which formerly belonged to an American company, became by virtue of a contract made by the government in February, 1908, the property of the Republic. This road connects the two important cities of Puerto Plata and Santiago with an extension to Moca, and has a length of 60 miles, 28 of which run through broken and mountainous lands.

Costa Rica has in actual operation 427 miles of railway, including branches and sidings, all of 3 ft. 6 in. gage. Of this mileage 69 miles are the property of the government, 141 belong to the Northern Railway Company, and 217 to the Costa Rica Railway. The Costa Rica Railway is leased to the Northern Railway Company, so that the whole system of some 358 miles, having its focal point at Port Limon, is under one general management. Both these roads are well constructed with steel and iron bridges, suitable stations, and side tracks, and are maintained in good condition. Various branch lines have been extended up and down the coast for the service of the banana industry. The main line leaves Port Limon, passing through Matina, Siquirres, Turrialba, and Cartage, reaching San Jose, the capital, at a distance of 103 miles. The system is continued to Alahuela, 14 miles north of San Jose.

The railways in Salvador during 1910 comprised 97 miles, all of narrow gage. The longest railway in the country runs from the port of Acajutla on the Pacific coast to the city of San Salvador, the capital, a distance of 65 miles. This line, which has 14 stations from terminal to terminal, is the most important railway of the nation. A branch line, 25 miles long, connects Santa Ana, the second city of the republic, with Sitio del Nino. A short railway runs from the city of San Salvador to Santa Tecla, a distance of 11 miles. A project for the extension of this line from Santa Tecla to the port of La Libertad is now being considered The operation of the railway from La Ceiba to Ateos, a distance of 30 miles, has been temporarily abandoned. Of the branch line between San Miguel and La Union, 6 miles were completed at the end of 1910. At the end of May, 1911, there were completed 16 miles, and the work is being pushed rapidly on this line, which will have a total length of 38 miles.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

H. I. Miller has been elected vice-president, in executive charge, of the Mexico North Western, with headquarters at New York City. Mr. Miller is also vice-president of the Missouri Pacific. A portrait of Mr. Miller and a sketch of his railway career were published in the *Railway Age Gazette* of June 23, 1911, page 1669.

J. E. Dalrymple, assistant freight traffic manager of the Grand Trunk Pacific, at Winnipeg, Man., has been elected vice-president, in charge of traffic, of the Grand Trunk, with office at Montreal, Que. John Pullen, assistant freight traffic manager of the Grand Trunk, at Montreal, has been appointed vice-president and general manager of the Canadian Express Company.

Operating Officers.

Henry Martin, superintendent of the International & Great Northern under the receivership, has been appointed general manager, with office at Houston, Tex.

H. C. Robinson, superintendent of the Southern division of the Boston & Maine, at Boston, Mass., has had his authority extended over the Concord division, which is added to the Southern division, effective, October 2.

W. M. Bacon, superintendent of the Colorado & Southern at Denver, Colo., has been appointed superintendent of the Salt Lake division of the Denver & Rio Grande, with office at Salt Lake City, Utah, succeeding S. E. Burkhead, resigned.

H. W. Stanley, general superintendent of transportation of the Seaboard Air Line, at Portsmouth, Va., has been appointed assistant general manager in charge of transportation, with office at Portsmouth, and his former position has been abolished. J. M. Shea, superintendent of the Third division, at Atlanta, Ga., has been appointed general superintendent, with office at Portsmouth, Va.

John H. Doggrell, whose appointment as superintendent of freight loss and damage claims of the St. Louis & San Francisco, with office at Springfield, Mo., has been announced in these columns, was born August 6, 1876, at Ellis, Kan. He received a public school education and began railway work in November, 1894, as an office boy in the operating department of the Kansas City, Memphis & Birmingham, now part of the St. Louis & San Francisco, and was later a clerk in the office of the car service agent of the Kansas City, Ft. Scott & Memphis at Kansas City. In 1901, when the latter road was consolidated with the St. Louis & San Francisco, he was transferred to Springfield, where he was employed in the office of the superintendent of transportation, and in August, 1902, he was appointed to a position in the office of the superintendent of car service. He was appointed chief clerk in that department in October, 1903, and in June, 1907, was promoted to car accountant, which position he held until the time of his appointment to the new office of superintendent of freight loss and damage claims.

J. H. Doggrell.

A. E. Boughner, superintendent of the Missouri, Kansas & Texas at Sedalia, Mo., has been appointed superintendent of transportation, with office at Denison, Tex., succeeding E. J. Lampert, resigned. W. E. Williams, superintendent at McAlester, Okla., has been transferred to Sedalia, succeeding Mr. Boughner, and K. A. Easley, assistant superintendent at Parsons, Kan., succeeds Mr. Williams.

John R. Jones, whose appointment as division superintendent of the International & Great Northern, with office at San Antonio, Tex., has been announced in these columns, was born April 17, 1859, in Monroe county, Missouri. He attended the common schools until he was 14, and began railway work with the Missouri, Kansas & Texas in September, 1886, as a switchman. He was later a brakeman and then a conductor on a freight train for almost three years. In April, 1892, he went with the International & Great Northern as a freight brakeman, was made conductor in 1896, and in April, 1907, was appointed trainmaster, from which position he has now been promoted to superintendent, with office at San Antonio.

Traffic Officers.

R. L. Thompson, district passenger agent of the Canadian Pacific, at Toronto, Ont., has resigned.

C. H. Williams has been appointed traveling freight and passenger agent of the Gulf & Ship Island, with office at Gulfport, Miss.

W. D. Jones, district passenger agent of the Chicago Great Western, with office at Pittsburgh, Pa., has resigned to accept service with another company.

C. E. Dewey, general freight agent of the Grand Trunk Pacific, at Winnipeg, Man., has been appointed assistant freight traffic manager, with office at Winnipeg, succeeding J. E. Dalrymple, promoted.

W. F. Mundee, commercial agent of the Seaboard Air Line, at Tampa, Fla., has been appointed commercial agent, at Jacksonville, succeeding T. P. Toland, who in turn succeeds Mr. Mundee as commercial agent, at Tampa.

George C. Whitney, soliciting freight agent of the Queen & Crescent Route at Dallas, Tex., has been appointed traveling freight agent, with office at Dallas, succeeding A. C. Valentine, resigned to accept service with another company.

W. G. Trufant, commercial agent of the International & Great Northern and the Texas & Pacific in New York City, has been appointed general eastern traffic agent, with office in New York City, succeeding George D. Hunter, promoted.

W. S. Napier, assistant general baggage agent of the Galveston, Harrisburg & San Antonio, the Houston & Texas Central, the Houston East & West Texas and the Houston & Shreveport at Houston, Tex., has been appointed general baggage agent, with headquarters at Houston, succeeding W. W. Monroe, retired under the pension system.

George W. Squiggins, who has been appointed general passenger agent of the Baltimore & Ohio, with office at Baltimore, Md., entered the service of the Baltimore & Ohio in November, 1887, as yard clerk at Bellaire, Ohio. The following year he was appointed assistant ticket agent at the same place, and in 1889 was transferred to Wheeling in the same capacity. He was again transferred in 1891 to Pittsburgh, and in 1896 was promoted to city passenger agent at Pittsburgh. He was later appointed passenger and ticket agent at Cleveland, Ohio, and in 1902 was made traveling passenger agent. In 1905 he was appointed city passenger agent at Baltimore, and on August 1, 1909, was promoted to district passenger agent. Mr. Squiggins was again promoted on February 1, 1910, to assistant general passenger agent, which position he held at the time of his recent appointment as above noted.

Engineering and Rolling Stock Officers.

H. Y. Harris, general foreman of the Tampa Northern, at Tampa, Fla., has been appointed master mechanic, with office at Tampa.

B. C. Martin, resident engineer of the New York Central & Hudson River, at Watertown, N. Y., has been transferred to Utica.

Frank A. De Wolf has been appointed acting shop superintendent of the United Railways of Havana, with headquarters at Havana, Cuba.

E. Collings, chief carpenter of the Chicago, Milwaukee & St. Paul at Aberdeen, S. D., has been appointed chief carpenter of the Chicago, Milwaukee & Puget Sound, with headquarters at Malden, Wash.

D. N. Hooker has been appointed chief engineer of the Wichita Falls Route, with office at Wichita Falls, Tex., succeeding R. A. Thompson, resigned to go with the California Railway Commission as engineer.

D. T. Williams, mechanical engineer of the Philadelphia & Reading, will report direct to H. D. Taylor, superintendent of motive power and rolling equipment, at Reading, Pa., and the position of superintendent of power house at the Reading terminal has been abolished.

M. J. McCarthy, superintendent of shops of the Cleveland, Cincinnati, Chicago & St. Louis, the Peoria & Eastern and the Cincinnati Northern, at Beech Grove, Ind., has been appointed assistant superintendent of motive power, with headquarters at Beech Grove, and R. J. Williams succeeds Mr. McCarthy.

Purchasing Officers.

George C. Smith has been appointed purchasing agent of the Union Pacific, with office at Omaha, Neb., succeeding J. W. Griffith, retired.

OBITUARY.

J. T. Walch, superintendent and master mechanic of the Corvallis & Eastern, Albany, Ore., died in that city on September 19.

Joseph N. Frazer, recently engaged in important railway construction in Bolivia, S. A., died at La Paz, Bolivia, in the latter part of August. Mr. Frazer was born in Maryland about 28 years ago, and graduated from Delaware College in 1903. He was with the Baltimore & Ohio for about two years, in the engineering department, working in Pennsylvania, Maryland and West Virginia. In 1905 he was made engineer for the commission to study the railways of the Bolivian government, and was afterward for two years chief engineer of the Andes Tin Company. He was then engaged in the mining business and in 1909 became a member of the firm of Yount & Frazer which built railway lines from Rio Mulati to Potosi and from Cruro to Cochabamba. He was a member of the American Society of Civil Engineers.

General Samuel C. Lawrence, formerly president of the Eastern Railroad, now a part of the Boston & Maine, died on September 24 at his home in Medford, Mass., at the age of 79. General Lawrence was educated at Harvard College, and in the civil war served in the army as colonel of the Fifth regiment of Massachusetts volunteers. In 1875 he became president of the Eastern Railroad, which was later leased to the Boston & Maine. He has been at various times director of a large number of railway companies, including the Atchison, Topeka & Santa Fe, and he was a director in several Boston & Maine properties at the time of his death.

The *Boston Transcript*, in its notice of General Lawrence's death says: "His activity in railway matters began in 1875, [illegible] financial shipwreck. He was chosen to the directorate and [illegible] Instead of keeping silence, remaining absent from his post and endeavoring to save himself, he locked what were then apparently worthless certificates in his safe and laid bare every fact in the case and the stock declined from $85 to $3 [illegible] credit by the power of his wealth and will, and astonished everybody by the masterly manner in which he retrieved the [illegible] rose to $150, through General Lawrence's integrity and persistency. Afterward, with James T. Furber, he started the Boston & Maine on its career of importance and prosperity. [illegible] directorate until the merger interests secured fifty one per [illegible]

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Buffalo, Rochester & Pittsburg is in the market for 15 locomotives.

The Norfolk Southern has ordered five 10-wheel locomotives from the Baldwin Locomotive Works.

The San Diego, El Paso & St. Louis, Artesia, N. Mex., has ordered two 10-wheel locomotives from the Central Locomotive & Car Works.

The Central Railway of Brazil has ordered 6 Mallet compound locomotives from the American Locomotive Company. The cylinders will be 20 in. and 32 in. x 26 in., the driving wheels 50½ in. in diameter, and the total weight in working order, 280,000 lbs.

The Edwardsburg Starch Company, Ltd., Cardinal, Ont., has ordered one 4-wheel saddle tank switcher from the Montreal Locomotive Works. The cylinders will be 13 in. x 18 in., the driving wheels 36 in. in diameter, and the total weight in working order, 56,000 lbs.

The Bureau of Manufactures is informed by an American consular officer that a business house in his district is interested in the purchase of locomotives. Further information may be obtained by writing to the Bureau of Manufactures, Washington, D. C., mentioning inquiry No. 7392.

The Erie, as mentioned in the *Railway Age Gazette* of August 18 has ordered 20 mikados from the Baldwin Locomotive Works, 15 mikados and 5 switchers from the American Locomotive Company, and 5 switchers from the Lima Locomotive Company. The general dimensions and special equipment of these locomotives are as follows:

	Mikado	*Switching*
Simple or compound	Simple	Simple
Weight on drivers	240,900 lbs.	148,540 lbs.
Total weight	305,000 lbs.	148,540 lbs.
Cylinders	8 in. x 32 in.	20 in. x 26 in.
Diameter of drivers	63 in.	50 in.
Type of boiler	Straight top	Straight top
Working steam pressure	170 lbs.	180 lbs.
Heating surface, tubes	4,020 sq. ft.	1,799 sq. ft.
Heating surface, firebox	210 sq. ft.	152 sq. ft.
Heating surface, total	4,230 sq. ft.	1,951 sq. ft.
Flues, number	34 and 36	302
Tubes, outside diameter	2¼ in. and 5½ in.	2 in.
Tubes, length	21 ft.	11 ft. 6 in.
Firebox, type	Wide	Wide
Firebox, length	120 in.	114¼ in.
Firebox, width	84 in.	66 in.
Firebox, material	Otis, steel	Worth Bros., steel
Grate area	70 sq. ft.	52.3 sq. ft.
Tender, capacity	9000 gal.	4,500 gal.
Coal capacity	16 tons	7 tons

Special Equipment

Valves	Coffin	Otis
Valve gear	Simplicity	Simplicity
Boiler lagging	Franklin	Franklin
Injector	New York air brake	New York air brake
Boiler checks	Penberthy	Damascus
Brake shoes	A. B. S. & Fdy. Co.	A. B. S. & Fdry. Co.
Cylinder packing	Gould	National
Headlight	Dressel	Dressel
Bell ringer	Ohio	Ohio
Driving boxes	Bronze Metal Co.	Bronze Metal Co.
Tender trucks	U. S. King	U. S. King
Tender frames	Consolidated	Consolidated
Sanding device	Leach	Leach
Injector pipe	Chicago	Chicago
Springs	Ry. Steel Spring	Ry. Steel Spring
Tires	Bethlehem, Rome	Bethlehem, Rome
Axles	Vulcan	Vulcanott
Steam heating equipment	Ward with Leslie valve	.....
Lubricator	Detroit Lubricator Co.	.....
Injector	Lunkenheimer	Lunkenheimer
Flues	Purchased from [illegible]	Pittsburg Steel Products Co.
Staybolts	Tiemann	Stephenson
Staybolt iron	Crucible steel	Crucible steel

CAR BUILDING.

The Pittsburg & Lake Erie is in the market for 1,000 steel hopper cars.

The Buffalo, Rochester & Pittsburg is in the market for [illegible]

The Louisville & Nashville is buying steel underframes for 500 hopper and 500 box cars.

The Buffalo, Rochester & Pittsburg is in the market for 1,000 50-ton steel hopper cars.

The Grand Trunk is in the market for ten 30-ft. and ten 40-ft. steel underframe flat cars.

The Buffalo, Rochester & Pittsburg is in the market for 1,100 steel underframes for reinforcing freight cars.

The Union Refrigerator Transit Company, Milwaukee, has ordered 150 refrigerator cars from the American Car & Foundry Company, to be built at the plant at Madison, Ill.

The San Diego, El Paso & St. Louis, a new road with offices at Artesia, N. Mex., has ordered 25 box, 10 gondola and 10 stock cars, one caboose, one combination car and two coaches, from the Central Locomotive & Car Works.

The Grand Trunk, mentioned in the *Railway Age Gazette* of August 4 as being in the market for 25 steel underframe coaches and 25 express cars, is said to have ordered this equipment from the Pullman Company. These items are not confirmed.

The Baltimore & Ohio, mentioned in the *Railway Age Gazette* of August 4 as being in the market for ten steel baggage cars and 10 steel postal cars, has ordered the baggage cars from the Barney & Smith Car Company, and the postal cars from the Pullman Company.

The Bureau of Manufactures is informed by an American consular officer that a business house in his district is interested in the purchase of freight and passenger cars. Further information may be obtained by writing to the Bureau of Manufactures, Washington, D. C., mentioning inquiry No. 7392.

The Erie, as mentioned in the *Railway Age Gazette* of August 18, has ordered 1,000 steel underframe box cars from the American Car & Foundry Company, and 1,000 steel hopper cars from the Standard Steel Car Company; and as mentioned September 15, has ordered ten 70-ft. through passenger cars from the Barney & Smith Car Company, 25 suburban coaches from the Pullman Company. It has ordered five combination suburban cars, instead of 10 through passenger cars as previously stated, from the Pullman Company. The box cars will have a capacity of 40 tons, and will weigh 35,970 lbs. The inside dimensions are: 30 ft. long; 8 ft. 6 in. wide, and 8 ft. 3 in. high, and the overall dimensions are 40 ft. long; 10 ft. wide, and 13 ft. 7 in. high. The body will be of steel frame, with wood sheathing, and the underframe will be of steel. The hopper cars will have a capacity of 110,000 lbs., and will weigh 39,400 lbs. The inside dimensions will be 30 ft. 6 in. long, and 9 ft. 5 in. wide; the overall dimensions will be: 34 ft. long, 9 ft. 6 in. wide, and 10 ft. 6 in. high. The special equipment of the box and hopper cars will be as follows:

Bolsters, body	Simplex
Brakes	New York
Brake beams	Simplex and Damascus
Brake shoes	Am. Brake Shoe & F'dry
Brasses	Barrett Metal Co.
Couplers	Gould
Doors (hopper cars)	Triple hopper
Door fastenings (hopper cars)	Enterprise
Draft gear (hopper cars)	Miner
Draft gear (box cars)	Sessions
Dust guards	Basswood
Journal boxes	Franklin
Roofs (box cars)	Improved Winslow inside
Side bearings	Malleable iron
Springs	Ry. Steel Spring Co.
Trucks (hopper cars)	Andrews cast steel side frames
Trucks (box cars)	Cast steel frames
Wheels	Cast iron

The passenger cars will have a capacity of 80 persons, and will weigh 112,000 lbs. The overall dimensions will be: 78 ft. 3 in. long; 10 ft. wide, and 14 ft. 5 in. high. The bodies will be of wood and the underframes of steel. The suburban coaches will have a capacity of 72 persons. Their overall dimensions will be: 66 ft. 9 in. long; 10 ft. wide, and 14 ft. 5 in. high. The bodies will be made of wood, and the underframes of steel. The capacity of the combination cars will be 50 persons, and their weight will be 92,000 lbs. The overall dimensions are: 66 ft. 9 in. long; 10 ft. wide, and 14 ft. 5 in. high. The bodies will be of wood and the underframes of steel. The special equipment of these cars will be as follows:

Bolsters, body	Commonwealth
Brakes	Westinghouse
Brake beams	Am. Steel F'dry, Vulcan
Brake shoes	Am. Brake Shoe & F'dry
Brasses	Bronze Metal Co.
Couplers	Janney 3 Stem
Draft gear	Westinghouse
Dust guards	Basswood
Heating system	Ward
Journal boxes	Franklin
Lighting system	Wilson storage battery
Roofs	Canvas
Side bearings	Malleable iron
Springs	Ry. Steel Spring Co.
Trucks	Commonwealth, cast steel

IRON AND STEEL.

The Canadian Pacific has ordered 1,200 tons of rails from the Illinois Steel Company.

The Norfolk & Western is making inquiries for 30,000 tons of standard rails for 1912 delivery.

The Pennsylvania is in the market for 500 tons of bridge steel for the bridge over the Schuylkill river, near Philadelphia.

The Monongahela has ordered 2,000 tons of bridge steel from the American Bridge Company for the bridge over the Monongahela river.

The Central Railway of New Jersey is in the market for 10,000 tons of bridge material for two large bridges to be built over the Hackensack and Passaic rivers.

The Chicago, Milwaukee & St. Paul has divided an order for 4,000 tons of bridge steel between the Minneapolis Steel & Machinery Company and the Milwaukee Bridge Company.

The Chicago, Burlington & Quincy is in the market for 6,000 tons of structural steel for the 14-story office building to be built at Jackson boulevard and Clinton street, Chicago.

The Baltimore & Ohio has ordered 300 tons of structural steel for the pier sheds at Staten Island from the Baltimore Bridge Company. This company is also in the market for 1,000 tons of structural steel for the new warehouse at Baltimore.

General Conditions in Steel.—Steel prices continue low, due to the failure of consumers to respond, notwithstanding that the quotations are at the lowest level in several years. Few steel manufacturers anticipate any improvement in business in the last quarter of the current year, and a falling off in operations is looked for. The cut in the price of tubes is expected to be followed by a reduction in other classes of steel. Mills are looking for business at any price in order to keep their plants in operation. The Steel Corporation's Chicago district mills combined are operating at over 75 per cent. capacity, but the railway contracts for large orders do not improve.

FOREIGN RAILWAY NOTES.

Railway lines of standard gage, 4 ft. 8½ in. in operation in Uruguay at the end of 1910 amounted to 1,436 miles. There were reported last year 26 miles of narrow gage. This brings the length of the railways in Uruguay in 1910 to 1,472 miles. Of the standard gage lines 935 miles were subsidized.

The total length of railways in operation in Venezuela is 542 miles. The number of lines, according to latest information, is 12, with an invested capital of over $40,000,000. The only railway construction during 1910 was the extension of the Central Railway to Santa Lucia, about 3 miles.

The Chinese government has given its formal approval to a plan formulated by Tang Shao Yi for connecting the various commercial centers of the empire by railway and for bringing them into communication with the Siberian system on the north, the French lines in Indo-China on the south, and the Indian system terminating in Burmah on the west. It is proposed to connect with the Trans-Siberian near Lake Baikal and thus cut off about two days in the journey from Europe to Pekin and points south of it. The connection with the French lines to the south at Yunnan is entirely practicable if the Chinese would grant the necessary concessions, and British interests are ready to open connections with India and Burmah if the Chinese government will meet them half way.

Supply Trade News.

The Chicago & Alton has issued a list including about 125 machine tools which this company expects to buy in the near future.

P. H. Wilhelm has been appointed special railway representative of the Standard Leather Packing Company, Boston, Mass., with headquarters at Boston.

The Hanna Locomotive Stoker Company, Cincinnati, Ohio, has moved its offices from the South National Bank building to the Mercantile Library building.

E. C. McMillan, mechanical engineer of the American Bureau of Inspection & Tests, has been appointed manager of that concern, with office at Pittsburgh, succeeding George W. Greene, resigned.

The Mumford Molding Machine Company, Plainfield, N. J., has received an order from the American Brake Shoe & Foundry Company for a 24-in. cylinder jolting machine with a table 72 in. square.

The McKeen Motor Car Company, Omaha, Neb., has delivered a seventh standard 70-ft. all steel motor car to the Oregon-Washington Railroad & Navigation Company at North Yakima, Wash.

J. A. Sauer, formerly secretary to the vice-president of the T. H. Symmington Company, Baltimore, Md., has been appointed manager of its New York office, succeeding C. S. Arthur, resigned to go to the Wales Adding Machine Company, Atlanta, Ga.

W. A. Garrett, vice-president of the T. H. Symington Company, Baltimore, Md., has resigned to re-enter railway service. Mr. Garrett was chief executive officer of the Seaboard Air Line prior to November, 1909, when he left to go to the T. H. Symington Company.

The Isthmian Canal Commission is asking bids until November 20 on electric towing locomotives for all the canal locks. Sealed proposals in triplicate will be received at the office of the general purchasing officer of the Interstate Commerce Commission, Washington, D. C. (Circular No. 650.)

E. R. Euston, formerly vice-president of the Stoerer Foundry & Manufacturing Company, New York, which has been absorbed by, and will continue business under the name of, the Treadwell Engineering Company, Easton, Pa., will be located at its general sales office at Easton.

The Youngstown Sheet & Tube Company, Youngstown, Ohio, has ordered 7,500 tons of structural steel from the American Bridge Company for the extension to its plant at Youngstown. This company is also taking prices on machinery and equipment to be used in the new building. The entire cost of the building, machinery and equipment is estimated at $2,500,000.

The Bureau of Manufacturers, Washington, D. C., has received a communication from a railway officer in South America asking for sketches showing the type of car barges used on the Mississippi, Ohio and Missouri rivers. The work on his road involves interchange of freight with other lines which have different gages, and some method must be arranged to lift the cargo that the broad gage trucks may be substituted by narrow ones, or vice versa. Plans of the methods and the machinery to be used are wanted. The address of the inquirer may be had by writing to the Bureau of Manufacturers, mentioning inquiry No. 7353.

The Roberts & Schaefer Company, Chicago, has been awarded a contract by the Kentucky & Indiana Terminal, for designing and building a [illegible] locomotive coaling station for installation at Louisville, Ky. The [illegible] to the Baltimore & Ohio, the Southern and the Monon. The company has also been awarded a contract by the Vandalia for a [illegible] type locomotive coaling station for installation at Rose Lake, Ill. [illegible] of concrete and steel, and will coal locomotives on the St. Louis division. The approximate contract price is [illegible]

The Kennicott Company, Chicago, has placed on the market a patented steel underframe for freight cars, to the design of which special attention has been given to combine strength with lightness and durability. This company is also manufacturing a patented all steel drop bottom and side dump car which has an automatic lock to prevent the doors from sagging and dropping the contents of the car along the road. Recent orders for equipment received by this company include the following: Ten all-steel 7,000-gal. Kennicott tank cars on 80,000-lb. capacity trucks for the Canadian Northern; seven 36-ft. steel underframes for the Fox River Dispatch; one 4,000-gal. sprinkling car for the Green Bay Traction Company, and two Davies patented all-steel 120,000-lb. capacity drop bottom cars for the Reiss Coal Company, Sheboygan, Wis.

The Miller Engineering Company, with which Charles H. Miller and A. C. Butterworth are associated, has recently been formed, with its principal offices in the Southern Trust building, Little Rock, Ark. The company is prepared to investigate, survey, report on and furnish estimates, designs and specifications for all classes of drainage, levee, railway, bridge, water supply, river protection work, and other municipal improvements and industrial propositions. Mr. Miller has been engaged in drainage, levee and river protection work for 19 years, having been with the Mississippi river valley and the United States government engineers for 13 years and with the Missouri-Pacific Iron Mountain system six years. Mr. Butterworth has done engineering work for ten years; most of his experience having been with the Wabash and the Missouri-Pacific.

C. J. Nash, who has been with the Westinghouse Air Brake Company, Pittsburgh, Pa., as special representative in the draft gear department for the past year, has resigned to engage in the railway supply business, where he will make a specialty of draft gear attachments. Mr. Nash began in the car business as chief draftsman of the old Lafayette Car Works, at Lafayette, Ind., and was later made general foreman at that place. He was mechanical engineer for the Pullman Company, Chicago, in charge of the contract car construction and the estimating department, for 16 years. During 1905 he was superintendent of the wooden car department and in charge of the steel passenger car department of the Standard Steel Car Company, Pittsburgh, Pa. He was then appointed chief mechanical engineer of the W. H. Miner Company, Chicago, which position he held until he went with the Westinghouse Air Brake Company.

TRADE PUBLICATIONS.

Electric Heaters.—The Gold Car Heating & Lighting Company, New York, has issued a catalogue illustrating its electric heaters for all kinds of service.

Motors.—The Crocker-Wheeler Company, Ampere, N. J., has issued a 16-page catalogue on induction motors, telling the advantages of the magnetic bridges, and how they add to the motors' operating characteristics and mechanical durability.

Circuit Breakers.—The General Electric Company, Schenectady, N. Y., has published bulletins No. 4837 to 4843, inclusive, on its circuit breakers. Bulletin No. 4837 gives full information on circuit breakers in general; bulletin No. 4838 describes circuit breakers of large capacity; bulletin No. 4839, circuit breakers of intermediate capacity; bulletin No. 4840, circuit breakers that are especially adapted to motor-driven tool applications; bulletin No. 4841, circuit breakers of small capacity; bulletin No. 4842, remote control circuit breakers; and bulletin No. 4843, magnetic blowout circuit breakers.

Drilling Machines and Tools.—The American Well Works, Aurora, Ill., has published catalog 120 on well-drilling machines, and catalog 121 on well drilling tools to be used with the machines. Catalog 120 describes various types of well drills, such as the automatic trip churn drill, the hydraulic drill, the jetting drill, the diamond drill, etc., and gives the kind of work to which each drill is best adapted. It then illustrates and describes the different machines of these types. Catalog 121 is devoted to well drilling tools designed to be used with the well drilling machines described in catalog 120 or with any other machines of standard make.

Railway Construction.

New Incorporations, Surveys, Etc.

Arizona Eastern.—See Southern Pacific.

Atchison, Topeka & Santa Fe.—An officer writes that contracts have been given to the H. Hauser Contracting Company, Los Angeles, Cal.; George W. West, San Bernardino; C. C. Welsh, Needles, and to the Sharp & Fellows Contracting Company, Los Angeles, for grading for second-track from Needles, Cal., west to Goffs, 31 miles. (September 8, p. 493.)

Atlantic, Okeechobee & Gulf.—An officer writes that the city of Tampa, Fla., has recently granted this company a franchise to enter the city. The city officials will buy at a cost of about $20,000 sufficient right-of-way for the tracks of the company, a part of the cost will be paid by the railway company. A contract has been given to the W. K. Palmer Company, engineers, Kansas City, Mo., for preliminary work on a section of 308 miles, and in about 10 weeks, or as soon as the maps, profiles and estimates are made, contracts will be given to contractors to build the line. It is expected that the work on the first section will be finished in 18 months. The projected route is from Tampa, on the west coast of Florida, southeast to Fort Lauderdale, on the east coast. Terminal facilities have been secured at both ends of the line, also a deepwater frontage at Tampa, where the company has 148 acres of water front. There are also to be some branch lines built in the territory near Tampa. The offices of the company are at Tampa. H. C. Ferriot, president; Hiram McElroy, chief engineer, and T. P. Bell, secretary. (September 22, p. 575.)

California Roads.—A line is to be built from Dumont, Cal., to the mining district of the Avawatz Gypsum Company, about 12 miles. H. H. Kerckhoff, Los Angeles, is interested.

Chicago, Burlington & Quincy.—A subway is to be built under the tracks of this company in Denver, Colo., at a cost of $13,000. The railway tracks will be raised to a minimum height of five ft. for a distance of several hundred yards on either side of the subway. The city of Denver and the county of Adams will pay part of the cost of the improvements.

Chicago, Rock Island & Pacific.—An officer writes that a contract has been given to the C. H. Sharp Contracting Company, Kansas City, Mo., to build from Malvern, Ark., to Kent, 55 miles. (June 9, p. 1333.)

Creston, Winterset & Des Moines Interurban.—Incorporation has been asked for in Iowa with $500,000 capital, and office at Creston, Iowa. The plans call for building a line northeast via Macksburg and Winterset to Des Moines, about 55 miles. R. Brown, president, Creston; C. E. Wilson, vice-president, Macksburg; M. E. Harris, second vice-president, Winterset; A. S. Lynn, secretary, Orient, and W. W. Walker, treasurer, Macksburg.

Cumberland Valley.—A contract has been given to Sundstrom & Stratton, New York City, for revision work on the line through Chambersburg, Pa. (August 25, p. 390.)

Erie Railroad.—An officer writes that this company has secured a large tract of land near Crown Point, Ind., to be used as a site for new terminals and freight yards, to have a capacity of 2,000 cars.

Eufaula & Chattahoochee Valley.—An officer writes that the company expects to begin grading work within the next 60 days. The first section to be built will be from Pittsview, Ala., to Eufaula, 21 miles. There will probably be two bridges on this section. It is expected that contracts for building additional sections between a point in Russell county and a point in Henry county will be let in the near future. J. P. Foy, president; A. H. Merrill, vice-president, and W. L. Wild, secretary and treasurer, Eufaula. (September 22, p. 575.)

Evansville, Henderson & Owensboro (Electric).—An officer writes that this company proposes to operate a line from Evansville, Ind., to Henderson, Ky., and for this purpose will electrify the Illinois Central's line which was abandoned for passenger traffic about seven years ago. This section of the Illinois Central between Evansville, Ind., and Hopkinsville, Ky., included a transfer across the Ohio river by means of incline and transfer boats. It was abandoned when an agreement was entered into with the Louisville & Nashville, by which the Illinois Central trains used the L. & N. between Henderson and Evansville, including the bridge over the Ohio river. That section of the Illinois Central has been maintained for switching service, but its river transfer was abandoned. The distance from the city limits of Evansville to the city limits of Henderson, by the I. C. is about six miles, exclusive of the river crossing, and an agreement has been entered into with the Evansville Railway Co. to permit the latter to electrify these tracks and run cars over them, connecting with the street railway tracks at the city limits at each point. The Evansville Railway Co. will install and operate a small passenger transfer boat at the river, but this will not be used by the I. C.

Evansville Railway Co.—See Evansville, Henderson & Owensboro.

Florida Roads.—The Alger-Sullivan Lumber Company, Century, Fla., is planning to build a 25-mile extension of its logging road in Monroe and Conecuh counties, Ala., for which bids will be asked in October. The work involves handling about 8,000 cu. yds. a mile. Maximum grades will be 1.5 per cent.

Illinois Central.—The report of this company for the year ended June 30, 1911, shows that during the year 128.46 miles of track were relaid with 90-lb. rail; 0.21 miles with 85-lb. rail, and 38.61 miles with 75-lb. rail, a total of 167.28 miles, and 12.22 miles of track were relaid with second-hand rail, replacing lighter sections. 85 new industrial tracks, aggregating 7.74 miles, and 63 new sidings, aggregating 8.05 miles, were added during the year. 81 miles of partially ballasted track were reballasted, this work involved widening the embankment preparatory to replacing the ballast. The company placed in operation during the year second-track between Jackson, Tenn., and Frogmoor, 1.96 miles; between Curve and Diversion, 1.3 miles, and work is 63 per cent. completed on 36.04 miles between Ponchatula, La., and Orleans Junction. Second-track is also being laid between Hawthorne, Ill., and Parkway, and it is expected that all this work will be finished during October. Work is now under way building third and fourth-tracks between Blue Island Junction, Ill., and Matteson, 13.1 miles, it is expected that this work will be finished in November. Work in connection with the enlargement of the yards and facilities at Centralia was begun in July and at Champaign on August 1. It is expected that the important additions under way at these places will furnish much needed yard facilities. See comment on the annual report of this company elsewhere in this issue.

See Evansville, Henderson & Owensboro.

Intercolonial Railway.—An officer writes that the branch to be built from near Alba, N. S., to Baddeck, 22.7 miles, for which bids are wanted October 12, is to have maximum grades of 1 per cent. and maximum curvature of 7 deg. There will be one swing span bridge, 350 ft. long, another bridge of three spans, 110 ft. long, and a third bridge of three spans, 100 ft. long. In addition, there will be six spans, 30 to 40 ft. each on this branch. (September 22, p. 575.)

Lehigh Valley.—The report of this company for the year ended June 30, 1911, shows that substantial progress has been made in the construction of the branch line from Ashmore, Pa. (formerly Lumberyard), to a connection with the main line at White Haven. This line is being built to shorten the distance from the coal fields, and to provide a route with lower grades and less curvature than the existing lines. In connection with this work, the line between Laurel Junction and Silver Brook Junction is being changed from single to double-track. It is expected that these improvements will be placed in operation within a few months. A branch from a connection with the main line near Glendon to the plateau south of Easton is under construction and nearing completion. Additional third and fourth-track work has been continued and the company now has 67.6 miles of third-track and 33.32 miles of fourth-track. An extension from Fullerton to Cementon, 3.72 miles, is completed, making a continuous four-track line of 19.61 miles through this congested section, and work is under way on a further extension

from Cementon to Treichler; 17.99 miles of company's sidings and 3.35 miles of industrial sidings were constructed during the year. West of Roselle Park a depression was eliminated by raising 4,000 ft. of the main line tracks a maximum of 6 ft. Work has been completed on a change in the alinement, eliminating a sharp reverse curve on the main line, and on the construction of additional yard facilities at South Bethlehem. A freight yard, to have a capacity of 400 cars is being constructed at Richards, west of Easton, and a new yard, with a capacity of 220 cars was constructed at Catasauqua, to provide facilities for interchange with other railways, and to compensate for sidings absorbed by third and fourth track extensions.

Liberty-White.—An officer writes that work is now under way on an extension from Ada, Pike county, Miss., to Tylertown, 15.6 miles, where connection will be made with the New Orleans Great Northern. The first two miles to Kaigler has been placed in operation. (June 9, p. 1334.)

Regarding the reports that an extension is to be built to timberlands at a point near Columbia, in Marion county, an officer writes that plans are not yet sufficiently advanced to give out any information.

Oregon Electric.—A contract has been given to McDougal & Guthrie, and a sub-contract has been given to Fuller & Bain, for building the extension from Salem, Ore., south to Albany, about 30 miles. This work is now under way. (September 22, p. 576.)

Oregon-Washington Railroad & Navigation Company.—An officer writes that grading work has been finished, but track laying has not yet been started on the line from a point west of Ayer station, Wash., on the existing line east along the south bank of the Snake river, thence north along Cow creek, passing east of Perry and Palouse Falls, thence via Ankeny to Marengo, 41 miles. The contractors for the grading and bridge work were: G. A. Carlson & Co. and W. L. Tribble, both of Spokane; Eschbach-Bruce Company, North Yakima; George Chew and Coughren-Boynton & Co., both of Spokane. The grading work averaged about 25,500 cu. yds. of solid rock, 8,250 cu. yds. of loose rock and 30,000 cu. yds. of earth a mile. Maximum grades are 6 per cent. and maximum curvature 3 deg. There are three steel bridges 4,870 ft. long and eight tunnels, having a total length of 6,470 ft. (May 19, p. 1187.)

San Antonio, Rockport & Mexican.—Financial arrangements have been made in London, Eng., it is said, to build this line. The terms of the agreement provides that bonuses amounting to $8,000 a mile must be secured from land owners and others along the proposed route. The plans call for a line from San Antonio, Tex., south to Brownsville, with a branch from a point about 125 miles south of San Antonio east to Rockport, on the Gulf coast, in all, about 350 miles. A. L. Matlock, San Antonio, is said to be interested. (September 15, p. 545.)

Scott City Northern.—An officer writes that it is undecided when this line will be extended. The road was opened for operation on August 1, from Winona, Kan., on the Union Pacific, south to Scott City, 52 miles, where connection is made [illegible] and the Garden City, Gulf & Northern. The line is expected to find a traffic in grain and live stock. (March 3, p. 434.)

[illegible] is planning to start work on the proposed extension of the Arizona Eastern, which has been under consideration for a long time. The plans call for an extension of the Globe division, from Globe, Ariz., northeast through Arizona and western New Mexico to Durango, Colo.

[illegible]

RAILWAY STRUCTURES.

[illegible]

Sound, have been finished, it is said, and construction work will be started soon. The estimated cost of the passenger station is $40,000, and the freight house $15,000. The same plans will be used for the construction of stations at Hoquiam. (May 26, p. 1225.)

Alba, N. S.—See Intercolonial Railway under Railway Construction.

Bingham, Utah.—The Bingham & Garfield is building a station, it is said, near Carr Fork, at Bingham. The work includes putting up a cable railway to transport passengers and freight from the street level in the business district, to the station, which is located upon a hill at an elevation of 500 ft.

Centralia, Wash.—The city council of Centralia has passed an ordinance granting street vacations requested by the Oregon-Washington Railroad & Navigation Company, and the Northern Pacific, for the construction of the new passenger and freight stations, roundhouse and machine shops at Centralia. It is understood that the improvements will cost $750,000. (June 2, p. 1297.)

Cleveland, Ohio.—Contracts have been let and work has been started on a large ore handling plant for the Pennsylvania Company on the lake front, a short distance from the mouth of the Cuyahoga river, at Cleveland. It is expected that the plant will unload two large vessels a day, or from 25,000 to 30,000 tons. There will be four unloaders, which will be equipped with 17-ton buckets. Some 43 acres is now being reclaimed by filling in between the government harbor line and the shore, and this will provide a frontage on the lake of about 2,000 ft. The work includes the construction of a reinforced concrete dock, 1,000 ft. long; foundations for the ore handling machinery; a 15-ton ore bridge; a power house of 2,200 k. w. capacity; a hauling system for placing cars under the machines; a yard development for loaded and empty cars, and an undergrade crossing of the Lake Shore & Michigan Southern. Contracts have been given for the dock and concrete work to the Great Lakes Dredge & Dock Company; the steel unloaders are being furnished by the Wellman-Seaver-Morgan Company, Cleveland, and the embankments are being made by the railway company with its own forces.

Crown Point, Ind.—See Erie Railroad under Railway Construction.

Daytona, Fla.—The Florida East Coast contemplates making extensive improvements at Daytona.

Ft. Stockton, Tex.—The Kansas City, Mexico & Orient is preparing plans for a division terminal to include roundhouse and yards.

Galveston, Tex.—The Southern Pacific has let the contract to Wm. Pearson & Co., Houston, for building a reinforced concrete warehouse, 71 ft. x 1,000 ft., with tar and gravel roof, on Pier "B" at Galveston. The building will be divided into five compartments of 70 ft. x 200 ft. each, by fireproof brick walls. Excavation work for the foundations has already been started. The estimated cost is $65,000. (September 8, p. 494.)

Holly, Colo.—The Atchison, Topeka & Santa Fe will build a brick passenger station to cost $25,000.

Hoquiam, Wash.—See Aberdeen, Wash.

Keddie, Cal.—The Western Pacific is building an addition to its station and yards at Keddie.

Laurel, Miss.—The New Orleans, Mobile & Chicago has plans to build new repair shops and to remove the present turntable and install an 80 ft. table near the new shops.

London, Ont.—Permission has been granted the Canadian Pacific, it is said, to make improvements in London, at a cost of $70,000. The work includes building a two-story brick station, constructing a coaling plant with chutes and approaches, also [illegible] and a steel and cement water tank. A contract for the brick work has been given to John Hayman.

Long Beach, Cal.—The Pacific Electric has started work on the new station at Long Beach, to cost $10,000. (November 11, p. 944.)

Los Angeles, Cal.—A permit has been given to the Southern Pacific to make improvements and additions to its wharf at San Pedro harbor, at a cost of $10,000.

Louisville, Ky.—The Kentucky & Indiana Terminal Railway has let the contract for building a 300-ton concrete coaling station of the Hulman type, and will probably build in the near

future a roundhouse and machine shop. This company has also started construction on a new freight yard, with a capacity of 2,500 cars. In addition to the above it is double tracking all of the main line, and has begun grade separation work at all street crossings between the Ohio river and Walnut street, a distance of about two miles.

Milan, Pa.—The report of the Lehigh Valley, for the year ended June 30, 1911, shows that work has been carried out during the year on the following structures: A combined freight and passenger station of hollow tile and stucco construction was built at Milan, and separate passenger and freight stations of similar construction at Cortland, N. Y. At South Bethlehem, Pa., a concrete freight house was built. New milk shipping stations were built at Erin, N. Y., and at Wilseyville. Additions were made to the freight station at Wilkesbarre, Pa., and to the office buildings at Easton and Oak Island Transfer, N. J., an additional platform, 810 ft. long, with necessary tracks, was constructed at Oak Island Transfer. A 16-stall concrete roundhouses was constructed at Coxton, Pa., and a concrete boiler house at South Easton. A steel bulkhead shed was erected at pier 34, New York, and extensive repairs were made to various bulkheads, sheds, piers and docks at New York and Jersey City, N. J., as well as to the cold storage and shipping trestles at the Pert Amboy and Tifft Farm, New York, terminals.

Moscow, Idaho.—The Spokane & Inland Empire is making plans, it is said, for putting up a new station at Moscow.

New Orleans, La.—The report of the Illinois Central for the year ended June 30, 1911, shows that the following improvement work was carried out during the year: A combined freight station, office building and warehouse of brick and reinforced construction and the necessary yard facilities, at New Orleans, was completed, and a number of other stations were rebuilt or enlarged during the year. A new coaling plant was built at Manchester, Iowa, to replace the structure destroyed by fire, and a new water station was installed at La Branch, La. New 85-ft. turntables were installed at Paducah, Ky., and at McComb, Miss., replacing 66-ft. tables. 3,693 lin. ft. of permanent bridges, and trestles were constructed, replacing timber and pile bridges, trestles and embankments; 722 lin. ft. of permanent bridges and trestles, and 34,792 lin. ft. of timber and pile bridges and trestles were rebuilt or replaced by embankments, and 1,003 lin. ft. of permanent stone culverts were constructed.

Pecos, Tex.—The Pecos Valley Southern will build an engine work shop 40 ft. x 100 ft. of reinforced concrete construction.

Pittsburgh, Pa.—An officer of the Pittsburgh & Lake Erie writes that improvements are now being carried out in front of the Pittsburgh terminal station. The work includes putting up a covering 40 ft. wide over Smithfield street. The clearance under the roof will be about 19 ft. 9 in. above the street. In addition, a subway is being constructed under Smithfield street for the use of passengers to pass under the street to a stairway on the opposite side from the station. W. F. Trimble & Sons Company has the contract for the overhead structure, and the McKelvy-Hine Company has the contract for the subway. The cost of the improvements will be about $50,000.

Roseburg, Ore.—The Southern Pacific has plans made for putting up a new station at Roseburg, to cost $22,000. Work on this improvement, it is said, will be started at once.

Terre Haute, Ind.—The Terre Haute, Indianapolis & Eastern is preparing plans for a brick and steel passenger station and office building which will probably be six stories high and cost about $100,000.

The Dalles, Ore.—The Great Southern has started work on a new station at The Dalles, to replace the structure recently destroyed by fire. (August 11, p. 305.)

Sherbrooke, Que.—Bids are wanted by the Quebec Central, it is said, for putting up a concrete station, two stories high, at Sherbrooke, to cost $30,000.

Woonsocket, R. I.—The New York, New Haven & Hartford through the Eastern Construction Company, has filed an application for a building permit to put up two new freight houses on North Main street, Woonsocket. It is thought that this is a plan of the New Haven to delay the entrance of the Grand Trunk into Rhode Island.

Railway Financial News.

Chicago, Indianapolis & Louisville.—John R. Waterbury, president of the Manhattan Trust Company, New York, has been elected a director, succeeding William H. McDoel.

Boston & Albany.—The board of directors has been increased from nine to ten, and William K. Vanderbilt, Jr., assistant to the president of the New York Central & Hudson River, has been elected a director of the Boston & Albany.

Denver, Northwestern & Pacific.—The *Denver Republican* says that the stockholders of this company will be asked at a meeting on October 14 to authorize an issue of $40,000,000 5 per cent. bonds and $8,000,000 6 per cent. income bonds, and to increase the capital stock from $20,000,000 to $40,000,000. It is said that a part of the new bond issue will be used to retire the $10,940,000 bonds outstanding. The paper quotes S. M. Perry, secretary and treasurer, as follows:

"The new stock and the new bonds, if authorized and issued, will not be placed upon the market all at once, as to do so would flood the market. After disposing of the present bonds and the floating debt, the portion of the new issue remaining will be disposed of from time to time as money is needed for construction, or for other purposes. This means that funds necessary for the construction of the line through to Salt Lake City, the building of the Orestod to Dotsero cutoff and the building of a road into the anthracite coal fields in Routt county will be forthcoming and that the vast empire of northwestern Colorado will be opened to development.

"This will not consume the entire bond and stock issues, by any means, but the directorate thought it wise to make one mortgage of the property and make certain of having sufficient money in sight before again beginning actual construction work, rather than be forced to re-finance the road at some future time and before the work is completed."

Detroit, Toledo & Ironton.—The protective committee of the bondholders of Detroit Southern, Ohio Southern division, first mortgage 4 per cent. bonds, J. N. Wallace, chairman, will accept further deposits of these bonds up to September 30, 1911, on the payment of an assessment of 1 per cent.

International & Great Northern.—On September 22 the property of the International & Great Northern Railroad was deeded to the International & Great Northern Railway, the new company.

Old Colony Railroad.—The directors have authorized an issue of $500,000 additional stock, making the total stock outstanding $21,664,000. The proceeds of the sale are to be used to reimburse the New York, New Haven & Hartford for expenditures under its 99-year lease amounting to about $850,000.

Washington-Virginia.—The directors have declared a dividend of 1½ per cent. on the common stock and on the preferred stock, payable November 1. The first dividend payments were made on March 15, 1911, and were 1½ per cent. on the preferred and 1 per cent. on the common.

FOREIGN RAILWAY NOTES.

Good progress is being made on the Goyaz Railway, Brazil, which is to run from Formiga, in Minas Geraes, up to and beyond the capital of Goyaz. At the close of 1910 the line had been completed to Bambuhy in that state.

The Samana and Santiago Railway, Dominican Republic, extends from Sanchez to La Vega, with a branch to Salcedo. Plans have been completed for the extension of this branch to Moca to connect with the Dominican Central Railway, and construction work is soon to be commenced. The total number of miles of this road now in operation is 73.

Concessions have been granted by the Argentine government for several lines in the north to be constructed toward the Chilean frontier. One of these will start from Salta, and run to Antofagasta by way of Huatiquina, work on which will begin in October, 1911; another commences at Tinogasta, in Catamarca; while a third will extend from Chilecito, in the province of La Rioja.

ANNUAL REPORTS

BROOKLYN RAPID TRANSIT CO.

REPORT OF THE BOARD OF DIRECTORS TO THE STOCKHOLDERS FOR YEAR ENDING JUNE 30, 1911.

85 Clinton Street,

Brooklyn, N. Y., Sept. 18, 1911.

COMPARATIVE STATEMENT OF THE RESULTS OF THE OPERATIONS OF THE BROOKLYN RAPID TRANSIT SYSTEM FOR YEARS ENDING JUNE 30, 1911 AND 1910.

	1911.	1910.	Increase or Decrease.
Gross Earnings from Operation..	$21,986,543.01	20,979,514.58	+1,007,028.43
Operating Expenses	12,166,367.03	11,737,110.76	+ 429,256.27
Net Earnings from Operation	9,820,175.98	9,242,403.82	+ 577,772.16
Income from Other Sources....	297,524.30	278,814.08	+ 18,710.22
Total Income	10,117,700.28	9,521,217.90	+ 596,482.38
Less Taxes and Fixed Charges	6,969,221.35	6,909,622.61	+ 59,598.74
Net Income	3,148,478.93	2,611,595.29	+ 536,883.64
Cost of which there was taken for Betterments to Property, charged to Operation.....	88,534.72	108,560.19	— 20,025.47
Surplus from Operation for the Year	3,059,944.21	2,503,035.10	+ 556,909.11
Profit from Real Estate disposed of	.....	69,184.65	— 69,184.65
Total Surplus for Year.....	3,059,944.21	2,572,219.75	+ 487,724.46
Surplus at Beginning of Year	4,781,035.42	4,387,229.84	+ 393,805.58
Total	7,840,979.63	6,959,449.59	+ 881,530.04
Of this amount there has been appropriated:			
Old accounts written off...	3,609.91	636.43	+ 2,973.48
Additional Reserves for Taxes prior years.....	49,855.61	232,917.34	— 183,061.73
Adjustment of Expenses prior year	.....	13,281.17	— 13,281.17
Supercession and Depreciation	105,608.46	25,292.73	+ 80,315.73
Refunds applying prior years	11,821.11	.....	+ 11,821.11
Dividend on B. R. T. Co.'s Stock outstanding	2,242,690.00	1,906,286.50	+ 336,403.50
Total Appropriations	2,413,585.09	2,178,414.17	+ 235,170.92
Balance Sheet Surplus.....	$5,427,394.54	4,781,035.42	+ 646,359.12

NEW RAPID TRANSIT LINES.

Under date of December 20th last, the Public Service Commission for [illegible] extension of its lines in Manhattan, the Bronx and Brooklyn, and for the [illegible] rapid transit development.

The Board of Estimate and Apportionment responded to the request by [illegible] proposals [illegible] Brooklyn [illegible] eventual [illegible] suburban population, contributing to the commercial, financial and intellectual activities of a great city, creating increasing demands for employment and consumption, which marks the evolution of a metropolis. It is the opportunity for cheap homes amid healthful surroundings which relieves unwholesome congestion and stimulates the moral, physical and political welfare of a cosmopolitan community. Not without adequate transit, reaching from its municipal heart like great arteries to its outlying sections, can New York realize its best and richest development, and even the appreciation of material values in Manhattan, the business heart, must depend mostly upon the facility with which the resident population of the neighboring Boroughs is brought into its territory. Until now this great outside army of residents has been brought only to the gateways of Manhattan. The handicap of double fares, change of cars and constricted terminals has been a retarding influence on municipal growth and public welfare. No system of transportation can be adequate which does not carry people quickly, safely and cheaply between their homes and the districts of their daily vocations.

Your Company, recognizing these considerations and its obligations toward them as the only public service corporation through which, by reason of its existing facilities, improvement of transit conditions in Brooklyn and Queens can be most promptly and effectually accomplished, proposed through its communication of March 2d, not only new lines and enlargement of existing lines in those two Boroughs, but a distributing subway line in Manhattan, from the Battery to 59th Street, located mostly on Broadway, with suitable connections with the East River Bridges and a new tunnel under the river. The plan of transportation thus proposed received instant and general public approval. It did not involve the use of any thoroughfare in Manhattan covered by negotiations between the City and any other railroad company. It did not conflict with any plans for the development of rapid transit in Manhattan and the Bronx nor in part of Queens. During the negotiations and conferences however, it became evident that the City might not be able to agree with the Interborough Company as to desired rapid transit lines in Manhattan and the Bronx if the Brooklyn Company was to be allowed a distributing line for its passengers on Broadway. The joint committee therefore requested your Directors to consider whether the Company would include in its proposition all of such Manhattan and Bronx lines (with the exception of a line on Seventh Avenue south of 42d Street) and certain additional lines in Queens and Brooklyn. Assurance to this effect was furnished in the Company's communications of April 25th and May 2d.

The conclusions of the Joint Committee were incorporated in a unanimous report under date of June 5th outlining generally the principles which should guide the City in transit commitments, and recommending specifically not only the carrying out, under conditions laid down in the report, of the transportation plan as substantially presented in your Company's original proposition of March 2d, but also the allotment to the Interborough Company, under terms prescribed, of lines which it had sought to operate in Manhattan, Bronx, Queens and Brooklyn Boroughs. In the contingency that the Interborough Company should not accept the terms of the report as related to that Company, most of the lines proposed for operation by it were, by the report, to be offered to the Brooklyn Company. *This report was unanimously approved on June 21st by the Board of Estimate and Apportionment, including the Mayor,* and the Companies, under the resolution of approval, were requested to file their acceptance or rejection of the terms proposed for each on or before June 28th. The Interborough Company's reply was a declination and a withdrawal of its previous propositions. The Brooklyn Company's reply was a general acceptance. Once more the Joint Committee reported, suggesting some modifications in terms for each Company and recommending the preparation of contracts for carrying out substantially the Brooklyn Company's original proposition, conditioned, however, upon the Company's assurance on or before July 6th that it would, if requested, operate additional lines which had been allotted to the Interborough Company but declined by that company, and once more the Board of Estimate approved the Committee's recommendations. The assurance required of the Brooklyn Company was again formally given. In the meanwhile negotiations had been resumed by the Joint Committee with the Interborough Company, but no agreement satisfactory to the Board having been reached, the Board, on July 21, 1911, acting for the third time upon the recommendation of its special committee and the Public Service Commission, adopted resolutions reciting that it would "approve contracts to be prepared by the Public Service Commission under the general provisions of the Rapid Transit Act for the construction, equipment and operation of rapid transit railways along the lines now proposed for operation by the Brooklyn Rapid Transit Company —either through instrumentality of such new railroad company as may be organized for the purpose, or through its present agencies—and for the extension and third-tracking of the existing elevated lines of the Brooklyn Rapid Transit Company," and requesting the Public Service Commission at the earliest practicable date to submit the necessary forms of contract. Thus, with great deliberation, and after the fullest opportunity for public discussion and for corporate co-operation, was the City's policy of transportation officially defined, and your Company's relation thereto materially [illegible]

The Rapid Transit Act requires a certain procedure to be followed, including a public [illegible] proposals and these formalities are now to be undertaken by the Public Service Commission. Upon their completion, [illegible] the [illegible] if made in accordance with the declared policy and expressed sentiment of the two official bodies (the Board of Estimate and [illegible] and the Public Service Commission), your Company, through the [illegible] of a new corporation to be organized for that purpose, and with the co-operation of existing railroad companies, will be furnished with the necessary authority to undertake the execution of a much larger plan of transportation than it originally proposed, involving the expenditure of much additional money, and operation over a much wider territory. Your Company, through its [illegible] connectability, while preserving its distinctive [illegible] in Manhattan and the enlargement asked for in Brooklyn and Queens, will no longer be a local corporation, serving the people of the Boroughs, but a Greater New York corporation, serving the people of five Boroughs. The conditions which have brought about this situation have not been of our making, but the responsibility which it involves will not be evaded, and the opportunity which it affords for public service will not be ignored. In the disinterested purpose and intelligent consideration which marked the preceding official conferences, and in the subsequent declaration of principles upon which the City's representatives acted, a new chapter was written in the history of municipal transit and a new standard

of official conduct and performance was established. Your Directors conceive it to be their paramount duty to insure, so far as the obligation rests upon them, the complete and satisfactory carrying out of the City's comprehensive and far-sighted policy for a unified transportation system, capable of indefinite expansion, constructed and equipped in accordance with the most improved methods, and operated with the highest attainable efficiency and for a single fare. The radical safeguards to be embodied in the proposed contract for the protection of the City's interests make the terms severe, the rewards of successful operation are to be shared equally by the City and the operator, and the privilege of recapture after ten years is a financial handicap to the operator—but so much does the proposed new system offer for the development and welfare of the City that it would be an extremely short-sighted policy for an existing transportation company, from motives of temporary expediency or profit, to refrain from co-operating for the accomplishment of these great results—in which, with the City and its people, the operator, so long as it fulfills its obligation faithfully and renders to the public the service called for, may be participant both as to pride and profit.

Under the terms of the proposed contract the operator will be called upon to expend approximately $75,000,000 in construction and equipment. This money your Directors have already arranged for. The plan of financing will be announced at the proper time.

The system of transportation comprised in the proposed contract will traverse sections aggregating substantially nine-tenths of the area of Greater New York and will serve seven-tenths of the population. The only important section not covered is that which would be served by the construction of a rapid transit line on Seventh Avenue, from 42d Street south, passing the Pennsylvania Railroad Station. In the event that such a line should not be constructed and operated as a natural extension of the existing rapid transit railroad, it could be made a part of the new system with a northerly extension on the east side of Manhattan, which within a few years will probably be necessary for the relief of that growing population. It should be borne in mind, however, that without any extension on Seventh Avenue the lines already comprised in the new rapid transit system will bring within short distance of the Pennsylvania Station several millions of people of Greater New York who cannot now reach it at all by rapid transit except with change of cars and for two fares. The train platforms in the Pennsylvania Station will be only 500 feet farther from the proposed Broadway subway than the train platforms in the new Grand Central Station will be from the present subway station at 42d Street.

CONSOLIDATED BALANCE SHEET, JUNE 30, 1911.

Assets.

Cost of Road and Equipment:		
Properties owned in whole or in part by Brooklyn Rapid Transit Company	$125,486,453.28	
Construction, Expenditure, Constituent Companies, not yet funded	465,455.23	
	$125,951,908.51	
Bonds of Brooklyn City Railroad Company deposited with Trustee of Brooklyn Rapid Transit Company Refunding 4% Bonds	600,000.00	
Advances to Leased Companies, account of additions and betterments to Leased Lines	11,233,083.38	
Securities deposited with Trustee to guarantee performance of terms of Lease of Brooklyn City Railroad (Comprising $2,000,000 Brooklyn, Queens County & Suburban Railroad Co. 1st Mortgage 5% Bonds at 103½, $25,000 Brooklyn Rapid Transit 5% Bonds at par, $1,627,000 Brooklyn City Railroad Consolidated 5's at 103½, $125,000 Brooklyn City Railroad Refunding 4's at par, and Cash $975)	3,904,920.00	
		$141,689,911.89
Materials and Supplies		1,012,607.83
Current Assets:		
Accounts Receivable	$864,980.21	
Investments	177,164.20	
Cash on hand and in Bank	$1,518,058.84	
		2,560,203.25
In addition there are the following Treasury Bonds and Stocks available for sale not included in Assets or Liabilities:		
Brooklyn Rapid Transit Company—Capital Stock, par value	$146,228	
Bonds of Brooklyn Rapid Transit and Constituent Companies, par value	16,016,500	
	$16,162,728	
Special Deposits of Securities and Cash:		
Insurance Reserve Investments	$216,155.82	
Cash deposited to guarantee performance of contract	500.00	
		216,655.82
Prepaid Accounts		110,181.74
		$145,589,560.53

Liabilities.

Capital Stock:		
Brooklyn Rapid Transit Company—		
Capital Stock	$45,000,000.00	
Less—In Treasury	146,228.00	
	$44,853,772.00	
Constituent Companies—		
Shares not owned by the Brooklyn Rapid Transit Company	842,608.98	
		$45,696,380.98
Funded Debt:		
Issued:		
Brooklyn Rapid Transit Company	$56,717,000.00	
The Brooklyn Heights Railroad Company	250,000.00	
The Nassau Electric Railroad Company	15,000,040.00	
Brooklyn, Queens County & Suburban Railroad Company	6,624,000.00	
Brooklyn Union Elevated Railroad Co.	23,000,000.00	
Sea Beach Railway Company	650,000.00	
	$102,241,040.00	
Less—In Treasury or pledged as collateral	$16,016,500	
Deposited with Trustees of Mortgages	1,809,000	
	17,825,500.00	
		84,415,540.00
Real Estate Mortgage		150,000.00
Current Liabilities:		
Bills Payable (secured by deposit of Brooklyn Rapid Transit Company Refunding Bonds)	$5,100,000.00	
Accounts Payable	1,640,361.94	
Taxes accrued	1,855,289.37	
Interest accrued on Funded Debt	615,469.03	
Interest and Rentals accrued	59,925.58	
		9,271,045.92
Reserves:		
Insurance Reserve	$267,584.09	
Accrued Amortization of Capital	361,615.00	
		629,199.09
Surplus		5,427,394.54
		$145,589,560.53

PRICE, WATERHOUSE & CO., CHARTERED ACCOUNTANTS,

54 William Street, New York City,
August 26, 1911.

We have examined the books and accounts of the Brooklyn Rapid Transit Company and constituent Companies for the year ending June 30, 1911, and certify that in our opinion the above Balance Sheet is properly drawn up so as to show the true financial position of the Company and its constituent Companies at that date, and that the Income Account for the year as shown herewith is correct.

(Signed) Price, Waterhouse & Co.,
Chartered Accountants.

CONSOLIDATED BALANCE SHEET, JUNE 30, 1911.

ILLINOIS CENTRAL RAILROAD COMPANY.

REPORT OF THE BOARD OF DIRECTORS.

To the Stockholders of the Illinois Central Railroad Company:

The Board of Directors herewith submit report covering the operations and the affairs of the Company for the year ended June 30, 1911.

The number of miles of railroad operated on June 30, 1910, was.. 4,550.54
On July 1, 1910, there was transferred from "Mileage of road leased to other companies" to "Mileage of road operated," the line Riverside Jct., Ill., to Harlem, Ill..... 2.15
There was added on January 17, 1911, the mileage formerly operated as the Brookhaven & Pearl River R. R., from Brookhaven, Miss., to Monticello, Miss..... 23.40
The number of miles in operation on June 30, 1911, was..... 4,576.09
The average number of miles operated during the year was..... 4,563.27

INCOME.

The following income account for the year is stated in accordance with the Company's returns to the Interstate Commerce Commission and for comparative purposes the account for the preceding year is re-stated.

	1911.	1910.	Increase+ Decrease—
Miles operated during year	4,563.27	4,550.54	+ 12.73
Operating revenues:			
[illegible]	$40,682,197.38	$38,777,758.45	+$1,904,438.93
Bridge tolls and miscellaneous freight	3,132,190.02	3,093,636.52	+ 38,553.50
Passenger	12,925,004.44	11,881,013.64	+ 1,043,990.80
Bridge tolls and miscellaneous passenger	263,226.04	198,876.09	+ 64,349.95
Mail	939,005.88	940,118.90	— 1,113.02
Express	1,524,416.15	1,540,218.94	— 15,802.79
Other passenger train	424,431.76	403,506.53	+ 20,925.23
Other transportation	672,218.13	658,122.97	+ 14,095.16
Revenue from operations other than transportation.	414,341.69	391,469.05	+ 22,872.64
Total operating revenues..	60,977,031.49	57,884,721.09	+ 3,092,310.40
Operating expenses:			
Maintenance of way and structures	7,523,295.47	7,607,891.43	— 84,595.96
Maintenance of equipment..	12,317,364.33	13,502,249.72	— 1,184,885.39
Traffic expenses	1,334,163.08	1,246,381.57	+ 87,781.51
Transportation expenses	21,333,834.75	19,734,910.53	+ 1,598,924.22
General expenses	1,347,570.50	1,229,297.14	+ 118,273.36
Total operating expenses..	43,856,228.13	43,320,730.39	+ 535,497.74
Net operating revenue....	17,120,803.36	14,563,990.70	+ 2,556,812.66
[illegible]			
Revenues	471,491.13	462,254.04	+ 9,237.09
[illegible]	527,955.37	496,672.27	+ 31,283.10
Net revenue from ferry operations	56,464.24	34,418.23	+ 22,046.01
Total net revenue.....	17,064,339.12	14,529,572.47	+ 2,534,766.65
Taxes accrued	2,671,290.22	2,524,898.68	+ 146,391.54
Operating income	14,393,048.90	12,004,673.79	+ 2,388,375.11
[illegible]	6,743,438.50	5,284,608.85	+ 1,457,829.65
Gross corporate income...	21,135,487.40	17,289,282.64	+ 3,846,204.76
[illegible]	2,830,143.45	2,476,084.46	+ 354,059.02
Net [illegible]	18,305,343.95	14,813,198.18	+ 3,492,145.74
Deductions from net corporate income:			
Dividends on capital stock.	7,650,720.00	7,650,720.00	
Appropriated for additions and [illegible]	164,847.53		+ 164,847.53
[illegible] credit	3,499,776.42	1,162,478.18	+ 3,317,298.24

REVENUE.

[illegible] Company has continued satisfactory, and while the [illegible] for the current year show substantial increases in practically all departments, the total operating revenues for the [illegible] $60,977,031.49 compared with $57,884,721.09, an increase of $3,092,310.40 or 5.34 per cent.

Revenue from transportation of freight increased $1,904,438.93 or 4.91 per cent. The tons of freight carried increased [illegible] tons or 2.28 per cent, and the tons carried one mile increased [illegible] or 3.18 per cent.

Revenue from transportation of passengers increased $1,043,990.80 or 8.79 per cent. The increase in passenger traffic was general over the [illegible] of the system.

EXPENSES.

[illegible] $43,856,228.13 compared with [illegible] an increase of $535,497.74 or 1.24 per cent.

MAINTENANCE OF WAY AND STRUCTURES.

[illegible] $84,595.96 or 1.11 per cent. [illegible] to various betterments on the [illegible] Division and on the [illegible] Division, and [illegible] Bridges and Water Works, the entire cost of which [illegible] operating expenses.

[illegible] $1,184,885.39 or 8.78 per cent. [illegible] $1,178,768.37 compared with $393,339.08 for the previous year. [illegible] 340 locomotives received general repairs compared with 297 last year, and 335 locomotives received thorough repairs compared with 356 last year.

The average mileage per serviceable engine for the year was 34,145.

371 passenger train cars received general repairs compared with 374 last year, and 124 cars received thorough repairs compared with 111 last year.

54,466 freight cars received medium repairs compared with 53,576 last year, and 30,435 cars received heavy repairs compared with 36,574 last year.

The average age of locomotives was 14.22 years compared with 13.87 years for the last year; of revenue freight cars 9.20 years compared with 8.44 years last year; of passenger train cars 19.2 years compared with 19.4 last year.

TRAFFIC EXPENSES.

Traffic expenses increased $87,781.51 or 7.04 per cent.

A new commercial agency at Minneapolis, Minn., and a freight and passenger agency at Sacramento, Cal., were established.

Additional contracting and soliciting forces were added to the agencies at New York, N. Y., Boston, Mass., Pittsburg, Pa., Evansville, Ind., and Portland, Ore. An Assistant Industrial and Immigration Commissioner was added to the traveling representation in the South.

TRANSPORTATION EXPENSES.

Transportation expenses increased $1,598,924.22 or 8.10 per cent.

The revenue freight train miles increased 468,490 miles or 2.65 per cent.

The tons of all freight carried increased 753,329 or 2.28 per cent, and the tons of all freight carried one mile increased 248,092,657 or 3.18 per cent.

The revenue passenger train miles increased 162,324 miles or 1.28 per cent.

The number of revenue passengers increased 1,556,995 or 6.17 per cent. and the revenue passengers carried one mile increased 49,173,299 or 7.56 per cent.

From time to time during the fiscal year substantial increases were granted in the rates of pay of engineers, firemen, conductors, brakemen, flagmen, baggagemen, switchmen, roundhousemen, telegraph operators and a number of other employes engaged in the transportation department.

As a result of the labor difficulties during the spring and summer of 1910, the wages of coal miners were increased and this resulted in a substantial increase in the price per ton paid by the Company for its fuel supply.

GENERAL EXPENSES.

General expenses increased $118,273.36 or 9.62 per cent.

TAXES.

There was an increase of $146,391.54 or 5.80 per cent in taxes.

There was a substantial increase in the Federal Excise tax, in the Charter tax in Illinois and in the taxes in several other states through which the road is operated.

FINANCIAL.

The general balance sheet Table No. 4 showing the financial condition of the Company at the close of the fiscal year is in the form prescribed by the Interstate Commerce Commission. For the purpose of comparison, the figures for the fiscal year 1910 have been re-stated in the same form.

CAPITAL STOCK AND FUNDED DEBT.

There was no change in the capital stock during the year.

$71,000.00 Belleville & Eldorado R. R. Co. 7% Bonds matured July 1st, 1910, and were redeemed. Upon the Company depositing these bonds with the Trustee of the St. Louis Division 3½% Mortgage of 1951, it became entitled to issue $78,000.00 of bonds secured under that mortgage.

On January 26th, the $2,662,000.00 of Purchased Lines 3½% Bonds of 1952 which were held in the treasury and the $78,000.00 of St. Louis Division 3½% Bonds of 1951 were exchanged for $2,740,000.00 of Gold Refunding 4% Bonds of 1955 in accordance with the terms of section three of article two of the Refunding mortgage.

The railroad property known as the Indianapolis Southern Railroad was sold under foreclosure to the Illinois Central Railroad Company, and early in the calendar year 1911 this Company mortgaged to the trustee of the Refunding mortgage by a supplemental indenture, the property thus acquired. In accordance with section two of article two of the Refunding mortgage the Company issued during the month of June $8,200,000.00 of the [illegible] of bonds authorized to be issued. The $8,200,000.00 of bonds so issued, in addition to the $2,740,000.00 of Gold Refunding bonds above referred to, were sold and the proceeds are reflected in the cash account.

[illegible] of the First Lien Equipment Bonds were delivered to the trustee and cancelled in accordance with the provisions of the indenture.

SECURITIES OWNED.

In order to simplify the accounts, certain bonds of the subsidiary companies have been returned to the respective companies and the valuation at which [illegible] carried on the books of this Company is now kept under the caption "Capital Advances", Folio No. 6.

The securities of the Louisville New Orleans & Texas Railway Company Last Mile Bridge Mortgage of 1934 have been placed [illegible] of bonds owned by your Company and pledged as partial security under the Illinois Central Railroad Company's Bonds of 1953, [illegible] cancelled and cancelled.

[illegible] of bonds and [illegible] of the Yazoo & Mississippi Valley Railroad Company First Lien Equipment Bonds of 1931 were received in payment for [illegible] purchased by your Company for construction.

INSURANCE AND OTHER FUNDS.

The Sinking Dividend Fund which at the close of the last fiscal year amounted to $[illegible], has been closed and the amount credited to "Profit and Loss".

The Insurance Fund was augmented during the year by charges to [illegible] and other charges have been made as follows:

1,732 lineal feet of iron pipe culverts were put in.

Thirty miles of road bed were widened preparatory to ballasting. 505 miles of ballasted track were repaired or renewed to restore to original standard.

Reference is made to information shown under the head of "Physical Changes" on page 10 of this report for work charged wholly to "Additions and Betterments" as well as work involving both "Renewals" and "Additions and Betterments."

MAINTENANCE OF EQUIPMENT.

The expenditures for maintenance of equipment decreased $1,184,885.39 or 8.78 per cent.

Charges for depreciation of equipment amounted to $1,572,107.45, compared with $393,339.08 for the previous year, an increase of $1,178,768.37.

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As a result of the labor difficulties during the spring and summer of 1910, the wages of coal miners were increased and this resulted in a substantial increase in the price per ton paid by the Company for its fuel supply.

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On January 26th, the $2,662,000.00 of Purchased Lines 3½% Bonds of 1952 which were held in the treasury and the $78,000.00 of St. Louis Division 3½% Bonds of 1951 were exchanged for $2,740,000.00 of Gold Refunding 4% Bonds of 1955 in accordance with the terms of section three of article two of the Refunding mortgage.

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In order to simplify the accounts, certain bonds of the subsidiary companies have been returned to the respective companies and the valuation at which [illegible] carried on the books of this Company is now kept under the caption "Capital Advances", Folio No. 6.

The securities of the Louisville New Orleans & Texas Railway Company Last Mile Bridge Mortgage of 1934 have been placed [illegible] of bonds owned by your Company and pledged as partial security under the Illinois Central Railroad Company's Bonds of 1953, [illegible] cancelled and cancelled.

[illegible] of bonds and [illegible] of the Yazoo & Mississippi Valley Railroad Company First Lien Equipment Bonds of 1931 were received in payment for [illegible] purchased by your Company for construction.

INSURANCE AND OTHER FUNDS.

The Sinking Dividend Fund which at the close of the last fiscal year amounted to $[illegible], has been closed and the amount credited to "Profit and Loss".

The Insurance Fund was augmented during the year by charges to [illegible] and other charges have been made as follows:

	Year Ending June 30, 1911.	Year Ending June 30, 1910.
Amount at credit of fund July 1st	$2,036,464.51	$2,009,655.15
Added through monthly charges to operating expenses	60,000.00	60,000.00
Collected from lessees account of insurance	5,189.02	6,121.01
Interest received on investments of the fund	81,320.00	84,160.00
Fire losses collected	309.02	197,710.10
	$2,183,282.55	$2,357,646.26
Losses by fire	$80,486.04	$287,450.66
Premiums paid for reinsurance	35,094.93	33,731.09
	$115,580.97	$321,181.75
Amount at credit of fund June 30th	$2,067,701.58	$2,036,464.51

The trustees of the various sinking funds have reported holdings as of June 30th, 1911, as follows:

Cairo Bridge Contingent Fund, $504,180.00, a decrease of $570.11.

Cairo Bridge Sinking Fund, $223,007.11, an increase of $24,865.40.

Sinking Fund for Western Lines Bonds, $1,040,530.76, an increase of $85,249.52.

Sinking Fund for Omaha Division Bonds, $128,644.47, an increase of $14,592.78.

The additions during the year to the several sinking funds amounted to $124,137.59.

ADDITIONS AND BETTERMENTS.

There were expended during the year for Additions and Betterments (including improvements on subsidiary properties) $3,581,668.06. The following is a classified statement of these expenditures:

	Additions and Betterments paid for from Proceeds of General Refunding Mortgage Bonds.	Additions and Betterments Appropriated out of Year's Income.	Additions and Betterments Represented by Advances to Subsidiary Lines.
Right of way and station grounds	$62,284.77	$70,955.03	$25,490.43
Real estate	355,854.67	Cr. 7,625.00	.....
Widening cuts and fills	.....	.....	33,759.64
Protection of banks and drainage	2,968.31	.....	20,905.99
Grade reductions and changes of line	.....	.....	5,822.75
Bridges, trestles and culverts	195,243.63	8,653.47	270,912.87
Increased weight of rail	55,729.21	5,626.66	52,398.48
Improved frogs and switches	2,670.76	.....	.....
Track fastenings and appurtenances	1,149.89	.....	.....
Ballast	.....	.....	59,942.52
Additional main tracks	98,335.78	.....	210,240.14
Sidings and spur tracks	99,988.10	4,871.98	113,262.66
Fencing right of way	282.52	60.07	661.54
Improvement of crossings under or over grade	2,342.42	.....	889.43
Elimination of grade crossings	144,832.89	Cr. 15,846.89	3,453.28
Interlocking apparatus	6,715.22	Cr. 1,948.70	3,861.39
Block and other signal apparatus	3,027.25	185.59	159.60
Telegraph and telephone lines	2,751.74	.....	14,349.60
Station buildings and fixtures	56,528.47	100,984.86	60,401.12
Shops, enginehouses and turntables	35,809.72	7,455.43	51,530.85
Shop machinery and tools	9,049.75	511.49	7,717.63
Water and fuel stations	1,482.36	Cr. 14,985.81	25,812.20
Grain elevators and storage warehouses	468.91	.....	1,447.72
Dock and wharf property	.....	.....	136.79
Electric light and power plants	.....	.....	466.90
EQUIPMENT:			
Steam locomotives	947,016.80	120,155.80	.....
Passenger train cars	325,736.62	255,755.79	.....
Freight train cars	24,661.47	Cr.304,925.06	.....
Work equipment	610.68	Cr. 58,293.21	.....
Floating equipment	1,600.00	Cr. 5,000.00	.....
Other additions and betterments	10,937.33	Cr. 1,744.27	5,118.03
	$2,448,079.27	$164,847.23	$968,741.56

The following shows the amount advanced during the year to each of the subsidiary lines, these amounts being included in "Capital Advances" shown in Table No. 6 of this report:

Chicago, St. Louis & New Orleans R. R.	$657,595.22
Canton, Aberdeen & Nashville R. R.	2,472.38
South Chicago R. R.	1,657.10
Blue Island R. R.	1,472.73
Dubuque & Sioux City R. R.	176,541.90
Kensington & Eastern R. R.	35,718.31
Mississippi & Alabama R. R.	8,309.09
Alabama Western R. R.	84,974.83
	$968,741.56

PHYSICAL CHANGES.

The physical condition of the Company's road and equipment has materially improved during the year. The following covers the principal physical improvements, the cost of which was wholly or partially charged to "Additions and Betterments":

ROADWAY AND STRUCTURES:

There were 128.46 miles of track relaid with 90 lb. new steel rail, .21 mile with 85 lb. new steel rail and 38.61 miles with 75 lb. new steel rail, making a total of 167.28 miles of track relaid with new steel rail. During the same period 12.22 miles of track were relaid with second hand rail replacing rail of lighter pattern. The total mileage of track relaid with new and second hand steel rail was 179.50.

Eighty-five new industrial tracks aggregating 7.74 miles in length were added after deducting industrial tracks which were taken up.

Sixty-three new Company sidings aggregating 8.05 miles in length were added after deducting the tracks taken up and those converted into second main tracks.

Eighty-one miles of partially ballasted track were reballasted and brought up to present standard, washed gravel being used for this purpose. This work involved the widening of a like mileage of embankment preparatory to placing the ballast.

On October 10th, 1910, 1.96 miles of Company's sidings were put into operation as second main track between Jackson, Tenn., and Frogmoor, Tenn.

Second main track was completed and opened for operation on July 6th, 1911, between Curve and Division, Tenn., a distance of 1.3 miles, and second main track between Ponchatoula and Orleans Junction, La., a distance of 36.04 miles, is in course of construction and about 63% completed. It is expected the track will be opened for operation about October 15th, 1911. Second main track between Hawthorne and Parkway, Ill., a distance of 4 miles is also under construction and about 70% completed. It is expected this track will be opened for operation about October 1st, 1911.

The work of constructing third and fourth main tracks between Blue Island Junction and Matteson, Ill., a distance of 13.1 miles, involving 26.2 miles of continuous track, is now under way, the work having been started a short time before the close of the fiscal year. It is expected that these tracks will be ready for service about November 1st, 1911.

The Company has in process of installation electric block signals for the track between Orleans Junction and New Orleans, La., a distance of approximately twelve miles, which when completed will protect about twenty-four miles of track. This with the trackage previously equipped makes a total of 581.30 miles of protected track. There is also in progress the work of making necessary changes in the old signal arrangements between Blue Island Junction and Matteson, Ill., a distance of 13.26 miles, which when completed will afford protection for the new third and fourth tracks now being constructed between these points as well as for the present two main tracks.

A combined freight station, office building and warehouse of brick and reinforced construction and the yard facilities in connection therewith, at New Orleans, La., were completed.

Depots were rebuilt or enlarged as follows: Passenger depots at Murphysboro, Ill., Crystal Springs and Louisville, Ky., and Jackson, Tenn.; freight depots at Murphysboro, Ill., Henderson, Ky., Waterloo and Sioux City, Iowa; combination stations at Marissa and Galton, Ill., Cerulean, Gracey, Otter Pond, Graham and Whitesville, Ky. Umbrella sheds were erected at Jackson, Tenn.

A new coaling plant was erected at Manchester, Iowa, to replace one destroyed by fire.

A new water station was installed at La Branch, La., with a water tank of 100,000 gal. capacity. Two additional tanks were erected at Chicago of 20,000 gal. and 25,000 gal. capacity respectively. At Shandy, Tenn., a new 100,000 gal. tank was erected, replacing a worn out tank of 50,000 gal. capacity. At Independence, Iowa, a new 100,000 gal. tank was erected replacing a worn out tank of 40,000 gal. capacity.

Sheds for the protection of car repairers were erected at Mounds, Ill., Memphis, Tenn., Nonconnah, Tenn., McComb, Miss., and Harahan, La.

New eighty-five ft. turntables were installed at Paducah, Ky., and McComb, Miss., replacing sixty-six ft. tables.

3,693 lineal feet of permanent bridges and trestles were constructed replacing timber and pile bridges and trestles and embankment.

722 lineal feet of permanent bridges and trestles were rebuilt or replaced by embankments.

34,792 lineal feet of timber and pile bridges and trestles were rebuilt or replaced by embankment.

1,003 lineal feet of permanent stone culverts were put in.

EQUIPMENT:

Fifty-one locomotives were added during the year and two were sold or destroyed, an increase of forty-nine locomotives with an increase of 914.6 tons in tractive efficiency.

Fifty-three passenger train cars were added during the year and three cars were vacated or transferred to other service, an increase of fifty cars.

Two hundred and twenty-four freight-train cars were added during the year and 1,879 were sold, destroyed or transferred to work service, a decrease of 1,655 cars. The cars retired from freight service were old and of light capacity. The average capacity of cars owned at the close of the year was 38.74 tons compared with 38.39 tons for last year, and the total capacity of cars was 2,232,905 tons compared with 2,277,831 tons for last year.

GENERAL REMARKS.

In furtherance of the plan of consolidating the Company's various lines of railroad, the Indianapolis Southern Railroad, all the capital stock of which has been owned by your Company for a considerable time, but which road has been operated independently, was sold under foreclosure on May 5th, 1911, and was purchased by your Company.

Commencing July 1st, 1911, the Indianapolis Southern Railroad will be operated as a part of the Indiana Division of the railroad of your Company.

The railroad extending from Brookhaven to Nola, Miss., leased to the Pearl River Lumber Co., and an extension to Monticello, Miss., constructed by the latter company, operated independently under the name of the Brookhaven & Pearl River Railroad, were taken over and the extension purchased by the Mississippi Valley Company in accordance with an agreement dated June 11th, 1904, made at the time of the construction of the extension. On January 17th, 1911, your Company began the operation of its trains over the line under a trackage agreement.

On July 3rd the new freight station and facilities located at New Orleans, La., which have been in the course of construction for several years and to which reference has heretofore been made in the annual reports of your Company, were opened for operation.

Work in connection with the enlargement of the yards and facilities at Centralia, Ill., was begun on July 1st, 1911, and at Champaign, Ill., on August 1st, 1911. It is expected that the important additions under way at these points will furnish much needed yard facilities and result in a more punctual handling of traffic.

Under the Pension System, there are carried on the rolls 364 employes to whom payments aggregating $82,598.93 were made during the fiscal year.

The Board takes pleasure in acknowledging the fidelity, efficiency and splendid team work displayed by the officers and employes in the discharge of their duties during the past year.

By order of the Board of Directors

C. H. MARKHAM
President.

FIFTY-SEVENTH ANNUAL REPORT OF THE LEHIGH VALLEY RAILROAD COMPANY.

PHILADELPHIA, September 20, 1911.

To the Stockholders of the
LEHIGH VALLEY RAILROAD COMPANY:

The Board of Directors herewith submit the annual report of the business and condition of your Company for the fiscal year ended June 30, 1911.

MILEAGE.

The first track mileage owned or controlled and operated by the Lehigh Valley Railroad Company, the main line of which is double track, extending from Jersey City, N. J., to Buffalo and Suspension Bridge, N. Y., is as follows:

	Miles.
Lehigh Valley Railroad Company	300.93
Controlled by ownership of entire capital stock	937.44
Controlled by ownership of majority of capital stock and lease	115.37
Operated under lease	27.04
Total mileage operated (owned or controlled)	1,380.78
Trackage rights over railroads owned by other companies	48.91
Total first track mileage	1,429.69

In addition to the above, there are 597.11 miles, or 41.76 per cent., of second track, 67.60 miles of third track, 33.32 miles of fourth track and 1,143.45 miles of yard tracks and sidings, a total of 3,271.17 miles of track in operation at the close of the year. The average number of miles of railway operated for the year, and upon which the mileage statistics in certain tables submitted in this report are based, was 1,432.29.

The decrease of 3.33 miles of first track is due principally to changes in the alignment and the abandonment of certain branches in the anthracite coal region. The increase in third and fourth track mileage is occasioned by the construction of additional tracks more specifically mentioned hereinafter.

OPERATING REVENUES AND EXPENSES.

The statement following sets forth the gross revenues and expenses and net revenue from the operation of the entire system for the fiscal year, not including other income, compared with similar figures for the fiscal year 1910. The complete income account appears herewith.

GROSS OPERATING REVENUES.

From	1911.	1910.	Increase or Decrease.
Coal freight	$17,155,534.15	$15,821,797.62	$1,333,736.53
Merchandise freight	14,687,291.27	14,757,799.34	—70,508.07
Passenger	4,568,029.75	4,330,172.45	237,857.30
Mail	190,760.08	193,859.75	—3,099.67
Express	453,819.83	462,437.70	—8,617.87
Other transportation	360,717.36	356,165.22	4,552.14
Miscellaneous	271,250.55	245,166.09	26,084.46
Total operating revenues	$37,687,402.99	$36,167,398.17	$1,520,004.82

OPERATING EXPENSES.

	1911.	1910.	Increase or Decrease.
Maintenance of way and structures	$3,620,176.26	$3,462,903.41	$157,272.85
Maintenance of equipment	6,003,286.95	5,995,810.09	7,476.86
Traffic expenses	1,010,675.41	918,720.11	91,955.30
Transportation expenses	11,979,378.24	10,593,565.10	1,385,713.14
General expenses	793,901.50	713,148.52	80,752.98
Total operating expenses	$23,407,418.36	$21,684,147.23	$1,723,171.13
Net Operating Revenue	$14,279,984.63	$14,483,250.94	$203,166.31
Ratio of operating expenses to operating revenue	62.12%	59.95%	2.16%

OPERATING REVENUES.

COAL FREIGHT.

The transportation of coal, including coke, produced a revenue of $17,155,534.15, an increase of $1,333,736.53, or 8.43 per cent., as compared with the preceding year. This increase is general in both anthracite and bituminous coal.

The percentage of coal freight revenue to total operating revenue was 45.52 per cent., an increase of 1.77 per cent.

Excluding the Company's supply coal, 15,589,750 tons of coal and coke were transported, an increase of 1,014,564 tons, or 7.00 per cent.

The average revenue per ton received was $1.09,40,639, an increase of $0.01,934, or .94 per cent.

The average distance each ton was carried was 114.2 miles, a decrease of 1.19 miles, or 1.03 per cent.

The average revenue per ton per mile was .954 cent, or 2.16 per cent of the total decrease in freight revenue, or 1.60 per cent.

MERCHANDISE FREIGHT.

The revenue received from the transportation of merchandise freight amounted to $14,687,291.27, a decrease of $70,508.07, or .48 per cent., as compared with the preceding year. Excluding the Company's freight, the decrease was $1,977.76 tons, or 1.92 per cent.

The average revenue per ton received was $1.09,40,639, a decrease of $0.01,934, or .94 per cent.

The average distance each ton was carried was 114.2 miles, a decrease of 1.19 miles, or 1.03 per cent.

The average revenue per ton per mile was .954 cent, or 2.16 per cent of the total decrease in freight revenue, or 1.60 per cent.

PASSENGER.

The receipts from passenger traffic amounted to $4,568,029.75, an increase of $237,857.30, or 5.49 per cent., over the preceding year.

The total number of passengers carried was 5,359,754, an increase of 186,793, or 3.61 per cent.

The number of passengers carried one mile increased 10,365,847, or 4.19 per cent.

The average revenue per passenger was 85.23 cents, an increase of 1.52 cents, or 1.82 per cent.

The average revenue per passenger per mile was 1.771 cents, an increase of .022 cent, or 1.26 per cent.

The average distance traveled by each passenger was 48.13 miles, an increase of .27 mile, or .56 per cent.

Passenger train mileage was 4,448,049, an increase of 297,191 miles, or 7.16 per cent., as compared with an increase in this traffic of 5.49 per cent.

The average revenue from passengers per passenger train mile was 102.70 cents, a decrease of 1.62 cents, or 1.55 per cent.

MAIL.

The compensation received from the Federal Government for the transportation of United States mails was $190,760.08, a decrease of $3,099.67.

EXPRESS.

The revenue from this class of business amounted to $453,819.83, a decrease of $8,617.87.

OTHER TRANSPORTATION.

The earnings derived from transportation other than that shown under the preceding headings were $360,717.36, an increase of $4,552.14.

MISCELLANEOUS.

Miscellaneous revenue amounted to $271,250.55, an increase of $26,084.46.

OPERATING EXPENSES.

MAINTENANCE OF WAY.

The expenditures for maintenance of way and structures amounted to $3,620,176.26, an increase of $157,272.85, or 4.54 per cent., as compared with the preceding twelve months. The policy of making ample expenditures for the maintenance of the property has been continued throughout the year.

Three new steel bridges and one new concrete-steel bridge were built in connection with additional track construction. Sixteen new steel bridges and four concrete-steel bridges were placed in the track, replacing light iron or wooden bridges. Ten small bridges were replaced by culverts and nine bridges abandoned and the openings filled. One wooden highway bridge was replaced by a new solid floor steel bridge and one steel highway bridge was renewed.

663 tons of 110-pound rail, 3,024 tons of 100-pound rail and 14,042 tons of 90-pound rail, together with necessary frogs, switches, etc., were placed in the track.

975,963 tie plates were used.

555,038 cross ties, 2,150,111 feet B. M. switch ties, 886,562 B. M. bridge ties and lumber amounting to 4,682,410 feet B. M. were used.

222,658 of the cross ties, 332,929 feet B. M. of switch ties and 158,210 feet B. M. of bridge ties used were treated with creosote.

104,840 cubic yards of crushed stone were used in ballasting track.

61,249 feet of drain tile were placed in the roadbed.

6.03 miles of new telegraph and telephone pole line were erected, 75.83 miles rebuilt and 57.50 miles reset. 980.84 miles of copper and 47.98 miles of iron wire were used in extending and renewing the telephone, telegraph and signal wires on the system.

MAINTENANCE OF EQUIPMENT.

The total expenses for the maintenance of equipment during the year amounted to $6,003,286.95, an increase of $7,476.86, or .12 per cent., over the previous year. Included in the expenses is a charge of $1,072,770.81 for depreciation of equipment, as called for in the classification of accounts prescribed by the Interstate Commerce Commission.

The new equipment added to your property during the year consists of ten passenger locomotives, fifteen freight locomotives, five switching locomotives, forty-two steel passenger coaches, fifteen steel underframe milk cars, fifteen steel gondola cars, three spreader cars, two caboose cars, six locomotive cranes and one snow plow. Orders have also been placed for twenty additional switching locomotives, ten freight locomotives, sixteen steel passenger coaches, two steel buffet-library cars, twenty-five steel baggage cars, three steel postal cars and one steam derrick car.

Sixteen passenger coaches and one combination car were converted into [illegible] cars and three freight equipment cars were transferred to road service.

One dining car, one mail car and two caboose cars were rebuilt.

Seventeen wood cut locomotives, one passenger coach, one express car, 176 freight equipment cars, and four road service cars were condemned and destroyed during the year and their value written off the books by an appropriate charge through Operating Expenses. One business car was sold.

6[illegible] locomotives received heavy and general repair.

Fifty-four passenger equipment cars received heavy repairs, 341 were painted and varnished and two were equipped with wide vestibules and steel platforms. Three library cars were remodeled.

Steel underframes were applied to 1,661 wooden freight cars, making a total of [illegible] equipped during the last three years. 7,367 freight equipment cars received heavy repair.

The total number of locomotives on hand at the close of the year was 355, with a tractive power of 7,916,[illegible]5 pounds.

The total number of freight equipment cars was 43,967, with a capacity of 1,[illegible] tons.

The additions that have been made to equipment and the rebuilding and remodeling of cars have resulted in increasing the average tractive power of locomotives in the last five years from [illegible],728 tractive power pounds to [illegible] tractive power pounds, and the average capacity of freight equipment cars, in the same period, from 61,[illegible]20 pounds to 73,001 pounds.

TRAFFIC EXPENSES.

The cost of operation amounted to $1,010,675.41, an increase of $91,955.30 over the previous twelve months.

TRANSPORTATION EXPENSES.

The total cost of conducting transportation was $11,979,278.24, an increase of $1,385,713.14, or 13.08 per cent. over the preceding year. The increase is explained principally by the higher rates of wages paid employes.

The ratio of transportation expenses to total operating revenue was 31.79 per cent. as compared with 29.29 per cent. last year, an increase of 2.50 per cent.

GENERAL EXPENSES.

The expenditures under this heading amounted to $793,901.50, or 2.10 per cent. of the total operating revenues.

TAXES.

The taxes accrued on your property and business during the year amounted to $1,145,476.69, or 3.04 per cent. of the Company's revenue.

FLOATING EQUIPMENT.

The floating equipment of the Lehigh Valley Transportation Company, the entire capital stock of which is owned by your Company, has been well maintained. One steel tug, two 12-car steel floats, two covered barges, two steam hoisting barges, ten open lighters and eleven coal barges were purchased and received during the year. One car float and one barge were converted into cattle boats. One car float, one cattle boat, one covered barge and three lighters, unfit for further service, were condemned and sold.

The equipment used by your Company and its affiliated companies consists of the following, assigned as indicated:

GREAT LAKES.

Name.	Description.	Capacity.
Wilkes-Barre	Steel Steamship	6,000 tons.
Mauch Chunk	" "	6,000 "
Bethlehem	" "	3,000 "
Seneca	" "	3,000 "
Saranac	" "	3,000 "
Tuscarora	" "	3,000 "

One Fuel Lighter. One Tug.

NEW YORK AND COASTWISE BUSINESS.

20 tugs.	233 barges.	4 cattle boats.
4 steam lighters.	25 car floats.	1 hoisting boat.
4 work boats.		1 wrecking boat.

ADDITIONS AND BETTERMENTS.

The total expenditures for additions and betterments were $3,351,270.92, of which $980,549.42 was deducted from income. The classification of these expenditures, as prescribed by the Interstate Commerce Commission, is given in the accompanying tables.

Substantial progress has been made in the construction of the branch lines from Ashmore (formerly Lumber Yard) to a connection with the main line near White Haven. This undertaking, as mentioned in the preceding annual report, will be a valuable factor in reducing the cost of handling traffic in that region, particularly coal, as it will shorten the line from certain coal fields and provide a route with lower grades and less curvature than at present encountered. In connection therewith, the line between Laurel Junction and Silver Brook Junction is being changed from single to double track in order to provide for the increased movement of traffic in that vicinity upon the opening of the new route. It is expected that these improvements will be completed and in use within a few months.

A branch, two and one-half miles in length, from a connection with the main line near Glendon to the plateau south of Easton, is under construction and rapidly approaching completion, making available a desirable site for the location of industries on the south side of the Lehigh River at Easton.

The construction of additional third and fourth tracks has been continued and there are now 67.60 miles of third track and 33.32 miles of fourth track on the system. An extension from Fullerton to Cementon, a distance of 3.72 miles, is completed, making a continuous four-track line of 19.61 miles through this congested territory. A further extension from Cementon to Treichler, a distance of four miles, is under way.

94,987 feet, or 17.99 miles, of Company's sidings and 17,688 feet, or 3.35 miles, of industrial sidings were constructed on the system during the year.

West of Roselle Park an objectionable depression was eliminated by raising 4,000 feet of the main line tracks a maximum of six feet.

The change in alignment, eliminating a sharp reverse curve in the main line, and the construction of additional yard facilities at South Bethlehem, referred to in previous annual reports, have been completed.

A freight yard with a capacity of 400 cars is being constructed at Richards (west of Easton) to provide facilities for handling the increasing local and interchange business in that territory, which is one of great traffic density.

To provide facilities for interchange with other railroads and to compensate for sidings absorbed by third and fourth track extensions a new yard of 220 cars capacity was constructed at Catasauqua.

A combination freight and passenger station of hollow tile and stucco was built at Milan, and separate passenger and freight stations of similar construction at Cortland. At South Bethlehem a concrete freight station was erected. New milk shipping stations were built at Erin and Wilseyville. Additions were made to the freight station at Wilkes-Barre and to the office buildings at Easton and Oak Island Transfer. A 16-stall concrete roundhouse was constructed at Coxton and a concrete boiler house at South Easton.

A steel bulkhead shed was erected at Pier 34, North River, New York, made necessary by the transfer to that point of the freight station at Pier 44, the lease of the latter having expired.

An additional platform 810 feet in length, with necessary tracks, was constructed at Oak Island Transfer, facilitating the delivery of eastbound less-than-carload freight to the New York Piers and eastern connections.

Extensive repairs were made to various bulkheads, sheds, piers and docks at New York and Jersey City as well as to the cold storage and shipping trestles at the Perth Amboy and Tifft Farm terminals.

Property has been acquired at Rockdale to provide a gravity water supply with a storage capacity of 6,000,000 gallons, which eliminates the expense of pumping.

New steel water tanks of 100,000 gallons capacity each, with 12-inch standpipes, were erected at Tunkhannock, Laceyville and Reeders.

A concrete ash pit with locomotive crane has been provided at South Easton, and an elevated ash pit at Canastota.

The dredging of a 22-foot channel at the Tifft Farm Terminal in Buffalo to enable large vessels to reach the coal and ore docks, has been completed.

Steel signal bridges, replacing bracket poles, are being installed on the four-track system, twenty of these bridges having been erected during the year.

Upper quadrant three position semaphore signals, displacing disc signals, have been installed between Parkview and Roselle Park, and between Penn Haven Junction and Weatherly.

Visible and audible crossing alarms have been installed at Valentines, Glen Summit Springs, Wyalusing, Lodi, Kendaia and Lancaster.

The telephone train dispatching lines have been extended east to Jersey City and Perth Amboy and west to Sayre. The entire system east of Sayre is now equipped with these facilities. The lines between Sayre and Buffalo are in course of construction and will be completed and in operation at an early date. These improvements not only permit of a substantial saving in expenses, but very materially increase the efficiency of train dispatching. Further benefits in this direction will be derived as soon as passenger and freight trains are equipped with portable telephone sets, so that immediate communication may be had with dispatchers in case of accident or delay. This installation is now being made.

FINANCIAL.

As referred to in the last annual report, your Board of Directors, acting with the approval of the stockholders, authorized an increase in the common capital stock from $40,334,800 to $80,000,000 and the issuance and sale of $20,220,550, or 404,411 shares, of such additional stock to shareholders at par. Proceeding under that authority the common capital stock of the Company has been increased by the issuance of 403,338 shares with a total par value of $20,166,900, being the entire amount offered to the stockholders, with the exception of 1,073 shares, or $53,650, which were unsubscribed. All stockholders having been notified of the terms and conditions of the subscription at their last known addresses, as well as by advertisement in the daily press, the subscription, under instructions of the Board of Directors, was closed on November 30, 1910. The proceeds were $20,166,900, against which have been charged only those expenditures representing capital outlays.

The funded debt of the Company was reduced during the year by the retirement of $6,000,000 Second Mortgage Seven Per Cent. Bonds, which matured September 1, 1910; $1,000,000 Collateral Trust Four Per Cent. Bonds, which matured in August and February; $1,170,000 Equipment Trust obligations which matured at various dates, including the small remaining issue of $180,000 of Equipment Trust Certificates, Series H, held in the treasury, a total permanent retirement of $7,170,000 of obligations. In addition, $2,268,000 Collateral Trust Four Per Cent. Bonds, $11,000 Middlesex Valley Railroad Company Five Per Cent. Bonds and $571,900 par value preferred stock and $387,900 par value consolidated stock of the Morris Canal and Banking Company, carrying dividends at the rate of ten per cent. and four per cent. per annum, respectively, were purchased and placed in the treasury. As a result of the retirement or purchase of these several obligations, the fixed charges of your Company have been reduced $646,476 per annum.

There have been received from the Trustee and placed in the treasury $10,000,000 General Consolidated Mortgage Four Per Cent. Bonds, issued under the provisions of that mortgage to reimburse your Company for expenditures incurred in previous years for additions and betterments to the property and the retirement of equipment trust obligations, making $13,000,000 of such bonds in the treasury. These with the $2,268,000 Collateral Trust Bonds, $2,400,000 Equipment Trust, Series I, Certificates and other securities now held as treasury collaterals available for sale or other use, place your Company in an exceedingly strong position financially.

Additional Fifty-Year Five Per Cent. Gold Debenture Bonds have been issued to the Lehigh Valley Railroad Company by those subsidiary companies to which advances were made for additions and betterments to their properties, the title, of necessity, being in their respective names. Such additional bonds are as follows: Lehigh Valley Railroad Company of New Jersey, $139,000; The Lehigh Valley Rail Way Company, $297,000; Loyalsock Railroad Company, $20,000; Pennsylvania and New York Canal and Railroad Company, $133,000, and Easton and Northern Railroad Company, $5,000.

Your Company has also received from the Wyoming Valley Water Supply Company $87,000 of its Fifty-Year Five Per Cent. Gold Bonds issued in payment of advances made to that Company for capital expenditures in the development of its several water plants.

The investment your Company had in The Locust Mountain Coal and Iron Company, represented by the ownership of 6,618 shares of the capital stock of that Company, with a par value of $330,900, was sold for a cash consideration equivalent to the value thereof as carried on the books of the Company.

Following the practice that has obtained for the past three years, the book value of the capital stock of Coxe Brothers & Company, Incorporated, all of which is owned by your Company, was reduced by the sum of $1,000,000, Profit and Loss Account having been charged therewith. This fully covers whatever depreciation the property has suffered in the mining of anthracite coal from its lands.

The value of materials and supplies on hand at the close of the year amounted to $2,858,574.02. This is an increase over the preceding year and is due to large purchases of steel rails, ties and track fastenings at the close of the year, which are now being placed in the track.

The increase in the advances to subsidiary real estate companies is occasioned by the purchase of various parcels of land for future terminal extensions, additional right of way and for other purposes incident to the development of your property.

Working Assets are $41,139,127.93 in excess of Working Liabilities.

Semi-annual dividends of five per cent. each were declared in December, 1910, and June, 1911, upon the common and preferred capital stocks of the Company, payable respectively in January and July, 1911.

The cash and security balances have been verified and the accounts of the Company examined by certified public accountants, whose certificate as to the correctness thereof is attached.

GENERAL REMARKS.

The operations for the year under review have felt the full effect of the higher rates of wages paid employes. To this single factor may be ascribed almost entirely the increase in operating expenses apart from that naturally resulting from the transportation of a greater volume of traffic. As was mentioned in the last annual report, the principal increases granted to the various classes of labor employed by your Company were not effective until the latter months of that year and so cause an unfavorable comparison of the present year's operations with the past. Then, too, it must be recognized that the higher standard of present-day operations injects greater costs into the expense of transportation. The demands of the public are most exacting in the matter of equipment, time, facilities and service generally which, in view of the keen competition prevailing, must be met. Although the additions and betterments made to the property, together with various improvements and economies in the method of transportation, have been of benefit in holding the cost of operations in check, they were not, in themselves, sufficient to offset the increase in the cost of labor. Nor has there been any curtailment in the appropriations for maintenance where it would mean simply deferring needed expenditures to a future year and at greater expense. On the contrary, the property has been thoroughly maintained and it is in a most excellent and efficient condition. The high standard of service furnished shippers and the traveling public has likewise been sustained and new methods for its further improvement adopted as conditions would warrant.

Your Company in 1871 leased the property of the Morris Canal and

Banking Company. Since that time there have been but four years in which the canal property was able to earn its operating expenses. It has, therefore, been necessary for your Company to make up the deficits and, in addition, to pay the dividends of ten per cent. and four per cent., respectively, on the preferred and consolidated capital stocks of the Morris Canal and Banking Company and all interest charges, as called for in the lease. Transportation on small inland canals like the one in question has become obsolete, and this canal cannot be made to pay its cost of operation and is further complained of as an annoyance in many of the cities and communities through which it passes. Negotiations have, therefore, been had with the State of New Jersey looking to its abandonment. It is proposed that any abandonment will comprehend the retirement of outstanding bonds and stocks of the Canal Company, the settlement of suits in regard to the rights of your Company in the "Basins" at Jersey City used as terminals, the sale and conveyance of the Canal Company's property, the adjustment of certain taxes assessed upon the property used in the canal operations, etc. A Commission was appointed by the Legislature of the State of New Jersey to take up this matter, and an understanding has been reached covering the adjustment of all questions at issue, and the Commission so reported to the Legislature. The latter thereupon instructed the Commission to prepare a bill for the abandonment of the canal and the disposition of its property and to submit the same at the next session of the Legislature, at which time it is hoped the matter will be satisfactorily closed.

The operation of the Lehigh and New York Railroad, which was leased to your Company in the year 1895, has resulted in a loss of $120,303.80 for the year. A suit was brought some time ago by certain of the stockholders of the Company owning that railroad in which, among other allegations, it was claimed that the bases used in arriving at the results of operation were incorrect. In connection with that suit, expert railroad accountants were employed by your Company to examine into the books and accounts covering the operation, which examination has not indicated any unfairness in the charges for the operation of that property. The suit [illegible].

During the year sixty-eight new industries were located on the system, direct track connections having been made with twenty thereof.

56.84 per cent. of the total operating expenses, including outside operations, or $15,003,166.20, was paid direct to labor, being distributed among an average of 21,654 employes during the year.

The Company contributed $46,211.60 to its Employes' Relief Fund, which is an amount equal to the payments made by the employes themselves to that Fund.

At the request of many of the stockholders the common capital stock of your Company was listed on the New York Stock Exchange in the [illegible] of November, 1910.

Mr. William R. Butler, of Mauch Chunk, Pennsylvania, was elected a director to fill the vacancy caused by the death of the Honorable Simon P. Wolverton.

The acknowledgment of the Board is tendered to the officers and employes of your Company for their loyal and conscientious services during the year.

By order of the Board of Directors,
E. B. Thomas,
President.

COMPARATIVE INCOME ACCOUNT FOR THE YEARS ENDED JUNE 30, 1911 AND 1910.

	1911.	1910.	Increase or Decrease.
Operating Revenues:			
Coal freight revenue	$17,155,534.15	$15,821,797.62	$1,333,736.53
Merchandise freight revenue	14,687,291.27	14,757,799.34	—70,508.07
Passenger revenue	4,568,029.75	4,330,172.45	237,857.30
Mail revenue	190,760.08	193,859.75	—3,099.67
Express revenue	453,819.83	462,437.70	—8,617.87
Other transportation revenue	360,717.36	356,165.22	4,552.14
Miscellaneous revenue	271,250.55	245,166.09	26,084.46
Total operating revenues.	$37,687,402.99	$36,167,398.17	$1,520,004.82
Operating Expenses:			
Maintenance of way and structures	$3,620,176.26	$3,462,903.41	$157,272.85
Maintenance of equipment.	6,003,286.95	5,995,810.09	7,476.86
Traffic expenses	1,010,675.41	918,720.11	91,955.30
Transportation expenses	11,979,278.24	10,593,565.10	1,385,713.14
General expenses	793,901.50	713,148.52	80,752.98
Total operating expenses.	$23,407,318.36	$21,684,147.23	$1,723,171.13
Ratio of operating expenses to operating revenue.	62.11%	59.97%	2.61%
Net operating revenue.	$14,280,084.63	$14,483,250.94	—$203,166.31
Outside Operations, Net	*320,170.33	*146,333.24	—173,837.09
[illegible]	[illegible]	[illegible]	[illegible]
Operating Income	[illegible]	[illegible]	[illegible]
Other Income:			
[illegible]	[illegible]	[illegible]	[illegible]
Total Income	[illegible]	[illegible]	[illegible]
Deductions from Income:			
[illegible]	[illegible]	[illegible]	[illegible]
Miscellaneous deductions	169,993.88	148,154.41	20,839.47
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
Net Income	[illegible]	[illegible]	[illegible]

*Deficit.

PROFIT AND LOSS ACCOUNT FOR THE YEAR ENDED JUNE 30, 1911.

		Dr.	Cr.
Balance, July 1, 1910		.....	$27,219,779.64
Net income for the year ended June 30, 1911		.....	7,519,457.57
Expenditures for Additions and Betterments deducted from Income, excluding Lehigh and New York Railroad		.....	967,829.00
Miscellaneous adjustments		.....	25,882.47
Property abandoned		$15,764.30	.....
Federal Excise Tax for calendar years 1909 and 1910		140,777.91	.....
Reduction of book value of capital stock of Coxe Brothers & Co., Inc.		1,000,000.00	.....
Dividends:			
Five per cent. on preferred stock, paid July 14, 1910	$5,315.00		
Three per cent. on common stock, paid July 14, 1910	1,210,044.00		
Five per cent. on preferred stock, paid Jan. 14, 1911	5,315.00		
Five per cent. on common stock, paid Jan. 14, 1911	3,025,085.00		
		4,245,759.00	.....
Balance, June 30, 1911		30,330,647.47	.....
		$35,732,948.68	$35,732,948.68
Balance brought forward, July 1, 1911			$30,330,647.47

THE LEHIGH VALLEY COAL COMPANY.

REPORT OF OPERATIONS.

Philadelphia, September 18, 1911.

The Board of Directors herewith submit the annual report of the operations conducted by The Lehigh Valley Coal Company for the fiscal year ended June 30, 1911.

The net income of the Company amounted to the sum of $1,512,844.40, an increase of $376,301.42, as compared with the previous year.

The total production of anthracite coal from lands owned, leased and controlled by The Lehigh Valley Coal Company and affiliated companies, including that mined by tenants, was 9,021,206 gross tons, an increase of 928,266 tons, or 11.47 per cent., as compared with the preceding year.

The percentage of sizes above pea produced by the mining operations of the Company was 65.57 per cent., an increase of 1.03 per cent.

The operations conducted on the Snow Shoe lands produced 236,930 gross tons of bituminous coal, an increase of 1,952 tons.

The total expenditures for improvements and betterments to the property deducted from income during the year amounted to the sum of $444,677.

In the earlier days of its history, The Lehigh Valley Coal Company leased certain of its coal properties to a number of different parties for the mining of anthracite coal, under which it received as rental varying rates of royalty as the coal was won from the land. Whether the poor financial condition of the Company at that time rendered it impossible to raise funds to construct its own breakers for the purpose of increasing the production, or whether there were other reasons, is not apparent at this time. The present management, however, is not continuing such a policy, believing rather that the interests of the Company are best protected by conserving its natural resources for its own use. Not only have the rentals received in the majority of such cases been small, compared with the value of the property, but there have been many complications arising out of these old leases, as is natural in such an uncertain and hazardous enterprise as anthracite coal mining where the conditions are constantly changing. In certain instances the leases provided for the mining of coal from veins either above or below those mined by the Company and vexatious questions have arisen in the matter of ventilation and drainage. Then, too, the mining by a tenant is apt to be more wasteful than that conducted by an owner, resulting in the loss of considerable tonnage which might otherwise be won. It has recently, therefore, been the policy of your Company, wherever satisfactory terms could be agreed upon, to take over from its tenants their operations by a surrender of the lease, the Company purchasing whatever improvements have been made by tenants upon the land in the way of breakers, machinery or other property incident to the mining operations.

Two such leases were taken over in the previous fiscal year and mentioned in that annual report. During the present year the operations conducted by the Austin Coal Company on the lands of your Company were assumed by the purchase of the entire capital stock of that company, the corporation passing out of existence by the expiration of its charter. In addition the lease made in 1884 of certain lands to Lentz & Company, operating at Park Place, Delano and Mahanoy Townships, has been surrendered to your Company for a consideration that included the purchase of all the breakers, machinery and running supplies. Payment was made part in cash and the balance in short term five per cent. notes secured by a coal lease mortgage on the property surrendered, the notes maturing in ten annual instalments, with the option of redemption by the Company upon reasonable notice.

Extensive operations are conducted by your Company under a lease of property from [illegible] in the Lykens Land, in which the Company has for some time held a one-half interest. An additional interest, approximating [illegible] of the whole, was purchased during the year, leaving about a one-forth interest outstanding. One, two and three year five per cent. notes on equal amounts were given for the major portion of the consideration, the balance being paid in cash.

The Company, during [illegible] purchased for cash the entire capital stock of the [illegible] Mountain Coal and Iron Company, which owns certain coal lands on Mt. Carmel, Pennsylvania, and from which your Company has been purchasing coal for many years.

Current Assets are $4,[illegible]69,[illegible]10 in excess of Current Liabilities.

Certified public accountants have verified the books and accounts of the Company and have furnished a certificate to that effect.

By order of the Board of Directors,
E. B. Thomas,
President.

PROFIT AND LOSS ACCOUNT OF THE LEHIGH VALLEY COAL COMPANY FOR THE YEAR ENDED JUNE 30, 1911.

	Dr.	Cr.
Credit balance, July 1, 1910	.....	$3,393,442.67
Net income for year ended June 30, 1911		1,512,844.40
Miscellaneous adjustments	$42,087.24	.....
Balance, June 30, 1911	4,864,199.83	.....
	$4,906,287.07	$4,906,287.07
Credit balance brought forward July 1, 1911		$4,864,199.83

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Including the Railroad Gazette and the Railway Age

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E. A. Simmons, *President.*

L. B. Sherman, *Vice-President.* Henry Lee, *Sec'y & Treas.*

The address of the company is the address of the officers.

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E. T. Howson
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ALTHOUGH the past year has not been one in which railway companies found it particularly easy to sell securities at profitable prices, nevertheless there is a notable indication from the annual reports that have so far been published that there has been a tendency to greatly strengthen the cash assets of railways. For instance, the New York, New Haven & Hartford had $28,160,000 cash on hand on June 30, 1911, as compared with $18,000,000 at the end of 1910; the Lehigh Valley had $20,620,000 cash at the end of 1911, as compared with $10,920,000 at the end of 1910; the Atchison, Topeka & Santa Fe had $28,320,000 cash in treasury and check deposits, as against $23,060,000 the year before; the Illinois Central had $15,140,000, as against $2,200,000 the year before; the Chicago, Milwaukee & St. Paul had $13,580,000, as against $5,540,000. In particular instances it may be true that these large cash balances are the result of the sale of securities in the past year, but in general it is the result of a curtailment in extension and in betterment work. The transportation plant has not been extended, probably because the concensus of opinion of railway managers is that the prospects for increased new business are not good.

A RAILWAY stockholder, Mr. A., recently found pretty conclusive proofs of stealing on one line of the system in the shape of the delivery to one of the superintending employees of supplies presumably owned by the company. He mentioned the suspicious facts to another stock owner, Mr. B., who asked Mr. A. for the name and residence of the employee for the purpose of bringing the facts to the attention of higher officers of the company. Mr. A. curtly refused, alleging it was no part of his business to play detective and intimating—though offering no proofs—that it was but part of a larger system of theft higher up, responsibility for which rested on the corporation, and it is highly probable that Mr. A. has used his text case industriously to point out the corporation's "inefficiency." A year or so ago we cited a different case in its detail and with a different outcome. In that instance an aggrieved passenger was the double victim of an insolent conductor and of an engineman who, contrary to the schedule, ran by the passenger's flag station. The passenger promptly carried his complaint to the powers above, who not only disciplined the conductor and engineman, but thanked the passenger. The two cases we have cited differ in description, but are identical in their moral. Can a railway company put a detective on every train and at the home of every section hand? And, if it cannot, where can a certain large degree of responsibility rest save on the passenger who suffers and sees the wrong? If an ordinary passenger defaults in such a case, what is to be said of the attitude of a man who is a stockholder also and whose personal loss is added to a grievance. It is another example of that big group of folks who are as prompt to condemn the railway as they are slow to recognize the principle of co-operation with it, and who are more fertile in utterance than in action.

IN its relation to railway interests, the legislature of Connecticut, which has just adjourned after a prolonged session of almost nine months, had two noteworthy features. The upper house of 35 senators, traditionally the stronghold of corporation interests, including those of railways, reversed precedent and was almost radically an anti-railway body; the lower house of 258 members was relatively conservative, not only holding up for a time the pretty drastic measure for a new public utilties commission, but defeating by a large majority a radical employer's liability bill which had passed the senate. This reversal of the temper of the two houses was partly the outcome of a popular anti-corporation movement in the state last year, affecting the party nominations to the senate, and partly the result of the fears of party leaders that further delay in passing a public utilities measure—already hung up for six years—would cause a popular revolt. Thus politics had its familiar influence on a question essentially economic. Of late

railway legislation, not much was enacted; but in the new public utilities act there are many provisions bearing on the railways, including the singular and radical "recall" feature and the power, novel in Connecticut, given the commission to regulate rates. This vast proviso may yet wreck the whole act, as high legal authorities in the state have held that while, under the Connecticut constitution, the legislature can regulate rates directly, it cannot delegate the power. The first test case will soon come up in the state courts. Should the unconstitutionality of the new law be upheld, on appeal, a curious sequel will be a reversion to the old railway commission, with exactly the same personnel and, of course, yet another anti-corporation campaign. The example of Connecticut joined with that of other New England states indicates that the anti-corporate temper of the region is not so very far behind that of any other part of the country, though, happily for the railways, less vigorous and severe in action.

RECENTLY several letters have appeared in the Chicago newspapers from persons who complained that they have been unable to get satisfactory taxicab service from the passenger stations in that city. It is regrettable that the complaints on this subject are justifiable. The Frank Parmelee Company long has been given a monopoly of the solicitation of baggage and carriage business on trains entering Chicago and in the passenger stations in that city. Formerly it provided only a horse cab and a horse coach service for the carriage of passengers. There sprang up a demand for an arrangement under which passengers could order taxicabs at some desk in each station. A competing carriage and baggage company a short time ago offered to furnish this service. It was then announced that the Parmelee company would provide a taxicab service, and the offer of the competing concern was rejected. When the Parmelee company's service was established it proved to be not a taxicab service, to be paid for at the mileage rates fixed by ordinance in Chicago, but a motor car service, the rates for which within a limited radius are reasonable, but which increase so fast with distance that for any considerable distance they are very much higher than the taxicab rates. For example, to one residence in the city where the taxicab rate from the union station is $3.30 the Parmelee company on one and the same day asked one passenger $4, and another $4.75. When complaints are made to the Parmelee company its answer is that it furnishes a horse cab and a motor car service, but does no taxicab business. Now, the Parmelee company has a perfect right to refrain from doing a taxicab business if it likes. The situation of the railways is very different. They have no moral right to deny to their patrons the opportunity to engage taxicabs in their stations when this can be done without interfering with railway service in any way or encroaching on the rights of anybody. The power [illegible] in Chicago. Such solicitude on the part of the railways for the taxicab companies' financial welfare is more gratuitous than business-like. People can get taxicabs by telephoning to hotels [illegible] give it to one that will not render a complete and satisfactory

THE STRIKE OF SHOP EMPLOYEES.

IT was not the unexpected that happened when the officers of the federations of shop employees of the Harriman Lines and the Illinois Central last week ordered their members to strike. By their demands, and especially by their way of making them, the leaders of these organizations had committed themselves so far that when the railway managers refused to grant anything that they asked for they had no choice except either to order a strike or to ignominiously back down and suffer incurable loss of prestige.

That the stand the railway managers have taken is right is conceded, we think, by almost all fair-minded persons who know the facts. The leaders of the strikers complain that the attitude of the managers was arbitrary. They say that the employees have a right to determine through what organizations they shall deal with the railways; that this right was denied when the managers refused to recognize the federation, and that this is the sole cause of the rupture. But, as Mr. Kruttschnitt and Mr. Markham have pointed out, the railways perform a public service, and it is the duty of their officers to take all reasonable precautions to prevent interruption of that service. For them to enter into contracts with federations of all their employees, or even of all their shop employees, they have contended, would put into the possession of the latter the power to stop the railway's service. From this reasoning it follows that the managers could not at once do their duty to the public and recognize the federations.

However, it is not true that the refusal of recognition of the federations was the sole cause of the strikes. The federations had formulated numerous demands which they proposed to make on the railways and which they undoubtedly would have pressed immediately if they had been recognized. These demands included reductions in hours of work; increases in pay; abolition of the requirements regarding physical examination of, and the furnishing of personal records by candidates for employment; the closed shop, the abolition of the piece, premium and bonus methods of compensation where they exist and their non-establishment where they do not obtain, etc. When the railway managers refused to recognize the federations they were largely influenced by the fact that they saw these other demands in the background, and perceived that if they did recognize the federations, they would thereby greatly increase the power of the unions and render themselves much less able to resist these other demands; and when the employees struck, they did so not so much because their federations were not recognized, as because they saw that only after compelling such recognition could they hope to coerce the railway managers into granting their unreasonable demands regarding wages and conditions of employment.

The managers of the Harriman lines and the Illinois Central are fighting the battles both of their stockholders and of the public. It has not been uncommon in the past for railway managers who had the courage to do this to incur the displeasure of their stockholders, their directors and the public, not because they did not so perform their duty as, in the long run, to benefit both, but because they incurred the cost necessarily incident to the performance of that duty. The directors saw that the strike reduced net earnings, and they forgot that this temporary reduction of net earnings was necessary to safeguard net earnings permanently. The public saw that the service of the railways was more or less interfered with, and it gave more attention to this than to the fact that the temporary interference was necessary to maintain or secure conditions under which the service could permanently be rendered with a maximum of efficiency and a minimum of cost. The principal stockholders, the directors of the lines involved and the public probably have a better understanding of what is involved in this struggle than has usually been the case. Victory for the strikers would mean unreasonable conditions of employment, unreasonable advances in wages and a dangerous addition to the power of the leaders of the unions. Victory for the railways will mean that these

chosen to manage them and held responsible for their management by both the owners and the public, will be allowed to continue to manage them. It probably will not mean lower wages or worse conditions of employment, but it may—and let us hope that it will—mean a practical recognition of the fact that railways have the same right as other industries, and, because of the public nature of their service, a much clearer duty to so adjust the compensation of their employees and to so fix their conditions of employment as to conduct their operations with reasnable efficiency and economy.

The strike comes at a time that is peculiarly favorable to the roads. Many men are out of employment who are glad to take the places of those who have quit. The equipment of the railways involved is in good repair, and there is a good deal of it out of service which can be put into service as fast as that in use needs repair. Prompted by consideration of their own self-interest, as well as by loyalty to the roads, many of those ordered to quit work have refused. The indications are, therefore, that the losses that will be incurred by railway corporations and the inconvenience that will be suffered by the public will for a considerable time, at least be small, and that if the managers are properly backed up by those whose battles they are fighting, the strike will be a failure, a result which will be good for the railways, good for the public and, in the long run, good for the employees themselves.

THE RAIL SITUATION.

THE seriousness of the rail situation is emphasized by the wreck on the Lehigh Valley near Manchester, N. Y., which the New York Public Service Commission found was caused by the failure of a rail which was piped and which also had a defective base. The Oriental Limited on the Chicago, Burlington & Quincy was wrecked about a year and a half ago by a similar rail failure, and numerous other accidents of less serious nature have occurred recently. Reports for the year ending October 31, 1910, showed 35,843 rail failures for 11,691,302 tons of rail laid, including only rail weighing more than 70 lbs. per yard, and the character of these failures indicates that nearly all were due to defective material.

Up to a few years ago rail failures were of such unusual occurrence that they did not attract serious attention, but with the use of rails weighing more than 80 lbs. to the yard made necessary by the use of heavier locomotives, serious trouble was experienced with rail failure. These failures were due to either physical defects or inferior chemical composition, as shown by the fact that under the same locomotives running at the same speeds the heavier sections had a higher percentage of defective rails than the old lighter sections. In 1907 the matter had reached such a stage that the railways of the country were seriously alarmed and the American Railway Association began a campaign for better rails. Meetings of the rail committee of this association were held at various times, at which the matter was thoroughly discussed, statistical data presented, and the whole subject studied. A committee representing the manufacturers was called in consultation to obtain the manufacturers' idea as to the causes of defective rails, and at this conference it was decided that the existing section was not well adapted to rolling, the proportions of the metal in the head and base being such as to give different temperatures throughout the rail. After a great deal of work and study, new specifications were prepared, a new set of rail sections designed and adopted, and forms for keeping statistics of rail failures prepared. In addition to the change in sections, the following changes in manufacture were considered necessary to secure a better rail:

1. Greater discard from the top of the ingot.
2. Lower phosphorus content and better proportioning of the other elements.
3. More and higher drop tests.
4. More careful mill practice.
5. More severe and uniform inspection.

These changes in manufacture were strongly objected to by rail manufacturers, as were all changes which had a tendency to decrease the tonnage of the mills. When it was attempted to buy rails under the proposed specifications the manufacturers demanded what railway men considered extortionate prices for any improvement which interfered with existing mill practice. For example, the full price of the finished rail was asked for any additional discard, making it just as cheap for the railway company to buy all rails from the ingot and throw away the top rail. Higher drop tests were refused and a high price was asked for any additional tests.

After a number of concessions on the part of both the railways and manufacturers, a set of specifications was adopted, which has been in use the last three years. The quality of rails has probably improved during this time, but it is evident that the need for further improvement is still great. A number of roads have become so much dissatisfied with the results secured from Bessemer rails that they are paying a premium for open hearth rails of special quality and alloy steel of several types. The rail which caused the Lehigh Valley wreck was an open hearth rail, having 20 per cent. discard, the discard in excess of 9 per cent. being secured at a premium. The increased use of alloy steels for rails is clearly shown by the increased tonnage of such rails rolled during 1910, as mentioned in an editorial in the *Railway Age Gazette* of March 23, 1911, page 627. In many cases, however, the results secured from such rails have not warranted the additional expenditure, the percentage of failures in some cases being equal to or greater than the failures with ordinary Bessemer rails. Since the roads are showing their willingness to pay a higher rate for better rails, the responsibility for inferior products rests largely on the manufacturers. The latter contend, however, that the prevailing price for Bessemer rails is from $1 to $2 a ton lower than the price on plates and shapes, which are similar products, and that the demand for a large tonnage of rails forces them to cut down the time consumed in the milling process, resulting in the poor quality of steel. The profit on steel manufacture seems to prove that the price at which rails are furnished is not abnormally low, and the fact that a number of roads have paid prices very much above the normal and have not secured good rails seems to indicate that even if higher prices were uniformly paid the rails obtained would be no more satisfactory.

The work of collecting statistical data on rails, which was started by the American Railway Association, has been transferred to the Rail Committee of the American Railway Engineering Association, which is composed of some of the most able engineers in the country. This committee has employed an engineer of tests at the expense of the railways and has carried on various elaborate tests, the results of which have been given wide publicity. Over 40 roads are now reporting to this committee statistics of their rail failures, and a number of the individual roads are giving careful study to their own record of failures. A great deal of work is planned for the next few years by this committee. It expects to continue its investigations with the aim of framing a comprehensive set of specifications under which a satisfactory quality of steel for rails will be manufactured. While it will probably be necessary to complete the tests outlined by the committee to determine exactly what chemical composition and mill practice will secure the best results, certain defects in present methods of manufacture are already well recognized, and the interests of the roads represented in the American Railway Engineering Association will be still further advanced if that association will recommend improved specifications to remedy such defects pending the conclusion of the experiments, when final recommendations can be made, based on the knowledge which will be gained.

THE RAILWAYS APPEAL TO THE COMMERCE COURT.

THE action of the transcontinental railways in petitioning the Commerce Court to enjoin the Interstate Commerce Commission from enforcing its orders in the Pacific coast rate cases was a natural, and perhaps inevitable, sequence of the investigations and orders made by the commission. Indeed, it probably was inevitable from the first that these cases should be carried into the courts, no matter what orders the commission issued. The interests of the innumerable communities and the numerous railways involved are so conflicting that no tribunal having less than superhuman wisdom and diplomacy could have rendered decisions and issued orders which all interests would have accepted as just and reasonable. Not only the railways but many of the shippers and communities concerned are dissatisfied with the commission's attitude, and if they were not all the other communities and shippers would be.

The commission's orders were discussed at considerable length in an editorial in the *Railway Age Gazette* of September 22, 1911, page 548. In their petitions the roads attack the long and short haul clause as amended by the Mann-Elkins act as unconstitutional, on the ground that it delegates to the commission legislative discretion. This will, no doubt, lead to decisions by the courts either nullifying the fourth section, or clearly defining its meaning and the powers it gives the commission. The roads further contend that if the fourth section be constitutional the orders of the commission are illegal, because they are arbitrary and unreasonable, and that it could not have been the intention of Congress to authorize it to act arbitrarily and unreasonably. The commission in the orders issued by it a year ago indicated a large number of commodity rates to Spokane, Salt Lake City, and other interior points which it held would be reasonable, there being specified by it, for example, 540 carload commodity rates and 436 less-than-carload commodity rates to Spokane and points east thereof. In its orders of June 22, 1911, it forbade the roads to make their rates from the Missouri river to intermediate points any higher than their rates to the coast, from Chicago more than 7 per cent. higher, from Pittsburgh more than 15 per cent. higher, and from New York more than 25 per cent. higher. Its two sets of orders are inconsistent with themselves. The roads could not obey the order of June 22, 1911, without either raising their present rates to the coast or making their rates to intermediate points from 3 to 9 per cent. less than the rates to intermediate points which the commission itself a year ago held would be reasonable. Furthermore, they could not accept the commission's rule that their rates to the intermediate points should never be made more than the specified percentages higher than their rates to the coast without making it necessary for them, in case increased water competition obliged them to further reduce their rates to the Pacific coast, to further reduce their rates to the intermediate points below what the commission has held would be reasonable.

The amounts of money directly and indirectly involved are something enormous. It is estimated that the reductions of earnings which would result directly from compliance with the commission's orders would be $12,000,000 a year. This at 6 per cent. would be the return on $200,000,000 of capital. At 5 per cent. about the average net earnings of all the railways of the United States, it would be the return on $240,000,000. Furthermore, if the roads made the reductions specifically required by the commission, [illegible] to make [illegible] rates to points east of Spokane, Salt Lake, etc. Finally, there are cases pending before the commission involving the rates from the Pacific coast eastward, and while the commission has not ordered reductions in these rates, it has intimated that it thinks they ought to be lowered by 20 per cent., which would involve additional losses.

Another reason why the commission's orders are objected to is that they seek to compel the roads to fix their rates to the intermediate points according to a scheme which is wholly illogical. It is well known that the practice of railways all over the United States has been to apply class rates ordinarily and to make commodity rates to meet unusual conditions. Heretofore, the railways have usually charged their class rates to intermediate western points, where there has been nothing extraordinary about transportation conditions, while, in order to meet water competition on the coast, they have made about 1,300 commodity rates on which from 90 to 95 per cent. of their traffic to the coast is handled. Under the commission's orders they would have to extend all of these commodity tariffs to the intermediate points, thus giving them rates entirely different from those given to any other similarly situated communities in the United States.

In point of principles involved these are as important railway rate cases as were ever brought in any court in the United States; and in point of money involved they are probably the most important proceedings of any kind ever begun in an American court.

NEW BOOKS.

Addresses to Engineering Students. Edited and published by Waddell & Harrington, consulting engineers, Kansas City, Mo. 6 in. x 9 in. 490 pages. Price, 75 cents when distributed to students through universities or colleges; single copies, $1.00.

About the first of 1911 circular letters were sent out by Waddell & Harrington to professors in engineering schools throughout the country calling their attention to the desirability of publishing in a single volume a number of the most valuable lectures which have been delivered to engineering students, with the vim of providing sound advice to such students to help them to obtain the full benefit of their courses of instruction and to guide them in their conduct at college and in after life in starting a successful professional career. These engineers offered to edit and publish such a volume, and the consensus of opinion as indicated by the replies to this circular letter was that the need for it was great and that assistance in placing it before students in engineering colleges could be readily secured from the faculties of leading institutions. In view of the opinion thus expressed it was decided to publish the book which has just appeared.

It includes 45 lectures by 22 authors, each of whom is a prominent engineer in some branch of the profession. The list includes such men as Ira O. Baker, Onward Bates, Charles H. Benjamin, J. L. Harrington, V. Kerapetoff, Walter C. Kerr, Francis C. Shenehon and J. A. L. Waddell.

The papers have been arranged in the book in the order in which it is thought best for a student to read them, and each is prefaced by a note concerning the author, the occasion of the delivery of the lecture or paper, and a brief word of advice as to the principle benefit to be derived from it. They are also arranged with the idea that a portion of the book may be read by students during each year of the engineering course. It is the intention to distribute copies through the faculties of engineering schools, and as the price was made to cover only the work of printing, binding and mailing the book, it is reasonable to expect that the work of distributing the volume will receive the hearty co-operation of educators who are interested in engineering training.

The Colombian Northern in Colombia starts at Bogota, and is now in operation to Sesquile and is expected to continue on to Chiquinquira 66 miles further, where it will meet the Puerto Wilches line to be extended from Barrancabermeja. If the plans for this route are carried out, these two roads will form a great trunk line from Bogota to the Magdalena river, which will not only shorten the distance and the time required in the journey to the coast but will open up a vast extent of territory now but little developed.

REORGANIZATION OF THE HARRIMAN LINES.

Judge R. S. Lovett, chairman and president of the Harriman Lines, on September 28 announced his retirement from the presidency of these roads and a number of other important changes, effective October 1. The changes announced by Judge Lovett, who remains chairman of the executive committee, and, as such, the chief executive authority of the system are as follows:

A. L. Mohler, vice-president and general manager of the Union Pacific, has been selected as president of that company, and of the Oregon Short Line, with headquarters at Omaha.

William Sproule, who was for a number of years its freight traffic manager, has been selected as president of the Southern Pacific Company, with headquarters at San Francisco. He has heretofore been president of Wells, Fargo & Company.

Thornwell Fay, vice-president and general manager, has been selected as president of the companies operating the Southern Pacific Lines in Texas and Louisiana, with headquarters at Houston.

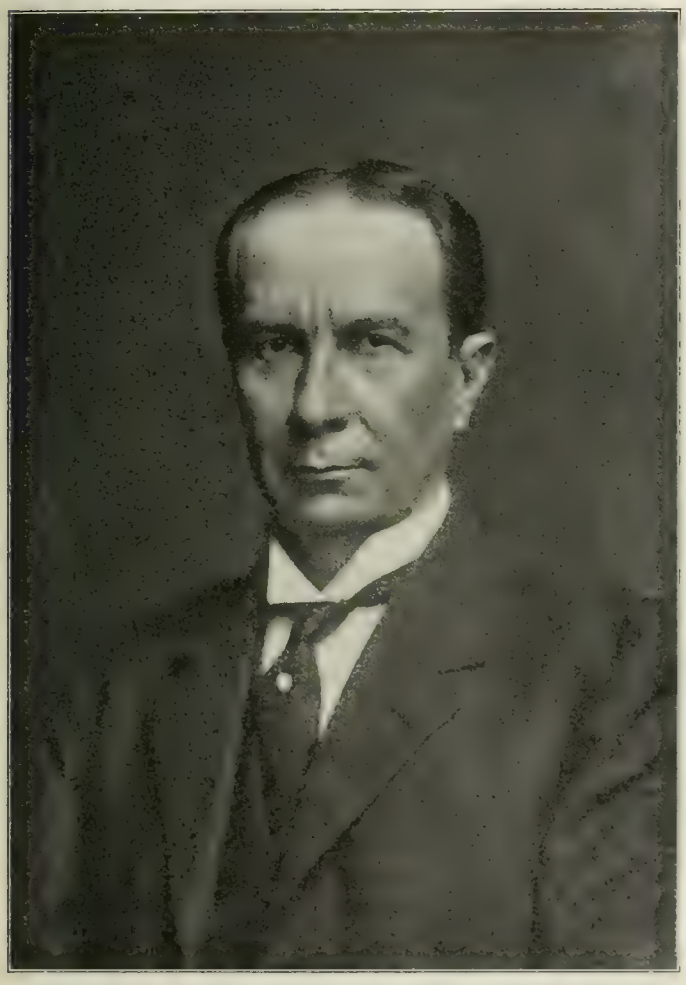
J. D. Farrell, vice-president in charge of the Puget Sound extension, has been selected as president of the Oregon-Washington Railroad & Navigation Company, with headquarters at Portland, Ore.

Epes Randolph, vice-president and general manager, has been selected as president of the Southern Pacific Railroad Company of Mexico, with headquarters at Tucson, Ariz.

Each of these presidents will have supervision of all local departments, and will be responsible for traffic as well as for transportation.

Julius Kruttschnitt, director of maintenance and operation, and L. J. Spence, the principal assistant of J. C. Stubbs, and who will succeed him as director of traffic next January (Mr. Stubbs having some time ago decided on account of failing health and advancing years to retire January 1, 1912, remaining, however, in a consulting capacity) will move from Chicago to New York. It was stated that they will retain all the authority now possessed by them, but will exercise it in a more critical and advisory and less administrative manner, relinquishing to the presidents much of the detail with which they have hitherto been burdened. They will become members of the board of directors and advisers of the chairman and the directors upon matters in their respective jurisdiction; and in conference with the chairman they will study the entire territory served by the lines and the development of the system as a whole, and will handle any other matters referred to them. In announcing the plan after its approval by the directors, Judge Lovett said:

"The changes which have taken place in recent years in conditions affecting the management and operation of railways, particularly in the West, where development has been most rapid, has made it increasingly evident that the best interests of our properties and of the territories which they serve will be promoted by localizing the management with respect to local matters, vesting in a president on the line supervision of both traffic and transportation, and of all local departments with authority to decide promptly questions as they arise. But it is equally important that the central authority and jurisdiction of all questions affecting the system as a whole should continue to reside in the board and executive committee represented by the chairman of the executive committee with his immediate collaborators, the director of maintenance and operation and the director of traffic.



Robert S. Lovett.

J. Kruttschnitt.

"The particular merit of the plan, in my judgment, is that it retains unimpaired in the chairman of the executive committee, the director of maintenance and operation and the director of traffic, the jurisdiction now exercised on all questions affecting the system as a whole, such as through rates, through service, standards of equipment, maintenance and efficiency, the larger questions of general policy and the close scrutiny and criticism of operating results, while at the same time it localizes the management, and brings the companies into closer touch and relationship with the public, and renders the management more directly and immediately responsive to the interests and needs of the traffic and the communities served."

Those who have followed the development of the Hine unit system of organization on the Harriman Lines will at once perceive that by this reorganization the principles of that system

L. J. Spence.

A. L. Mohler.

[illegible] new organization, each railway will be a unit, the largest unit [illegible]

One of the greatest advantages of the new organization will be that it will make practicable the solution by the officers of each railway of all problems that are local to that particular [illegible] each railway reported to Mr. Kruttschnitt and the traffic head of each railway reported to Mr. Stubbs. If, then the operating [illegible] any matter it had to be referred to their respective superior officers, and if Mr. Kruttschnitt and Mr. Stubbs happened to [illegible] York. Under the new system the president of each road will [illegible]

and if the operating and traffic officers of the road differ as to whether certain additional train service shall be provided or certain branch lines or sidings constructed, or anything of that sort, the matter will go to the president of the road and be settled by him, unless it is a question of such great importance that he requires the advice of the director of maintenance and operation, or the director of traffic.

The result, so far as the individual roads are concerned, will be to enable them to deal with their local problems both more quickly and more satisfactorily to the people living along the lines than has been practicable in the past; and the director of maintenance and operation, the director of traffic and the chief executive officer of the system, now the chairman of the executive committee, will be relieved of the necessity of passing on a very large number of detail matters, which they have felt has [illegible] larger problems [illegible]

[illegible] Mr. Kruttschnitt and Mr. Spence, who will succeed Mr. Stubbs, remove from Chicago to New York, they will take with them their [illegible] and the Chicago office will be practically closed.

It is well known that the Harriman Lines have had steamship lines as well as railway interests. The Morgan line of steamers, operating from New York to the Gulf of Mexico, has long been a very important factor in transcontinental traffic and in the determination of the rates that shall be applied to it. Mr. Spence, who is to succeed, will on January 1, 1912, succeed Mr. Stubbs as director of traffic, has had experience in handling [illegible] Prior to his appointment [illegible] as Mr. Stubbs' assistant in Chicago he was general [illegible] of the South-

ern Pacific, and also general freight agent of the Atlantic steamship lines of the Southern Pacific, with office at New York. Mr. Spence's rise in recent years has been very rapid. He was born September 16, 1868, at Wilmington, Del., and received a public school education. In October, 1885, he became a stenographer in the office of Edwin Hawley, then general eastern agent of the Southern Pacific at New York, and was afterward made chief clerk to the assistant general traffic manager there. For six years from 1896 he was eastern freight agent, and was promoted to general eastern freight agent in 1902. His jurisdiction was extended over the Atlantic steamship lines of the Southern Pacific in 1906, when he was given the title of general freight agent of those lines.

Mr. Mohler, who becomes president of the Union Pacific, is no stranger to the duties of the president's office. He was president of the Oregon Railroad & Navigation Company for seven years before he was appointed, in April, 1904, general manager of the Union Pacific. During the years that he has been its general manager the Union Pacific has enjoyed its most rapid development and its greatest prosperity. Under Mr. Kruttschnitt's general supervision, Mr. Mohler has made it the fine property physically that it is so well known to be. And, yet, while he has been so successful an operating executive, he did not get most of his railway training in the operating department. His first work was as warehouse and office clerk on the Chicago & North Western at Galt, Ill. This was in 1868. He then served in various positions in the traffic departments of different roads until 1888, when he was transferred from general freight agent to general superintendent of the St. Paul, Minneapolis & Manitoba, now the Great Northern, and he has been in the operating department ever since. Under the new organization the traffic department of the Union Pacific will report directly to him, and, owing to his past experience in that department, its problems will have no novelty for him.

It is said that when Mr. Mohler went from the Oregon Railroad & Navigation Company to the Union Pacific he did not even take his secretary with him, and that he hesitated some time before he finally decided to take with him the cook on his car. This is characteristic of his way of dealing with his subordinates. When a railway executive officer goes from one road to another and, without any apparent cause, takes with him a good many men to supplant those on the road to which he goes, he is apt to excite antagonism on the part of a great majority of its officers and employees—an antagonism which will be an obstacle to the success of his work as long as it lasts. Mr. Mohler, with all his force, is naturally diplomatic, and, therefore, is always very unlikely to do anything that will cause unnecessary antagonism on the part of either his subordinates, his superiors or the patrons of the railway. This has been one of the secrets of his success. On the other hand, when he has felt that he should express himself regarding the relations of his road to the public, he has been notably plain spoken.

Mr. Mohler was born at Ephrata, Pa., in 1850. As stated above, he began railway work with the Chicago & North Western as warehouse and office clerk in 1868. Two years later he was made a station agent at Erie, Ill., of the Rockford, Rock Island & St. Louis, now part of the Burlington Route. For 11 years from 1871 he was with the Burlington, Cedar Rapids & Minnesota, now part of the Rock Island System, first as traveling auditor and for nine years in the traffic department, where he was promoted successively until he was made general freight agent. He then went with the St. Paul, Minnesota & Manitoba,

William Sproule.

Thornwell Fay.

where for six years he was general freight agent and land commissioner, and in April, 1888, was transferred to the operating department as general superintendent. He was soon promoted to assistant general manager and for four years, from 1889 was general manager of that road and the Montana Central. In July, 1894, he was appointed general manager of the Minneapolis & St. Louis, and three years later was elected president and general manager of the Oregon Railroad & Navigation Company. He was appointed general manager of the Union Pacific in April, 1904, and a year later was elected vice-president and general manager, which title he has held to date.

Mr. Sproule, who is to be the new president of the Southern Pacific, will be one of the growing number of traffic men who have been promoted to the presidencies of large railways. All of his railway experience he has had on the road to which he now returns as president, after having been out of railway work since 1906. Mr. Sproule was born in Ireland 53 years ago. He came to New York when a boy, and previous to entering railway service in 1882 was engaged in mercantile business in California. He went with the Southern Pacific as a freight clerk in 1882, and for ten years from 1887 was assistant general freight agent of the Pacific system of the Southern Pacific. From 1897 to 1898 he was general freight agent, and was promoted to freight traffic manager in 1898, which office he held until 1906, when he became traffic manager of the American Smelting & Refining Company in New York. He was elected president of Wells, Fargo & Company early in 1911.

Mr. Sproule is thoroughly acquainted with the Southern Pacific property itself, with the country through which it runs, and with the conditions of all kinds under which it has to carry on its business. He was recognized before he left the Southern Pacific as one of the ablest railway traffic officers in the country. He is not only a man of great ability, but belongs to the modern school of railway men who recognize the fact that the business of the railway manager is not only to get traffic and to get trains over the road, but also to conduct the affairs of the property in such a way as to produce the minimum of friction and bring about the maximum of co-operation with the people of the territory that it serves.

Mr. Farrell, the new president of the Oregon-Washington Railroad & Navigation Company, has had a varied experience. He began railway work as a track laborer, did engineering work, was a conductor and then an operating officer, and was in the mining and steamboat business for a time. He was for some years James J. Hill's principal representative on the Pacific coast, being president of the Northern Steamship Company and also assistant to the president of the Great Northern. When Mr. Harriman decided to extend his lines to Puget Sound, Mr. Farrell was chosen by him as the best man to do the work, and to him is very largely owing the fact that the Harriman Lines are already running trains regularly into Seattle and Tacoma. The skill and success with which he handled all of the negotiations and all of the development work incidental to the extensions of the Harriman Lines referred to are, no doubt, in considerable measure due to the broad business experience that he had had. He is a very decisive, incisive and forceful man, and no one in the country knows better the people and the [illegible] in the northwestern part of the United States than he does. When he is not busy with his railway duties he is enjoying himself running a dairy farm near Seattle, and it is said by his friends that he is a very good dairy farmer. His farm [illegible]

[illegible] several years' experience as brakeman, station agent and passenger conductor on the Canadian Pacific and on the St. Paul, Minneapolis & Manitoba, now the Great Northern. He was appointed trainmaster of the Chicago, St. Paul & Kansas City, now the Chicago Great Western, in 1888, and the next year was promoted to division superintendent. In June, 1892, he went with the Great Northern, where he was, consecutively, superintendent, assistant general superintendent and general superintendent, leaving the latter position in 1895 to engage in the mining and steamboat business. He was president of the Pacific Coast Company from 1898 to 1903, having been general manager also of the same company for four years from 1898. From February, 1903, to July, 1905, he was president of the Northern Steamship Company, and from March, 1903, to July, 1905, was also assistant to the president of the Great Northern. He then left the Hill Lines.

The new president of the Southern Pacific Lines in Texas and Louisiana, Thornwell Fay, has not only grown up on these properties, but he has long been associated in railway work with Mr. Kruttschnitt. He was chief clerk to Mr. Kruttschnitt when the latter was general manager of the Southern Pacific's Atlantic system at New Orleans, over 20 years ago. His entire railway career has been spent on the properties of which he now becomes president. Needless, to say, he is thoroughly familiar with the conditions of every kind under which they are operated.

Everyone knows the difficulties under which the managers of Texas railways have had to work. They have had to deal with an adverse public sentiment and to negotiate with a railway commission which has not only imposed stringent requirements on them, but has fixed rates so low as to make it very difficult to meet these requirements. The fact that Mr. Fay has been able for over seven years to perform his duties as vice-president and general manager of these properties in such a way as to maintain them on a reasonably prosperous basis, and at the same time gain for himself the favor of his superior officers and no small measure of popularity in Texas, is a sufficient indication both of his executive ability and of his diplomacy.

Probably no other railway officer in the country has taken a keener and more intelligent interest in all problems pertaining to the public relations of the railway. He has done a great deal to educate the employees of the road to so treat their patrons as to mitigate the hostility of public sentiment. He has done much to give the public correct information regarding railway matters. The relations between the railways and the people of Texas are today more harmonious and the railway outlook there is a good deal brighter than it has been in many years. For this improvement in conditions Mr. Fay deserves no small part of the credit.

Mr. Fay was born March 13, 1861, and began railway work when he was 17 years old as a telegraph operator on Morgan's Louisiana & Texas Railroad & Steamship Company, and remained with that company until 1885, serving consecutively as station agent, train despatcher and private secretary to the president. He was then for 15 years with the Atlantic System of the Southern Pacific Company, first as secretary to the general manager, then chief clerk to the general manager, and later manager's assistant. He was elected vice-president and general manager of the Southern Pacific lines in Louisiana in January, 1902, and in April, 1904, was elected also vice-president and general manager of the lines in Texas.

Epes Randolph, who becomes president of the Southern Pacific lines in Mexico, first won distinction in railway service as an engineer. His early work was in the engineering departments of railways in the eastern part of the United States that were controlled by Collis P. Huntington, and he became one of Mr. Huntington's most trusted lieutenants. When the Chesapeake & Ohio made its entrance to Cincinnati it was Mr. Randolph who built its bridge across the Ohio river under difficulties which some other engineers had regarded as insurmountable. In 1894 it became necessary for Mr. Randolph to go to Arizona on account

of his health. He stayed out of railway service a year, and then went with the Southern Pacific, still being with Mr. Huntington. After Mr. Harriman acquired control of the Southern Pacific Mr. Randolph maintained much the same relationship to him that he had to Mr. Huntington. Among other things he was made president of the California Development Company, a Southern Pacific enterprise which had much to do with the development of the rich Imperial valley which lies in California just north of the California-Mexico line. He was president of this company in 1906, when the entire valley was threatened with desolation by an overflow of the Colorado river. The story of the work done to save the country was told in *The Railway Age* of June 14, 1907. It was carried on under the supervision of Mr. Randolph, whose engineering experience and skill, coupled with his remarkable capacity for quick action, probably saved the country. Subsequently, when the Southern Pacific decided to extend its lines into Mexico, naturally Mr. Randolph was chosen to handle the work, which has been carried out with the greatest success. There are not a few persons, who know Mr. Randolph well, who believe that if it had not been for his delicate health he would have long since taken rank in the general estimation as one of America's greatest railway men.

Previous to March, 1891, Mr. Randolph was superintendent and chief engineer of the Elizabethtown, Lexington & Big Sandy, the Kentucky & South Atlantic, and the Ohio & Big Sandy, all now parts of the Chesapeake & Ohio. For two years from the date mentioned he held the same titles on the Newport News & Mississippi Valley and the Ohio Valley, and in January, 1893, had his jurisdiction extended over the Chesapeake, Ohio & Southwestern, all three of which roads are now parts of the Illinois Central. He was appointed superintendent of the Yuma and Tucson divisions of the Southern Pacific in May, 1895, and was promoted to general manager of the Los Angeles Railway and the Pacific Electric Railway in 1901. In February, 1902, he was elected president of the Gila Valley, Globe & Northern, the Maricopa & Phoenix, the Arizona & Colorado, the Cananea, Yaqui River & Pacific and the Sonora Railway, and since June, 1909, when he was made vice-president of the Southern Pacific Railroad of Mexico, he has been general manager also of these lines.

REVENUES AND EXPENSES OF STEAM ROADS OVER FIFTY MILES LONG.*

The accompanying table presents statistics of operating revenues and expenses covering the fiscal year ending June 30, 1911 The table includes returns from 93 per cent. of the railway mileage of the United States. The average mileage operated by these railways during the fiscal year 1911 was 225,067 miles. The returns of a few recently opened or newly reorganized railways have been omitted from this table, because comparable returns for 1910 were not available.

There is much new railway construction in Natal. The new lines authorized at the last session of the Union Parliament to be constructed in Natal were as follows: (1) Stuartstown to Union Bridge, 16 miles. The line is to be of 2-ft. gage and the estimated cost is $243,325. (2) Winterton to Bergville, 18 miles. The estimated cost of this line, which is to be an extension of the Upper Tugela branch, is $421,955. (3) Greytown to Krantzkop, 33 miles. This line, which is a northeasterly extension of the Pietermaritzburg-Greytown line, is estimated to cost $837,670. In addition to the foregoing, 37 miles of the 69-mile Piet Retief-Vryheid line from Piet Retief in the Transvaal to Vryheid in Natal is within this province. The estimated cost of the entire line is $1,945,529, and construction to the value of $1,043,250 pertains to Natal.

*Compiled by the Bureau of Railway Economics from monthly reports of the railways to the Interstate Commerce Commission. This tabulation includes 93.1 per cent. of the mileage of steam roads which filed reports with the commission in May.

REVENUES AND EXPENSES OF STEAM ROADS OVER FIFTY MILES LONG—FISCAL YEAR ENDING JUNE 30, 1911.

Item	Total. Amount 1911	Total. Per Mile of Line.	Total. Increase over 1910. Per Mile.	Total. Increase over 1910. Per Cent.	Eastern Group. Amount, 1911	Eastern Group. Per Mile of Line.	Eastern Group. Increase over 1910. Per Mile.	Eastern Group. Increase over 1910. Per Cent.	Southern Group. Amount, 1911	Southern Group. Per Mile of Line.	Southern Group. Increase over 1910. Per Mile.	Southern Group. Increase over 1910. Per Cent.	Western Group. Amount, 1911.	Western Group. Per Mile of Line.	Western Group. Increase over 1910. Per Mile.	Western Group. Increase over 1910. Per Cent.
Total Operating Revenues	$2,700,232,308	$11,997	d 6	d.1	$1,273,360,738	$18,942	$133	.7	$345,604,131	$9,034	$286	3.3	$1,081,267,439	$9,042	d$252	d2.7
Freight	1,856,446,695	8,253	d172	d2.0	882,637,636	13,130	d109	d .8	246,466,764	6,443	109	1.7	728,322,295	6,090	d264	d4.2
Passenger	639,381,447	2,841	73	2.6	291,344,098	4,334	198	4.8	75,103,646	1,963	144	7.9	272,933,703	2,282	d 11	d .5
Other transportation	177,453,810	788	27	3.5	86,499,814	1,286	36	2.8	20,270,583	530	16	3.1	70,733,413	591	29	5.1
Non-transportation	25,970,356	115	2	1.8	12,929,190	192	8	4.4	3,763,138	98	17	20.7	9,278,028	78	d 6	d6.9
Total Operating Expenses	1,955,253,049	8,243	236	2.9	898,806,586	13,371	696	5.5	234,777,075	6,137	370	6.4	721,669,388	6,035	d 34	d .6
Maintenance of way and structures	353,547,454	1,571	d 45	d2.8	158,069,391	2,351	50	2.2	47,164,375	1,233	75	6.5	148,313,688	1,240	d132	d9.6
Maintenance of equipment	417,635,857	1,856	31	1.7	211,119,610	3,141	50	1.6	57,112,037	1,493	53	3.7	149,394,210	1,249	22	1.8
Traffic	57,442,768	255	9	3.7	25,574,985	380	15	4.0	8,214,439	215	6	2.9	23,653,344	198	8	4.1
Transportation	957,453,560	4,254	224	5.6	473,445,833	7,043	546	8.4	112,493,284	2,941	232	8.6	371,514,443	3,107	57	1.9
General	69,183,410	307	17	5.9	30,596,767	455	36	8.5	9,792,940	256	4	1.7	28,793,703	241	12	5.1
Net Operating Revenue	844,979,259	3,754	d305	d7.5	374,554,152	5,572	d563	d9.2	110,827,056	2,897	d 83	d2.8	359,598,051	3,007	d218	d6.7
Outside Oper.—Net Revenue	1,392,469	6	..	..	745,461	11	..	..	224,168	6	..	..	422,840	4	..	..
Taxes	104,195,144	463	10	2.2	48,473,292	721	33	4.7	12,322,957	322	28	9.5	43,398,895	363	d 7	d1.8
Operating Income	742,176,584	3,298	d318	d8.8	326,826,321	4,862	d591	d18.4	98,728,267	2,581	d112	d4.2	316,621,996	2,648	d217	d7.6
Miles operated, Average, 1911		225,067				67,222				38,255				119,589		
1910		221,563				66,791				37,527				117,294		

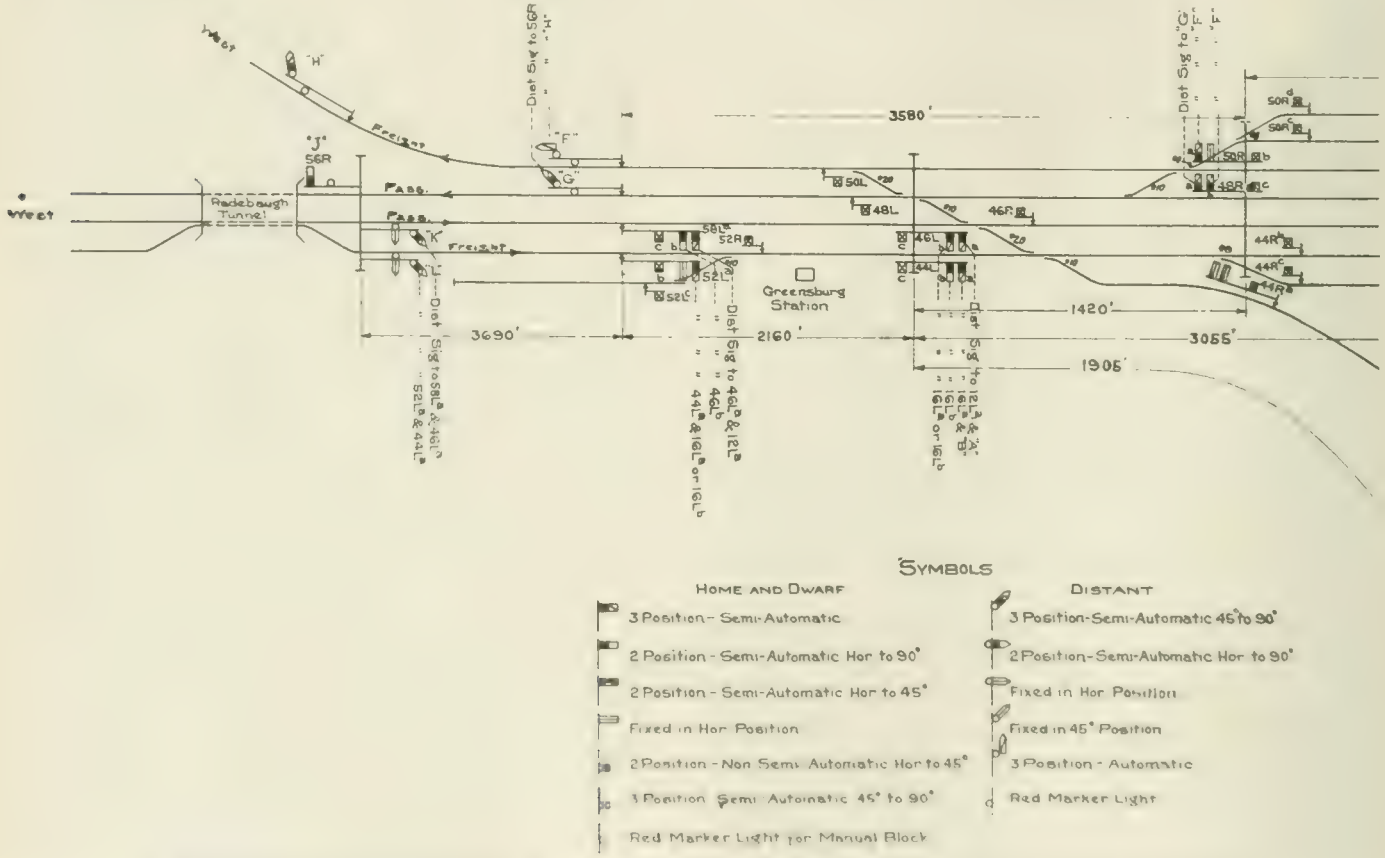
† Decrease.

INTERLOCKING AT SOUTH WEST JUNCTION.

The extensive electro-pneumatic interlocking at South West Junction, Greensburg, Pa., on the Pittsburgh division of the Pennsylvania Railroad, 31 miles east of Pittsburgh, which has been under construction for several months, was put in service on September 4, establishing one of the largest interlockings ever constructed outside a large city terminal. This work, carried out in connection with some changes in alinement of tracks, has necessitated many temporary track and signal changes. One double track tunnel is done away with. The improvement completes the four track system between New York and Pittsburgh, with the exception of the eastbound gauntlet at Radebaugh Tunnel. This tunnel is shown in the drawing, west of signal "J." Greensburg station, with island platforms, is situated between signals 52L and 44L. Included in the change is the installation of a "duck-under" of the east leg of the "Y" leading to the South West Branch. This track connects with the west bound tracks of circuits are used throughout. Circuits are arranged for approach and route locking, so that after signals are cleared the route over which they govern cannot be changed until the train has passed over it, except that to give the elasticity necessary (which can only be attained by allowing routes to be changed quickly after movements have been made) this route locking is so arranged that any switch may be moved after the signals have been restored to stop, and the train has passed entirely over it and beyond its fouling point.

The electric circuits which control the home and dwarf signals and switches are direct current supplied from a storage battery in the cabin; while the distant and automatic signals are controlled by alternating current. All signals are electrically lighted.

This plant is one of the finest examples yet installed of "speed signaling" as recommended by Committee No. 1, of the Railway Signal Association, and Committee No. 10, of the American Railway Engineering Association, and affords an excellent demonstration of the utility of this method.



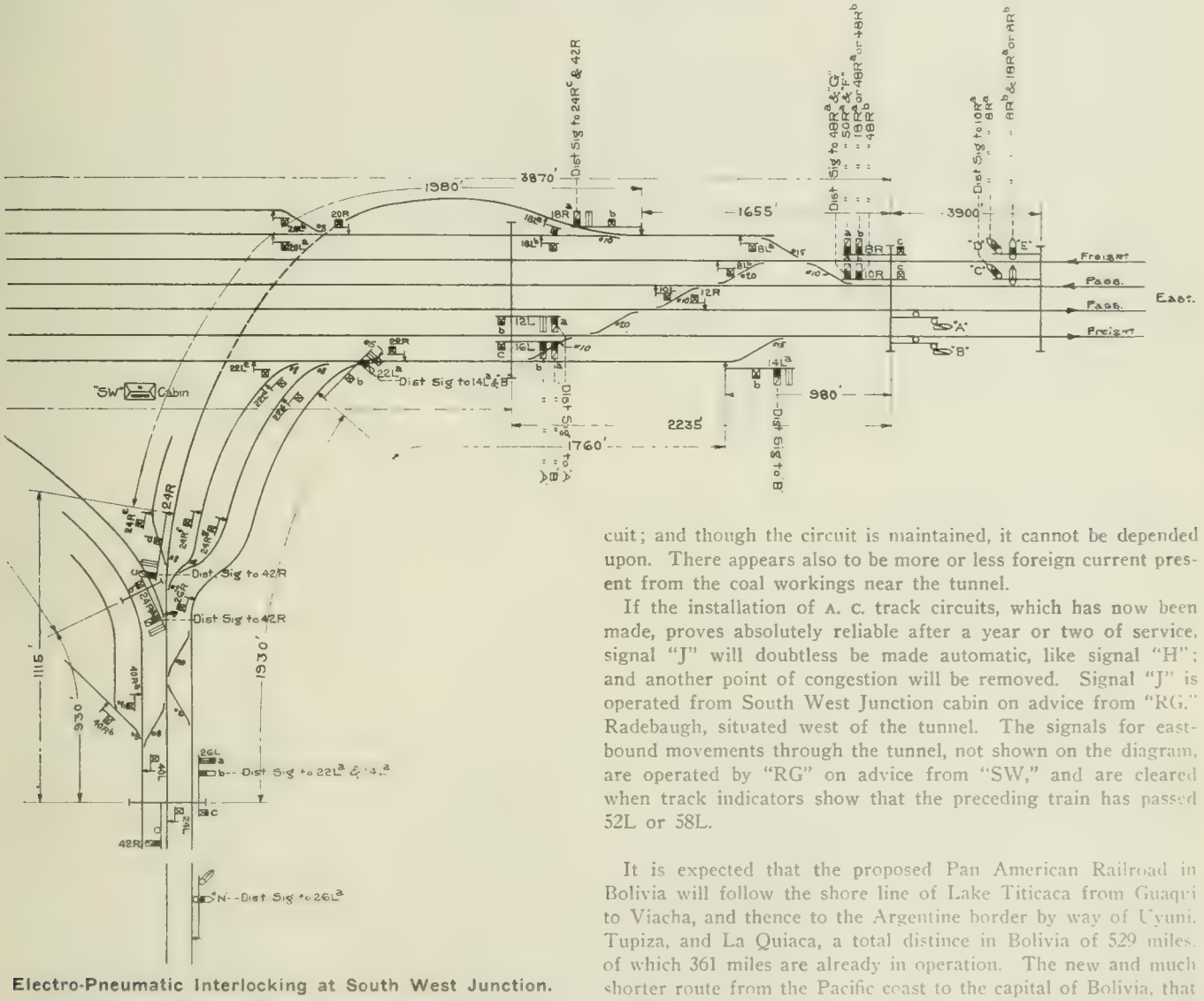
Electro-Pneumatic Interlocking at South West Junction, Greensburg, Pa.; Pennsylvania Railroad.

Thirty-six hundred feet (3,600 ft.) is established as the safe distance at this point to ensure stoppage of the fastest trains between the distant and the home signals; obviously any shorter distance than this would be insufficient.

Referring to the diagram, it will be noted that the distance from signal L to 52L is 3,690 ft., but that 52L to 44L is 2,160 ft., 44L to 16L is 3,055 ft., and 16L to "B" is 2,235 ft. Therefore there is not full braking distance for the highest speed train between these latter signals, although in some cases the distance is sufficient if two signals in the rear show caution. It would not give the needed facility if signal L were made a distant for signals 52L, 44L, 16L and "B"—showing caution if any one of these signals were at stop, as, if "B" were at stop, it would greatly reduce the track capacity to show "caution" at a point over two miles away, when 3,600 ft. is sufficient. If the territory were divided, for signaling purposes, into two interlockings with an advance signal on the bridge near signal 44R, making L a distant for 52L and 44L, and this advance signal and the latter in turn a distant for 16L and "B," still the end would not be attained, for this new distant would be only 1,635 feet from 16L, not a sufficient braking distance. By the use, however, of home signals as distant signals for the next signal or two signals ahead, sufficient braking distance is obtained by overlapping the distant indications, continuing the caution indication until a signal in advance is clear.

The utility of signal 58L on the eastbound passenger track may not be apparent, there being no switches between it and 46L. Greensburg station is situated between these signals, and several trains originating at Greensburg for points on Southwest Branch are made up in the yard and backed west on this track. Signal 58L is to protect this movement, rendering flagging back unnecessary.

It will be noticed that signal "J" governing the westbound passenger track through Radebaugh Tunnel is a "stop and stay" signal. Absolute block is maintained through this and the eastbound tunnel. The conditions at this point are and have been peculiar for years. Although the tunnel is dry, a coating of insulating material will form on the rails in a very short time to such an extent that a train will not shunt the direct current circuit; and though the circuit is maintained, it cannot be depended upon. There appears also to be more or less foreign current present from the coal workings near the tunnel.



Electro-Pneumatic Interlocking at South West Junction.

Drawing continued from preceding page.

If the installation of A. C. track circuits, which has now been made, proves absolutely reliable after a year or two of service, signal "J" will doubtless be made automatic, like signal "H"; and another point of congestion will be removed. Signal "J" is operated from South West Junction cabin on advice from "RG," Radebaugh, situated west of the tunnel. The signals for eastbound movements through the tunnel, not shown on the diagram, are operated by "RG" on advice from "SW," and are cleared when track indicators show that the preceding train has passed 52L or 58L.

It is expected that the proposed Pan American Railroad in Bolivia will follow the shore line of Lake Titicaca from Guaqui to Viacha, and thence to the Argentine border by way of Uyuni, Tupiza, and La Quiaca, a total distince in Bolivia of 529 miles, of which 361 miles are already in operation. The new and much shorter route from the Pacific coast to the capital of Bolivia, that from Arica, Chile, to La Paz, Bolivia, is under construction and is well on its way toward completion, the intention being to have the entire line in operation by the end of 1911. The distance between the two cities by this railway will be only 250 miles, or only about one-third as long as the older route. Up to April, 1911, the contractors had already put into operation about 56 miles of road from Viacha to Corocoro. A portion of this line, that from kilometer 70 to kilometer 112, is the rack-rail system. At the former point the altitude is 4,921 ft., and the climate is delightful and very healthful. At kilometer 110 there is an altitude of 11,811 ft., and the highest point on the line is 14,108 ft. It is proposed to make the entire journey—that is, upward from Arica to La Paz—in 14 hours, while down it will take only 12 hours. Compressed oxygen will be carried to protect the passengers against mountain sickness.

NEW YORK CENTRAL'S WEST SIDE IMPROVEMENTS IN NEW YORK CITY.

The New York Central freight line into New York City diverges from the main line at Spuyten Duyvil and runs south along the river front. From the Sixtieth street yards to the Thirtieth street yards the tracks are on Eleventh avenue at grade; at the Thirtieth street yards they swing east to Tenth avenue, continuing down that street to West Twelfth street, whence they continue down West street, which is at the river's edge, to the terminal at St. John's Park. At various points about the city the road maintains docks to which freight is transferred from Thirtieth street on lighters or car floats. The existence of this freight line on crowded streets has been disadvantageous both to the city and to the railway for obvious reasons: people were killed; operation was slow and expensive; the river front was made unsightly in front of Riverside Park, which extends from Seventy-second street northward to One-hundred-and-twenty-ninth street; and there were complaints of the smoke nuisance.

Various plans have been suggested for the improvement of the whole west water front of the city. One was to construct a freight and passenger subway. This was somewhat along the lines promulgated in Mr. Wilgus' plan for freight subways, which was published in these columns several years ago. Calvin Tomkins, dock commissioner, proposed an elevated railway, to be owned by the city, and a union freight terminal in the neighborhood of Thirtieth street, to be owned by the city, but to be operated by a terminal company controlled by various railways. Access to this terminal would be had by the New York Central direct and by the roads terminating across the Hudson river on the Jersey shore by car-floats.

Negotiations between the New York Central and the city have been under way for some time. For a while these negotiations were hampered by a manufactured "public opinion" clamoring for "immediate" removal of the tracks off the streets at any cost. This culminated when the legal right of the road to operate its trains was questioned, on the ground that the company's franchise for the use of the streets had expired. A test suit was brought and carried through various courts until the Court of Appeals decided in favor of the railway. This cleared the way for bills which passed the New York legislature this year, empowering the Board of Estimate of New York City to enter into an agreement with the railway company as to the plan to be followed in getting the tracks off the streets. This agreement is to be binding; the approval of no other body being required. The bills prescribe the general plan, which is as follows: There are to be no grade crossings from Spuyten Duyvil to Seventy-second street, the tracks may be on the present level, but they are to be routed over within the limits of city parks, of which there are now two, Fort Washington Park and Riverside Park; south of Seventy-second street they are to be carried on an elevated structure to the southern end of the island, the use of steam locomotives is to cease within four years from the date of agreement between the Board of Estimate and the railway company, and the whole work is to be finished within six years from that date. The railway was to submit plans to the Board of Estimate by October 1. If no agreement is reached by January 1, 1912, the Board of Estimate is to appeal to the legislature for further action.

The New York Central submitted its plan last week. The accompanying map and profile shows the main features, which provide for the removal of about 13 miles of track from the surface of the streets. It is not suggested that the tunnel under Spuyten Duyvil be built at first. Provision is made for the tracks at the south of the Inwood street yard and thence a four-track line to Canal street on an elevated structure. In front of running down Tenth and Eleventh avenues it is to run south of the "Marginal Way" along the waterfront. There are no changes at present made at Riverside Park, but the plan calls

for an elevated structure as far as Cortlandt street, where the New York Central operates two piers at present. There is now a small yard at Manhattanville. The plan is to enlarge these yards and perhaps build some piers. At the site of the Thirtieth street yard the terminal buildings are to be built, with spurs of the elevated road running between them on the second story level. Owing to the slope of the ground, the second story will be at street level on Tenth street, so that trucks can come in on a level with the tracks. Freight is to be received and distributed on the lower level on Eleventh street and Twelfth street. Somewhat similar treatment is planned for the St. John's Park yard. Spurs at various points can be run from the elevated structure to the different piers and to private industries.

One of the accompanying drawings shows the proposed treatment through Riverside Park. It is suggested that there be a driveway, as shown, on the roof over the tracks. The design of the roof covering and the cost to the railway is about the same whether such a drive is constructed or whether the right-of-way is entirely covered with earth. In the latter case provision would have to be made for ventilation.

In time, the passenger traffic at the Grand Central station will presumably increase so that some of it should be diverted to the west side line. In this case, permission would be asked to build a connecting tunnel in the neighborhood of Fifty-seventh street.

The total cost is estimated at $65,000,000, of which $43,000,000 would be required to put into effect the first stage of the improvements. All of this cost is to be borne by the railway company (contrary to the policy of the state and many cities in the state, where the state or municipality, or both, bear part of the expense of grade crossing elimination), receiving in return a perpetual franchise for such extensions and tracks as are not now possessed, and for a six-track and four-track line north and south of Seventy-second street respectively, in place of the four and two track lines now existing.

Typical Section in Riverside Park.

Typical Location of Elevated Structure.

LETTERS FROM AN OLD RAILWAY OFFICIAL TO HIS SON, A GENERAL MANAGER.*

XIX. Chicago, August 12, 1911.

My dear Boy: As the old order changeth, yielding place to new, the last of the feudal barons among the chief engineers are passing. Bold have been their conceptions, faithful their performances and great their achievements. Their work has developed those splendid types of manhood which are characteristic of the futile struggle of nature against art, of the wilderness against civilization.

Partly because of better intellectual training, partly because of the rush to complete additions and betterments and partly because of the inborn tendency of human nature to over-specialize, the construction men of most railways have frequently put it over on the so-called operating men. Peace hath her victories no less renowned than war. As civilization advances the struggles of a railway are less against physical nature and more against sociological and political conditions. This advanced stage makes for altruism and comprehensive co-operation. The problem of the construction engineer becomes harder when his work is interwoven with the necessities of everyday operation. A manufacturing plant can sometimes shut down during a period of new construction. A railway, however, cannot store its product, transportation. Some car wheels must be moving all the time. It follows, then, that construction must yield to operation rather than operation to construction. Again, from the nature of a railway, construction is a component of operation, and the whole is greater than any of its parts.

During the period of rapid expansion the construction men were kept "on the front." Here is another bet that our predecessors overlooked. Instead of amalgamating construction with operation and developing a corps of all around men they sacrificed the future. The result is two sets of specialists lacking sympathy with each other's difficulties. The point of convergence is the company's treasury, which pays unnecessary bills. Sometimes these are in the form of a duplication of work train service; sometimes in idle equipment in which the construction bureau retains a proprietary interest on days of idleness. The construction people may be awaiting material or men. Meantime *my* work train cannot be used by the superintendent for maintenance purposes. The chief despatcher has so little sympathy with new construction that the young assistant engineer dare not let go of *my* engine lest *au revoir* may mean good-bye. Another delightful but expensive duplication occurs frequently in the matter of stores. Look around and see how many separate stores your construction bureau is maintaining, some of them within a stone's throw of a well stocked permanent store.

After defying a few times the official lightning our wise construction Ajax learns to make his estimates large. Having beaten his own figures he exclaims, "Behold how much money I

difficult than in operation. This inability to control disburse-

All positions have their inherent temptations. The young en-

maintenance conditions. Experience in maintenance would help

much money being charged to maintenance could have been saved if the construction people had better appreciated operating conditions. See how many side tracks and water tanks are on curves. Never investigate a collision without considering faulty construction and location as factors.

One of the easiest ways to save your company money will be to reorganize your construction activities. When you decide upon some new line, be it a branch, a second track, or an extension, call a cabinet meeting of all your assistants. Let the supply assistant of your grand opera troupe know at which stand you are to play. Call in the superintendent of the division concerned, with his maintenance assistant. Tell the superintendent that he will be responsible for the new work subject to the instructions of your construction assistant. Let it be understood that the work will be under the direct charge of his maintenance assistant, that the equipment will be looked after by his mechanical assistant and the material and supplies furnished by his supply assistant. Throw the whole official momentum of the division on the side of the new work. Under the old order of things the division people do what they are told in helping out the construction, but no more. The proposed organization will beget that extra individual effort which is relatively as profitable as the farmer's extra bushel per acre. At this same cabinet meeting let your superintendent nominate a junior assistant to act as understudy for maintenance while his leading maintenance man is treading the construction boards. If, when the job is over, any scrimping has to take place it will not be the construction man who has to drop back. Two years hence the maintenance assistant will not give you the old song and dance about poor construction causing excessive maintenance, because he himself built the line. There is, of course, a danger that this maintenance assistant will be extravagant in construction for the sake of a future record in maintenance. You have two checks against this, one through the efficiency of your construction assistant and the other through the division accounting bureau, which should handle additions and betterments as separate accounts.

Once upon a time I ran across a contractor grading a new line. His organization, the most efficient that I ever happened to see in any line of activity, made that of the railway for which he was working look like thirty cents. He made the grading camp the unit. Each of his sixteen camps was in charge of a foreman who controlled his own commissary, his own timekeeper, his own blacksmith and his own animals and equipment. The first duty of the foreman was to supply his men with grub and his animals with feed. Normally this took two wagons. If he happened to be near the base of supplies he used only one team and put the other on a plow or a scraper. If he happened to be clear at the front he might have to borrow another wagon and use three teams for supply. The point is that he kept all of his teams working all of the time and never ran out of supplies. The railway would organize a department of wagons, a department of plows and a department of scrapers, and the foreman who kicked the hardest would have the most grub, even though somebody else

railway in charge of the several staking and inspection parties could not procure railway commissary supplies without the O. K

cials and sub-officials with authority to act for the contractor. A general foreman and two assistant general foremen were riding the line and giving instructions to meet changing conditions.

the general manager who had

When a resident

the chief engineer and gained the desired information from the latter's chief clerk, who was receiving a smaller

description of the complex methods imposed by the railway accounting department in marked contrast to the simple common sense practice of the contractor. How much stockholders are paying for maintaining the sacred system of railways I am unable to state. Many administrative crimes are committed in the name of organization.

One of the fallacies sometimes introduced by the accounting department in construction organization is to have all the timekeepers report to a chief timekeeper, regardless of the engineer or other chief of party. A bright young engineer once told me his troubles in this respect. He was astonished at the difference when he followed the advice to make each party a complete unit with its own timekeeper, the chief of the party being held responsible for proper time keeping as well as for all other duties. This efficient youngster deplored the fact that neither his engineering school nor his official superiors had ever deemed it necessary to give him lessons in the applied science of organization. Never forget, my boy, the immortal words attributed to George Stephenson that the greatest branch of engineering is the engineering of men.

Affectionately, your own, D. A. D.

RAPID BRIDGE WORK ON THE BOSTON & ALBANY.

BY W. F. STEFFENS,
Engineer Bridges and Structures, Boston & Albany.

Mention has frequently been made in the columns of the *Railway Age Gazette* of the extensive improvements now in progress on the Boston & Albany. Among these improvements, the company is replacing its lighter bridges with modern structures capable of carrying the heaviest known wheel loads. The specifications provide for Cooper's class E-60 loading, i. e., two 213-ton locomotives coupled, followed by a load of 6,000 lbs. per foot.

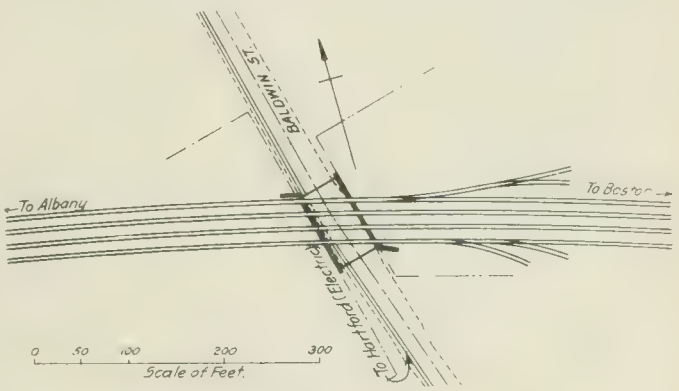
In the issue of May 5, 1911, the erection method followed in connection with the replacement of bridge No. 126, at Huntington, was described. The new superstructure was erected at the side of the old, and then the two spans simultaneously were rolled laterally, so that the new span occupied its final position and the old span occupied a temporary position from which it could be subsequently dismantled as convenient. The method of moving large masses on steel rollers has been in use for many years, as has its application to bridge work. On the Boston & Albany this method has been so perfected that the mere movement of the masses now requires but a matter of seconds, instead of minutes as elsewhere executed.

The latest and best example of the method was carried out last Sunday, October 1, at West Springfield, Mass. At this point are located the shops and one of the principal yards of the road. Baldwin street crosses beneath the railway at the extreme westerly end of the yard by a bridge known locally as No. 113A. The yard conditions render it imperative that the form of structure shall be such as to avoid any projecting steel work above the track level. The angle between the center line of location and the center line of street is about 60 deg., and the distance between street lines is about 42 ft. The depth of the floor possible for the bridge is limited by the surface of the street, which is about as low as possible at the present time, and by the elevation of the track, which is on about 0.51 per cent. grade ascending westward. The old superstructure to be replaced consisted of deck plate girder spans, three girders per rail, with a depth less than 1/15 of their span length. Under the heavy modern loadings, the deflection of these girders was an important consideration in deciding to replace them.

Considering these facts, together with the necessity for providing for the future extension of tracks over the bridge at such time as the yard may be extended, and the further consideration that maintenance of exposed steel-work should be eliminated as far as possible, a composite form of structure was selected. Deck plate girders form the basis of the design, but these girders are turned to lie at 90 deg. with the abutments, resulting in shortening the span. The original idea was to encase these girders in concrete, so that the resulting structure would resemble a slab and T-beam type. On account of the length of girders, 47 ft., it was finally decided to transform the concrete work into solid filling between the girders, placing in this filling sufficient steel rods to result in a series of reinforced concrete beams between the steel girders, although the steel-work was computed to carry the entire dead-load. Subsequent to the design of the concrete beams on this basis, a question arose as to the clearance between the bottom of the structure and the top of the street, which is used by a line of interurban electric cars. Rather than raise the question of changing the grade of the street to maintain the necessary under-clearance, the tracks were slightly raised at the west end of the yard and over the bridge, and a reduction of floor depth was made by omitting the concrete work below the angles of the bottom chords of the girders, and raising the reinforcing bars so that they lie between the girders, as shown in the section.

The girders are composed of web plates 38 in. x 7/16 in.; the flange angles are 8 in. x 6 in. x ¾ in.; and the cover plates are 14 in. wide. The girders are spaced about 2 ft. 4 in. center to center, except where vault lights pierce the slab to partly light the street below the structure.

Originally it was expected that the new superstructure could be erected in place, and that the concrete filling and waterproofing would be placed under traffic. Later, however, due to the experience obtained at other points on the road, it was determined to erect the new superstructure at the side of the old,



Location of Bridge.

in five sections. It was thought that, on account of being obliged to roll the sections into final position at a height sufficient to clear the masonry, the lowering of these slabs to avoid cracking would involve considerable risk, and that these slabs were possibly as large as could be safely handled. The intervening panels could be concreted and waterproofed after the main slabs occupied their final position on the bridge seats. The problem was further complicated by the fact that the grade of Baldwin street rises rather abruptly both sides of the bridge, and, to obtain clearance for the electric cars while the structure occupied the temporary position, it would be necessary to erect the slabs on a grade.

After the contract for the erection was let, the contractors were able to negotiate with the local electric car company to temporarily lower their tracks at the side of the street to obtain running clearance under the structure if erected nearly level in its temporary position. From this point, it was but a step to suggest the entire completion of the new slab with the exception of the ends of the girders, to enable the shoe plates to be placed on the masonry when the girders had reached final position. The important question as to by what method this unusually large slab could be lowered to final position on the abutments was solved by the sand-jack principle, applied in rather a unique manner.

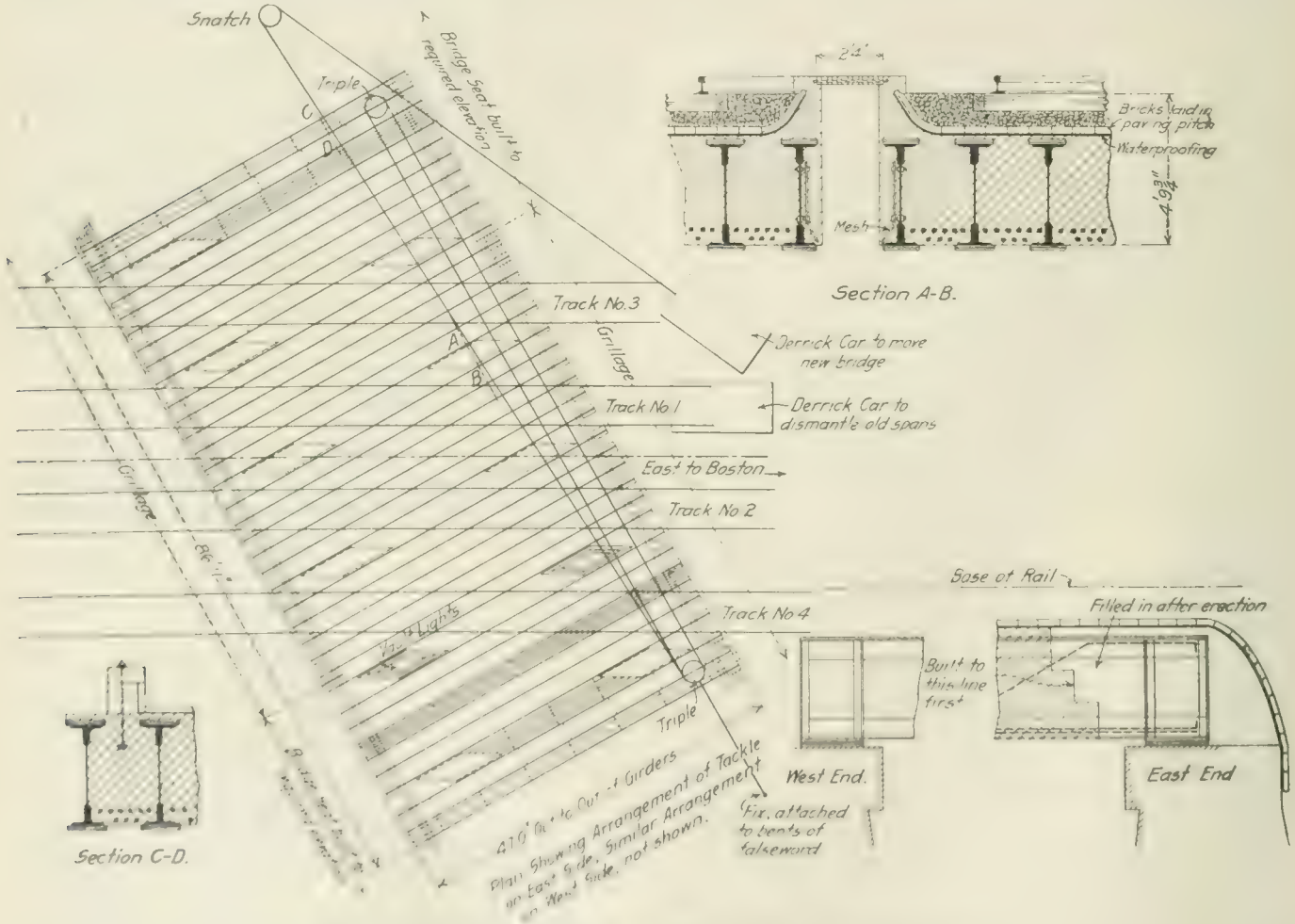
The falsework supporting the old bridge, and which later supported the new bridge in its final position, consisted of double bents at each abutment, upon which bents were placed the racks of rails and rollers. The sill of each bent was not seated direct on the ground nor on blocking, but was placed above another 12 in. x 12 in. timber sill, whose top was placed 6 in. below

the bottom of the main sill. In the intervening space, dry, clean sand was placed and confined in place by means of 8 in. x 16 in. timber stringers bolted to the faces of both sills. In erection, the false sills with the cheek plates attached were first placed on a carefully prepared foundation at exact elevation, and the open box thus formed was filled with sand to the correct elevation. The bents were then erected in the usual manner in this sand bed. Upon the completion of the erection work, these cheek plates were removed and the sand ran out, lowering the span to place.

Much apprehension was expressed in local quarters as to the possibility of moving into place a single slab weighing 1,500 tons, and lowering it to place without cracking. This, however, was successfully accomplished. The only evidence of a crack was at a joint caused between concrete placed at different dates on adjacent sides of a dividing line separating one day's work from another. At this point a very faint evidence of separation was

track. The slab was rolled in a southerly direction to a clearance distance from the last span of old girders remaining in place. After the passage of the Twentieth Century Limited [the B. & A. train which connected at Albany with the New York Central train] at 9:27 a. m., this last span of old girders was lifted by the derrick car clear of the new slab, which was run beneath it. The old girders were then lowered so as to rest upon the new bridge, which was then rolled into final position in about 15 seconds. The old span, thus mounted on the slab, was carried to one side, whence it could be loaded on flat cars and removed from the site.

Previous to the last operation, the track ties had been placed on the slab and blocked up to convenient height with 3-in. plank. When the slab reached its final position, the rails were placed in position and spiked. The ties were temporarily blocked over the exposed ends of the girders at the edge of the slab and the bridge was ready for traffic at 10:50 a. m. on the eastbound main



Plan and Details of West Springfield Bridge; Boston & Albany.

noted, but this will be protected by the waterproofing coating.

In the moving of the span, three interesting features may be noted. In general, the method was similar to that described in the article mentioned above. The arrangement of tackle is indicated in one of the accompanying drawings. The operating department of the road abandoned, for a short time, the extreme north and south tracks leading to the yard and operated the yard entirely from the east end, so as to enable the removal of the girder just supporting these tracks over Baldwin street. As a part of the operation, the slab was moved on Sunday morning to within clearance distance of the northerly middle track, which is the westbound main track. After the passage of the first regular passenger train westbound Sunday morning at 8:03, the rails were removed for that track and the girders were lifted to the east westbound main track just south of the eastbound main track. The derrick car had been standing during the operation at the east end of the westbound main track. The westbound main track was prepared for traffic a few minutes later. After the metal shoe plates were placed on the abutments and the span lowered to firm bearing on them, the open ends of the slab between the girders were filled with concrete, and the waterproofing was completed, ready for the ballast that replaced the temporary blocking.

The design and general execution of the work were under the direction of F. B. Freeman, chief engineer of the B. & A., and of the engineer of structures, and W. B. Knight, division engineer. The direct execution of the work was by the Lucius Engineering Company, Pittsburgh, Pa., F. J. Lucius, president, and H. D. Mason, general foreman, in charge in the field. Acknowledgment is also due to the co-operation of the operating department, J. L. Truden, general superintendent, and S. H. Clark, superintendent, for rearranging traffic movements to accommodate the erection of the structure, and to the various members of the interested departments, whose efforts made possible the result

Shop Section.

WE have been asked if contributors to the competition on the Benefits to be Derived from Convention Attendance, which closes October 15, must have attended conventions during the past summer. No, not necessarily. Any one who can testify as to the practical benefits derived from attendance at conventions is eligible. A first prize of $35 and a second prize of $20 will be awarded for the best two articles. Articles not awarded prizes, but accepted for publication, will be paid for at our regular rates.

SO many kinks were received in the competition which closed, September 15, that the judges have been unable to decide upon the prize winners in time for announcement in this issue. Ninety-two kinks were submitted by eleven contributors. Texas, Georgia, Kansas, Kentucky, Canada, Illinois, Ohio, Pennsylvania and New York each had one or more representatives. The supply appears to be unlimited for we have described almost 1,000 of them since the Shop Section was inaugurated.

AN error was made in announcing the results of the competition on Reclaiming Scrap Material in last month's issue. The winner of the second prize was C. C. Leech, foreman of the Pennsylvania Railroad at Buffalo, N. Y., and not J. S. Sheafe, as announced on the editorial page. Proper credit was given, however, in connection with Mr. Leech's article, which appeared on page 418 of that issue.

IT was interesting to note the interest that F. W. Brazier, superintendent of rolling stock, N. Y. C. & H. R., displayed in the Master Painters' Association during the last convention. And to be assured that this interest was genuine and permanent one need only to raise the question with a member of that association. His attendance at these conventions, which, by the way, is as regular as possible, adds a great deal to the value of the meetings. It shows the members that a man in his position appreciates the work of the Painters' Association and the difficult propositions which the master painters are up against. His talk to the younger men was very much to the point; the young painter could receive no surer tip to the road to success.

MORE and more attention is being given to safeguards and the prevention of accidents in railway repair shops and car repair yards. Splendid results have been obtained in many cases, but the number of accidents can be reduced to the minimum only when the men themselves heartily co-operate with the management by helping to keep the safeguards in good condition and by refraining from taking hazardous risks in order to save a few steps or make a few more cents per day. It is difficult to secure and hold this co-operation, for the men will at times be careless. The foremen must be watchful and alert at all times, both in watching for defects in the apparatus and for the non-observance of the rules governing the safety of the workmen. If the man at the head of the shop or department uses these precautions and draws the attention of the men to their importance, they will usually be impressed with the advisability of following in his footsteps.

THAT the railway painter is in rather a peculiar position can be readily understood by referring to the papers on the output of the passenger car paint shop, which are abstracted elsewhere in this issue in connection with the report of the Painters' Convention. They are the last men to work on the car before it is put into service, and if it is not delivered from the shop at the right time it is the prevailing tendency to get after the painter about it. He is subject to the delays of all the other departments that have anything to do with the repairs of a car. It is also up to him to make the car look respectable, and here again he is limited by the supplies given him, and in cases where he has to use what he can get, his hands become almost tied. That his true position is not altogether understood by his superiors was hinted at in the papers read during the convention. The painter should take considerable pride in his work, and that he does, there is no doubt. In this time of economy he has many things to consider in the line of substitutes for paint oils and turpentine. That these are being considered is well shown in the account of the convention. Of late years his troubles have increased considerably since the life of the recently introduced all-steel equipment is, to a large extent, in his hands. The painters sometimes wonder whether their troubles are duly comprehended by those above them. It is a matter that might profitably receive more consideration on the part of their superior officers.

WE have aimed to have kinks or articles of special interest to the boiler maker foreman in every Shop Section. This month we are especially fortunate in being able to present a description of the method of laying out a wrapper sheet for a locomotive tapered firebox, prepared by William H. Damon, foreman boiler maker of the Long Island Railroad. We trust that we may receive similar contributions from others of our readers who are particularly interested in the laying out of boiler work.

PAINT SHOP PRACTICE will be the subject of the competition to close November 15. It is purposely made as broad as possible in order that no paint shop foremen can excuse himself from participating. For instance it will include the painting of freight cars—both wood and steel. Have you a better way of handling this work than your neighbor? If so, how do you do it? Do you use a pneumatic painting apparatus for your freight cars? Is it better than hand painting? You may have designed some kink or more convenient way of doing certain classes of work, or you may have assigned the work or changed the organization in order to handle it to better advantage. Tell us about it. Then there is the matter of passenger car painting and interior finish, presenting an almost endless variety of subjects which might be treated to advantage. The sanding and decorating of windows is usually handled by the paint department. Very little has appeared in the technical papers regarding this class of work. We should like to know the details of handling it. The materials used in the cleaning of passenger equipment and the way in which the work is done may also be considered, for it is usually directed by the master painter, and if not properly done severely affects his work. The recent introduction of steel passenger cars has presented new and difficult problems for the master painter to solve, both as to the protection of the steel and as to the materials and methods to be used. What are the difficulties and to what extent have you solved them. These are only a few suggestions as to subjects which might be considered. Select the one that you are best qualified to write about and make your article clear and practical. A prize of $35 will be given for the best article, and one of $20 for the second best. Articles not awarded a prize, but accepted for publication, will be paid for at our regular rates.

THE forty-second annual convention of the Master Car and Locomotive Painters' Association might also have been called the forty-second annual reunion of the railway painters' families' for the feeling of brotherhood and relationship between the painters is no less marked than the comradeship and friendly feeling between the families and friends who accompanied them. There was a congenial, wholesome atmosphere throughout the

hotel during the time the painters were there. The wife of an ex-president remarked that this was her fifteenth convention, and that she had only missed one in the past sixteen years; many others could have equaled her record.

The meetings were conducted in a business-like manner and the program was carried out very smoothly. The authors of the papers took special pains to cover the subjects to the best of their ability and the marked improvements over last year's convention were unanimously declared to be in the reports of the test and information committees. W. O. Quest, as chairman of the test committee, should be especially complimented on the results of his committee's work. He showed the results of some twenty-eight experiments with different mixtures of paints and varnishes in which the value of various substitutes for paint oils and turpentine was demonstrated. It is to be regretted, however, that the report was so tied up to the specimens exhibited that it is impossible to publish a comprehensive abstract of it at this time.

The report of the information committee, of which H. Heffelfinger was chairman, was received with great satisfaction and was voted the best report ever presented by that committee. We hope that this record will be sustained, if not bettered, for through this committee the value of the association as an association can be strongly felt by all its members. It provides a means of solving the individual troubles of the railway painter, and should be used by every member. Such a committee should be considered by other mechanical associations, for through it questions can be more carefully and thoroughly answered than on the floor of the convention hall.

There are a few criticisms that can be made of the convention, and these are common to most other associations. The convention should be made, as Mr. Brazier said, a clearing house for all the troubles of the painter. There should be no hesitancy on the part of any one to get up and tell the difficulties they experience—and if any one knows of a remedy for such difficulties he should make it known at once. There is no possible excuse for anybody to fail in responding in this way, as it is for these very reasons that all the mechanical associations are in existence today. The papers should also be thoroughly discussed by *all*. Although it cannot be said that the discussions were not extensive, the number of members that participated in them should have been larger. Every one that is interested should have something to say.

The attendance at some of the meetings was open to criticism, especially since only one session was held a day, leaving plenty of time for inspecting the exhibits, improving acquaintanceship and interchanging ideas.

MECHANICAL ARTICLES DURING SEPTEMBER.

A LIST of special interest to our mechanical department readers that have appeared in the weekly issues of the [illegible] Gazette since that of September 1, and to which they [illegible] wish to refer, are as follows:

[illegible]. Editorial comment on the special [illegible] convention which was held in Chicago. September 8, page 465.

[illegible]. Abstract of the report of [illegible] which was held at the Lake Shore shops at West Albany. September 8, page 468.

[illegible]. Abstract of the proceedings of the [illegible] held in Chicago August 31 to September 1. The [illegible] and addresses which were considered of particular interest to the [illegible] September 8, page 469.

[illegible]. Abstract of a paper read by [illegible] Chicago & North Western. September 8, page 469.

[illegible] Locomotive in Air Brake Operation. Abstract of a paper read on this subject. Actual demonstrations [illegible]. September 8, page 469.

[illegible]. An important paper by W. C. [illegible], mechanical engineer, Erie Railroad. A record of [illegible] and tests on the Erie road during the last year [illegible] were tested. September 8, page 467.

Address by F. O. Melcher. Mr. Melcher emphasized the importance of the work of the traveling engineer whose duties bring him in direct contact with the men who actually operate the locomotives. He also told the supplymen how they might assist in preventing unwise legislation. September 8, page 470.

Mallet Compound in Road Service. Abstract of a paper presented by J. B. Daugherty, B. & O., and an account of the discussion. Mallets can be used successfully in through freight service and comparatively fast service, if properly designed. September 8, page 471.

Lubrication of Locomotives Using Superheated Steam. A committee report and an abstract of the discussion on it. Successful results are being obtained with high superheat, especially where drifting valves are used when it is necessary to shut off quickly or drift. The report considers the methods of lubrication, the lubricant and the packing and packing rings. September 8, page 472.

The Traveling Engineer and His Duties. Abstract of an address by T. A. Foque, general mechanical superintendent, M., St. P. & S. S. M. September 8, page 473.

Efficient Handling of Electric Locomotives. Abstract of a paper presented by S. A. Brickford, N. Y. C. & H. R. R. September 8, page 474.

Treated Water. An extract from a report on this subject presenting facts as to the loss of efficiency due to scale formation of different thicknesses and physical properties. September 8, page 474.

The Brick Arch. Abstract of the report and discussion on this subject. The advantages of the brick arch are outlined and tests are cited showing its effect on fuel economy and smoke prevention. September 8, page 475.

Efficient Management. An address by S. O. Dunn, editorial director of the *Railway Age Gazette*, on true "scientific management," and the part which such organizations as the Traveling Engineers' Association have in promoting it. September 8, page 476.

Automatic Stoker. Abstract of a report and the discussion on it. The Crawford, Hanna, Street and Strouse stokers were considered. September 8, page 477.

Automatic Fire Door for Locomotives. Description of the Shoemaker automatic fire door. September 8, page 483.

Boiler Circulation. Editorial comment on an article by H. B. MacFarland in the same issue. September 15, page 497.

Western Shop Employees. Editorial comment on the situation. September 15, page 498.

Women's Parlor Car for the Burlington. Illustrations showing the arrangement of these new cars which have a woman's reception room with a seating capacity of 15. Details of the steel underframe are also shown. September 15, page 501.

Brake Shoe Friction. Abstract of a paper on The Friction of New and Worn Brake Shoes and New and Worn Cast Wheels, which was read before the convention of the Air Brake Association, by A. S. Williamson. September 15, page 504.

Water Circulation in Locomotive Fireboxes. Description by H. B. MacFarland of a series of tests made on the Santa Fe to determine the relative merits of the circulation in Jacobs-Shupert and the ordinary type of fireboxes. It is difficult to make conclusive tests of this character and the conclusions drawn by Mr. MacFarland are based on the location of solids and suspended matter in the water spaces around the firebox. The tests and the theories evolved are ingenious, but it is to be hoped that it will be possible to make further and more conclusive tests. September 15, page 505.

Master Car and Locomotive Painters' Association. An account of the opening session and a list of the exhibitors. A complete account of the convention will be found in the issue of October 6. September 15, page 534.

Mountain Type Locomotive for Heavy Passenger Service. A completely illustrated description of this new type of locomotive and data as to the service results which are being obtained. They haul 10 to 12-car trains over a mountain division of the Chesapeake & Ohio, replacing 108-ton Pacific type locomotives which could only handle 6-car trains. They are equipped with Schmidt superheaters, Street stokers, and a power operated grate-shaking system. September 22, page 555.

Swiss Ambulance Car. Illustrated description of a car introduced by the Swiss railways, and arranged for use over all the railways of Europe, in which sick or invalid persons may be comfortably transported over long distances. September 22, page 559.

Heavy Mikado Locomotives for the Illinois Central. Fifty of these locomotives [illegible] for handling coal traffic. They are equipped with superheaters and have 30 per cent. more tractive effort than the consolidation locomotives which they replace. September 29, page 585.

Scientific Development of American Railways. S. M. Felton, president of the Chicago Great Western, prepared a paper on Scientific Management of American Railways for the Congress of Technology, held in Boston last April. Extracts are presented, showing the growth of traffic on the Pennsylvania since 1865; also the development of the freight and passenger locomotives during the same period. September 29, page 586.

Tonnage Ratings of Locomotives on the Burlington. A thorough description of the methods used as described by M. H. Wickhorst in Bulletin 138 of the American Railway Engineering Association. September 29, page 592.

Concrete Engine House, Elgin, Joliet & Eastern. The house has 17 stalls, and was recently erected at the new terminal at Joliet, Ill. September 29, page 597.

Letters to the Editor.

EFFICIENCY.

Vallejo, Cal., July 22, 1911.

To the Editor of the Railway Age Gazette:

The scientific management of railway shops means, I suppose, the saving of unnecessary waste in time, money and material; or in other words, decrease the cost, and increase the output. Every employee in the shops that I have worked in, has had to make out a time card at the end of each day, showing the time he started and stopped each job. Now why not introduce another card on which each man could and should show how and why time, of say more than 5 or 10 minute periods, was lost each day, in the same way as making out the timecards. This would in certain cases show up lazy men as well as poor tools, and when such losses are added up, they certainly would amount to something worth further investigation, and consequently call for remedies. Many methods and systems would be considerably changed, because the officials would come to know of things that they were not aware of.

If a man has to run two and three times to the tool room for a tool before getting one that will work, or has two run two, three or more times during the day to get his hammer-shafts repaired, do you suppose that the officials will not try to remedy such matters? As it is now, when a man complains, generally no one pays any attention to it, but if half a dozen or more such items are reported every day, they will be noted. Why not give each air-tool, such as a motor, or hammer, an official number and note the work that each tool does; it would not be a hard matter to hand in a slip with each tool taken from the tool room, making thereon the time that the tool was issued. The workman could give his name or number; also what work and how much work he did with the tool before returning it; the time that the tool was returned should also be marked, and the slip then deposited in a box, which should be locked so as to prevent any tampering with these reports.

What good will it do? Not very much perhaps, however, if there should be a shortage of tools, you would have a record of where the tools were, and of what use they were, and it is quite possible that a man will be more likely to bring back the tool as soon as he has finished his work with it. The output of each tool could be easily traced and compared with the output of other tools; in this way the loafing tools could be found out. I have had motors of the same make and size, where one would drill a 1 in. hole in less time than another would drill a ½ in. hole through the same thickness. I have handled a variety of hammers in which the output ranged all the way from 2 to 6 and even more; again there are tools that are in the hands of the repairer very often, and there are also those that require repairs very seldom; if these tools were debited with all repairs and troubles they give, and credited with the work they do, I am sure the officials would not worry so much about incompetent and lazy workmen, as about useless tools.

Most of the letters and articles on scientific management deal with the question of how to increase the output of the workmen—why not rather try and increase the output of the machines? If a punch makes 60 r. p. m., what's the use of asking the man to punch more than 60 holes per minute? Or if a drill press can drill a 1 in. hole 1 in. deep per minute, how can the driller give you better results? Find out the maximum work a machine can do, then reduce this to a practical minimum and insist upon every man giving you this minimum and no less, then you will know whether a man is doing his work or not, that is the men attending to the machines, which practically will account for about one-half the men in a shop.

If a man wants to go in for scientific management, he of necessity should know all the factors that go to make up his expenditures, which will not only be the cost of wages and materials, but also the cost of power to run the machinery of his shop, besides the cost of lighting, heating and ventilating. For the modern electrical driven shop, it is easy to ascertain beyond a doubt the actual costs of power by merely installing a meter in each shop. The next step then would be to ascertain the power necessary for each machine, and then the value of each machine can be known, as far as expenditure is concerned. It certainly would not be a bad plan to debit each machine with all its costs for running, repairing and maintainance, and also credit them with the value of the work done—similar to the accounting of engines on the road in service. Of course it will take a little outlay of money to keep track of all those matters, but then I am sure it will pay if the systematizing is done thoroughly and started by a competent man; later on an ordinary clerk will be quite able to attend these duties.

I have worked in a large railway car factory, building and repairing all sorts of cars, from the private cars of the Czar down to the humblest box and flat car; also oil tanks and tramway cars. There the power to each shop was measured, every machine had its minimum output fixed, and every attendant had to work piece-work. He could make as much as he wanted to or could—above the minimum—but under no consideration was he permitted to fall below the minimum, without being required to give a satisfactory explanation as to why he could not make this minimum (and a pretty tough minimum it was, so that you could not do much visiting); to allow a machine to run idle, was almost a criminal offense; if you wanted to loaf a bit, first set your machine idle, then loaf, were the orders. All the machinery was kept in first-class shape and the repairs and expenditures together with the work performed were kept as accurately (or even more so) as the wage accounts. Things that could be done there, can be done in a railway shop.

FREDERICK F. ZEPP.

ENGINE HOUSE EFFICIENCY.

Winnipeg, Man., September 6. 1911.

To the Editor of the Railway Age Gazette:

Why not give the engine house foreman a better chance to work on the efficiency problem? If there is one part of a road that should have modern equipment in every way it is the engine house. Yet there are houses in operation on old established roads at the present time where it is necessary either to hold an engine out of service while a part travels two or three hundred miles to be turned or bored at a back shop, or some very slow and expensive maneuvers have to be made with the available machinery to handle the work. While it may be creditable for a foreman to get out of a difficulty by makeshifts, it should not be necessary; his ingenuity can be much better exercised in other ways.

On many roads the purchasing department could do a lot to improve shop and engine house efficiency. In walking through an eastern engine house in company with the foreman a short time ago, the writer noticed a blacksmith making a number of small bolts. When asked if he found it difficult to keep his blacksmith busy, the foreman pointed to a pile containing enough work for at least ten days, and replied: "I have had bolts of that size on order for three months and have been drumming up the purchasing people for weeks to get them here. They are probably haggling over a small reduction in price, while I am wasting dollars making bolts by hand."

Then there is the cutting off of requisitions of material that is very likely to be needed. How long will it take the higher officers to learn that a foreman who is worthy the name should be trusted to order his own material? A common reply to such a question is that foremen are not careful and that they are very commonly addicted to duplicating orders. Then why not give them clerical assistance

enough and of the right quality to insure against duplicating orders? The average engine house office is below any reasonable standard of clerical help. Give the foreman a chance and reduce the activity of the blue pencil, the all-too-frequent result of which is that broken parts for which repairs should be in stock have to be expensively patched up, or new ones made at great expense, or else the engine is held out of service while the repair part is sent for. Under such circumstances a foreman has often to spend time working out some method of getting out of the trouble that could be much better employed for other purposes. It is common practice to have staff officers who are relieved from any direct duties and spend their time in developing betterment schemes. Give the engine house foreman better help, better equipment (as some of the large roads are doing) and reduce the activity of the blue pencil, and thus give him a chance to use his thinking powers in developing methods of more efficient operation.

A. C. LOUDON.

SHOP KINKS.

BY F. RATTEK, BRIGHTON, MASS.

REMOVING RUSTY AIR PUMP BOLTS.

Engine house repairmen often experience considerable difficulty in removing rusty bolts on air pumps, and much time is sometimes lost due to the breakage of the heads of the bolts, necessitating the drilling out of the bolts. An ordinary ratchet and "old man" are not at all convenient for performing this operation, especially as it often has to be done in poorly lighted places; if the drill is not started right the bolt hole threads will

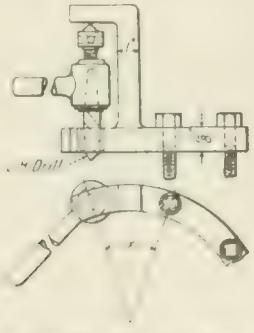


Fig. 1—Device for Drilling Out Broken Air Pump Bolts.

be ruined. To overcome this difficulty the device illustrated in Fig. 1 was designed. The holes are provided with hardened bushings and the distance between them is the same as the standard distance between the holes on the air pump head. The device is clamped in place by two of the good bolts that have already been removed. A portable drill is used, and often the bolt will turn before the drill gets half way through.

A cheap and quick die for cleaning burrs out of bolt threads or bolts is shown in Fig. 2. It can be made by filing two grooves

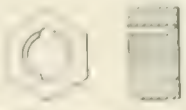


Fig. 2—Die for Running Over Damaged Bolts.

to a standard nut or screw and case hardening it, or better still, by using a machine steel nut and case hardening it. It will pay well to have a plentiful supply of these dies on hand.

The usual practice when a rod end bushing wears and there is too much play on the pin is to remove the bushing and force a new one in with a liner, then ream it to and scoring at a neat fit on the pin. When new the bushings are usually turned straight from end to end on the outside; if care is not exercised when they are being pressed in, they will start at an angle and the bushing will never give good service. In order to prevent this the bushing should be formed on the outside as shown in Fig. 3. The part marked *X* should be the same size as the hole in the rod, or from .001 in. to .002 in. smaller, thus allowing the bushing to start in properly. On the drawing the difference

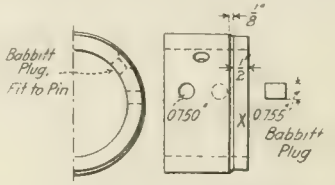


Fig. 3—Side Rod Bushing.

between the diameter of this portion and that of the main part of the bushing is exaggerated in order to convey the idea. Because of the difficulty in replacing babbitt in a bushing, it is often let go without any and consequently is back for another overhauling long before it should be. Drill two or three ¾-in. holes through the bushing and drive in a plug of babbitt of the dimensions shown on the sketch. The plug should be headed over tight and will not loosen and will have a perfect bearing on the pin.

PORTABLE PRESS.

A handy press for use in an engine house where considerable repairs have to be made is shown in Fig. 4. It consists of an ordinary hydraulic jack clamped on a cast steel base. This base is arranged to take two wheels at the rear and one leading wheel, as shown, making the apparatus portable. The uprights and the top crosspiece are constructed of wrought iron. A bracket is placed at the rear, which is fitted with a wheel so that for such work as forcing in a new crank pin the device may be placed in the upper right hand corner of the illustration, as shown.

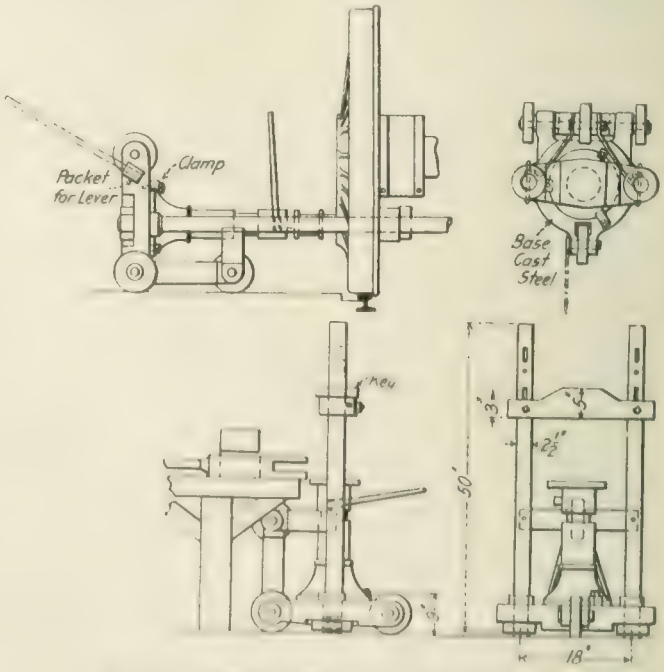


Fig. 4—Portable Press for Engine House.

When the device is used for this purpose it has one fault, and that is that every 30 ton jack will not have 6 in. of travel and the ram will have to be pushed back after making a 3 in. movement, and a block used to push the pin the remaining 3 in. To obviate this difficulty, it is well to properly mark a jack which will give the necessary travel so that it can be used in the press and be depended upon in an emergency.

THE TRAINING OF THE APPRENTICE.*

BY LE ROY W. ALLISON,
Los Angeles, Cal.

Nothing is more natural than for the graduate apprentice to wish to remain among surroundings with which he is familiar, among associates he knows and at work following methods of operation in direct accordance with his training. If he does leave the shop it is usually on account of wages; he has his own welfare to consider, he has himself to care for, and if, at the end of a four-year course of apprenticeship at a minimum stipend, he is still to receive compensation far below that given the journeyman in that shop, he is bound to look elsewhere. The railway justly holds that the boy is indebted to it for his knowledge of the trade, if it is properly taught, but such indebtedness should expire at the close of the term. A balancing of accounts should show in favor of the railway. The instruction given and the results attained ought to show a condition of productive investment, rather than one of profitless expense. Is not an apprentice, after having served his time, more valuable, or at least of equal worth, in that particular shop, to the journeyman employed from other sources?

Considerable cause of dissatisfaction among the young men and apprentices may be attributed to the correspondence schools. Although it is conceded that their courses of study have assisted many to advance and have proved excellent in their way, their publicity methods, which tend to depict the machinist and shop employee as a menial of very inferior rank, with such references as "are your hands tied," "are you one of the bunch," and the like, imbue the student with the impression that it is easier to act as a mechanical or electrical engineer, than to undergo a course of shop training. Time proves that these ideals require a little more than "home study," and that practical experience is necessary.

A few of the large railway systems have adopted courses of study and instruction for the apprentices which promise effective results. Observation of apprenticeship work in the more modest establishments indicate that the methods employed in many might easily undergo treatment for improvement and offer greater opportunity both to the shop and the apprentice. Placing boys under the direct charge of the foreman in the shop and giving them meagre and inefficient class-room work coupled with a formidable contract and scanty wage scale will fail in being productive of the desired results.

Selection of Apprentices.—Not all of the applicants for railway apprenticeship instruction are fitted for the work; they cannot do justice either to themselves or to their employers and will not only prove a loss to the latter, but will tend to retard the development of their associates. The apprentice should be carefully selected; his record should be investigated as to character, general inclinations and manifest ability. The object must be to obtain an apprentice who can think for himself, who will not learn by rote, who will display initiative, and who will from all appearances develop into an efficient workman—one to be depended on. The entrance examination should be one that will bring out those essentials which we must have knowledge of in the would-be apprentice, and which will tend to exhibit any special qualifications and adaptability for the work, rather than laying too much stress on his elementary learning.

The class of apprentice desired is not as difficult to obtain as many would have us believe. The writer has seen and knows boys of the proper sort who are only awaiting a chance for a "square deal" with a wage scale that will afford a little semblance of self-support. It is far better to have a small allotment of promising material that is to prove valuable to the railway, than a large aggregation of questionable worth. When we realize that we should not expect too much of raw material, and that we should encourage, assist, and develop the highest and best traits in the boy, consider his well-being, deal with him honestly and offer financial support in accordance with his ability and value to us, we will not only create a profitable asset to our business, but will inspire the boy with the desire to make a competent workman and a good citizen. When we select an applicant we must put him a little on his honor, and not offer him a contract to sign which is too one-sided and stringent; one that we would hesitate to accept ourselves in like position.

Instruction.—The boys should be placed under the direct supervision of a competent instructor, who is fully equipped for his work and will feel a personal interest in his students. Regularity and order must prevail and the apprentice should be impressed with their value. Work in the shop should be supplemented by work in the class-room. The class-room periods should occur at regular intervals and be brief. Instruction papers compiled for a particular apprenticeship course in a railway shop and prepared by an able and broad-minded instructor are to be preferred to any textbook. The drafting work should as far as possible, be done in connection with actual models.

The apprentices should not be left to the foreman in the shop; he has not the time and usually lacks the patience to obtain the greatest degree of efficiency possible from apprentices. An instructor should relieve the forman of this duty, reporting directly to him and issuing his orders to the boys. He should be thoroughly practical and have the ability to explain and demonstrate the best methods of operation effectively. Allowing the older apprentices to act as instructors occasionally will prove advantageous, showing the fitness of the former to act independently. The product of the apprentice, after a short period of instruction and aid in the proper handling of tools and the correct methods of operation, should soon begin to more than pay its cost to the company and show a profit.

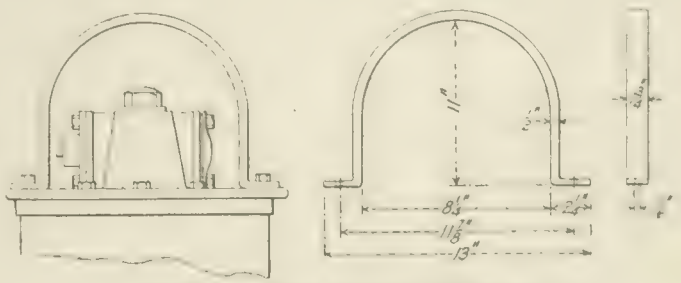
Graduate Apprentice.—The graduate apprentice should be thoroughly equipped to engage as a journeyman. He should understand the value of discipline, the moral obligations attached to a position of trust and that the class of men desired are those who can produce maximum results. The bonus plan, offering a suitable pecuniary return at the successful completion of a course, has many admirable features to recommend it. The graduate apprentice is open to two alternatives—to stay or to go; if he is no longer treated as an apprentice, if his basis of wages is proper and equivalent to wages paid in other plants, he will be more than likely to remain.

*Entered in the competition on the instruction of apprentices and workmen which closed April 15, 1911.

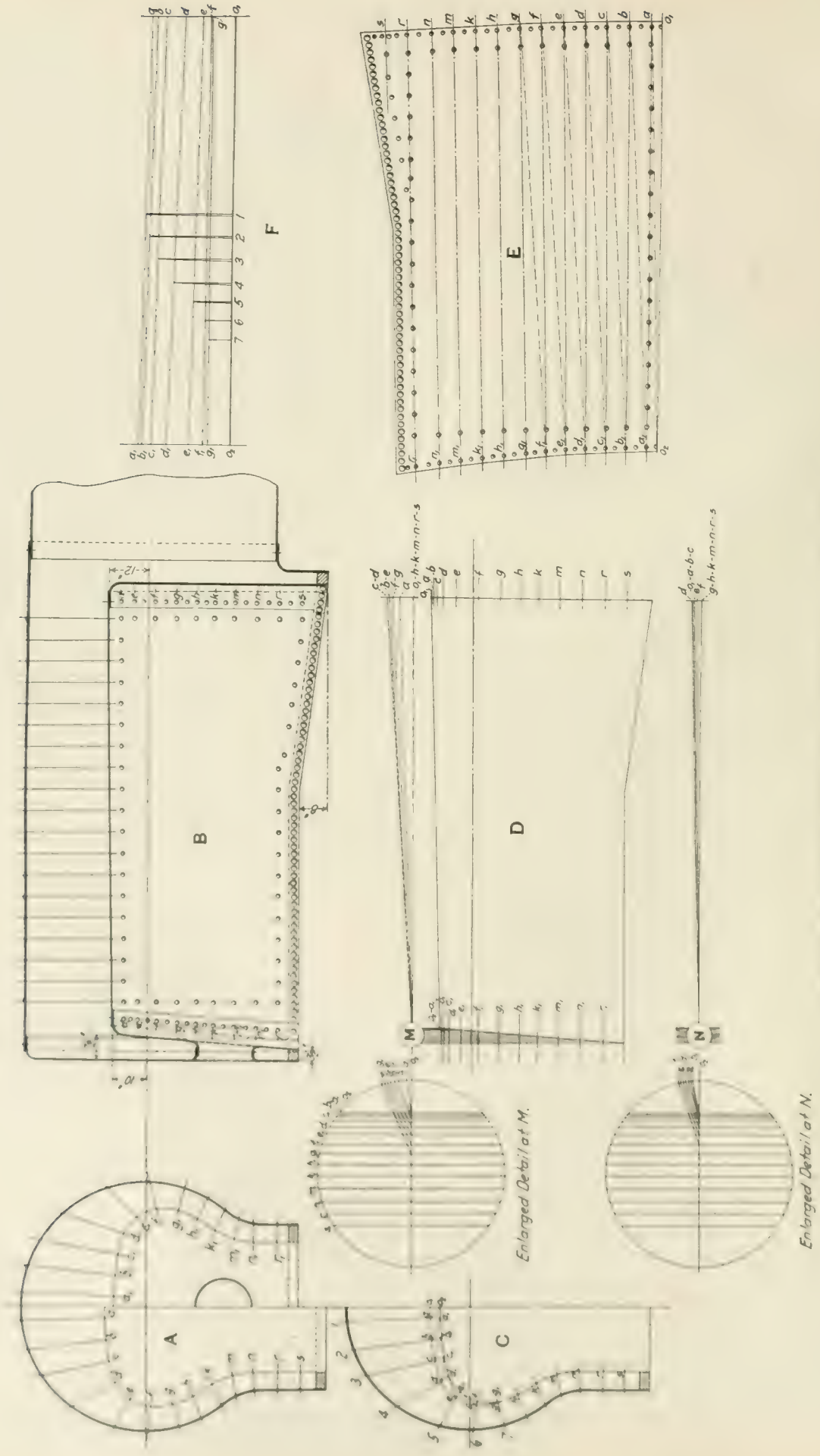
YOKE FOR LIFTING AIR PUMPS.

BY F. W. BENTLEY, JR.,
Chicago & North Western, Huron, South Dakota.

A safe method of applying air pumps to locomotives is by means of the yoke shown in the accompanying illustration. It is made of strap iron, [illegible] wide [illegible] thick, arched 11 in. above the head and fastened to the pump by the cylinder head studs as shown. By the use of this arrangement better facilities are provided for lifting the pump, and greater safety is afforded the workmen. The method of lifting the pump by means of a chain or eyebolt is cumbersome and dangerous, as the chain is liable to slip; it usually interferes with the application and the eyebolt is apt to pull out after being used several times.



Yoke for Lifting a 9½-in. Air Pump.



Lay-out of the Wrapper Sheet for a Tapered Locomotive Firebox.

LAYING-OUT WRAPPER SHEET FOR LOCOMOTIVE TAPERED FIREBOX.

BY WILLIAM H. DAMON,
Foreman Boiler Maker, Long Island Railroad, Richmond Hill, N. Y.

Usually once in the life of a locomotive boiler its firebox must be renewed. In doing this it is not sufficient to follow the original drawings, for many times considerable variation is found, especially when a mistake has been made in the original layout, in which case every effort is made to hide it by building the rest of the boiler to fit. The writer found a case where one side of the firebox conformed to the drawing, but the other was totally different, this being made necessary by a careless mistake in the original layout.

In the case in question, *A* and *B* represent the boiler drawing, the crown sheet having a drop of 2 in. throughout its length. *C* is one-half of *A*, showing also the contour of the back edge of the wrapper sheet. It will be noticed that the front and back contours coincide at *g* and continue on as the same line to the mud ring. *D* is the outline of the wrapper sheet taken from *B*, O_2 O_1 representing the exact length of the top center line of the wrapper sheet. The ends of the rows of staybolts are located by projecting over from *C*, and are noted at both ends as shown.

A base line is then drawn above *D* parallel to the center line of the boiler and to that line are projected the points O_2, a_1, b_1, etc., from *D*. An enlarged detail of the area *M* is shown where they intersect with this parallel line, to make the description clearer. The point O_1, on the right end of this line, is projected up from *D*, and at O_1 a perpendicular is drawn. On this perpendicular lay off the distance O_2 *a*, as shown in *C*, from O_1. This gives the point *a* on the perpendicular; also lay off a_1, *b* (taken from *C*) from O_1 which gives point *b* on the perpendicular. Follow this same process until all these dotted diagonals shown in *C* are measured off. From *h* on, the horizontal lines of the staybolts are parallel to the center line of the boiler so that they will coincide with the base line of this diagram. Now the distance from where the line projected up from the back end of *D* intersects the base line at *M*, as for instance e_1, to the point *f* on the perpendicular gives the diagonal distance between e_1, on the back of the sheet, and *f* on the front end. This will be used later.

Next; below *D* draw a base line parallel to the center line of the boiler and project down the points O_2, a_1 b_1, c_1, etc., the enlarged detail at *N* being shown—as at *M*. From the front end also erect a perpendicular as in the previous case. On this perpendicular lay-off from its foot the distance O_2 O_1, a_1 *a*, b^1 *b*, etc., taken from *C*. Now a line drawn from the point of intersection at *N* of, say c_1, to the correspoinding point *c*, on the perpendicular will give the exact length of the sheet along that line of staybolts. With these two sets of triangles and the drawing *A* the sheet is ready to be layed out.

Lay-out of Sheet. The lay-out of one-half the sheet is shown at *E*. First—draw a center line O_2 O_1, which may be taken from the drawing *B* or from the lower set of triangles. O_2 is the back end and O_1 the front. With O_2 as a center, scribe an arc with a radius equal to O_2 a_1 (drawing *C*) and with O_1, as center draw an arc with a radius equal to O_1 *a* (drawing *C*). Now with O_2 as center, scribe an arc with a radius equal to O_2 *a*, taken from the set of triangles above *D*, intersecting the arc scribed from O_1. This will locate point *a* on the front edge of the sheet, which is the front end of the line for the first row of staybolts. Point a_1 at the back end of the first line, is located by taking *a* as a center and scribing an arc, with a radius equal to a_1 *a*, taken from the set of triangles below *D*, intersecting the small arc drawn from O_2. By following out this same method with the remaining points, the wrapper sheet is layed out in its development, the bottom or mud-ring end being put in from the drawing *B*. The stays are also located from *B*.

The drawing *F* shows the angle that each row of staybolts, 1 to 7 inclusive, makes with the wrapper sheet. To find the angles, draw the line o_2 o_1, representing the outer shell of the firebox. At each end of this line erect perpendiculars and lay off from o_2, the distances between the outside and inside sheets at the back end and from o_1, the corresponding distances at the front end, these measurements being taken from drawing *C*. Connect the points a_1 and *a*, b_1 and *b*, etc. These lines give the relation of the outside sheet to the inside sheet at the different rows of staybolts. Erect perpendiculars to these lines from the line o_2 o_1, then draw perpendiculars to the lines a_1 *a*, b_1 *b*, etc., from the points where they are intersected, and the space shown on the outer shell line gives the distance the staybolts have to be moved forward in the wrapper sheet or backward in the outside shell sheet. The rows of staybolts beyond 7 are straight, so no allowance has to be made.

Lay out the rivet holes in the wrapper sheet for the flue and door-sheet seam with about a 2 in. pitch. After this is done, take two strips of soft iron the same thickness as the wrapper sheet, about ¾ in. wide and long enough to take half the rivet holes from wrapper sheet. Bend the strips edgewise to the contour of the line that the rivet holes are laid off on and mark the holes on the strip, centering them with a prick punch. Now bend the strips flat-wise to the contour of the flue and door sheet as on plan *A;* draw the circumferential lines on the flanges of both sheets with a center line on top. Put the strips on and hold them with a small C-clamp as close to the sheet as possible. Now mark the rivet holes on the circumferential line that has been drawn on flange, This will lay out correctly rivet holes, also the last hole will locate the line for the front and back rivet holes in the mud ring. To lay out the side rivet holes in the mud-ring square down from the first straight row of staybolts across the mud-ring rivet line; using this point for a center will make the exact location of the rivets correspond with the staybolts.

ANNEALING ROLLED AND FORGED CARBON STEEL.*

The usual purpose in annealing miscellaneous forged or rolled carbon steel objects is to remove existing coarseness of grain. This removal is brought about by heating the object to an annealing temperature, which varies with the carbon-content of the metal. The rate at which the object cools from this annealing temperature influences its properties very profoundly, and hence this rate of cooling should be suited to the duties which the object has to perform in service, and to the properties which we seek to give it. Under certain special conditions annealing is required in order to remove, not only coarseness of grain, but the effects of rolling or otherwise working the metal at a temperature so low as to set up serious internal stresses. Appropriate treatment for these conditions will be given later. As the following specifications are intended to apply to a great variety of miscellaneous objects, they are purposely made suggestive rather than mandatory in many respects, because no single set of rules can be applied rigorously to such widely varying classes of objects and purposes.

Annealing for Removing Existing Coarse Grain.—In the case of large objects, where the heating of the interior lags behind that of the outside, although the early part of the heating may, if desired, be rapid, the final approach to the annealing temperature aimed at should be slow, so that the interior may be brought fully up to it without carrying the exterior far beyond it, because in general any needlessly high temperature is injurious, and tends to recoarsen the grain. An exposure of one hour for pieces 12 in. thick should be long enough to insure a thorough annealing; thicker pieces need longer heating.

For all important work in careful hands the use of some trustworthy pyrometer is strongly recommended, but most pyrometers

*Abstracted from the report of committee A-4, Dr. H. M. Howe, chairman, presented at the Atlantic City convention of the American Society for Testing Materials.

should be checked up frequently against some standard, and it is safer to rely on a trained eye than on an unchecked pyrometer. The temperature which most pyrometers indicate is one between the temperature of the outside of the object heated and the temperature of the flame which is supplying the heat. The pyrometer should be in immediate contact with the object, and should be protected from the flame or other source of heat by a suitable insulation, as, for instance, by covering it with sand. In important cases the gas or other sources of heat should be shut off for at least ten minutes before taking the observation.

When relying on the eye, the light surrounding the furnace should be dull, and should be kept as nearly constant as practicable, in order that the eye may not be misled by the changing contrasts. Direct sunlight should be excluded, and any arc and other strong lights should be so placed that neither they themselves nor any concentrated part of their light shall be in the field of the operator's sight at the time of observation. Allowance should be made for the brighter surroundings by day than by night, and on sunny than on dull days.

The annealing temperature for steels containing between 0.50 and 0.90 per cent. of carbon is that at which the metal suddenly ceases to be magnetic. In general the higher the carbon-content the lower should be the annealing temperature. Further, in order to bring the interior of large objects up to an effective annealing temperature their outside may often be raised advantageously somewhat above that temperature. The following ranges of temperature should be used for the several ranges of carbon-content indicated. They refer to the usual moderate manganese-content. For steels with a manganese-content greater than 0.75 per cent., a slightly lower temperature will suffice.

Range of carbon-content.	Range of annealing temperature.
Less than 0.12 per cent.	875 to 925 deg. C. (1607—1697 F.)
0.12 to 0.30 per cent.	840 to 870 deg. C. (1544—1598 F.)
0.30 to 0.49 per cent.	815 to 840 deg. C. (1499—1544 F.)
0.50 and over per cent.	790 to 815 deg. C. (1454—1499 F.)

Care should be taken that all parts of the object reach the same temperature. To that end it may be necessary to mask from the heat, by means of bricks, the thinner part of objects of varying thickness. When the heating is nearly finished, these bricks may be removed. The flame should never be allowed to touch any part of the object under treatment. After the object has been held long enough at the annealing temperature to make its temperature nearly uniform throughout, and to complete the refining of the grain, it should be cooled so as to give it the properties needed, and in a way appropriate to its carbon-content. The general practice is that the higher the carbon-content the slower should the cooling be; and that the slower the cooling the softer and more ductile the metal will be, the lower will be its tensile strength, elastic limit, and yield point. Objects containing more than 0.50 per cent. of carbon should cool slowly—till the color dies out, say at 500 deg. C. (932 F.), as, for instance, by leaving them in the furnace. They may then be removed and cooled in the air. Further, thin objects containing between 0.25 and 0.50 per cent. of carbon should be treated like those of 0.50 per cent. of carbon, unless they can be so massed together that their collective bulk will retard their cooling, so that they will collectively cool even in the air with moderate slowness, like single large [illegible].

In cases where special qualities are desired the following [illegible] to use the greatest ductility of which metal is capable, even at a certain sacrifice of strength [illegible] to avoid a [illegible] the metal should be cooled slowly, either within the furnace, or in the case of large objects, [illegible] other slow conductor of heat. [illegible] are required, it suffices to remove the object from the furnace [illegible] to cool it thereafter in the air.

To give great tensile strength and high elastic limit even at a certain sacrifice of ductility, the cooling should be more rapid, the rapidity to be governed by the thickness and carbon-content of the object. Thin objects and those with high carbon-content can not stand so rapid a cooling as thick and low carbon ones, lest their ductility be too far sacrificed. For instance, thick objects with less than 0.50 per cent. of carbon may be cooled completely in the air, of course, protected from rain or snow. Objects with 0.50 per cent. of carbon or more, and thin objects with from 0.30 to 0.50 per cent. of carbon may be cooled in the air if their cooling is somewhat retarded, as for instance by massing them together, as happens in the case of rails.

To give an unusually high combination of ductility with tensile strength and elastic limit, water or oil is used for quenching and annealing. This process needs great care and intelligence, and should in general be used only by those familiar with high-grade steels. After holding at the annealing temperature suited to the particular steel, as previously indicated, the object is quenched in oil, which should be kept in circulation. It may be quenched in water if its carbon-content is so low and its shape so simple that it is not in danger of cracking or receiving permanently harmful stress. In any event the danger of such cracking and stress is lessened by removing the object from the oil or water before it has cooled completely, say, when its temperature has fallen to 160 deg. C. (320 F.). The steel thus hardened should next be annealed by heating, within a very few hours of the quenching, to a temperature suited for giving the properties needed. In general the higher this annealing goes, the more ductile will the steel become, and the lower will be its strength and elastic limit.

For very high elastic limit and tensile strength, anneal at 500 deg. to 600 deg. C. (932-1,112 deg. F.). In this case the ductility will be low. (Watch-spring steel is only annealed to 350 deg. C., but no commercial steel below 500.)

For intermediate tensile strength, elastic limit and ductility, best suited to the majority of cases, anneal at 600 deg. C. (1,112 F.).

For the greatest ductility, with good strength and elastic limit, anneal at from 725 deg. to 750 deg. C. (1,337-1,382 deg. F.).

The object should be held at this second annealing temperature long enough not only to allow its interior to reach it, but also to relieve the stress given in the water or oil quenching. For pieces of moderate thickness a four-hour exposure should suffice.

A moderate increase of strength and elastic limit above that given by a simple slow cooling, without the full sacrifice of ductility which a simple air cooling would cause, is obtained by hastening the cooling till the object is at a dull red (say, 650 deg. C. or 1,202 deg. F.), and henceforth cool slowly. The hastening of the cooling may be brought about in the case of thin objects in relatively shallow furnaces by opening the furnace door till the temperature falls to dull redness; or by running the objects out into the air on a movable car bottom, and returning them to the furnace when they have cooled to a dull redness; or even, in the case of objects with not over 0.30 per cent. of carbon and not too thin, by a temporary immersion in oil or even water, followed by a return to the furnace. In cases in which such operations are to be performed frequently, special unfired chambers may be used for the final slow cooling, thus leaving the annealing furnaces proper available for their regular work. The results obtained in this way are not so good as those had with the method of grouping.

Annealing to Remove the Effects of Rolling. When annealing to remove the effects of rolling or otherwise working the object in the cold or at any unduly low temperature, the object should be heated to about 775 deg. C. (1,427 deg. F.) and cooled with a slowness which should increase with the thickness, i. e., the least dimension of the piece. In the case of thin plates a mere heating to 725 deg. C. (1,337 deg. F.), followed immediately by slow cooling, should suffice. In the case of thick forgings, in which much time may be needed to allow severe stress to relieve itself, the interval at 775 deg. C. may be prolonged for several hours, though always at the cost of superficial decarburising. Such annealing for steel containing less than 0.15 per cent. of carbon should be at 900 deg. C. (1,652 deg. F.). Great brittleness may be caused by annealing very low carbon steel in the neighborhood of 700 deg. C., after cold working.

MASTER PAINTERS' ASSOCIATION

The forty-second annual convention of the Master Car and Locomotive Painters' Association was held in the Hotel Rudolph, Atlantic City, N. J., September 12 to 15, John H. Pitard, Mobile & Ohio, presiding. Mention of the opening session was made in the *Railway Age Gazette* of September 15, page 534. The following are abstracts of the papers read and the subjects discussed:

PRESIDENT'S ADDRESS.

The master painter should not lay himself liable to the mistakes of the manufacturer when using ready mixed paint, the formula of which is unknown to him, and if the paints are to be made by a manufacturer they should be made to a prescribed formula. The master painter of today and of the future should take up the study of chemistry and physics as fundamental principals of one of the branches of the painting business. A practical knowledge of chemistry combined with a practical knowledge of the painting business, will place the painter's art upon a plane where none but the practical painter can dictate its operations.

Accepted theories of long standing regarding the cause and prevention of the rusting or oxidation of steel and iron, and the use of suitable paint materials for their protection, are gradually giving way to new and more plausible theories which attribute this rusting and oxidation to the impurities contained in the metal.

BAKING ENAMELS.

R. Scott (Am. Car & Fdry. Co.): The work must be sterilized before applying the priming coat. The primer should bake at 450 deg F. for a period of 2½ hours. For baking enamel, I would bake at 250 deg. F. for a period of 5 hours. All enamels cannot be baked in the same temperature, in fact much depends on the person doing the work to secure good results.

A. S. Baldwin (Barney & Smith Car Co.): We enamel and bake all of our refrigerators before putting them in place in the car. First, we clean all the iron and galvanized iron with benzine, after which we prime with keg lead ground in oil, thinned to a proper consistency with turpentine, adding ¼ pint of raw linseed oil and ½ pint of gold size japan to two gallons of the mixture. Bake this coating from 140 deg. to 160 deg F., and follow up with three or four coats of flat white, mixed as follows: Pure keg lead ground in oil and thinned to the proper working consistency with turpentine; add ½ pint of gold size japan and bake each coat the same as the first coat. Then apply two coats of enamel mixed as follows: Seven pounds of zinc white, ground in oil, thinned with 1½ pints of turpentine; add ¾ pint of gold size japan. Mix this with one gallon of Flood & Conklin's, or some other good make of white baking copal varnish. This should stand about ten hours before using. Add enough ultra blue in all three mixtures to clear the white. Bake the enamel at from 125 deg. to 140 deg. F. Open the doors of the oven as soon as the greater degree of heat is reached, as the work will turn yellow if allowed to stand with the doors closed. Take from the oven as soon as cool enough to handle. Sandpaper each coat of paint with fine paper for a smooth finish. The second and last coat of enamel can be rubbed to a dull finish or left in the gloss.

C. A. Hubbs (Southern Pacific): We have been doing this work on a small scale, that is, small miscellaneous work and trays for diners. The formula we are using and getting good results from is as follows: To ½ gal. of asphaltum we add ½ pint of boiled oil and ½ pint of gold size japan. To the first coat is added a little lampblack in japan, to give it covering properties. The coats should not be too heavy. The article to be enameled is then placed in the oven and baked for about three hours. Experience will determine the amount of heat necessary. After cooling, the second coat is applied and baked as before. For brass signs, after they are taken from the acid, we fill the design with an enamel called Sapolin, and the sign is allowed to remain in the oven all night with a slow fire. To this enamel we add some japan or asphaltum to aid drying.

John W. Young (Pennsylvania): My experience has been confined to two brands of material—Schrack's black baking japan and clear baking varnish, and Willey's 20th Century elastic gloss red. While the latter material is not a baking enamel, yet we have had excellent results as to its use on fire buckets, which are constructed of galvanized iron. This material has been subjected to very severe tests and has held on to the iron very well. We do not use any priming coats, but simply give the work two coats of red and bake in a temperature of 120 deg. F. for two hours. In regard to black baking japan, we use an under coat which is composed of equal parts of lampblack ground in oil and baking japan, thinned with turpentine. For this work we cannot use any more than 140 deg. F., because of the glass cracking in the lamps, but it would be very much better if we could bake with a temperature of 200 deg. F. I find if lamps are coated and left standing for an hour, and then placed in a cold oven, and heated gradually until the required temperature, 120 deg. F., is reached, we get the best results.

CAUSE OF BLISTERS ON FINISHED CARS.*

J. H. Pitard (Mobile & Ohio): The trouble was due to imperfect drying of the priming coat, or the second coat. The cause of such imperfect drying may have been due to various reasons. The scraping done by the carpenter may have been so slight at the blistered points that the grain of the wood was not thoroughly opened up so as to permit of free absorption of the primer; or it may have been due to one particular painter who applied the priming but failed to spread it uniformly. Lack of uniform spreading of the coatings is a common fault with painters and is in my opinion the cause of many of the deviltries of paint and varnish.

H. Hengeveld (Atl. Coast Line): My opinion as to the cause of the cars blistering in spots is that it is in getting ready for the priming coat. It may have been the fault of the carpenters in not doing their work properly; it may have been that the boards which blistered were applied in repairs and were not properly seasoned; it certainly was the fault of the wood and not of the paint, or the cars would have blistered all over. It may have been caused by the carpenters using oil on their planes, which penetrated the wood. I had a car come in the shop some time ago, which was burned off twelve months previously. This car was badly blistered in spots. I removed the blisters, took a knife and dug a hole in the wood, primed and re-puttied it. I examined this car a few days ago and found it in perfect condition, not a blister anywhere. The fact that the blisters referred to, were down to the wood, is a conclusive proof to me that at those particular spots, there was something in the wood which caused the blistering.

W. H. Truman (N. S.): In this case I have come to the conclusion that the primer was not thoroughly brushed in on the whole surface, and that the second coat was applied too soon, not allowing the primer sufficient time in which to dry. The sun beating against it for two or three hours will certainly produce blisters. It is just possible that the two cars that did not blister were in a little different position from the others, or else the primer was more evenly applied. Had they kept these cars moving back and forth through the yard and not allowed them to stand in one position for two or three hours, or had

*Replies received by the Information Committee on the question: Why does paint blister on parts of cars recently finished, after being burned off and dressed down by carpenters?

they placed them under a shed, until they were placed in service, I am satisfied that there would have been no blisters.

Mr. Scott: I had the same experience last month on a mail car done with the *A-B-C* system. I did not see the car, but received a report on it. It must be the material; maybe it is the body color, but I am of the opinion that it is in the primer, although heat might be the cause. It cannot be on account of water cleaning, as the cars were sand-papered. They might have rushed this car more than the rest. My opinion is that all the trouble comes from the priming.

H. Heffelfinger (Penn.): It is possible that the boards may have been renewed and hurriedly painted while the car was still in service, possibly with only one coat, which did not last, allowing the boards to become saturated with an acid or oil cleaner, which the carpenters did not remove and which would retard the drying of the priming coats. We have been having very successful results with the *A-B-C* system, but do not have our cars dressed down by the carpenters. We simply burn them off, clean, and sand-paper them ourselves. Any new wood is primed with *A* and second coated with *B*. All the old surfaces are primed according to the condition of the old primer. If surfacer *A* had been used, we then prime with a mixture of ½ *A* and ½ *B*. On this coat we putty and then apply surfacer *C*.

METHODS OF RUBBING DOWN.*

Mr. Scott: I am of the opinion that rubbing down with block pumice stone and oil will not prolong the life of a coach and body surfacer. If it were required of me to rub with oil, I would advise rubbing with a block and emery-cloth, which is the easier of the two methods. I have done considerable of it on steel and wood, using ⅔ raw linseed oil and ⅓ benzine. As to the sand-paper method, it depends upon the carpenters to get a smooth job. I have had excellent success doing work this way, especially as to durability, but I think it lots of work to bring a sand-paper job up, and do it correctly. Where the process of rubbing is in force I believe it is wise not to make a change. The sand-paper method is more economical in treating baggage and express cars, and old cars that are burned off, although I believe in applying surfacer to baggage cars as well as coaches, as it pays in the end.

Mr. Truman: In cases where the life of a standard coach and body surfacer means the prevention of rubbing through to the wood, I would say that rubbing down with block pumice stone and oil would prolong the life of a standard coach and body surfacer, because if the wood becomes exposed the oil used in rubbing it would act as a primer to a certain degree, while by the sand-paper method it would be necessary to go over the exposed parts with a primer. However, I do not think either of the foregoing methods is as economical or as satisfactory as the block pumice stone and water, when the surface has been properly treated.

Mr. Keil: I personally abandoned rubbing in oil after a ten years' test, fifteen years ago. I found that the cars rubbed in oil were checked and required burning off sooner than those running in the same train, that were rubbed in water. The sand-paper process is very unsatisfactory from a health standpoint. After finishing twenty new cars with the sand-paper process, about twenty years ago, I had sixteen men sick out of a force of thirty-five men. I would recommend two or three coats of roughstuff, also guide coats of yellow ochre or Venetian red, rubbed in water, as being both economical and durable.

Mr. Hengeveld: We rub our cars with pumice stone and water, and when I state that from six to eight years is the usual time between burning off periods, in our hot climate, I do not think we have much to complain of in the way of prolonging the life of our body surfaces. In reference to the dry sand-paper method, will say that some years ago we adopted this method for second class cars. After about four years, I came to the conclusion that there was nothing in it to recommend. It cracked a great deal sooner than a properly rubbed surface. It presented an unsatisfactory appearance, and taken as a whole, it was expensive in the end. We therefore discarded this method and returned to pumice stone and water.

*Papers received by the Information Committee to the questions: Will [illegible]

STEEL WOOL.*

Mr. Scott: I have used considerable steel wool and have found it to work very satisfactorily on inside work, where the varnish has had ample time to dry. It is fine for moldings, but I found it injurious to the hands of the workmen, who condemned it on account of the fine particles running into their hands. If the varnish is hard it never sticks, only where there are fatty wedges. I have often used it on finishing the outside, and it works very nicely. Personally, give me good sand-paper and I will get the best job, although the labor in using sand-paper is more expensive, excepting say on sash, where there is a saving.

Mr. Hengeveld: My experience with steel wool is such as to convince me that it is superior in every way to sand-paper or emery-cloth. I am satisfied that if properly used it is more economical. I have never had a case where it injured anyone's hands. If undercoats are given plenty of time to dry there is no trouble about its sticking to varnished surfaces. I have used this material for years and it has given general satisfaction.

Mr. Truman: I am opposed to steel wool.

J. G. Keil (L. S. & M. S.): I discarded the use of steel wool about 18 years ago. I found that it would make the men's hands very sore, by the small particles getting into the flesh and afterwards festering. The workmen got so that they would use gloves, which causes very inferior work on the interior of coaches. A good grade of garnet paper, in my opinion, is cheaper and you can turn out a better quality of work at less cost. The only practical place it can be used to advantage, is on furniture work.

*Papers received by the Information Committee to the questions: What is your experience with steel wool in place of sand paper or emery cloth? Which is the more economical system. Is steel wool injurious to the hands? Will it stick to the varnished surfaces after rubbing, previous to varnishing?

REPEATING COATS OF VARNISH.†

Mr. Truman: It has been my custom the past twelve years to use this process; however, for a first-class job, I would not recommend it. I am free to recommend it for desirability, but not for appearance.

Mr. Hengeveld: Some years ago I experimented along this line, that is, I followed the coats daily and I came to the conclusion that it was not a practical way to do the work; it did not have that brilliant appearance which is obtained when coats are allowed to harden before others are applied. I now allow two days between coats.

Mr. Keil: The practice of repeating coats of varnish on passenger equipment, in my opinion, is not practical and does not make a first-class job. When done, it is always at the expense of durability and brilliancy of the luster of the varnish.

Mr. Scott: My opinion is that generally 48 hours between coats will always bring about more durable results, than the 24-hour method.

Mr. Heffelfinger: The better way is to let each coat dry at least 48 hours before applying another coat. This has been my experience, yet I have varnished cars each day where the

†Papers received by Information Committee on the questions: Is this a practical way to secure a first-class job? Are other roads using it on their best equipment?

varnish had a good luster and wore well, but it came about by allowing as much time between coats as possible, and on cars receiving two coats, such as cars cut in, and baggage cars repainted over the old surface. On all new or first-class repairs, I let each coat of varnish stand at least one day for drying, which is little enough in my opinion, to guarantee a durable job.

APPEARANCE AND DURABILITY OF THE INTERIOR FINISH OF STEEL PASSENGER EQUIPMENT.

John Gearhardt (Penn.): It is essential that a smooth surface be provided before starting in with the color desired, yet we do not advocate applying more glazing or surfacer than is absolutely necessary. The following method employed by us is the one we consider the best: The steel is sand blasted and the interior of the car is immediately primed with a good metal primer; if the steel is allowed to remain without priming for but a short time, corrosion results, which greatly affects the durability of the finish. Necessary puttying, glazing and surfacing is then done; a smooth surface is next produced by rubbing with emery-cloth, using linseed oil and benzine; the day following the rubbing the ground color desired is applied; after this the striping or decorating is done and three coats of rubbing varnish applied; we then rub to nearly a flat finish with pulverized pumice stone, oil or renovator. Our reason for advocating rubbing to almost a flat finish is on account of the unevenness of the steel and the buckles which get into it in assembling the car.

In our opinion the two most important operations in the finishing of either the interior or exterior of steel cars considering durability is, first, to have the steel free from rust, for if rust is allowed to remain on the steel before priming, it matters not what kind or how good a priming material is used, rust will continue. Second: To rub both the surfacer and varnish with oil instead of water. After twelve years' experience of rubbing with oil, I have concluded that the practice of using water in rubbing of either wooden or steel cars should be considered an obsolete practice.

Pullman Car Company: The steel, in whatever form it is, is covered with rust and scale, which must all be removed before painting. There are at present three methods in use to remove the scale, etc.: First, acid pickling, which can be done either by pickling by sulphuric acid (oil of vitriol), or by hydrochloric acid (muriatic acid). Second, sand blasting. Third, rotating grinders, emery wheels or hand emerying.

The first method or acid pickling is the one which, from the painter's standpoint, needs the greatest care and consideration. The acid not only loosens the rust and scale, but it also dissolves the steel, but not altogether evenly over the surface. The steel plate is a mass of small crystals, of varying size, hardness and chemical composition. The acid attacks some of these crystals much faster than others, and it also creeps or follows along the outlines of the crystals, going into all the minute inter-crystalar crevices, etc. Once having lodged in these crevices, the acid tends to remain there, being held rather strongly by capillary attraction and it is removed with considerable difficulty. The surest way to wash the acid out is with a spray or stream of hot water which is under some pressure. The force drives the water into the crevices and it dilutes and washes out the acid. Some force is almost necessary in order to overcome the capillary attraction and fresh water should be used to insure no acid remaining on the plate. Some do not use the running water, but neutralize the last traces of acid with lime water.

When sulphuric acid is used as the pickling agent, unless it is completely washed away, there is always great danger for the future life of the paint on such plates. Sulphuric acid is a non-volatile acid at ordinary temperatures, absorbing moisture with great avidity, and when heated does not volatilize at from below 350 deg. F. to 450 deg. F. When painting over a plate having traces of sulphuric acid on it, the baking temperatures are not high enough to get rid of the acid, and the temperatures used (about 200 deg. F.) make the acid, even in minute quantities, very active. Its effects may not be noticeable to the eye at the time, but the chemical action continues to develop, affecting both the steel and the paint, and after a time we have a "running sore" rust spot which may be deep or may spread out under the painted surface.

Hydrochloric acid, as a pickling agent, also attacks the steel in much the same way that the sulphuric acid does, but the capillary attraction is not as strong as the sulphuric acid. It also readily volatilizes at low temperatures and consequently when a plate has been pickled in hydrochloric acid and has been washed off but a trace of acid remains. It does not have a strong attraction for water like sulphuric acid, which absorbs water readily and so spreads itself over the sheet. Hydrochloric acid, though safer than sulphuric, should be washed away with great thoroughness and care, as once it starts a rust spot, the rust itself will create more and more rust.

The safest and best method for cleaning steel is to use the sand blast. When properly adjusted and regulated thin plates can be cleaned without being damaged or buckled. Care should be used to see that the plates do not become cooler than the work shop temperature, as there would be a condensation of moisture from the air which would cause corrosion, even after painting. The grinding or emerying process is slow, and it is difficult to polish evenly over a large surface. The tendency is also to burn the plates and to buckle them.

After the steel has been thoroughly freed from scale, rust, etc., and there is freedom from all traces of acid, it is ready for the painter. The best method of painting the interior of a car, according to our present experience, is to prime the steel and bake it at a temperature of approximately 200 deg. F. There is one general fault with this procedure which may show itself later in the renewal of the interior finish; that is the baked primer is removed with great difficulty, the only methods for removing it, at the present time, are emerying or sand blasting. Where plates are to be riveted and hot rivets are used, the heads, on cooling, should be polished and then painted at once. All rivets, hot or cold, should be drawn tight and close. The reason for painting at once after setting, is that the moisture causes an electro-chemical reaction between the rusted or scale covered rivet and the steel plate, the result being that the plate around the rivet rusts and corrodes with great rapidity.

The primer used should be one which is an inhibiter of rust or corrosion, and especially so when applied to the rivets. It is the usual procedure on most riveted surfaces to use litharge or red lead paints, but tests show that a great many of these paints are direct stimulators of corrosion, no doubt due to impurities which the red lead or litharge contain. The reaction between the rivets and plate is prohibited by the inhibiting primer and subsequent coats of paint and moisture resisting varnishes. The usual processes of puttying, knifing in, sanding, etc., are followed. Dry sanding is to be recommended, the men being compelled to wear nose breathers to keep out the paint dust. Care must be taken to see that surface to be painted is at least as warm as the outside temperature and preferably a little warmer. This insures no moisture from the atmosphere condensing on the surface of the car. Where wet rubbing is used, the surface should be well dried and the car kept in a warm room to make sure that all the moisture is driven out of the paint films, cracks, corners, etc.

Several coats of color may now be applied and the interior is ready for graining or other finish. A good water and moisture resisting varnish, such as well made Kauri gum varnish should then be applied. We now have a finished paint on a steel surface free from all scale, rust, acid and moisture with a most inhibiting primary coat, baked on, smoothed, grained and varnished with a moisture resisting varnish. This is about as much as the painter can do for the preservation of the interior of a steel car.

With regard to the care and up-keep of the finished car: It is impossible to burn off the paint finish of a steel car and not do great damage, and the use of a varnish and paint remover will take you through only to the baked primer. As yet I have not found a varnish remover which will dissolve or loosen a baked primer in a reasonable time and at the same time not injure the steel or other parts. The only methods at present applicable are either sand blasting or emerying, the necessary care being taken not to burn, buckle or bend the steel. This is the worst feature of baking the paint and it may be of sufficient difficulty to ceuse a change in our methods. Where only a refinishing is necessary, a varnish remover will take you back to the primer, leaving you with a baked plate to build up on.

For surface cleaning, soaps of all kinds are to be avoided, as even the mildest has its effect both on the gloss and on the life of the varnish finish. An oil cleaner with a small percentage of a fine rouge or other gritful substance, will remove any dirt and at the same time revive the varnish and fill any hair checks with a water resisting film. The oil must be such that it will not injure the varnish and it must be free from all dirt and leave a dry, clean, greaseless, non-dust collecting surface.

F. W. Brazier (N. Y. C. & H. R.): I look upon these meetings as experience meetings. We should cite our own experience and the trouble we have had with our steel cars. We have had steel cars now for about four years, and Mr. Butts can tell you what the trouble has been with them. Some of the products used on them by the Pullman Company oozed out and spoiled the paint, and he has had to fix it up. I think you should be sure to tell what your troubles have been. Here is the place to let the others know what you know.

H. M. Butts (N. Y. C. & H. R.): There is any amount of trouble in maintaining the paint on a steel passenger car, and our troubles have only begun, in my estimation. I think we are destined in the future to condemn the steel car as a success, from the painter's standpoint. They are in their experimental stage at present, but I doubt very much whether they will be voted a success from the standpoint of economy, or from the standpoint of danger, or from any other standpoint. The trouble Mr. Brazer speaks of, with the new cars coming out of the factory, was that back of the letter board, there had been used a fibrous substance that was fastened to the back side of the letter board, a steel sheet, for insulating purposes, [illegible] It was glued on with a preparation made of sal soda mixture, and when the heat of the sun struck the letter board, it softened, and oozed out through the joints, and dissolved the paint instantly, wherever it touched it. It ran down the panels, between the windows, over the window sills, and to the sheathing, cutting the paint through to the steel, [illegible] The greatest trouble we are having is around the rivet heads, and [illegible] of metal are joined together and lapped. [illegible] a matter of a few months before there is an opening [illegible] to take in moisture, and corrosion begins at once. [illegible] of the car, especially around the vestibules, where the upright [illegible] and lap on, and are bolted to the platform structures, there is apt to be trouble. The steel cars that [illegible] in bad service for six years have to go into the shop [illegible] and the steel has to be renewed where it [illegible] After the corrosion once begins I have never found any coating that would stop it. It is only a few months before [illegible] I do not care how bright you clean it, [illegible] it will get to be in such a condition that they will have to get a metal that will not corrode, or use [illegible] which has not been found to [illegible] We have [illegible] of baggage and mail cars with steel ends. They are painted with one of the best [illegible] I know anything about, but even the action [illegible] they get out after a short time, and corrosion began. Nearly all of our roofs become bare in nine months, and get badly corroded.

John Gearhart (Penn.): Last season we had cars out 32 months, and nothing was done to them at all; some were out 40 months; I have seen the roofs and they are nothing like those Mr. Butts tells about. But I believe those cars should have their roofs coated after running six or eight months. Give them another coat, so as to have a body on before the cinders get a chance to wear the paint off. We give the roofs three coats of paint; we prime them before the sand blast, and then put two coats on. We use a primer, the same as for the other cars, and then use a metallic primer, just exactly as for our freight car color. In our dining cars we shall have to get a non-rusting metal for parts of them, and for some places in the vestibule, because they rust so. But on the balance of our cars that we have had out for six years I do not see anything alarming at all. We had some trouble in some of our work with that silicate soda glue. It is a glue that was used to put the insulating material on. Now we have changed and are using a coat of our freight car paint, and are sticking it on with that. We just make the freight car paint a little heavier, and use an asbestos material with it, and it sticks as well as on the silicate of soda. We have the benefit of an extra coat of paint on the interior sheet, and we feel certain that that coat will protect it as well as a coat of paint. On some of the large sheets we may have to clamp it until it dries.

E. F. Bigelow (M. C.): I think as a matter of durability, if we can get the priming to stick on the iron, there is no question but that the surface can be prepared, the same as on wood. With a proper surfacing, and water eliminated entirely from the interior during the process of surfacing and painting, there is no reason, with the primer adhering sufficiently to the steel, why durability cannot be produced.

Mr. Butts: It has been a common practice for years to rub the filled surfaces and rough stuff on the inside of the car with pumice stone and water. I believe it is a mistake to use water for rubbing the filled coat on a steel surface, that it could be rubbed with a mixture of linseed oil and benzine, to avoid any possibility of water getting into crevices and starting corrosion.

Mr. Gearhart: We have been rubbing with oil and benzine for twelve years, using emery with a block beneath it; we had orders some time ago to do five dining cars with a special surfacer, and they asked us to use sandpaper and water instead of the oil. The next morning after we rubbed that car, every place we rubbed through, and it is almost impossible to keep the sand from rubbing through, was rusted all over. The balance of the cars were rubbed with oil and benzine, and I know they will last as long as the ones rubbed with water. When we changed from water to oil, we cut down our piece work price by about one fourth. You can get as good a surface with the emery and oil as with pumice stone, but you will have to pay as much or more; however, we do not get as good a surface, and our people thought we were getting too good a surface when using the other. But on the outside and inside of passenger cars, we get a smooth enough surface to answer our purposes. I admit you can go quicker with sandpaper and water than with oil.

Mr. Pitard: What kind of oil do you use?

Mr. Gearheart: Linseed oil. But we found we could rub it quicker and better, and it would evaporate much quicker by using benzine with it.

W. O. Quest (P. & L. E.): That would be 54 deg. Baume petroleum. Do you have any delay before your rough stuff would be hard enough to stand? Do you wait from one day to the next day, or do you go on with your benzine and oil, the same as you would go on with the work while using water? Could you follow it with benzine, and not have a softening effect?

Mr. Gearheart: We would, if you leave it on long enough

Mr. Quest: That would be a matter of rapid handling. You would have to get it on and off quick, so that it would not become soluble under the benzine.

H. Heffelfinger (Penn.): If you apply it to the rough stuff each day, and rub with half oil and half benzine, it won't soften up. I think the rubbing with oil and benzine is the ideal way to do steel coaches, and a very much better way than with sand-paper and water.

Mr. Gearheart: Nobody can rub the outside of a car with water without having a lot of it splash on the inside, where it is not protected, and it will go in places on your steel floors, where you cannot get at it afterwards. With oil, it is different; if it does get inside, it will not hurt anything. I believe it is the only safe way of handling a new steel car.

Mr. Bigelow: I would like to ask Mr. Gearheart whether the rubbing with oil has any tendency to crack the subsequent coats of paint. I have noticed some steel cars that were badly crecked inside. I do not know whether the surfacer soaks up the oil to that extent, so that it cannot harden sufficiently to apply a coat of paint in the time usually taken, that is, waiting until the next day.

T. J. Hutchinson (G. T.): Another point is the question of whether rough stuff absorbs sufficient oil to warrant the use of oil in rubbing your exterior finishing. It is claimed by some that the oil used in the rubbing adds life to the surfacer. For my part, I never could see that there was anything to that at all. I should like to have an expression on that point.

Mr. Gearheart: I have seen many cars on the different roads of the country, and I do not think the records show that our cars are cracking more than those of any one else. I never believed that it hurt the surfacer at all; in fact, I believe in the theory that the oil the surfacer takes up would add to the life of that surfacer. About wiping the oil off, there is not any oil to wipe off. We rub until the men think they have a smooth surface, and then they wipe it and finish with fine emery. When they have what they think is a surface with their coarser paper, they do not put any more oil on; what oil is there is what is absorbed by the surfacer.

CHEMICAL AND PRACTICAL TESTING OF PAINT SHOP MATERIALS.

J. H. Gibboney, chief chemist of the Norfolk & Western, presented a paper on this subject as follows:

The constants that we have found to be of greatest value in determining the quality of linseed oil are specific gravity, which we think should be from .932 to .936 at 60 deg. F.; if lower it indicates the possibility of the presence of some percentage of a semi-drying. The most valuable test that we have found in such cases is one determining the rate and degree of oxidation under normal exposure, and in making this test we employ five small thin aluminum plates, 3 in. x 6 in., all fitting into a wire rack. One gram of oil is spread on these plates and allowed to dry; if we find the rate of oxygen absorption reasonably uniform, and reaching a maximum of approximately 16 per cent. in about 80 hours, we feel reasonably assured that such oil, when used with ordinary strength driers, will give a proper and satisfactory drying.

The paste paints specifications state that the material will be purchased by the pound, that it must contain nothing but pure raw linseed oil, conforming to the company's established standard for this material, and pigment, in well defined proportions by weight, and that the pigment if a single one, must have a composition recognized as a proper one by the trade, and if a composite one, must be made up by compounding two or more pigments in certain percentages by weight. Some further features are given prominence, that is, that the shade must conform to the established standard, a sample of which is furnished prospective shippers, and that the grinding must be such as to give a finished paste that will not feel gritty or separate on thinning. A simple fineness test is outlined in each specification which we have always found to be reasonable and which has also met with favor from the manufacturers. In a few cases we have found it necessary to go still further and state specific qualities desired in some single pigments making up a composite, placing limitations on impurities considered as undesirable. To obtain satisfactory results in purchasing under this plan the restrictions should be as few in number as is consistent with obtaining the material desired.

As it is assumed under the terms of the contract that a shipment is to be of uniform quality, a sample drawn from a single barrel, selected at random, should be considered as representative of the lot. The barrel selected should be opened by removing the head and should be thoroughly stirred by means of a heavy paddle to obtain a fair sample. We have always made it a practice to outline our methods of examination, in detail, to the manufacturers desiring such information, and it is a pleasure to record the very few controversies that we have experienced in this feature of our work.

Our method is to weigh accurately into a tared glass tube, the dimensions of which approximate 1½ in. diameter by 5½ in. long, and the weight about 75 grams, approximately 10 grams of paste. To this is added about 50 cubic centimeters of sulphuric ether, and the solution of the major portion of the oil is effected by stirring with a stiff platinum wire. The tube is then set into one arm of the common type of centrifuge used for milk examinations, and into the opposite arm a tube with sufficient water to counterbalance. By revolving the tubes at a rate of approximately 100 r. p. m. separation of the pigment from the solution of oil in ether is readily obtained in a few minutes. This oil extract is then poured off into a small beaker and the ether is expelled by placing it in hot water, the last traces being driven off by the heat of a hot plate of several minutes duration. The pigment in the bottom of the tube is then further treated with 88 deg. Baume. gasoline and two such extractions, with one further extraction with a small quantity of ether, will remove all but the slightest trace of the oil. The tube and pigment is now dried and weighed, and from the loss in weight found the proportions of oil and pigment are calculated. We have always found that all pigments have some action, slight in most cases, on the linseed oil present in the paste, and it is our practice to make a proper allowance for this condition, especially so in the case of paste containing a lead base.

Commercial spirits turpentine of the trade, obtained by the distillation of gum resin, is water white in color, with a specific gravity at 60 deg. F., ranging from .862 to .870, a boiling point between 300 deg. F. and 320 deg. F., a flashing point ranging from 100 deg. F to 106 deg. F., and it has a content of about 10 per cent. that is insoluble in sulphuric acid. Upon evaporation on glass a good quality of turpentine will leave only a slight trace of a resin like residue, which can be expressed by a small fraction of 1 per cent. This slight residue, when taken in conjunction with the property of pinene, the chief constituent of turpentine, will absorb oxygen and impart it to the oil of a paint film, which is responsible for the drying effects similar, but in less degree, to the stronger lead and manganese driers, and accounts for the drying conditions which we have been unable to obtain from the so-called substitutes.

In the cases of varnish testing it is imperative to have the exposure over the company's standard shade of body color, since it is common knowledge that the same varnish will ofttimes give different results when applied over the different colors. We have received during the past two years a great number of protective paints, representing some twenty-five or thirty distinct suggestions for metal protection, including the carbon blacks, graphites, iron oxides, in various compositions with different inerts, composite pigments containing small amounts of various chromates, and the products special vehicle

combinations, and others too numerous to mention, all of which are now having their day in court. Our system of testing these materials consists of complete chemical examination in detail, the regular panel exposure, and the exposure of from five to twenty-five cars under actual service conditions. In preparing a car for a service test, one-half of the two sides and one end are painted just as is prescribed by the manufacturer and the opposite half of the car is finished with our standard method of treatment, each half being properly stencilled for identification, with date of application, and the further instruction that the car must not be repainted except at our Roanoke shops. The panel test, which consists in painting one-half of a steel panel with the test paint and the other half with the standard treatment, is prepared and exposed at the time of painting the cars, and is used to indicate the progress of the exposure on the cars, so that when so indicated by the panel an inspection of the cars can be made.

We do not hesitate to go on record, that as the outcome of some fifteen years' experience with the testing of steel protective coatings from a practical standpoint, we are still of the opinion that properly and freshly prepared red lead in raw linseed oil of proper consistency and when properly applied as priming coat, and for second and third coats, a high oil carrying elastic paint, containing as pigment a composite, composed of 50 per cent. lampblack, 45 per cent. inert silicious material and 5 per cent. red lead, ground in linseed oil and thinned to a proper working consistency with boiled linseed oil and japan oil, has given a service which has not to this time been equalled. However, as the result of our present tests, which include some 500 cars in actual service, our present position will either be reinforced, or we will have intelligent information to form a basis for a change.

ECONOMY IN RAILWAY PAINTING.

D. A. Little (Penn.): There are two kinds of economy, false and true, and I think that we have drifted from the true to the false and in my opinion no one is more to blame for it than our individual selves. We are losing sight of the durability, and that we are to blame is evidenced from an article in the *Painters' Magazine* on Scientific Painting, by Charles E. Copp, who commented on an article by Carl F. Woods, an engineering chemist of Boston, wherein he said: "It has been shown by actual results that a saving of from $20 to $30 can be made on the painting of each car and an increase in life obtained of from five to ten years by the adoption of scientific methods of finishing."

Why should we not have a good (not a carriage-body) finish and the utmost degree of durability possible? There is no economy in any other method of painting, and we, as master painters, are greatly, if not altogether, to blame for the departure from this standard. It may be due to the insistence of our superiors to go further into the matter than we know was consistent, but why did we do it? Had we the courage of our convictions we would have shown our superiors the fallacy of such procedure. From the nature of conditions they could not have known what we did—or should know—about painting, and had we done so, our railway equipment would be a credit to us today. There are too many cars and engines turned out of paint shops at the present time that look as if they were painted by laborers instead of painters.

Many freak ideas have been advanced in the interest of economy. I have recollections of a very recent occurrence where a [illegible] required his foreman painter to use only a coat of flat black on his driving wheels and lower parts and no varnish whatever. In another case which I have in mind a master mechanic some years ago told how he was practicing economy in his paint shop by omitting the removal of flash and scale before painting his tanks, which we, as practical painters, know is entirely wrong and wasting good materials, and in our acquiescence in such methods there is no economy, no sense in it, if any engine or car is worth painting it is worth painting right. Better be guided by the old maxim:

"Whatever you do, do with your might,
Things done by halves are never done right."

The equipment of any railway is an index of its prosperity and good management, just as a clean, well kept home indicates the good housewife. If the railway has ramshackle dirty cars and engines, and the shops are in bad condition, the employees soon drift into a similar condition and don't take any interest in the company's welfare, while, on the contrary, a clean, well-kept equipment and orderly shop imbues the employee with a spirit of thrift and industry, and nothing contributes so much to the latter condition as good, practical, common-sense painting. Nothing is cheaper today in railway practice than practical painting; it won't average 5 per cent. of the cost. and maintenance, yet it is often considered of little moment. We, as master painters, are asleep on the job, it is time to wake up! Let us reason with our superiors in this matter of economy, showing them the true, as opposed to false, economy and in nine cases out of ten they will defer to our judgment if we are right and prove it to them. Our equipment will look better, last longer and cost less, and to us will be given due credit.

Mr. Butts: I would ask that the articles referred to in Mr. Little's remarks be incorporated in the proceedings of this convention.

T. R. Cowan (C. P.): I suggest that the secretary request the *Railway Age Gazette* to print these articles so that they may be read by the railway officers.

In accordance with this request the two papers are abstracted below. Carl F. Woods in a paper before the American Chemical Society said:

It is probable that no one of the methods used in railway painting embodies the maximum efficiency possible, and in view of the very large amount of money involved, it is desirable that the entire subject be given careful study by technical chemists. The cost of painting the same type of car varies on different roads from $30 to $60, or even more. Some roads are forced to repaint their cars every two years while other roads by means of an annual coat of varnish, make one painting wear from ten to fifteen years. The color and varnish process is of very recent origin and is a radical departure from the older lead oil and surfacer systems. The fundamental idea of the new process is that the fewer the number of coats and the more similar these coats are in composition, the more durable will be the final results obtained. With this in view, a combination of coats is applied which are so composed as to prime the wood, prepare a surface, and obtain the desired color at the same time. This is accomplished by employing heavy silicate paints, containing the proper color ground in the same kind of varnish, each coat possessing suitable drying qualities for its respective demands. The best results are obtained by the use of dark colors, such as green or brown, because the principal ingredient may be ocher, umber or some other natural earth pigment which not only produces the desired shade, but is well adapted for preparing a foundation. The surface so obtained is covered with a coat of the body color ground in varnish, followed by one thick coat of finishing varnish.

Each of the processes referred to has its specific faults and virtues. The "lead and oil" process, if properly applied, requires from three to four weeks and the application of ten or more coats. The "surfacer" process requires about the same number of coats, but, owing to the quick drying of the surfacers, requires but two or three weeks for application. The "color and varnish" process is the simplest of all, and has been applied with apparently successful results in from six to eight days, with an application of four to six coats. It should be understood that the aim of this shorter process is durability at the lowest cost, and that appearance is in a measure sacrificed. On the other hand the process is dependent upon specially made

paints in which adulteration is difficult of detection, and which if carelessly made, are not only short lived, but render more difficult the refinishing of the car. It has been shown by actual results that a saving of $20 to $30 can be made on the painting of each car and an increase in life obtained of from five to ten years by the adoption of scientific methods of finishing.

Mr. Copp's reply to this article was then read as published in the *Painters' Magazine* and is abstracted as follows:

Years ago the cost of painting a first-class passenger coach was estimated at about $600, and about three months was required to do it. Today we divide both the time and the cost very nearly by six. It would seem that the economy in car painting is already down to about the lowest notch consistent with a passable finish and a fair degree of durability, but when this chemist tells of the system to be used in the place of the lead and oil and a surfacer system for finishing cars, he is talking of the most expensive materials that can be used for this purpose, as are all varnish color productions. Besides, with this system the labor to produce the requisite surface is more expensive. He says "the lead and oil process, if properly applied, requires from three to four weeks and the application of ten or more coats." At the present time railway shops cut this time and the number of coats for this work about in half.

The surfacer systems require only five coats (and three of those are of "rough stuff") to the color, and two coats of color and two coats of varnish, or nine coats in all. And they have systems of doing this all in about six days! But there is a knifing system of three coats to the color that can be safely done in four days. He says his varnish-color method of four to six coats can be done in six to eight days.

This writer concedes and advises, for some classes of cars running on passenger trains, an enamel and oil combination finish in place of varnish, the priming surfacing having been brought up with lead and oil predominating in suitable pigments. These cars can safely run four years without shopping at all. His statement that "some roads are forced to paint their cars every two years," is questioned. They may cut them in with a thin coat of color before varnishing as often as that, but a painted car means one so badly cracked that burning off or resurfacing is necessary. He also says that annual varnishing makes a painted car last from ten to fifteen years. Then by all means keep up the annual varnishing as the best piece of economy imaginable.

Mr. Butts: We recently have revised our specifications for painting locomotives, and in doing so we have retained those parts of the locomotive that need to be done in a way to enhance the good looks and maintain the equipment in a respectable way. For instance, the cabs and upper works and tanks, are being painted as well as they were, but on the frames, trucks, fireboxes, pilots, and other parts of the locomotive that get covered with grease the first trip out, one coat of paint is as good as any number of coats. In this way, we have reduced the cost of painting our locomotives nearly one-half.

Mr. Watts: There has been much progress made by paint manufacturers in the line of economy and durability, also the reverse; but unless we can convince our superior officers that in supplying these cheap materials there is no true economy we cannot accomplish very much good.

Mr. Martin: What method do you employ on your driving wheels—one coat?

Mr. Copp: No; we give them two.

Mr. Butts: We have a separate specification for freight engines and passenger engines. When we go down to the iron, we prime it with a first class metallic primer, and follow it with what we call the intermediate coat, and then knife it in or sandpaper it to get a good surface. When they return to the shop, we use our judgment. Sometimes one coat will do, and sometimes not, depending on the condition. We do all the exposed parts of our engine in the same way, the driving wheels, cab, sandbox, upper works and body of the tank and cylinders. New work, we give the trucks two coats; when they come in for repairs, we give them one. We clean them thoroughly before we paint them at all.

Mr. Cook: The papers presented have so clearly enunciated the principles of this association in regard to railway painting, that I feel we can put ourselves on record with reference to that subject. Therefore, I move that it is the sense of this association that real economy and the limit of economy is reached by the practical painting of railway equipment. (The motion was carried.)

REMOVING VARNISH FROM CAR INTERIORS.

A. H. Phillips (N. Y. O. & W.): After inspecting the interior of the car when shopped for general painting, we often find the window caps, door casings and jams, also some parts around the lavatories, badly bruised and mutilated, and in order that the painter may make a satisfactory job of refinishing, the cabinet maker needs to scrape them. The cabinet maker makes use of the varnish remover, to remove the old varnish, so that he may be able to do the scraping more quickly. If the painter removed the varnish and the cabinet maker followed with the scraper it would necessitate two men on the job with two different prices. When about all the old varnish needs to be removed, we assign the entire job to the painter, after which the cabinet makers scrape or replace with new, all parts necessary.

Mr. Butts: In our shop, the inspector goes through the car—he is the foreman in charge of the interior work—and marks up all the places to be removed. The painters do the removing; the carpenters do the smoothing and finishing necessary to be done, if any. We think the painters, having the tools and the training, can do it better than the carpenters.

Mr. Quest: Our practice is about the same, except that if the abrasions are not too bad, the painters bleach them with oxalic acid. The seat arms, as a rule, are scraped; but generally we remove the varnish, and have the scraping done afterwards. There are many times, in a light colored car, when time can be saved by bleaching out the spots and touching them up.

Mr. Miller: You do not require regular painters to do the cleaning, do you?

Mr. Quest: No. We do that with a cheaper grade of labor. We have no piece price for it, but do it with a cheaper gang of men.

Mr. Hutchinson: On all fittings removed from the car, we supply the cabinet maker with the remover, and expect him to complete the work.

W. J. Russell (G. T.): My experience is that the cheaper class of workmen is the more expensive. I believe the ones to do the finishing are the ones to do the removing. I have removed the varnish on several cars, and never touched the filling, never got below the shellac, and made a fine job, but I had to do it with mechanics. A laborer, when he gets down to the wood, take off the filling.

Mr. Hutchinson: I select what you might call in all shops the handy man, the intelligent man, who takes an interest in his work, and who in a short time is particularly interested in that operation. In a short time he becomes efficient at it.

A. J. Bush (D. & H.): Our practice is the same as that of Mr. Russell. The inside finishers do that work, and we never allow the cabinet makers to have varnish remover except by special permission. On window caps, where it is hard, we sometimes give them some; but I think the work should generally be done by the men who understand it.

W. Bailey (B. & M.): I favor the painters doing this work. I believe the men who put it on should take it off. It is a disagreeable job, but I believe it belongs to the painters.

Mr. Cook: I believe that the work assigned to the cabinet makers should be to repair all defects and to remove all stains that cannot be removed by varnish remover. I will move that we go on record to that effect. (The motion was carried.)

HEADLININGS OF PASSENGER CARS.

James Gratton (B. R. & P.): I have looked into the various makes of headlining material in our cars, and, in my opinion, composite board is the most suitable headlining material from the painters' standpoint, as heat and moisture do not affect it the same as wood veneer and other headlining materials. The composite board is an excellent non-conductor, it is impervious to sound, will keep out heat and cold and is not distorted by shocks and strains, it will not check, crack or blister, as is the case with veneer headlining when exposed to moisture and to extremes of temperature.

When putting in new headlinings prime the front and the back of the sheets before applying. After the headlining is in place, putty all the defects and give it two leveling coats of surfacer, and rub with No. 1½ sandpaper and apply two coats of flat color to harmonize with the interior finish of the car, decorate in gold (we use one ⅜-in. gold stripe) and apply two coats of pale body varnish. When thoroughly hard, rub down to an egg shell finish or leave in the gloss as may be desired.

To maintain headlinings finished in the natural wood, we clean and refinish in the natural wood finish as long as they present a fair appearance. After they become discolored from length of service, repeated varnishing, burning around lamps, or from a defective roof or where the veneering comes apart requiring removal and replacing with new sheets, or where they have been elaborately decorated with scrolls and stripes (which in the present age is a thing of the past) and which to patch and redecorate would be unsatisfactory and expensive, we consider it best to thoroughly sandpaper, apply one coat of filler and two coats of flat color to harmonize with the interior finish of the car, and two coats of pale body varnish. When thoroughly hard, rub down to an egg shell finish or leave in the gloss, as desired. At such times as the car needs shopping again we find that a headlining finished in this way will clean up very nicely and will not need any further expense added to it other than cleaning and revarnishing or going over with a good emulsion car cleaner.

T. R. Cowan (C. P.): The ceilings or headlinings, known as the Empire style, consist of veneer of several layers cut and pressed into the required shapes and forms. They are given a good coat of paint before being placed in position; this protects the back from dampness. After the veneer is fitted the screw holes and joints are primed and puttied with hard putty; they are allowed to stand for twenty-four hours and then sandpapered down. A good coat of glue size is then applied to the veneers, using fish glue reduced to a proper working consistency, and allowed to dry before canvas is applied. Duck canvas of a very strong quality is then cut to the required shapes to fit, and given a good heavy coating of size which is an equal preparation of glue and flour made into a very strong adhesive cement. This should stand a short time after sizing to allow for any shrinkage that may take place.

The canvas is then placed in position, being well rolled and rubbed out to remove air blisters and creases. It should be allowed to set for at least twenty-four hours to properly dry. The canvas then receives a good coat of glue size, care being taken to avoid [illegible] portions of the canvas, as the material under will take the painting look patchy. When dried, the canvas is ready to receive its first coat of paint, a good strong color being well brushed into the canvas. The [illegible] coat consists of glazing. All seams are glazed evenly, so that the seams of the canvas will not be noticeable. When properly set it is given a good sandpapering to even down any heavy glazing or putty spots. The second, third and fourth coats are given, using a tint suitable for the gilding grounds of [illegible] yellow and silver grey.

The ceiling is now ready for the gilder, who prepares a strong gilding size and goes over the whole surface evenly. The lacquer can be used of any shade and according to the style of ornamental work to be applied. Stencils can be cut for any design and the colors used in stencilling should not be too dark. I think a color similar to the lacquered work (a few shades darker) produces a good effect; much better than dark lines. Three coats of rubbing varnish are applied to the work, allowing the usual time of drying between coats. These headlinings as a rule are only varnished every five or six years. We do not rub them because the projections on the canvas would only rub through.

Agasote Headlining.—Our method of preparing these headlinings is to first of all give to the back a good coat of strong brown paint, missing no part of it. These sheets are then ready for painting, but in cases where rough surfaces might occasionally be received, the following method might be employed. The inner side of the sheet is rubbed down till smooth, using coarse sandpaper. Use a block slightly smaller than a full sheet of sandpaper to allow for tacking down. This block is well weighted on top, a long handle is inserted in the block, and the block is moved all over the surface of the board, which in a very short time will take on a very smooth face.

The board is then ready for the carpenters to nail up in position. After the lining is fitted it is given a good strong priming coat, and when dry all the holes are puttied up and glazed where necessary, and left to dry for about twenty-four hours. Before receiving the second coat it is again well sandpapered, and it is also sandpapered before the final coats. The second and third coats are of the standard colors, the principal of which is green and very pale. These coats do not want to dry bright, but a little on the flat side, which makes the stencilling work much better, and gives cleaner edges. Both of these coats are well stippled.

The next operation is that of decorating. The headlinings receive three coats of rubbing varnish slightly thinned with turpentine which prevents any discoloration on the light painted work for the first coat, and pure varnish is used for the second and final coats. The majority of the ceilings are left bright.

The great feature of these ceilings is that they can be well washed at terminal points without any fear of water penetrating the joints and cracking or lifting it as would be the case with wood veneer work.

E. T. Condon (N. P.): From my experience of over thirty years in painting cars, no material has been found, up to the present time, more suitable for headlinings than the three-ply wooden lining. When surfacing, if the wood has an open grain, fill, varnish and rub. With poplar use outside body surfacers up to the color coats. The back of the lining should be made as nearly waterproof as possible. First, all the paper glued over joints should be removed and the back of the lining before being put into the car should be thoroughly primed and then given two good coats of oxide of iron paint, the last coat to contain a good proportion of spar varnish, or a varnish that contains a hard gum. When the face of the lining is brought up to the color coats, and the back is thoroughly painted, the lining should be put up, putty all the nail holes and joints, and proceed with the color.

About twenty-five years ago our people bought the first cars with a veneer lining. We have some of those cars on the road today with their linings in a fairly good condition. These cars were roofed with a good quality of tin and about every three years the headlinings were cleaned up and given a coat of varnish. For ten or fifteen years we had no trouble with veneer blistering or buckling as we do today on comparatively new cars and in order to maintain our old and new linings we must first maintain the roofs. In the purchase of new cars specifications should demand that all the linings should have three good coats of paint on the back, painted in the manner I have suggested, and special attention should be given to the roofs. In

the majority of cases leaky roofs are the cause of all blistering and buckling.

The discussion of this subject showed that there was considerable trouble experienced with all kinds of headlinings, and to give the sense of the convention Mr. Cook make the following motion: "The convention is of the opinion that any of the standard headlinings in use are suitable from the painters' standpoint, provided they are properly made and seasoned before being put in place, that they be protected by at least three good protective coats of paint on the back and edges, and that they be properly put up in the car." This motion was carried.

CLEANING PAINTED PARTS OF LOCOMOTIVES.

John D. Wright (B. & O.): The prominent parts of a locomotive, such as the tank, cab, dome and sandbox casings, boiler-jacket, driving wheels, etc., are usually painted with more care than the less prominent parts, and they are also cleaned better at the roundhouses, while the locomotives are in service. For such parts, I have not found a better method of cleaning than the old-fashioned way of scrubbing with a neutral soap, pulverized pumice stone and water, not forgetting to apply plenty of elbow grease, and to rinse off all traces of the soap. It may be necessary, occasionally, to scrape off an accumulation of dirt, or remove an excess of grease, washing certain parts with benzine and wiping dry with waste. This, however, should always be done before washing with soap. The less prominent parts, such as frames, trucks, truck-wheels, pipes, etc., which receive less cleaning during the period the engines are in service require somewhat different treatment. There is often a thick accumulation of dirt and grease on some of these parts which cannot be removed with soap and water. This is best removed by scraping with scrapers, or a putty knife, and then washing with benzine and wiping dry with waste.

The benzine we use for cleaning purposes runs from 54 to 58 deg. Baumé. It is not very much lighter than coal-oil, which runs from 46 to 48 deg. Baumé, and is not nearly so inflammable as the 68 deg. Baumé gasoline used in torches, commonly known as deodorized stove gasoline. The fire insurance inspectors object to the use of inflammable liquids around shop buildings, but up to the present time, I have been unable to find a suitable substitute for benzine which will clean the greasy parts of a locomotive as effectively as this petroleum product.

Mr. Quest: I do not see how we can get along without benzine in the paint shop. There is nothing that will take its place.

A. P. Dane (B. & M.): On the Boston & Maine, the motive power department has been restricted in the use of benzine. We used turpentine until it got to be 75 or 80 cents a gallon, and I suggested a substitute for it, which we have been using for the last two or three years. It is about one-half the price of the pure turpentine.

Mr. Butts: Our method is to take kerosene oil, and clean thoroughly with that, and then take a piece of waste, saturated with a substitute for turpentine—we have one costing 32 cents a gallon, which satisfies as to the flash point danger—and clean off the face of the work that needs to dry the hardest, and where there would be objection to slow drying, and wipe off the surplus oil with that. At one point I found that they did not have a substitute for turpentine, and the man had gone to a sawmill and got very fine sawdust, and after taking off the worst grease with kerosene oil, he had taken waste and rubbed the fine sawdust into it, and had gone over it with that. It didn't cost anything but the labor, and was a very good job.

Mr. Dane: We have used kerosene, for instance, on the eccentric straps, driving boxes, inside of drivers, and the motion work. The grease is an inch thick sometimes, and it is scraped, and kerosene is used. I find it almost impossible to paint over anything cleaned with kerosene and nothing else. It leaves an oily surface, and it does not thoroughly clean. The turpentine substitute gives entire satisfaction.

PAINT MIXING VEHICLES.

A paper on this subject was presented in an interesting manner by C. E. Copp of the Boston & Maine. He mentioned various articles recently published in technical magazines which bore on this subject. In speaking of substitutes for linseed oil he quoted from a paper written by Maximilian Toch, and published in the proceedings of the Paint and Varnish Society of London, Eng., as follows: "In speaking of fish oil, it has been stated that menhaden oil properly bleached or refined does not produce as hard a film as linseed oil, but this I am inclined to dispute. If raw linseed oil is mixed with a pigment, it makes a very poor, spongy, badly adherent film, but if a good drier is added with the proper kind of a dilnent, this is overcome. The same is true of fish oil, and if fish oil is treated with the proper tungate drier, the film produced has a number of advantages over linseed oil." Mr. Toch also speaks favorably of China wood oil and soya bean oil. Quoting from a New England railway chemist, Mr. Copp says: "Soya bean oil so much resembles linseed oil that it is difficult to detect the difference, and it is produced at about one-half the cost of linseed oil. In regard to turpentines, there are many substitutes, the most of them consisting of about 75 per cent. of a carefully distilled petroleum oil and 25 per cent. of turpentine."

Mr. Copp believes that there are many of these substitutes that can be used to good advantage, if not in all work, on a certain class of work. He says, "I have seen a board exposed two years on one-half of which the semi-paste paint was thinned for use wholly with a substitute paint oil, the other half with linseed oil, and the half with the substitute oil looked the best. I believe that for freight car work, if the semi-paste paint is furnished ground in pure linseed oil it can be safely thinned with a very nearly all substitute paint oil. But for passenger car work, especially when one prepares his own primers and surfacers of lead and oil, I would advise adherence to the use of linseed oil, and the purer and better prepared the better."

When speaking of turpentine he again quotes Mr. Toch as follows: "Turpentine has absolutely no value whatever as a binding paint material. If turpentine is flowed over a sheet of glass there should be no residue left on the glass after it has stood for twenty minutes. Now if a petroleum product is considered that will also evaporate in twenty minutes, and one which contains no product that is harmful to the pigment or the oil, and one which gives fluidity and unctousness to the paint or varnish, and which costs one-fourth the price of turpentine, I say that we are pulling the wool over our own eyes to use turpentine, if we can demonstrate that the petroleum product is equal." A substitute can be made by mixing varnish makers' naphtha and pure spirits of turpentine in such proportions as is suited to the work at hand. Such naphtha should have a specific gravity of 60 deg. Baumé, or the deodorized varnish makers' naphtha may be used and 2 parts of the latter mixed with one part pure turpentine will meet all requirements.

OUTPUT OF THE PASSENGER CAR PAINT SHOP.

T. J. Hutchinson (G. T.): The output of the passenger car paint shop is dependent on the following departments: The stores department; the traffic department, and the different branches of the car department. The first move towards reform, I believe, must be made through the stores department by the introduction of a more vigilant co-operative system in the purchase and punctual delivery of all staple material. Due allowance of course, must be made for all unforeseen difficulties that have to be met in obtaining material for special purposes.

Unfortunately on some of our railway lines the passenger traffic department officials are permitted to independently control the care, and maintenance of their passenger equipment in service, and wherever this system is in vogue with the usual in-

experienced help employed at terminal points, the tendency is inevitably towards neglect, and extremes of service, both of which so long as the above conditions exist are unsurmountable obstacles in the path of the master painter working with an eye toward quality and economy, as well as the maximum output. To safely keep up railway passenger equipment in service it is pretty generally understood that all first-class cars should be shopped for general repairs every twelve or fifteen months, and this particularly applies to the exterior painting.

Not many years ago it took from one to three months to properly paint a railway coach. Railway managers generally became dissatisfied, and demanded a sytsem that would shorten this time, but mark you, without impairing the durability of the work. Railway service is the most severe test you can give paint or varnish, and the work of days cannot be safely crowded into hours, as the quicker drying you make your paint or varnish, the shorter lived is the work; but this problem has been satisfactorily solved in the production of the railway coach surfacers now in use on the principal railway lines of this country. Upon the approach of the busy season we find insufficient shop capacity, and antiquated machinery a great obstacle to handling equipment in order, and getting it through the shops on time. Shop capacity could be greatly augmented by having the yard tracks adjacent to the shop equipped with heat, air and water service pipes, where much preliminary work, such as stripping, and interior washing might be done.

In order that there may be no delay in the repair of car fittings all interior coach equipment should be removed in the yard and sent to the shop for washing, and the necessary cabinet shop repairs. Of course in winter the outside sash and doors can be left in place until car is shopped. This will decidedly advance the work in the cabinet and sash rooms, allowing much needed time for the varnish to harden before the trimmers take the car to fit it up for service.

G. W. Lord (B. & M.): There are many departments hindering the output of the passenger car paint shop; perhaps unavoidably in trying their best to keep up their end. So every department from the head down should be on the lookout for these delays and try to overcome them as much as possible. By so doing, they will help the output. There should be a competent man looking after the stripping of all coaches, looking after every piece removed; see that it is all right and in condition to go back before it is sent to the paint shop. If parts are broken or missing, or there are changes to be made, they should be replaced and fitted at once, not waiting until the coach is to be hung up, then telling us this or that has got to be done.

Foremen of the different departments should work closely together all of the time. Get together occasionally and compare notes, so that when the coaches are ready to hang up, all the parts will be complete, and nothing be waiting to be done; thereby you avoid holding the car, which is taking up valuable room. When you take coaches out of the paint shop you should have others to take their places, or your men will soon be out of work. Sending out four or five coaches today, then waiting [illegible] does not help the output of any shop, but delays it. I do not mean filling the shop with old or unrepaired coaches, but coaches that have been overhauled and ready for the painters to continue their work.

Changing over the steam heating, air brakes, signal valves, tool boxes in the saloons, burned or water soaked head linings or taking down lamps, and many other things should be done as soon as possible after the car comes to the shop. If this is done, you will help the output. Holding cars for some missing or broken part after you have worked nights and Sundays to get them out on time, does not help the output, and the poor painter at the end of the month is blamed for not putting out more cars. There is but one solution to get best results and that is to have all the departments work and pull together, by so doing you will help the output.

Mr. Brazer: It won't do you painters any good to talk on this if you talk until doomsday. You are the last ones to get the car. Mr. Lord says you must have the co-operation of the other departments. That is, of course, true. The only way is to have the general foreman of the car department a broad-gage fellow, and as much interested in the paint shop as in the cabinet shop. Mr. Butts started to stop permitting any work being done in the paint shop. He says he can't varnish the car well if you are going to raise dust in there. We, of course, knew that, but they were after us for cars. The corporations do not own enough equipment to properly protect their paint shops. The men in the position I am in know what you are up against, and we appreciate your position. It is the car department men that have to give you the work before you can finish it.

Mr. Hutchinson: I wish all the master car builders and superintendents would take as much interest in the paint shop as my friend Mr. Brazer does. It would tend greatly to add to the efficiency and increase the output of our paint shops.

LINSEED OIL.

W. O. Quest (P. & L. E.). Notwithstanding all interested adverse claims made, we are still firm in the belief that the sellected, especially prepared, old reliable linseed oil is the king of paint and varnish oils, basing this conviction and claim on the fact that with but few exceptions, if any, the best substitute reducing oils of the past and today contain certain fixed percentages of linseed oil, the quality and price usually being based on the quantity of linseed oil used in the combination of the cheaper selling substitute. The substitute paint oils of today are the undoubted achievement of a demand backed up by brains; we consequently have no hesitation in openly saying that it is our honest belief that the quality of the best grade of the so-called substances, or reducing oils, is much better than it was fifteen years ago; that this improvement, owing to demand, has been steady and substantial, the proof of such a statement being the fact of the sale of thousands upon thousands of increased gallons of the product each year. It is our further belief that there is no one special consuming craftsman of today, fully capable of stating the many safe uses that a first-class substitute paint oil can be put to. Individually, for many years, we have been safely using these oils in our shop formulas.

The best substitute paint oils being purposely made more volatile in their make-up, certainly have a great advantage over the best straight linseed oil in the car paint shop, which in many instances is ruined where attempting to promote its drying qualities with a non-assimilating cold-stirred-in-Japan, which as a rule, has nothing to recommend it other than its cheapness. We have safely and economically, in both time and labor cost, substituted paint oils in our freight painting department for over twenty years. We have also safely used the same material throughout in our general all paint finishing work which needed reducing. We have no hesitation in saying that we think the manufactured paint oil to be one of the most indispensable of materials in the car paint shop formulas, that, where skillfully judged for quality and use, there is only one greater mistake that can be made, which would be the mistake of trying to advantageously operate a railway car and locomotive paint shop without the use of a judged safe, first-class substitute paint oil.

ELECTION OF OFFICERS.

John T. McCracken, of the Interboro, New York City, was elected president; A. J. Bush, Delaware & Hudson, Oneonta, N. Y., first vice-president; O. P. Wilkins, Norfolk & Western, Roanoke, Va., second vice-president, and Albert P. Dane, Boston & Maine, Reading, Mass., secretary-treasurer. The places receiving the three highest number of votes for the next place of meeting were Denver, Colo.; Cedar Point, Ohio, and Boston, Mass., in the order named.

SHOP KINKS.

From the Juniata Shops of the Pennsylvania.

MILLING CUTTERS FOR SIDE RODS.

A new type of milling cutter to be used in milling fluted side rods is shown in Fig. 1. The cutters are formed to the true shapes of helixes instead of being straight as was the former practice. The helical blade gives a constant cutting edge for the full width of the cutter, while the straight edge has a variable cutting angle which is too acute at one end and too obtuse at the other, and correct only at the center. Each cutter blade has three cylindric bushings secured by set screws, the bushings having a flat taper face which wedges against the blades when the screws are tightened up, holding them in position.

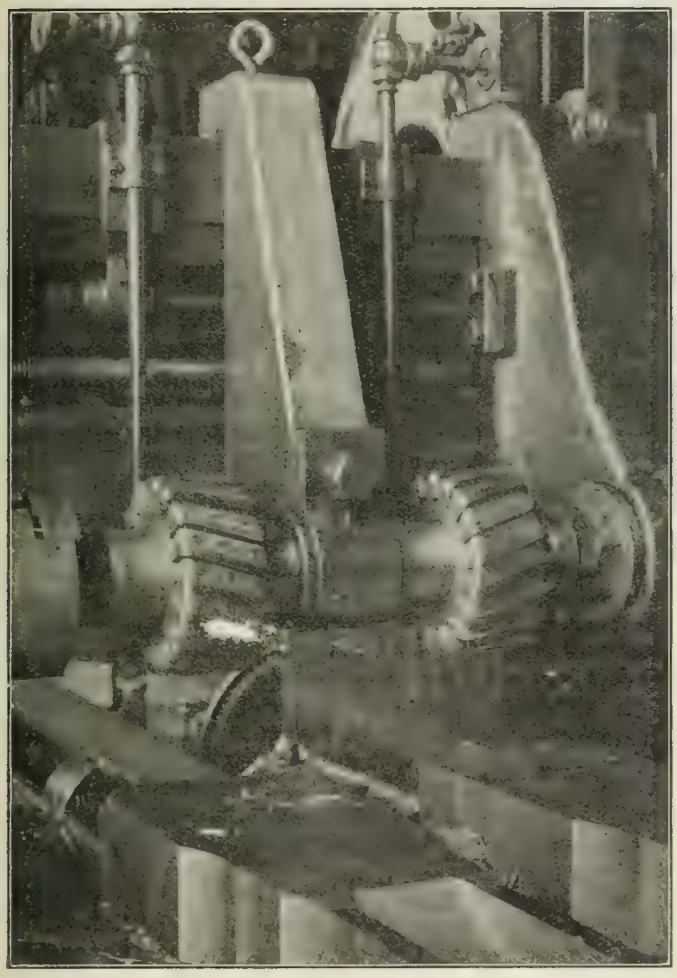


Fig. 1—Milling Cutters for Fluting Side Rods.

While this method of securing the cutter blades may appear to be expensive, it is found that the milling cutters of any diameter can be made for a considerably less cost per inch of width than is charged by the manufacturers. To provide the necessary rigidity the hole for the arbor is made one-half the extreme diameter of the cutter. In order to hold the arbor firmly against the work a substantial intermediate support is supplied, which shortens the span of the arbor between the bearings. This rigid construction materially increases the output of the machine, as it does away with chattering and enables the operator to run with a heavier feed.

Fig. 2—Tire Heater with Rotating Table.

TIRE HEATER.

A tire heater of simple construction and one that will take care of about 29 locomotives per month is shown in Figs. 2, 3 and 4. It consists of a furnace with only one burner and a

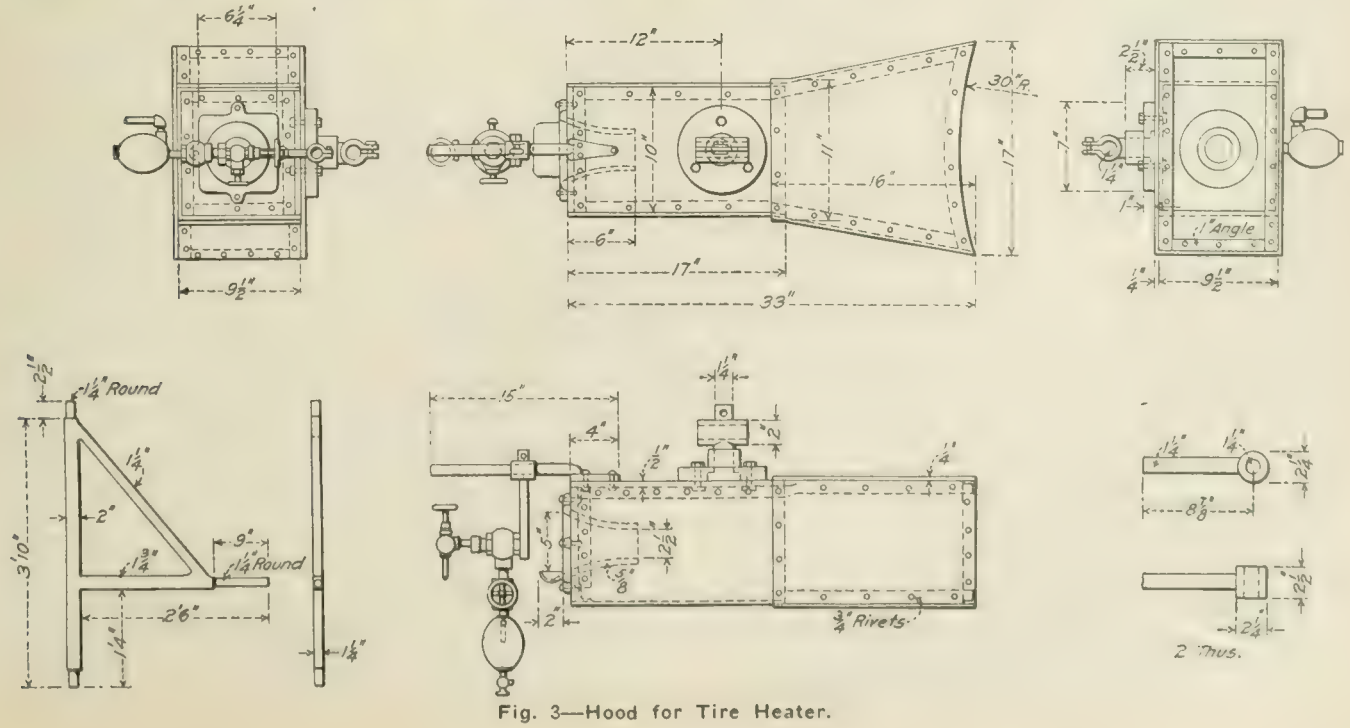


Fig. 3—Hood for Tire Heater.

turntable which will hold two tires. The table is revolved as fast as the portion of the tire in front of the furnace becomes sufficiently heated. The furnace or hood is lined with firebrick and is suspended from the wall by a small crane, as shown, so that it can be moved up to and away from the table according to

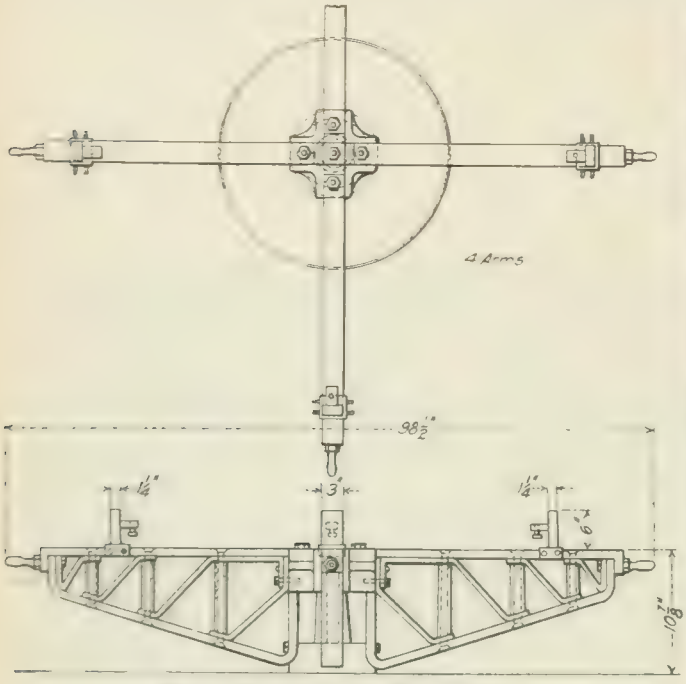


Fig. 4—Turntable for Tire Heater.

the different diameters of the tires to be heated. This method has been in successful operation for several years.

MILLING CUTTER.

An interesting type of a hob milling cutter with inserted teeth is shown in Fig. 5. These teeth have a rather unusual form, being triangular in section. They are inserted in circular holes

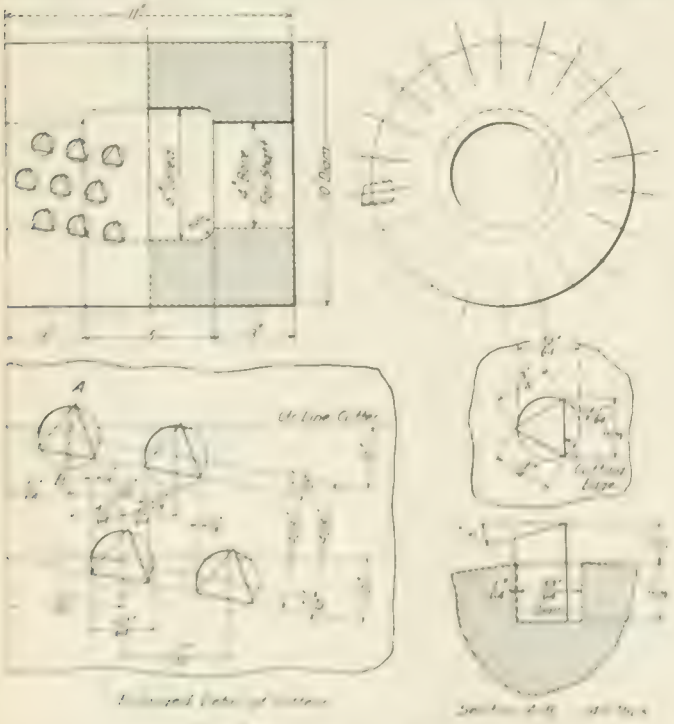


Fig. 5—Hob Milling Cutter.

CUTTING OUT ROD ENDS.

A novel method of cutting out the jaw ends of side rods is shown in Fig. 6. A gang cold saw is used with the two saws set the required distance apart. Instead of the slow recipro-

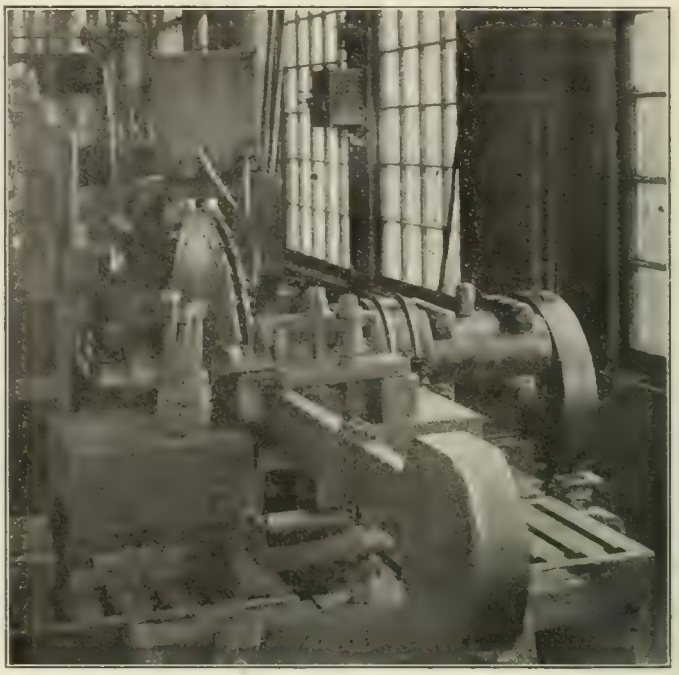


Fig. 6—Gang Saw for Cutting out Rod Ends.

cating motion of the slotter the work is done by the continuous cutters working at a much faster rate of feed. When the saws have cut in the required distance the core may be drilled out and the jaw will be ready for finishing.

MILLING CUTTER FOR BEADING TOOLS.

The milling cutter shown in Fig. 7 is made for the renewal of the boilermaker's beading tools. With this cutter the tools may be easily maintained to the standard size at a small cost. It is composed of six cutters shaped to the exact size of the beading

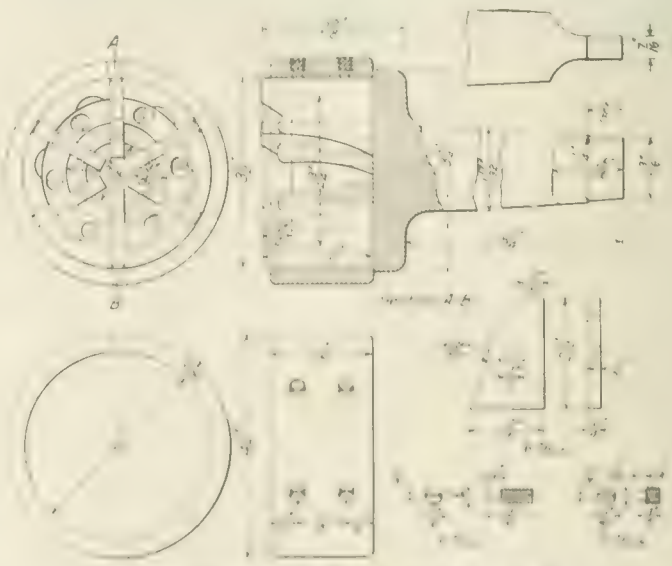


Fig. 7—Milling Cutter for Beading Tools.

TRIMMING PRESS.

A 100-ton trimming press that is found useful in connection with a heavy drop hammer is shown in Fig. 8. The main ram is 14 in. in diameter, and has a stroke of 18 in. It is provided with a rapid return acting through a smaller piston. The water pressure used is 1,500 lbs. per sq. in. The crosshead is heavily guided in the main frame so as to take up any side strains that are liable to come on the machine when trimming. The distance between the base and crosshead is 36 in., and the width between the housings is 36 in. The main cylinder frame is made in a single casting and the valve mechanism is arranged so that the stroke may be adjustable. The operating valve is made by R. D. Wood & Company, Philadelphia, Pa., and is of their standard patent piston type, made of hydraulic bronze.

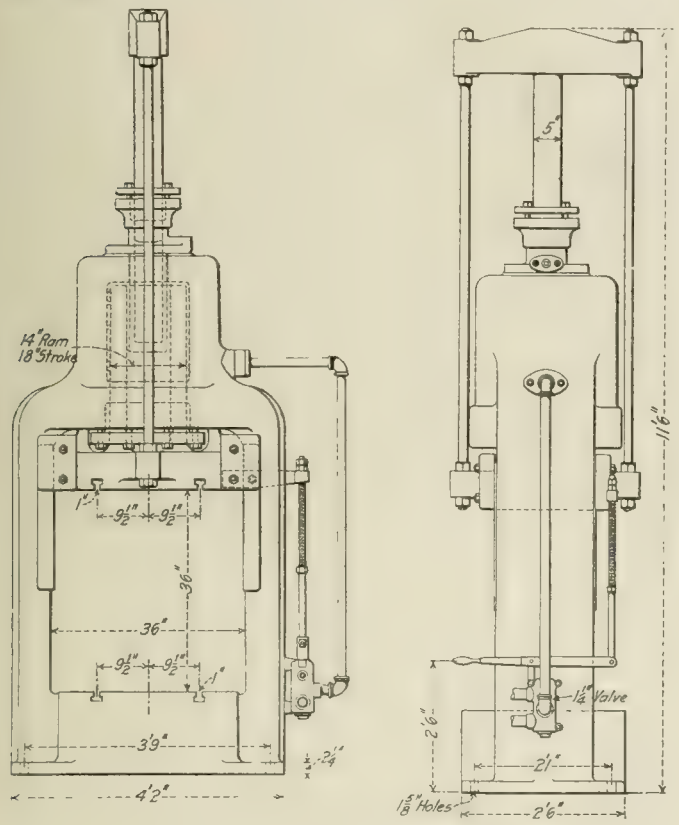


Fig. 8—Hydraulic Trimming Press.

An abstract from the *Painters' Magazine* was read at the recent Painters' Convention, concerning the origin and production of gasoline, benzine and naphtha, as follows: Petroleum, benzine is also called naphtha, and there is no real distinction between the two terms. However, there is a decided difference between benzine and gasoline. The latter is used as a fuel for lighting, while benzine cannot be used for this purpose without serious risk. When benzine is manufactured the product is designated by its specific gravity in degrees on the Baumé hydrometer, and the higher the degree the higher its volatility. At the present time 65 deg. is the most volatile benzine or naphtha, and anything over that degree—68 deg., 72 deg., 76 deg.—is termed gasoline. When crude petroleum is subjected to distillation the resulting products are—first the so-called gasolines, which boil and volatilize at low temperatures. The lightest of these is used only in gas machines, and as a solvent, and is known as 84-deg. gasoline. The next is 76-deg. gasoline, commonly used in gasoline stoves, lamps and automobiles, gas engines and motor boats. The 72-deg. and 68-deg. gasolines are sold for similar purposes, but in low temperatures do not work so well as the 76-deg. gasoline. Of the petroleum naphthas or benzine the 68-deg article is most commonly used for cleaning, etc.

NOTES FOR THE ENGINEMAN AND FIREMAN.

BY F. R. WADLEIGH.*

However well a locomotive may be designed its operating economy will be low, unless it is handled intelligently and fired with care and skill. A really good fireman will effect greater economies than any apparatus on the locomotive. The effective carrying out of all plans and schemes for the economical use of fuel on locomotives comes to depend finally on the interest, cooperation and skill of the engine crew; but, upon all factors affecting fuel consumption the fireman has the greatest influence. His work can spoil or render ineffective the best coal and the most efficient design of locomotive; on his intelligence and industry depends largely the expenditure of $188,735,868.00 (paid by the railways of the United States for coal in 1909), which is 12¾ per cent. of the total operating costs of the railways. He may, by the exercise of the utmost skill and intelligence, turn into steam 80 per cent. of the heat value of the coal, or by careless firing and ignorance, may easily waste 30 per cent. of the heat units in the coal, and only utilize 50 per cent. Of course, the quality of the coal and the design and the economical rating of the locomotive have much to do with the results obtained by the fireman, but skilful firing and handling of the locomotive can very largely neutralize poor design and overloading, just as good coal can, and is often made to, overcome the poor condition of the locomotive.

There is more coal wasted by careless firing than in any other way, and while some firemen are better than others, no man of ordinary intelligence can afford to do anything but his best. The fireman should look upon the coal as so much money entrusted to his care by his employer, to be used in the most careful and intelligent manner and from which he is to get the greatest returns. A good fireman is a skilled workman and should be ashamed to turn out poor work, just as a skilful mechanic is. The difference to the employer, in dollars and cents, between a good fireman and a poor one is certainly a great one. Anything in the way of written or printed suggestions that will help the fireman in his work will not only be of value to the man but also to his employer—the railway; it is hoped that the following suggestions, gathered from years of practical experience and study, will be of assistance to both.

The engineer and fireman should remember that all instructions are given them to think about and to find reasons for, so that they may be applied to varying conditions, as it is obviously impossible to give reasons and detailed instructions covering all points and conditions applying to fuel consumption without going into the matter at too much length. The mere giving out of such instructions is not sufficient in order to get results. The rules given should be carried out here, there and everywhere, not only on fast passenger trains but on slow freights as well. Everyone connected with the handling of locomotives should have copies of such instructions and be made to take an interest in their being carried out. The trainmaster, as well as the road foreman or traveling engineer, should be aware of the importance of the subject and should see that any firing instructions issued are carried out just as much as the train rules are.

If the railways expect their engine crews to be interested in fuel saving and insist on their carrying out reasonable and proper instructions to that end, they must keep in good condition all appliances affecting the use of fuel. It is not very encouraging to a fireman to know that a hundred or more flues are stopped up on his locomotive, and that when the engineman reported "clean flues" on the work report book to find, on going out on next trip, that only the small holes have been bored through in a few bottom flues and that the rest are as bad as they were on the previous trip. It is such occurrences (and they are not uncommon) that are largely responsible for the lack of interest and care shown by engine crews in the matter of fuel

*Fuel Engineer and Ass't Gen'l Manager, Chesapeake & Ohio Coal & Coke Company.

economy. Where one finds a road that keeps the flues clean and firebox and arch in good order, that does not have steam leaking around the piston rod and the valve stem packing, that keeps the valves square and the cylinder packing tight, there will also be found a road whose men take an interest in the fuel question.

There are several ways in which locomotive fuel is wasted with which the engine crews have little or nothing to do. Careful tests made not long ago showed that not less than 15 per cent. of the fuel supplied to locomotives performed no part in the actual moving of trains, but was accounted for in other ways. For instance, keeping more locomotives in service than are needed by business requirements, delays in yards and at meeting points, unnecessary stops, ordering locomotives out before they are needed, carelessness in cleaning and building fires, schedules divided up without taking into consideration the grades and curvature of the road. Every 15 or 20 minutes' delay may cost from 500 to 1,000 lbs. of coal, according to the state of the weather. In fact, everyone, from the general manager to the brakeman and the wiper, each and all affect, by their methods, the coal consumption of locomotives.

DISPOSITION OF HEAT IN A LOCOMOTIVE FIREBOX.

Tests on the distribution of the heat of the coal used in a locomotive, carefully made under the direction of Prof. Goss, showed the following results, a good Pennsylvania or West Virginia coal being used. (Bulletin 402, United States Geological Survey.)

	Percentage of Total Heat in Coal.	
	Used.	Lost.
Absorbed by water in the boiler	52	..
Absorbed by steam in the superheater	5	..
Lost in vaporizing moisture in coal	..	5
Lost through discharge of carbonic oxide gas	..	1
Lost through the heat in gases going out of stack	..	14
Lost by unburned coal in front-end cinders	..	3
Lost by unconsumed coal thrown out stack as sparks	..	9
Lost by partly burned coal in ashes and clinkers	..	4
Lost through radiation of heat by boilers and cylin-	..	7
	57	43

Now this statement applies to the locomotive only when running and not blowing off steam, and it does not include the coal used while standing, starting fires, and switching. Prof. Goss states that about 20 per cent. of the total locomotive fuel is used in the ways just mentioned, or is left in the firebox at the end of the run; so that the heat balance given above accounts for about 80 per cent. of the total fuel.

During the year 1906, there were 51,000 locomotives in the United States, which consumed not less than 90,000,000 tons, of coal, costing the railways $170,500,000. Applying the heat uses and losses given, we get the following results:

	Tons.
	41,040,000
Required to evaporate moisture in coal	3,600,000
Lost through radiation, leakage, etc.	5,040,000

Greater care in the selection of the coals used and more care in their mining and preparation will tend to reduce all losses. But, after all, these ways of reducing the losses of heat in the coal are carried out, it is the engine crew that has to look out for them all, and it is to their watchfulness and skill that the

of any design or appliance and cause good, well prepared coal to show poor results.

CLINKERS.

A coal that will make bad clinkers is one of the worst propositions the fireman has to contend with, and a little information as to what causes them will be of use. It takes a certain amount of heat or temperature in the fire to cause the clinkers to form from the ash of the coal. This temperature varies with different coals, but as soon as it is reached the clinker begins to form. Now this fusing point or melting point of the ash is largely determined by the kind of substances composing the ash. Some substances such as lime and iron will lower the melting point, so that a coal containing much lime or iron is sure to clinker badly, not because the iron or lime clinker or fuse themselves, but because they make the ash clinker more easily. There is, however, another item, and that is the temperature of the fire at or near the grates. If this temperature is not as high as the melting point of the ash, then the latter will not fuse into clinkers. So, the hotter the fire and the more it is sliced and disturbed near the grates the more chance there is of having clinkers.

Recent careful tests show that some coals clinker at as low a temperature as 2,200 deg., while others do not clinker until the temperature reaches 2,900 deg. The latter coal, one of the New River West Virginia variety, would not clinker in the ordinary firebox, as it is very seldom that the heat reaches over 2,400 deg. On the Pennsylvania locomotive tests at St. Louis, where most careful measurements were made, the heat in the firebox when working light ran from 1,400 to 2,000 deg., while when working hard it ran between 2,100 and 2,300 deg., the highest being 2,339. It is not always the coal making the most clinkers that will cause the most trouble, as it may make a large amount of light porous clinker that can be easily broken up and will not stick to the grates, while another coal may make a comparatively small amount of thin, glassy clinker that sticks to the grates and stops them up and cannot be removed until it gets cold.

The way in which the firing is done often has much to do with clinkering; the man that carries a very heavy fire and is continually digging holes in it, thus getting green coal on the grates, turning the fire upside down and bringing the ash up into the hottest part of the fire, will certainly have more trouble than the man who is satisfied to let the ash alone where it belongs, on the grates, and who only hooks the fire to level the top of it. Another frequent source of trouble from clinkers is due to not building up the fire properly before starting.

IMPURITIES IN THE COAL.

The fireman should learn to know by their appearance the different impurities to be found in coal, such as slate, bone, iron pyrites, fire-clay, etc. Knowledge of these impurities is of value, as by throwing them aside better results may be obtained from the coal and less ash and clinkers be produced. The effect of the different impurities on the burning of the coal should be watched, as all such knowledge tends to more economical results. There is, of course, a vast difference among different coals in the amounts of such impurities; some coals are apt to have considerable slate, others slate and bone, etc., this difference being mainly caused by lack of proper preparation and inspection by the mine operator.

Appearance of Impurities and Their Effect on the Fire.—Slates are of irregular shape, generally more or less flat and are heavier and harder than the coal and vary in size. Their color runs from a light gray to black. Some of them are soft and easily broken, while others are very hard. Their effect on the fire is to add to the amount of ash and refuse; they take up space on the grates that would otherwise be occupied by coal

Bone may be called a slaty coal or a carbonaceous slate. It is really an impure coal and the slate in it is not in layers but in

small particles mixed with the coal. It is harder and heavier than coal, of a darker color, and breaks into irregular shaped pieces. Sometimes it will be found in small pieces separate from the good coal and sometimes it shows in a layer in a large lump, just as it comes from the seam of coal. It is usually from ½ to 4 or 5 in. thick. Its only effect on the fire is to add to the amount of ash and to take the place of better fuel, but it will not clinker. It has considerable fuel value, varying in this respect; the harder it is the less fuel value it has. Analysis shows that it contains from 15 to 25 per cent. ash while the good coal will not have over 7 per cent.

Fire clays exist in small pieces or layers in the coal, soft, like putty and are generally of a light gray or reddish gray color. They are usually found below the seam of coal, but sometimes in the middle in thin layers. They add to the amount of ash and clinkers and have no value as fuel.

Iron pyrite is a bright yellow color, resembling gold or brass, coming sometimes in thin layers or flakes and sometimes in hard round, or partly round, balls, often in chunks more or less mixed with other substances. It is composed of iron and sulphur and not only has no practical fuel value but also is one of the main causes of clinkering, due to the iron it contains. Some coals contain very little pyrites, only a few flakes occasionally on the surfaces of the lumps, while other coals are full of it.

A form of lime is found on the surface of the lumps of some coals, and is of a whitish brown color. It is responsible for considerable trouble when it occurs in any large quantities, as it makes the ordinary ash fuse or run together, making a sticky, pasty clinker that runs into the spaces between the grates and stops them up. Good coals usually contain little or no lime, while some coals are almost covered with it.

WETTING COAL BEFORE FIRING.

The wetting of coal is such a universal practice on locomotives, as well as at many stationary plants, that a little information on the subject, which is not often discussed in books, may be of value. In the first place, coal will always be wet down on locomotives in order to keep dust from flying about, as a matter of comfort to the men on the engine, if for no other reason.

It is claimed by many chemists and engineers that coal should not be wet because:

First—Any moisture or water in the coal must be evaporated in the firebox, which wastes heat; the water must be raised to a heat of 212 deg., when it is evaporated into steam, and this steam must be raised to the heat of the gases in the firebox.

Second—That water in the coal is turned into steam which takes up valuable space in the firebox that would otherwise be occupied by the hot gases from the coal, and this reduces the draft. The steam from a given quantity of water takes up nearly 1,600 times the space or volume that the water did at the ordinary pressure and temperature of the atmosphere.

Third—That if the water is separated by heat into oxygen and hydrogen, their combustion gives no gain, as the heat it takes to separate them is just as much as will be gained by burning them.

On the other hand, the reasons given for wetting coal may be summed up as follows:

First—The comfort of the men on the engine.

Second—The coal is held together, especially if there is much slack, which prevents fine coal from being drawn out through the flues before it touches the fire, and, if a coking soft coal is used, it will coke more readily and make a better fire.

Third—Water vapor or steam in the firebox promotes combustion, lengthens the blue flame of the burning hydrogen and carbonic oxide gases, and the heat from burning these two gases more than makes up for the heat lost at first by separating the oxygen and hydrogen of the water.

Fourth—It keeps down the smoke by making the coal burn slower, giving the gases a better chance to mix with the air. When coal is first thrown on the fire it gives off at once a large amount of hydro-carbon gases (composed of hydrogen and carbon), which are usually given off faster than they can be brought into contact with the necessary amount of air for complete combustion. Now, if by wetting the coal we can hold back this gas a little, an advantage will be certainly gained by the burning of this gas, which is high in heating power, and some of which would otherwise pass out of the firebox unconsumed and make smoke.

Fifth—It prevents the loss of fine coal dust, which, if dry, would be blown away or lost by the shaking of the locomotive.

The writer knows of no actual reliable tests made on locomotives to settle this question. G. H. Barrus, in his book, "Boiler Tests," gives the following information:

> "In running a test on a double-deck horizontal return tubular boiler, using George Creek Cumberland coal, an amount of water equalling 5 per cent. of the weight of the coal used was added to the coal before firing, the result showing an increase in evaporation of 3 per cent. as compared with a test made on the day previous with dry coal. The coal used contained 6.7 per cent. ash."

G. R. Henderson, in his work on "Locomotive Operation," says:

> "The practice of wetting coal is due to an effort to keep down the dust and also prevent the dry, fine stuff passing to the stack without being consumed—in this it is effective, but no more water should be used than necessary to effect this purpose, as all such water must be evaporated in the firebox and absorbs otherwise useful heat."

It is believed therefore that, apart from the question of comfort of the engine crew, it is a good practice to always wet the coal, so that it goes into the firebox moist, but not dripping wet. It may be stated here that there is quite a widespread idea among enginemen and firemen that wetting some coals will cause them to clinker. This idea is a wrong one. The only effect that wetting coal might have on clinkering would be to prevent its formation or to make it less troublesome. It is a common practice in stationary plants to blow steam under the grates to prevent clinkers and also to keep the ash pit full of water, partly for the same purpose.

FIRING LOCOMOTIVES WITH MIXED COAL.

It frequently happens that more than one kind of coal must be used on locomotives on the same division or run. This is a matter over which the engine crews have no control, of course, but it is responsible for a large amount of trouble and reports of "poor coal." It should be the practice on every road to avoid, as far as possible, any mixing of coals on any one division. Coals of the same appearance and nature—two different coking or semi-bituminous coals, such as Pocahontas and New River, or two different gas coals such as Fairmont and Tennessee or Kanawha gas and Splint—will usually burn when mixed without any trouble, but coals of a different nature are very apt to give trouble from clinkers when mixed. Besides locomotives are drafted for one coal and consequently do not give good results with another coal. When coals of a different nature are used, such as a gas and a coking coal, different methods of firing are required.

That this mixing of coals is often detrimental to good results was shown some years ago on the Chicago & Northwestern, when a remarkable improvement in engine performance was gained by a change in distribution of coals, so that each principal division was given one kind of coal exclusively. Whatever the mixture may be the fireman should learn the difference between the coals, both in appearance and in their burning and how the mixture can best be burned.

CLEAN FLUES ON LOCOMOTIVES.

The importance of having clean flues can hardly be overestimated; and by clean flues is not meant the boring out of a hole through the flues, but a thorough cleaning, so that the inner surface of the flue is directly exposed to the flame and gases from the firebox. Dirty flues not only obstruct the draft, but also lower the amount of heat that can be transmitted to the water from the fire. It is likely that a large number of engine fail-

ures charged to poor coal were really due to stopped up flues. Before reporting the locomotive as needing a change in the draft by either moving the diaphragm or changing the size of nozzle or blaming the coal or the fireman, the engineman should always be sure that the flues have been thoroughly cleaned.

"Clean flues will put a lot of lump in a bad tenderful of slack." Yet cleaning of flues, one of the most important requirements about a locomotive, is neglected at most engine houses more than anything else about the engine. If locomotive flues were kept as clean and were cleaned as often as the flues in the average stationary boiler or in marine boilers, 50 per cent. of the failures would not be due to lack of steam, and the amount of coal used would be greatly reduced.

In any ordinary plant the flues are cleaned out with steam at boiler pressure at least once a day, and where they run in 8-hour shifts, on each shift. On board ship they are cleaned out usually on each watch. Locomotive flues should be cleaned out at the end of each trip with a blower, whether reported or not; the extra cost would be more than made up by more steam with less coal used. It is not uncommon to find a hundred or more flues more or less stopped up. The writer has lately seen a case on a large road where 242 flues needed cleaning on a passenger locomotive that was giving trouble and having delays on account of no steam, and the trouble was blamed on the coal. After the flues were cleaned the same tender of coal made more than enough steam, and much less coal was burned. The engine crew should watch the flues closely and try to have them cleaned as often as possible.

MAINTAINING STEAM PRESSURE.

The steam pressure should be allowed to vary as little as possible and the fireman should see that there is no change due to any inattention, carelessness or laziness on his part. When the steam pressure changes either way and the position of the reverse lever, the injector and the throttle are not changed and the speed is the same, the cause of such change must be due to a change in the condition of the fire, and the fireman should always try to find out what that change is. To do this he must watch the fire closely all over and see its exact condition, especially around the sides and ends of firebox. Variations in pressure are not only hard on the boiler and firebox, owing to unequal expansion and contraction caused by the change in heat on the outside and inside of the firebox sheets and flues which tends to make the flues leak, the sheets to crack and the staybolts to break, but such variations are also the cause of a waste of coal, as it will always take more coal and labor to raise the steam pressure than it would have taken to have kept the steam up.

Many firemen will put the same amount of coal on the fire at the same intervals regardless of the pressure. This is all wrong; firing should be regulated not only by the condition of the fire, but also by the pressure. It is not good firing to put in the same amount of coal when steam is at blowing-off point or is blowing off, yet it is often done by firemen who should know better. The position and lighting of the steam gage are often responsible for the careless practice, as the gage is sometimes placed in such a position that the figures cannot be readily distinguished by the fireman, especially at night. The gage should always be placed and lighted so that the figures can easily be seen from the regular places of both the engineman and fireman

WELDING LOCOMOTIVE DRIVING RODS.

BY HENRY BUCKERT,
Blacksmith, Delaware & Hudson, Carbondale, Pa.

Solid Intermediate Rods.—A method of welding solid intermediate side rods is shown in Fig. 1. Each piece is well upset with a ram, and a hook scarf is made as shown with a piece of 1¼-in. round iron, under the steam hammer. After the pieces are scarfed to the proper shape, place both of them in a long top fire with a poke hole in front and back. Both pieces should be put in at the same time, so as to have a uniform heat for welding. When sufficiently hot, place under the hammer in the position shown and make the weld. This type of weld has been made at the above mentioned shops in a satisfactory manner

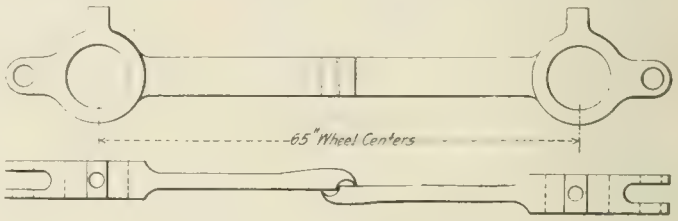


Fig. 1—Scarf for Welding Side Rods.

for the past six years, and with experience the weld can be made without the helper's having to strike a blow.

Repairing Worn Connecting Rods.—The rods sent to the shop for repairs should be annealed and closely examined for cracks after having been thoroughly cleaned of all paint and oil. If the holes on the back end are worn, old rod bolts should be riveted in as shown in *A*, Fig. 2. Also add filling pieces to the fillets to give additional strength to the rod. Two pieces, 2 in. x 8 in. x 12 in., shown in *B*, and two pieces of 1 in. x 5½ in. x 12 in., shown at *C*, are then forged from an old car axle, porter rods being forged in the pieces to provide handles for the tongs. The rod is then heated in a large hollow fire and each piece is welded

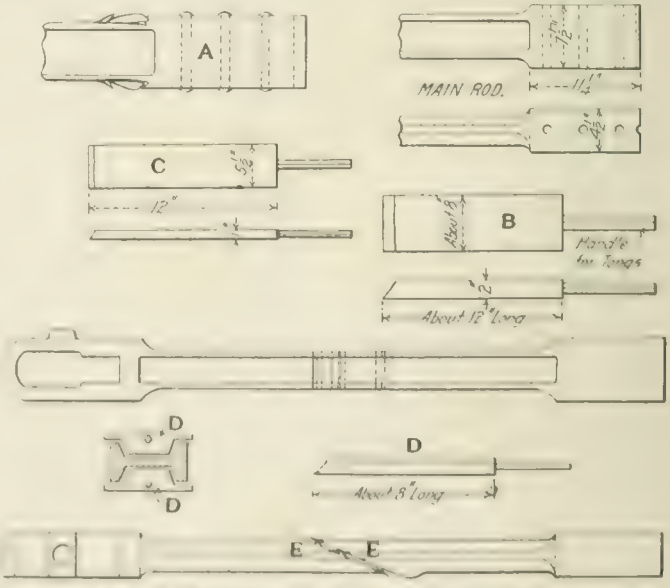


Fig. 2—Repairing Worn Connecting Rods.

on separately to the four sides. Too much borax should not be used in the welding, as it will form a scale that cannot readily be brushed off, and care should be taken not to burn the metal. After all the pieces have been welded to the rod it may be finished under the steam hammer. These repairs can be made in 15 hours. When a rod is broken in the channel section, forge out filler sections, as shown at *D*, and weld to the rod. Upset the rod at the fillers and scarf as shown at E. Put in a few notches so that the scarf will not slip when making the weld, and if the scarf appears to be a little loose, put in a small dutchman on each side. Allow about 2½ in. for the weld

SHOP KINKS.*

BY H. C. WILSON,

Tool Room Foreman, Southern Railway, Spencer, N. C.

TUBE CUTTER.

A tool for cutting tubes from boilers is shown in Fig. 1. It consists of a machine steel body *A*, a cast steel tool holder *B*, and a high speed steel tool *C*. One end of the body is turned to fit the tube and a 1¼-in. hole is bored part way through it and 5-16-in. off center for the tool holder. There are two slots, 7-16-in. and ⅝-in. wide, cut in the body one-half the way through, one for the tool, and the other for the pin which drives the tool holder. The other end of the body is slotted out for a knuckle joint connection. The tool holder is turned to fit the hole in the body; it has a hole for the pin and a slot in which the tool is held by a set screw applied from the end of the holder. The dimensions of the tool are shown on the drawing. It is not hardened and has cut as many as 800 flues with one grinding.

To set the cutter, place the tool holder in the body and adjust the tool so that it extends beyond the body on the thin side, but not on the thick side. Have the tool face the thick side and clamp in position by the set screw. Place the body in the tube up to its shoulder and put in the driving pin so that it rests against the thick side. Turn the body so that the pin will be driven by the thin side. One revolution is sufficient to completely cut off the tube. This tool costs about $3, and the cutters from 4 to 5 cents each.

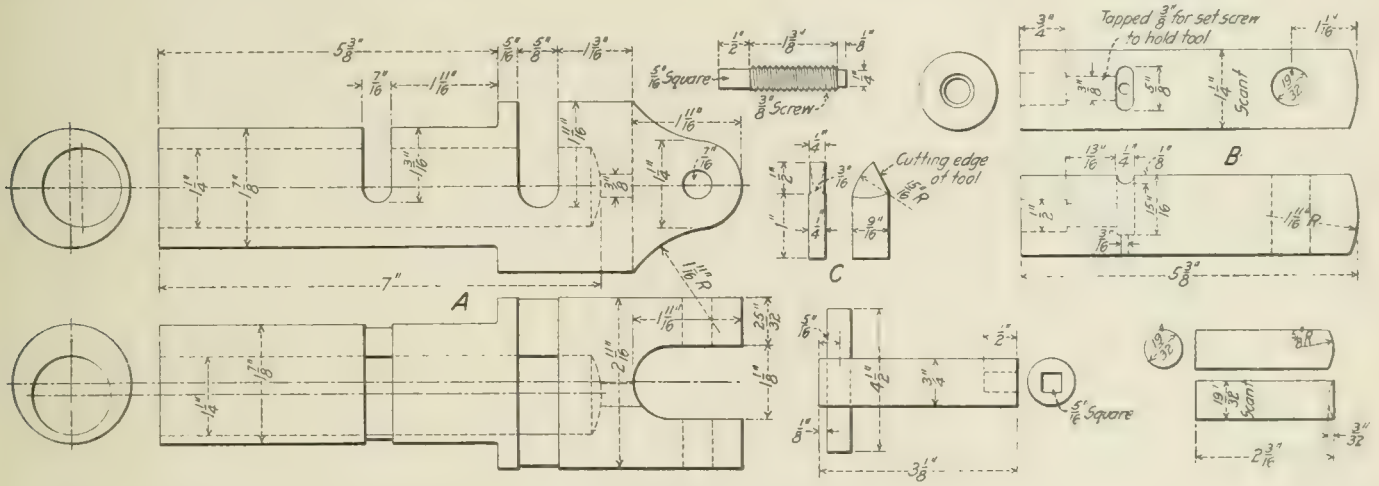


Fig. 1—Tool for Cutting Tubes from Boilers.

GREASE PRESS.

A grease press for forming grease for rod cups is shown in Fig. 2. It consists of a cylinder, inside of which is a left hand worm that grinds and forces the grease out through a brass nozzle ⅛ in. less in diameter than that of the rod cup. A knife at the end of this nozzle is used to cut the grease off to the proper lengths. Beyond this is an angle iron which catches the grease as it is cut off. The worm is driven by an air motor through a system of gears. The grinder is mounted on two 10-in. channel irons. A small angle iron is bolted across these channels at the rear to support the air motor.

*Entered in the shop kink competition which closed January 15, 1911.

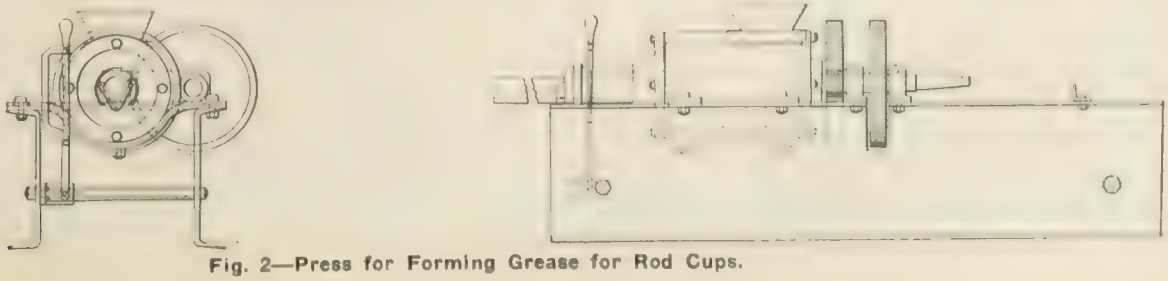


Fig. 2—Press for Forming Grease for Rod Cups.

CHUCK FOR BROKEN TWIST DRILLS.

The details of a chuck used to hold and drive twist drills that have had the tapered shanks completely broken off is shown in Fig. 3. The drills are held in V-jaws which have pins inserted in them to fit the flutes of the drill. The jaws fit in a machine steel body and are made with their outside surfaces conical to fit the nut, which screws down over the steel body and forces the

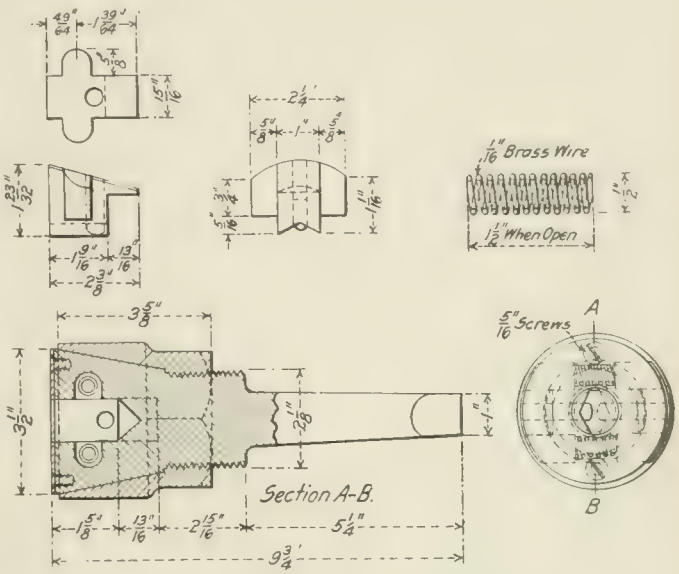


Fig. 3—Chuck for Broken Twist Drills.

jaws to grip the drill, holding it fast the pins keeping the drill from twisting. When the nut is loose, two helical springs, fitting in between the lugs on the jaws, hold them apart so that the drill may be easily inserted. A cover plate fits over the ends of the jaws and holds them in place. The body of the device is provided with a tapered shank to fit the drill press; it costs about $5, but soon pays for itself by prolonging the life of drills.

THE TRIALS OF AN ENGINE HOUSE FOREMAN.

BY ONE OF THEM.

If the average engine house foreman were asked what he considered the main essential to the prompt and efficient handling of engines at a locomotive terminal he would probably answer, a good organization, up-to-date shop equipment, or something similar. It would never occur to him to say "an ample water supply," because the average roundhouse foreman considers his water supply as a matter of course. To the roundhouse foreman with a modern roundhouse, modernly equipped and with a well-organized staff, who from the mere fact that he is a roundhouse foreman and a railway man has troubles of his own, the following narrative of water troubles is specially directed, in the hope that some glimmer of it may remain in his memory and comfort him with the thought that it might be worse, when the superintendent and trainmaster are after him hot foot because he does not furnish power as quickly as they can switch out cabooses.

The scene of these experiences is a road located far enough west to be in the bad water belt and far enough north to encounter severe winter weather. Some years ago, in order to meet competition, an extension was decided upon. Owing to trouble in getting an ample water supply there was a delay in locating one of the division points, the result being that when the balance of the extension was ready for operation this terminal was incomplete. Pending completion locomotives were taken care of outside and turned on a Y. Neither the pipe line from the water supply—three miles away—nor the pump house were ready but it was hoped to have them complete before cold weather set in. In the meantime the nearest available water supply was 32 miles away. Twice a day the engines requiring water were coupled together and run as a train to this water tank and their tenders filled. Every engine required tube attention on arrival, owing to the bad water, and frequently they had to have prompt action from the boilermaker to prevent loss of water. Two trips were the most possible between washouts.

For washing-out a small duplex pump and a vertical boiler were used. The engine to be washed after returning from the water supply with a full tender of water had the suction pipe of the washout pump placed in the tender. The boiler washer had to conserve the tender of water, as may be imagined, since it had to serve for washing and refilling the boiler and running to the water tank for another tender full.

One night the washout pump, without warning, gave out. As there were two engines due for boiler washing the yard engine was pressed into service; one of the injector branch pipes was disconnected and the washout hose was connected to the injector in its place. The broken pump could never be made to work satisfactorily again, and whether the order for a new one was misplaced, or not placed at all, was never learned; but no other pump arrived, and the injector washout system did business through the autumn and winter. Although the roundhouse building was available shortly after winter set in, the main water supply pump, through some mistake or misunderstanding, did not arrive till February.

One of the first storms of the winter was very severe, and during [illegible] the yard engine, in a train of six going for water, left the track about 10 miles from the water tank. The rear engine started back for the wrecking outfit with about one-third of a tank of water, and was stuck in a snow bank within half a mile. The engine crew and one brakeman shovelled an hour before they could get the engine through, and when they got the wrecker back to the derailed engine, the tender of their engine was dry and all hands had to shovel snow to get enough water to keep the engine alive. In the meantime the first two engines had cut off and gone on for water. They returned in about four hours, having been snow-stalled three times. Nothing had been done toward getting the derailed engine on the track, beyond putting in the replacers, as none of the remaining engines had sufficient water to do any hauling. Another three hours brought the whole train back to the terminal, with a total water supply considerably less than what the engines had at starting. Of the resulting train delays the less said the better. The two leading engines, having enough water to get them back to the tank, were started out at once with a plow to clear the division ahead of a passenger train, the rear one returning later and taking the other four for water.

Shortly after this a number of tank cars that had been used in construction work were refitted and provided with a piping arrangement for steam to keep them from freezing. One engine was assigned to handle this train between the tank and terminal as frequently as needed. As to a method of getting the water from the cars to the tenders, the "powers" did not seem to consider such a thing. An effort was made to revive the defunct pump, but it was only an aggravation. A request for an elevated track, on which to place the cars and permit of the water running to the tenders by gravity, was refused on the grounds that the main supply pump would be along in a few days and it would not be worth while going to the expense. After the whole staff had worn out their tempers fussing with the pump, an arrangement was made similar to a lifting injector on a crude scale. Into one end of a 4 in. pipe T was screwed a 4 in. to 1¼ in. bushing. A piece of 1¼ in. pipe, with one end flattened and reduced to form a nozzle, was screwed through this so that the nozzle end came about half way through the T. The 1¼ in. pipe was extended on the outside, and a hose connection was made to the turret of the engine to be watered. A 4 in. pipe was screwed to the bottom of the T, and this was placed in the car for suction.

To the other end of the T a 4 in. nipple was screwed, and a 4 in. discharge hose was connected to this and turned into the tender. By turning on the steam in the cab the water was drawn up through the suction pipe and forced through the discharge hose into the tenders. In this way a tender could be filled in about 35 minutes. This arrangement was used from that time to the end of the water troubles, and while in summer it would have worked fairly well, in winter it was the cause of many an engine delay. The steam hose would burst or blow off at the most unexpected and inopportune times. Then the steam entering the the cold pipe caused it to crack frequently, and there were many fingers frozen while putting in new pipe. On one occasion, after trying in every way possible to get water through the discharge hose, it was removed and found to contain a piece of an old coat.

The coaling plant was not as far advanced as the engine house, and was not ready for use till the following spring. Engines were coaled by hand, shovelling from gondola cars with a great deal of labor as the coal was generally frozen on top. It frequently required 2 or 2½ hours to coal an engine. Before the engine house was completed, boiler makers frequently had to go into the engines as soon as the fire could be dumped after their arrival to prevent their "dying" from leaky flues while waiting for coal; for the same reason when the roundhouse was completed they were frequently run in on arrival without waiting for coal. Occasionally an engine "died" on the turntable and the fire had to be dumped into the ash pan while the boilermaker went into the gas-filled firebox and stopped the worst of the leaks. The fires had then to be re-kindled to get steam to work the engine into the house.

On one of the coldest days of the winter, in a blinding snow-

storm, an engine arrived pushing a snow plow to which it was chained on account of a broken drawbar. The chain was a solid mass of ice. The left injector would not work, and the right feed hose had frozen solid, the engineer overlooking the heater in his anxious watch for signals. The water in the boiler was so low that it was impossible to get the frozen chain uncoupled and the engine into the house before the water would be below the safety mark. An effort was made to thaw the frozen hose, and while this was being done three men started removing the chain. In the meantime the water was getting so low that the fireman (who had been on duty for 36 hours and was also drenched to the skin and his outer clothes frozen) became excited and pulled the right heater wide open. The hose, with the sudden tendency to straighten out, pulled off at the tender and the two-thirds tank of water commenced making a lake around engine and plow. A rush was made for the tender water valve. It was stuck open. After ten minutes trying to get it closed it was given up, the fire was dumped, and another engine hurried from the roundhouse to pull the plow engine to a point where the water would run off the track instead of back on it. The chain had by this time been removed, but the ice formed so quickly that the relieving engine left the rails almost a car length from the plow engine. By the time it was rerailed, the plow and engine were in the center of a frozen lake, and there was nothing left but to drain everything about the engine and start a gang of men with picks removing the ice from the rails. It took three hours to get the engine and plow dug out.

On the completion of the engine house, the supplying of water to the heating system boilers became a problem. All of the openings in one of the engine pits were closed, and the boiler feed pump suction pipe disconnected from the main water line (in which, of course, there was no water) and extended to this pit. Tank cars were then run over this pit and drained into it. On one occasion, when the heating-fan engine broke down, the engine house became so cold that this pipe froze and cut off the water supply, and until the engine was repaired the pipe had to be kept thawed by lighting fires around it.

A shortage of power required the use elsewhere of the engine hauling the tank train, and thereafter the first available engine was used on this work. The cars could only be kept heated part of the time, and the result was that they soon became thickly coated with ice inside, thus cutting down their water capacity. Several times after this method was started engines that had just come in leaking had to be used, and engine failures on the trip for water caused bad delays. The men, from the foreman down, were frequently 24 and 36 hours without rest, and had worked not less than 17 hours a great number of the remaining days. The climax seemed to have been reached when the water began to get low in the well at the distant tank. Everything possible was done to conserve the supply—engines were given only what was required to move their trains to the next tank; time between washouts was lengthened as much as possible, and most of the washing out was handled at the other terminals. As a last resource the boiler feed pump suction pipe was removed from the pit and turned into the shop drain, and for two weeks the stationary boilers were run on the washout water from locomotives.

Fortunately, just as the water supply began to fail, the large pump arrived and was hurried across country to the pumping station. On the first day of March, water came through the main supply pipe, and the relief to the entire staff can be better imagined than described. The station being out of the way, it was hard to get men, and under such conditions it was still harder to keep them, the result being that the shop had been run with a depleted staff all winter.

There were two trainmasters coming in contact with this station. To the credit of one of them, be it said that during the entire time of these difficulties he raised no complaint regarding delayed trains. The other was an office man, who neither understood the conditions nor would come to be enlightened. Cabooses could be handled at that terminal as well as at any other, and he did not see why locomotives could not be handled in the same way. He reported every five minute delay, the only result being continual friction between his office and the foreman's.

These are some, but by no means all, of the incidents in what seemed afterwards to the staff to have been a long nightmare. Yet there are terminals today that are no better situated. It is hoped that this history may prove interesting, and as stated at the beginning, of some comfort to long-suffering roundhouse foremen.

SHOP KINKS.

BY F. W. BENTLEY, JR.,
Chicago & North Western Railway, Huron, S. D.

JIG FOR SCRAPING ROTARY VALVE SEATS.

A simple, inexpensive and handy jig to be used in scraping the rotary valve of a Westinghouse engineer's brake valve is shown in Fig. 1. The device is arranged so that the valve seat may be placed at any angle. Part I is held rigidly in a vise,

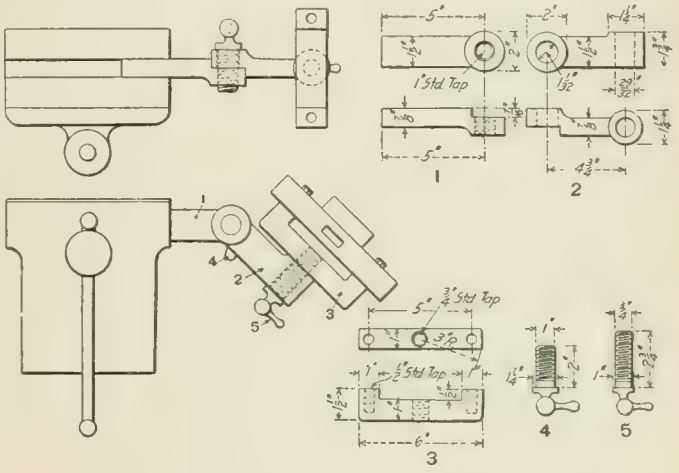


Fig. 1—Jig for Scraping Rotary Valve Seats.

the arm 2 being adjustable and held in its position by the thumb screw 4. The rotary valve is clamped to the forked piece 3, and is held to arm 2 by the thumb screw 5. With this arrangement the seat can be easily and quickly turned and adjusted so as to get the full benefit of the light, and the spotting of the high points is made much easier. Piece 1 may be permanently bent to any angle that will make the work more convenient for the workmen.

SAFETY DEVICE FOR COUPLERS.

A means of preventing two couplers from working apart is shown in Fig. 2. Two 1⅛-in. pins are placed in the holes in the knuckle lock and are tied together at both the top and bottom

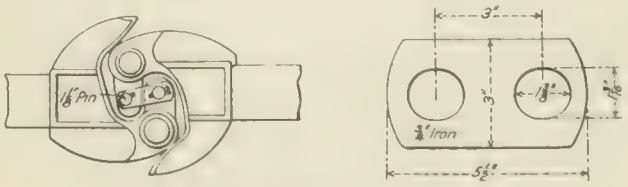


Fig. 2—Safety Device for Couplers.

by ¾-in. tie-plates as shown. The pins are prevented from working out by split pins, which are placed in both ends. With this arrangement the use of safety chains may be discontinued.

TRACK LOCK FOR TURNTABLES.

A convenient track lock for turntables is shown in Fig. 3. It can easily be made in any railway smith shop by taking a piece

of 4 in. x 7/8 in. bar iron about 4½ ft. long and welding on each end two cross pieces of the same stock about 15½ in. long so that the overall length of the assembled bar will be 4 ft. 9¾ in. This will readily slip in the tracks between the webs of

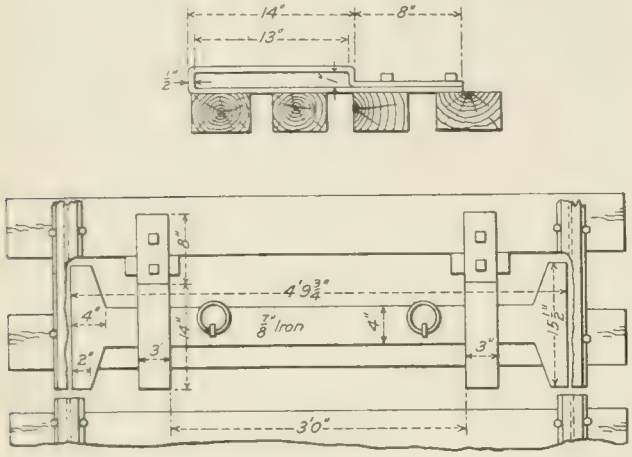


Fig. 3—Lock Bar for Turntables.

the rails. The lock bar is held in place by two straps made of 3 in. x ½ in. bar iron as shown. Rings are placed in a convenient position for the handling of the bar.

SYSTEMIZED CLERICAL WORK AT THE ENGINE HOUSE.

BY CHARLES MAIER,

Engine House Foreman, West Jersey & Seashore, Atlantic City, N. J.

There is one line of work in connection with the motive power department, and I do not know to what extent in other departments, to which scientific management can be applied with good results. During the past ten years the clerical work at engine houses has increased to such an extent that in some cases the clerical force has been increased more than 100 per cent. The average engine house foreman is not an office man, and as the demand arises for each new record to be kept the work is turned over to the clerical force. An examination of this clerical work will show a surprising amount of duplication, which if thoroughly investigated and eliminated will result in a considerable saving of time and labor. All the elements necessary to effect this elimination are not within the control of the engine house foreman, but since the work done is practically the same at all engine houses a systematic method of doing it is all that is required.

There are records for which printed forms or books are furnished and as they are the same at all points the manner of keeping them can be readily systematized. Since these forms are all alike it would appear at first glance that there can be only one way of filling them out. That this is not the case, however, can be shown by considering the time record of the workmen. Here is a record having a daily entry and a monthly total, and if all the men worked a regular number of hours each day at a given rate per hour it would be a very simple matter to get the total number of hours worked and the total amount earned. Where the hours are not regular throughout the month or the daily amount earned is not the same each day, as in piece work, it is a tedious piece of work to total it up for 100 or 200 men. An adding machine would help, but even this would take time, and time at the end of the month is precious to the clerical force on account of the various monthly reports required. If the time were made out in such a way that the number of hours made each day, or the amount earned each day, were added to that of the previous day, as it is entered on the sheets or books, the total at the end of the month or at any time during the month would be available at once. In order that the number of hours made, or amount earned daily, can be distinguished, two entries should be made for each day. Thus, the time made each day is put down in the regular way and immediately above it the total to date is placed. Thus if 237 hours had been made up to the 24th of the month and 9 hours were made on the 25th, the 9 hours would be entered and above it the total of 246 hours. This would apply to piece work or to any records where there is a daily entry and a weekly or monthly total. In the oil room or coal wharf records this is a very convenient method and shows at a glance just what the oil or coal consumption is to date for any given service.

Locomotive No. Assigned to _____ Enginehouse.

REPORT OF STAYBOLTS TESTED AND BOILER WASHED.

Staybolts must be tested every seven days and if found overdue must be tested at the point found overdue.

Loco. No.	Staybolts.				Boilers.			
	Date Due.	Date Tested.	Broken.	Renewed.	Date Due.	Date Washed.	Date Tested.	REMARKS.

Inspector. Foreman.

Fig. 1—Form for Reporting Staybolt Tests and Boilers Washed.

Let us consider the staybolt and boiler washout records and see how they are kept. As the staybolts are tested and the boilers are washed at regular intervals a list is made out showing when the engines are due. Where engines are regularly assigned to the care of an engine house it is not necessary to interchange this information and a record of only such engines as are assigned to the engine house is necessary. However, to overcome the chance of an engine being skipped it is now the custom to put a tag on it, showing the date the staybolts were tested or the boiler was washed. This tag is applied by the men inspecting the staybolts and is therefore a thoroughly reliable record. If an engine arrives at another engine house than that to which it is assigned and is found to be overdue for a staybolt test or a boiler washing, according to the dates given on the tags, or if the tags are missing, the fire is drawn, the work is done and a report is made of it, which eventually gets back to the party responsible, so there is not much danger of an oversight. When the staybolts are tested or the boiler is washed the staybolt inspector turns in a form showing the condition of the staybolts, the date they were inspected, and the date the boiler was washed. This is then entered in a book or on a sheet by the clerk and at the end of the month a new sheet is made out; all the engine numbers are written and if no printed blanks are available, a lot of ruling is made necessary and this same work is gone over again each month.

If we substituted in the place of the tags the form shown in Fig. 1, keeping it in a suitable frame in plain view, all the work of making out a list and checking it up could be overcome. These forms are to show the date the engine is due for a staybolt test or a boiler washing written on them by the staybolt inspector and are made in duplicate with carbon paper. The original is put in the frame on the engine, having the engine number and the place of inspection filled in together with the dates when the engine is due. The carbon copy is turned into the engine house foreman's office and is filed away according to the date. This gives the foreman a record of the engines due for this work. When the work has been done the staybolt inspector takes the original form off the engine, substituting a new one having the date of the next inspection thereon, and turns the original report into the office after signing it. This report is then disposed of, as usual, by sending it to the master mechanic or road foreman of engines. The duplicate copy is filed away according to engine number. If one of these reports were taken off the engine and the engine was at another engine house than that to which it was assigned, it would be its duty to attend to the work the same as though the engine were overdue. Thus by relying solely on these forms to give the dates due, the hostlers and staybolt inspectors must watch them continually, and the regularity of the test is thus insured. This method therefore gives a reliable record of the engines due for the staybolt test and boiler washing and also a record of the engines which have had this work done to them. The only work required is that which the staybolt inspector must now do when filling in his report, and all the clerical work in the office is dispensed with except the filing. Where an engine house takes care of 50 or 100 locomotives this is quite an item and well worth saving.

REPORT OF WORK DONE ON TUBES OF CLASS_____ ENGINE NO._____

DURING THE MONTH OF_____ 19____ AT_____

	NO. RENEWED.				NO. RESET.				NO. CAULKED.				REMARKS.
	A	B	C	D	A	B	C	D	A	B	C	D	

A	B
C	D

_____
Foreman.

Fig. 2—Form for Reporting Work Done on Tubes.

There are usually a number of periodical inspections that are made on boiler washing days, such as examining water glass valves, examining sponging and shells, draining the main reservoir, etc., and this involves considerable more clerical work where records are kept of it. Sometimes this work is assigned to certain men and they are supposed to do it, but there is no record that it has actually been done. If these periodical inspections are all printed on a blank the men doing the work could sign opposite and these blanks could be filed away in numerical order, thus insuring a permanent record and no clerical work would be required except the filing. In filing these reports and also the work reports of engineers and inspectors they should be placed between cards, the cards bearing the engine number and arranged in numerical order. This is more desirable for these reports than a cabinet with shelves, because when they are filed away for several months and engines come to the engine house, aside from the regular assignment, or engines are sent to the shop and others come out, it is not so difficult to locate the desired report. It is absolutely necessary that an engine house office should have a good filing system so

that any records, blue prints or instructions can be readily located and referred to.

The record of crews arriving at and departing from the engine-house consumes considerable time and is a duplication of the list posted for the information of engine crews. For the information of engineers and firemen a list is posted at the engine house showing the train they are to go out on and the engine they are to have. This list is generally made out on a slate, or a sheet, and is copied into a book, or on another sheet, which is kept for a permanent record. If the list that was posted had been made out in duplicate one sheet could be filed away for a permanent record and arranged according to dates, while the others could be sent to the engine houses reached by engines leaving the point where the list is made out. By the interchange of these lists a permanent in and out record of engines is available and the only work required is the making out of the posted list and filing.

The flue record is another case of unnecessary work. The boilermaker turns in a report showing the work done, the dates of the examinations for the information of other engine houses. The men making the examinations, or the gang foreman having charge of them, turn in a report which is then entered on the office record. If each engine carried an engine record card, as shown in Fig. 3, and a duplicate card were kept in the office of the engine house charged with the care of the engine, a considerable saving of clerical work could be effected and all the information would be in a compact form. As the dates of the various examinations do not always coincide, the men charged with making these examinations could tell at a glance which ones were due. They could get the duplicate card from the office, entering the date of the examination on the card carried on the engine, and on the duplicate, making no more work for them than formerly, when they turned in a report to the office, while the office would have no clerical work to do except filing the card in its proper numerical order.

Another good feature of this engine record card is the accessibility of the information. A road foreman of engines

Locomotive No._____ Assigned to _____Engine House.

ENGINE RECORD CARD.

	Date.	Place.	Date.	Place.	Date.	Place.	Date.	Place.	REMARKS.
Class Repairs.									
Tires turned.									
Flues renewed.									
Triple valves cleaned.									
Steam gage tested.									
Piston valves exam.									
Boiler tested.									

Fig. 3—Form for Reporting Various Examinations and Tests of Parts of the Locomotive.

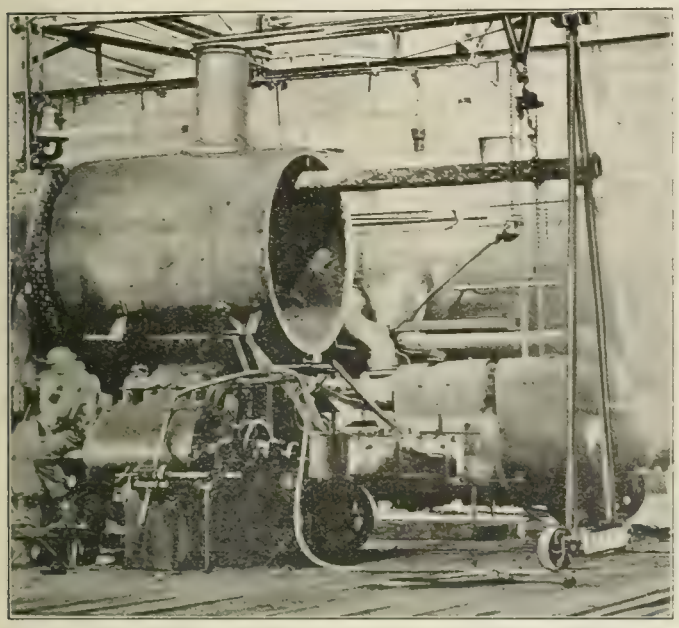
clerk copies this work in a book and then makes out another report to be sent to the master mechanic or road foreman. With a suitable flue report form, such as shown in Fig. 3, the boilermaker using carbon paper could make out the required number of forms for each engine and have no more work, or probably not as much to do as at present in making out his reports. He could retain one form for his information, one to be kept at the engine house foreman's office and the other to be disposed of as required. These forms should be filed away according to engine numbers and will give all the information that is now being written and rewritten, two, three and four times, and it would be just as convenient and reliable a record as the present one.

There are other examinations, such as boiler tests, cleaning triple valves, testing steam gages, examining piston valves, bushings, etc. These are made at longer intervals and a record of them is kept at the engine house, while the various parts are marked in a suitable manner showing the last time they were done. This information is frequently wanted by the engineman, road foreman of engines or a master mechanic when looking over an engine frequently wants to know when the engine last received new flues, piston valves or bushings, or had driving boxes rebored, tires turned or when the engine was put in service after receiving classified repairs. If he has not a record of it at hand and happens to be at some place where no record is kept, he must do without it until he gets back to his office or can get the information over the phone. Cases of this kind arise when time is precious or when the office is closed, causing annoyance and delay. The engine record card would overcome this and at the same time eliminate the chance of these examinations not being made, due to an oversight on the part of the clerk in not furnishing the information. This card, being in plain view, will insure the examinations being followed more closely, as they can be checked up by the enginemen, road foremen of engines, master mechanic or any one interested who happens to get on the engine. This outline of a system of clerical work can be modified or extended to suit requirements.

CRANE FOR LOCOMOTIVE REPAIRS.

BY GEORGE D. SIEMANTEL,
General Foreman, Atchison, Topeka & Santa Fe, Raton, N. Mex.

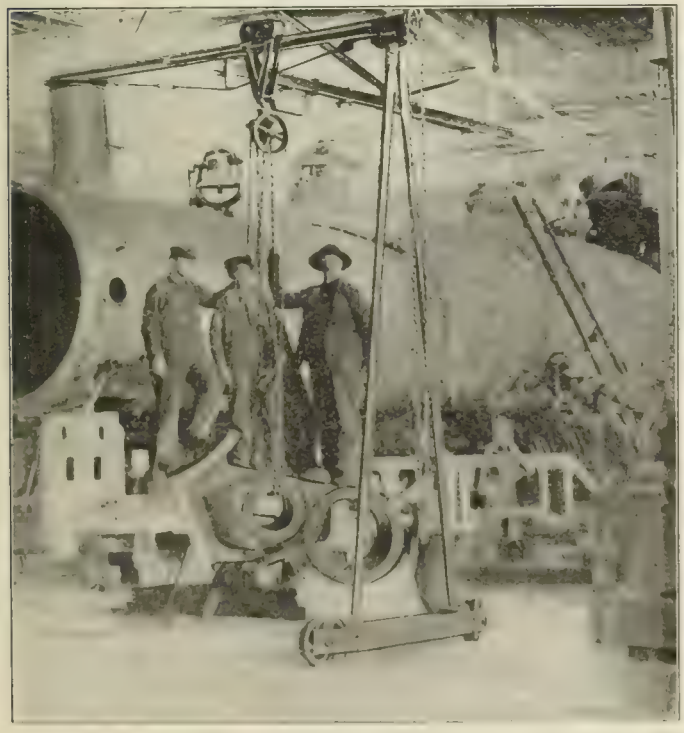
A handy crane for use when overhauling a locomotive is shown in the accompanying illustrations. It is pivoted on the smoke stack and will easily swing around to either side of the locomotive with or without a load. An old cast steel cylinder



Repair Crane for Locomotive Front End.

head that will fit freely in the stack supports one end of an old rail used for the cross beam, while the other end is supported by two legs of 2½ in. pipe. The legs fit into two round end hinges at the top, which in turn are bolted to an old tank wedge, fitted on the outer end of the rail. The top ends of the pipes are fitted with steel sleeves to prevent splitting.

The bottoms of the legs are held in a carriage made of



Repair Crane Loaded to 7,629 lbs.

scrapped car transoms, which are bolted together on blocks just inside of the wheels. The ends of these transoms, which hold the wheels, are bent to conform to the radius from the center of the stack. The blocks that hold the pipe legs are drilled 8 in. deep, which gives ample support to the legs, and are made to slide inside the carriage frame, thus allowing for a height adjustment, which is necessary, as the height of the stack above the floor will vary on different engines. The holes in the carriage blocks should be on a line between the centers of the two wheels, as this increases the stability.

The crossrail is reinforced by an inverted king-post truss and carries a two-wheel trolley, which is moved back and forth by means of a double threaded screw on the crossrail which is operated by a sprocket wheel and chain at the end of the beam. Care should be taken, when applying the crane, that the stack is strong and not eaten away, as such unevenness would be liable to capsize the crane. Its use is very valuable in shops where overhead or traveling cranes are not provided. Three men can usually put this crane on an engine in about 20 minutes, and it is said that the time saved by its use on one engine will almost pay for the crane.

WASHING LOCOMOTIVE BOILERS.*

The Chicago, Milwaukee & St. Paul use very thorough methods in washing out their locomotive boilers. The washout plugs are located in the front flue sheet for washing the flues. In the larger engines there are six plugs for this purpose, and in the smaller engines there are four. They are distributed in such a manner that each plug can be conveniently taken out with a long wrench, and are so located that six rows of flues may be washed from each plug hole. There are three washout plugs located in the boiler head so that all parts of the crown sheet may be washed; one plug is placed in the center over the door ring, another underneath the door ring, and one in each corner of the mud ring to wash the mud ring and the side sheets. Two are placed on each side of the outside sheets of the firebox and are so located that all parts of the side sheets may be washed. There are also two plugs in front of the throat sheets in line with a row of staybolts just above the fire line. Arch bar tubes are used to hold the brick arches, thus giving an additional number of plugs both on the boiler head and throat sheet. These are taken out at each washing and the tubes are cleaned with the Liberty arch tube cleaner. The larger engines have four and the smaller ones three of these tubes. A standard nozzle is used for all the engines, which allows a man standing on the platform at the front of the engine to place the nozzle through the washout plug in the front flue sheet and reach clear to the back flue sheet. This nozzle is fitted with a brass tip which throws the water at an angle of 60 deg. However, it was found necessary to drill a half-inch hole in the opposite side of the tip to balance it while in operation.

The washing is started as close as possible to the front flue sheet, and is gradually carried back to the back flue sheet. The nozzle is fitted with swivel and handle which allows it to revolve continually from one flue sheet to the other. The washing is repeated three times at each washout plug. Each time a nozzle is put into a washout plug hole it is held to the back flue sheet for one minute with the nozzle continually revolving. For the firebox a crown-sheet nozzle is used that will allow an engine to be washed the entire length of the crown-sheet through the washout plug holes in the boiler head. This nozzle has a brass tip set at right angles for the purpose of washing all the sludge into the leg of the boiler instead of washing it over on the flues. This nozzle is used in each hole on the crown-sheet. It is then replaced by a short straight nozzle with which all parts of the crown sheet are washed through each washout plug

*Committee report on this subject which was presented before the recent Convention of the Traveling Engineers' Association.

hole. This throws the water the entire length of the boiler over the top of the flues, removing all loose settlings from the flues. This again is replaced by a short crooked nozzle which washes over the door ring and crosswise and lengthwise through the mud-ring plugs. It is also used in the side plugs for washing the side-sheets. This nozzle removes all settlings from the flues and crown-sheets, off the mud ring and leg of boiler.

SHOP SAFEGUARDS.

BY LUTHER D. BURLINGAME.*

There have been two general reasons for putting safeguards on machinery. One has been to protect the machine from injury and the other has been to protect the workman. The protection of the machine has in the past been one of the great objects sought. For example, in grinding machinery the gearing and working mechanisms have been more thoroughly guarded than similar parts of other tools, for the purpose of protecting them from water and grit. The wheel guard, or hood, was originally provided rather to prevent the machine from slopping and throwing water and grit than to protect the workman. Latterly, however, pressure has been brought to bear through accident insurance companies, and employers' liability and compensation laws to make it more worth while financially for the manufacturer to guard the dangerous parts of machinery than to leave them unprotected. It is perhaps too much to expect that complete safeguarding will be adopted generally by manufacturers without compulsion, but such a course would be far preferable to a delay until compulsory legislation shall enforce such a procedure.

Safeguarding, furthermore, means expense to the manufacturer in two directions. There is first, the direct cost of installing guards, railings and other safety appliances; and second, the added cost of doing work where the workman is hampered by the safety provisions.

It is much better that the manufacturer of tools should provide the safeguards than that the user should have to design special guards for each make of machine that he happens to buy. Some investigation of the claim that safety devices retard production has made the writer feel that there is less in this argument than is often urged. Ingenuity, a time study, and special training with proper readjustment of piece work rates will often not only insure absolute safety, but even a higher rate of production than at present.

A classification of safeguarding devices to eliminate features of danger may be grouped into ten classes.

1. Guards for gears. All running gears within a workman's [illegible] standing on the floor should be guarded at least on the [illegible] side of the gears.

2. [illegible]ing or boxing for [illegible] and high speed belts, and for pulleys which are near the floor. These guards may be either a complete enclosure within boxing, or by railing around them, or by a combination of railing and wire mesh. Even when the combination seems unreasonably safe, there is danger of accident from slipping or falling. An accident has often resulted in this [illegible] in the workman being caught between belt and [illegible].

3. [illegible] projecting set screws [illegible] guarded or replaced with a style which does not project. This precaution is most important in places within reach of the workman but is also present in overhead shafting where there are parts requiring oiling or adjustment.

4. [illegible] overhead parts cannot [illegible]. Any overhead [illegible] and dirt on a workbench [illegible] should be so [illegible] as to make this impossible. Provision must [illegible] for example, [illegible] there is a [illegible] drop to catch any keys or [illegible] might work loose. Sufficient space should also be left between the pulleys themselves, and between hangers and pulleys so that a belt which runs off cannot become wedged and drag down the counter-shaft on workers below. Counter weights which may strike a workman in falling should be boxed, or incased in metal tubes. On overhead runways in foundries, which have switches, a safety guard should prevent the trolley with its load of melted metal being run into an open switch so that the metal can fall.

5. Safety stop for planers. All planers should be provided with a safety pin to lock the shipper lever so that it cannot be accidentally displaced.

6. Chains for hoists. Frequent inspection is the only safeguard here. Some experiments in annealing chain to remove the tendency to brittleness after service have not shown conclusively that this can be depended on as respects ordinary chains not exposed to heat.

7. Fingers and hands between dies and shears. The only safe rule is to forbid hand feeding and compel a mechanical feed, or the handling of the work with tweezers, pliers, etc.

8. Safety appliances for wood-working tools. Band saws can be fully guarded by a hinged guard covering the upper wheel, to catch the saw if it breaks, and a head guard following the saw down to a point near the work. A suction draught to carry away chips and sawdust is also desirable. These help also to keep the floor clear and less liable to become slippery. Padded leather aprons to be used with circular, slitting or ripping saws are a protection to the workman against the throwing of the block against him if it should catch in the saw.

9. Cleanliness, light and air. Adequate light not only keeps the workman in better condition for work, but more alert. Noxious fumes make him stupid and are a menace to health.

10. Education and instruction to prevent accident. Many accidents occur with new men just starting in. The foreman must exercise constant watchfulness over men showing a tendency to recklessness.

It is not claimed that these ten headings exhaust the list of avenues through which accidents occur, but if each shop were inspected, taking these items one at a time, a very large reduction in the number of accidents would follow. Classification and specific investigation followed by the adoption of thorough means of safeguarding, and maintained by periodic inspection to see that provisions which have been adopted remain in use is perhaps, after all, the most effective combination.

[illegible] Mechanical Engineering Congress, Providence, R. I. [illegible] Master Mechanics' Association, April 12-13. [illegible] in the Journal of Industrial Safety.

An interesting comparison between the oldest locomotive in the United States and one of the latest heavy passenger locomotives is made by the Pennsylvania Railroad, and shows the progress made since the first train was put into service eighty years ago. The old locomotive is the John Bull, which is on exhibition at the National Museum in Washington. The Pennsylvania locomotive is of the Pacific type, being the most powerful passenger locomotive used on that road. The weight of the locomotive and tender of the Pennsylvania engine, when loaded with coal and water, is about 430,000 lbs., as against 24,625 lbs. for the John Bull; the driving wheels are 80 in. in diameter, as against 54 in. The boiler of the modern locomotive contains 359 tubes 20.9 ft. long, having a heating surface of 4,420.6 sq. ft. The tubes in the John Bull are 7½ ft. long and have a heating surface of only 213 sq. ft.

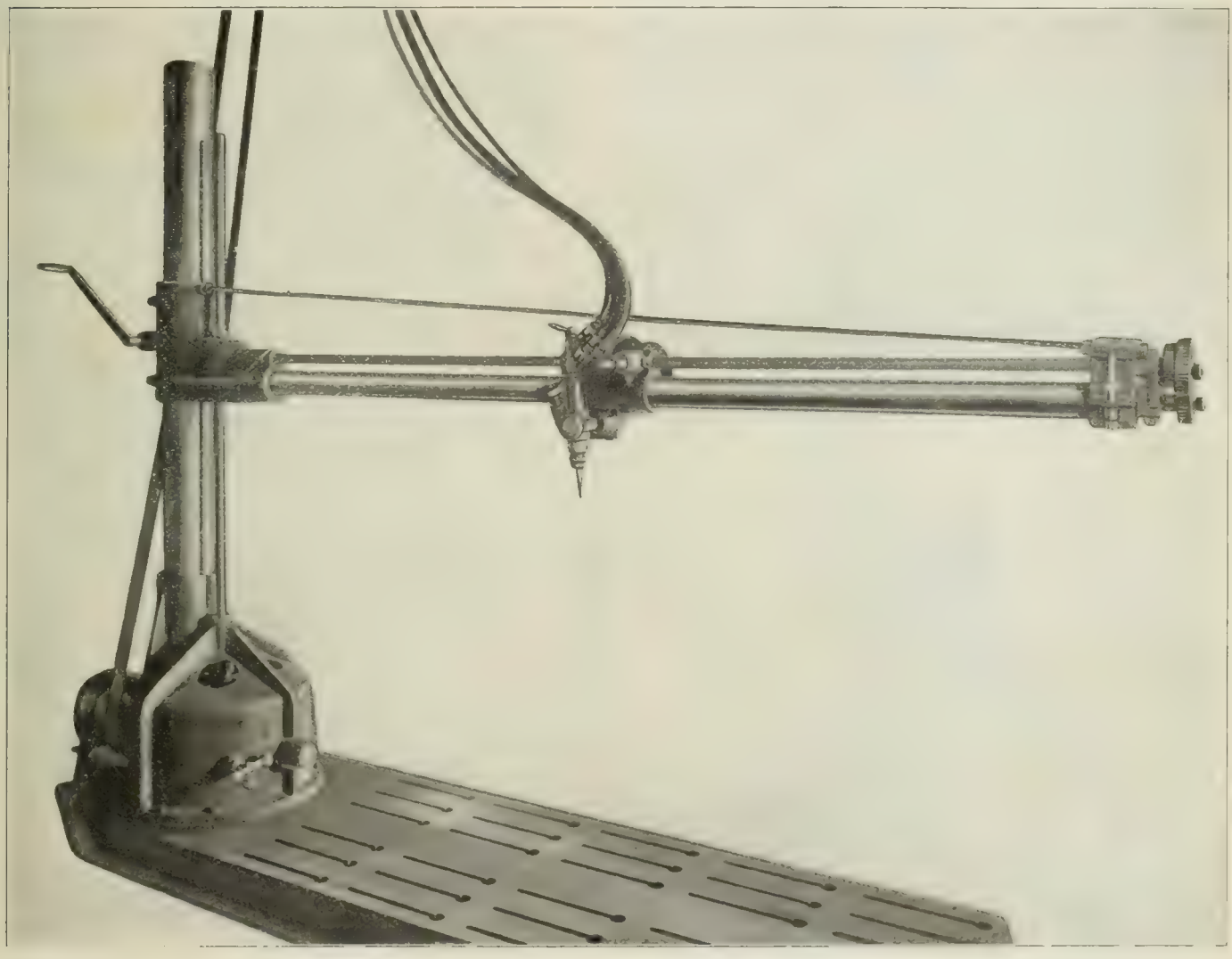
When the Atlantic type locomotive appeared in England [illegible] time ago it was not long in gaining popularity, as the design was looked upon as a solution of a difficulty that was supposed by many to be acute. As a matter of fact, however, this did not prove true, for had the Atlantic type offered a superior opportunity of utilizing the weight for adhesive purposes it would not have been replaced a little later by the 4-6-0 type, which has proved to be of greater advantage. When still more power is required the Pacific type is expected to take the place of these ten-wheel locomotives.

OXY-ACETYLENE WELDING AND CUTTING MACHINE.

Hand welding and hand cutting are now familiar operations to which the acetylene blow-pipe is highly adapted. Where straight-line operations have to be carried out, especially in connection with repetition work, a machine is often applicable and advisable, and where sheets are very thin, machine welding is desirable because of the certainty with which it can be regulated. Such a machine can be advantageously used in sheet metal work where the thicknesses range up to about 3/16 or 7/32 in. Straight cutting of both thin and thick work can be advantageously done with the machine, because of the precision of the movement.

An acetylene welding and cutting machine has recently been built by the Davis-Bournonville Company, New York, at its laboratory in Jersey City, N. J. It consists of a cylindrical upright 6 or 7 ft. in height. This carries a long hollow arm projecting for 6 or 7 ft. on one side. By means of a rack and pinion this arm, which carries a long screw, may be adjusted to any height desired. At the base of the upright loose and tight pulleys are mounted on a short horizontal shaft and are driven from an ordinary countershaft above. At one end of the short shaft a friction pinion is arranged, which contacts with a suitable disk mounted on a vertical shaft. This latter shaft and a rotatable rod arranged in the hollow arm are connected by bevel gears. At the outer end of the arm an arrangement of gears enables the inclosed rod to drive the screw. The turning of this screw operates a carriage back and forth horizontally along the arm. Upon the carriage are mounted the torch and its controlling fixtures. The work is placed or secured on a suitable fixed table, and flexible tubes bring the oxygen and acetylene to the torch. The tip is practically the ordinary form, and it is arranged at an angle of 40 deg. or 45 deg. to the horizontal, this angle being to the rear of the welding movement.

The method of welding is quite simple. If the weld is to be a flat one and of inconsiderable length, the two pieces are simply clamped in the exact relative positions they are to occupy finally. The carriage with the torch moves evenly along at the proper rate of speed. The countershaft, running at about 140 revolutions per minute, operates the short horizontal shaft at about 70 r. p. m. It is possible to adjust the friction pinion to vary the speed of the vertical shaft from about 70 to about 35 r. p. m.



Oxy-Acetylene Welding and Cutting Machine.

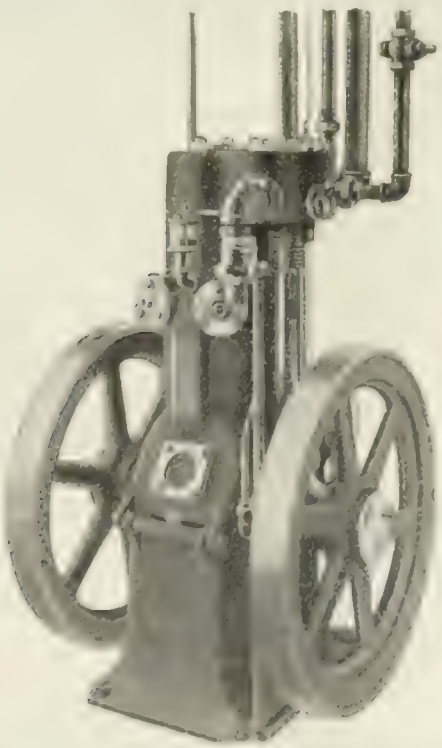
Still further reductions of speed may be made by the gears at the end of the arm. If an angular weld is to be formed, the only difference is in the arrangement of the work. The angle opens downwards and the vertical plane through the line of the weld bisects the dihedral angle. To illustrate, suppose that it is desired to weld two strips edge to edge at an angle of 90 deg. The strips are placed on the sides of an angle bar and clamped securely in position with clamping strips inserted between the outer faces of the work and the jaws of the clamps.

Because of the temperature of about 6,000 deg. F., which is claimed for the working point of the little inner flame, the oxy-acetylene torch is successful in bringing steel and other metals locally to or near the melting point, but where the form and character of the work do not prohibit there seems to be no

reason why pre-heating by cheap methods should not be employed. The saving is, in such cases as not alone connected with the consumption of the gases, but time may also be saved. For example, certain work requiring a long seam and involving sheets 0.10 in. to 0.12 in. thick can be welded on a European machine at the rate of about 12 in. per minute. Practical experiments where the work was pre-heated before passing under the torch showed that the same class of work could be welded at a speed of 26 in. to 28 in. per minute. The economy in time is striking. The methods of pre-heating may be various. Thus, if it is a question of small repetition work, the pre-heating may in some cases be done subsequent to clamping, but prior to putting the work on the table. Other cases will require pre-heating with the work in a welding position. Pre-heating is to be recommended strongly for two reasons—economy of oxygen consumption and reduction of the effects of expansion and contraction. The machine above described may also readily be used as a cutting apparatus, and the high precision of the motion of the carriage recommends it for this purpose.

TWO-STAGE, GAS-DRIVEN AIR COMPRESSOR.

A self-contained, efficient, gas driven air compressor is shown in the accompanying illustrations. It consists of a vertical gas engine with a differential trunk piston, the annular space around it being used for compressing the air. There is but one piston, one connecting rod and one crank shaft for both the gas engine and compressor, which increases the efficiency of the unit. On the up stroke the air is drawn into the crank case through the port *K*, when it registers with *J*, the corresponding

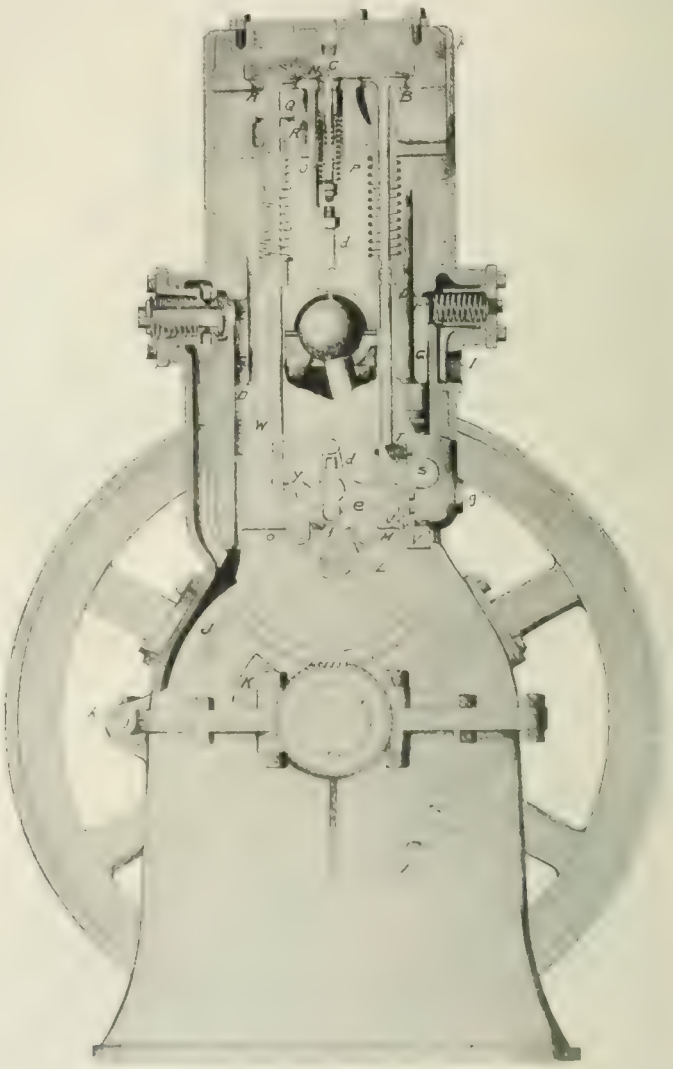


Sargent Two-Stage, Gas-Driven Air Compressor.

[illegible] on the down stroke the air is compressed in the crank case and flows through the valve *L* into the annular chamber made by the differential piston. On the return stroke this air is forced through the discharge valve *H* and valve *I* to the storage tank or receiver, during which time the crank case is again filled.

On account of the large surface surrounded by cool water and the short distance the heat has to travel when generated in the annular space by compression, the thermal efficiency should be higher than in compressors having a small cooling surface per unit of volume. As the pressure is always down, a clearance of .01 in. can be easily maintained, as well as discharge pressures of from 60 to 140 lbs. An absolute pressure of 21 lbs. is maintained in the crank case when compression begins in the second stage. The cold water surrounding the annular chamber in which the air is compressed and cooled passes up and around the combustion cylinder sufficiently warm to increase the efficiency therein. As the upper end of the connecting rod is a large steel ball, the piston and rings may revolve at will, giving a uniform wear to the cylinder.

The engine proper is of the four cycle type and as air is compressed every stroke the two flywheels and crank discs are made heavy to maintain a sufficiently uniform speed. An inertia gov-

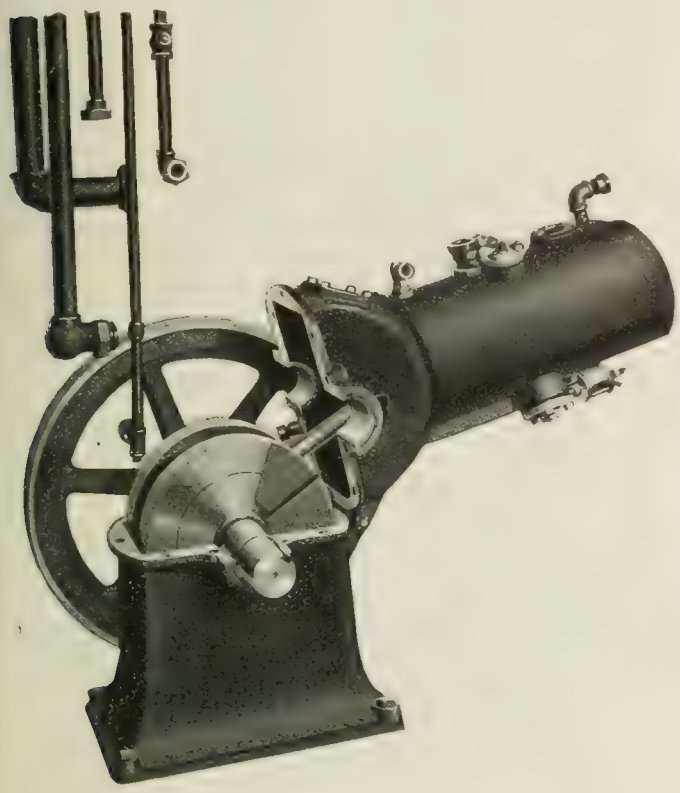


Exposed View of Sargent Air Compressor.

[illegible] falling slower than the spring seated exhaust valve *I*, when the engine tends to run above the normal speed, allows *I* to engage *V*, holding the exhaust valve open and the inlet valve stem *H* in such a position that *X* will miss *V* and the inlet valve will remain closed. When the speed drops *U* will miss *V* and the engine will resume its normal speed. Either gas, gasoline or kerosene may be used for fuel. When gas is used it is admitted through a graduated valve to the space *K* from which it flows to the explosion chamber *C* with the air when the collar *Q* on the admission valve stem rises.

The compressed air used for starting the engine is taken from a storage tank through the valve *H*, positively opened at the beginning of each working stroke as long as the compressed air is turned on and the pressure is greater than in the exhaust chamber. The crank pin is accessible through the

hand hole plates, or the piston rod and the crank may be adjusted or removed by turning back the cylinder on the hinge *k*. One sight feed oil cup lubricates both ends of the piston; the superfluous oil gathered by the narrow groove in the piston is delivered through diagonal holes to the ball and passing half way around, flows through a hole in the connecting rod to the crank pin. The main bearings are lubricated by heavy grease, which also makes an effectual air seal. Ignition is by jump



Sargent Air Compressor; Crank Case Exposed.

spark when the primary circuit is closed once in two revolutions by a pin on secondary gear. Compressors of this type will compress air to 200 lbs. gage, or to any lower pressure at which the unloader is set. One cam controls both admission and exhaust, and the valve motion is quiet and positive. The compressors are made in four sizes to compress from 9 to 150 cu. ft. of free air per minute. They were designed by C. E. Sargent, 136 West Lake street, Chicago.

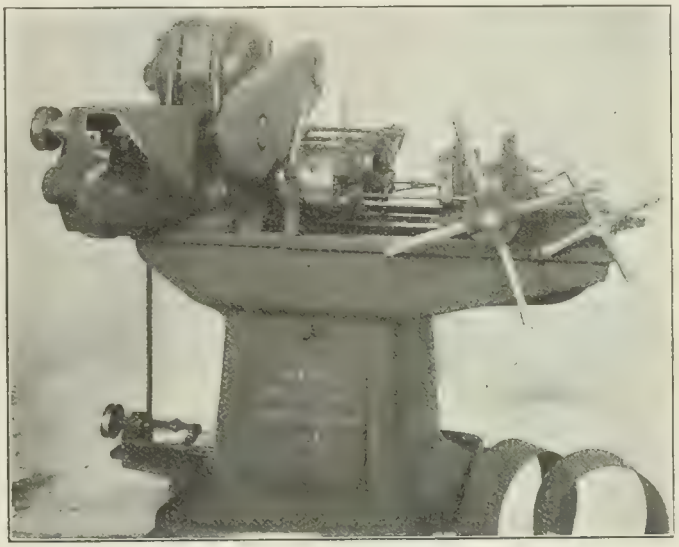
FOREIGN RAILWAY NOTES.

The Guatemala Railway has contracted with the government to build a railway from Zacapa to the frontier of Salvador. This line will be extended, under a concession from the government of Salvador, to Santa Ana in that republic, where it will join the Salvador Railway.

The Pacific Railway, Colombia, which, starting from Buenaventura on the west coast, runs to the city of Cali and thence through the Cauca valley, is expected to be in operation to Cali by the latter part of 1911. Cali was also connected with the Cauca river in July, 1910, by a short steam tramway. The Pacific line is expected to follow the valley of the Cauca for a considerable distance, and will furnish an outlet to the sea for the increasing commerce of that fertile district. With the completion of this line and the railway connecting the Cauca river with the cities of Amaga and Medellin, also that between Medellin and Puerto Berrio on the Magdalena river, the transportation rates on coffee will undoubtedly be cheapened and the products of a large part of the republic will be much more easily and quickly transported to foreign markets than at present.

BOLT CUTTING AND THREADING MACHINES.

Several new types of threading machines have recently been brought out by the Landis Machine Company, Waynesboro, Pa. They possess many unique and distinct features as compared to the machines it has been building. In the 1½ in. double head bolt cutting machine, shown in the accompanying illustration steel guides are used instead of cast iron guides, as has been the common practice in the past. Among the advantages possessed by the steel guides are the fact that they are accurate to size and maintain alinement at all times unless affected by



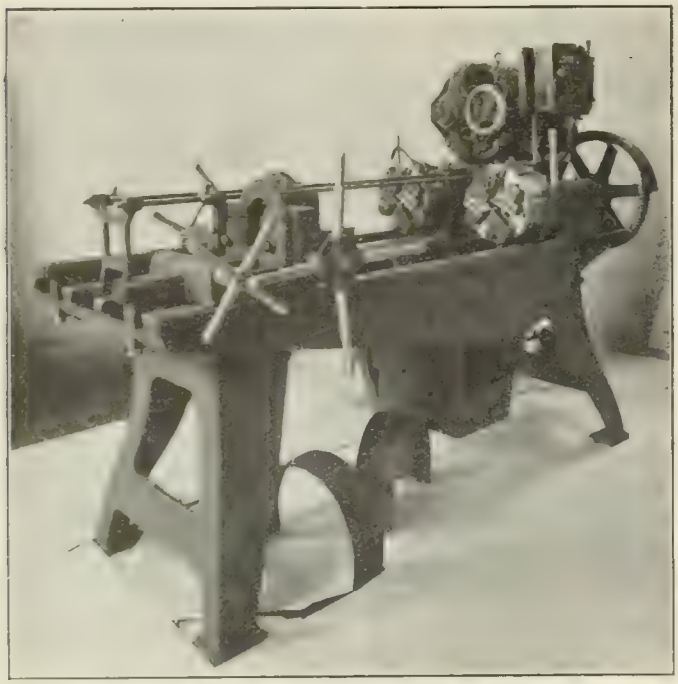
Landis 1-in. Double Head Bolt Threading Machine.

wear after long usage; that when the guides become worn they can readily be replaced at a slight expense, whereas on a machine with cast iron guides the wear that may occur cannot as a rule be compensated for, especially if the wear is not regular on all parts of the guide; that there is no tendency for cuttings to collect on the guides and cause them to wear, as with flat guides. The machine is built with a wide body, and has a large space for chips. The oil tank is placed in the base, and is separated from the chip room by a fine screen. The carriage is light, yet strong, and easily operated for rapid production. The oil pump is on the rear of the ma-

Landis 1½-in. Double Head Bolt Cutting Machine.

chine, and is of the rotary type. The machine is made for high speed work and is furnished almost exclusively with high speed steel dies.

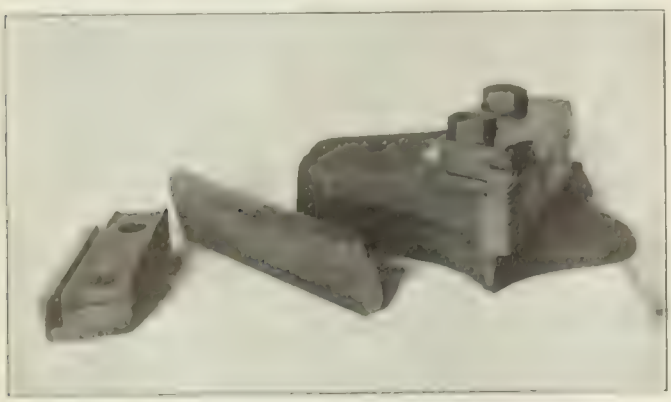
The standard 1 in. double head bolt threading machine, as shown, is provided with a constant speed motor, a silent chain drive, a mechanical speed change device, and a speed range of 3¼ to 1. The motor is mounted on top of the machine out of the way of dirt and oil, making the entire equipment compact and occupying a minimum amount of room. Speed changes



Landis 1½-in. Double Head Staybolt Cutter.

can be made while the machine is in operation, and any speed between the maximum and minimum can be obtained in an instant. The machine is also adapted for high speed work. The carriages have adjustment up and down, or sidewise, for centering the die, and the machine may be furnished with either rack and pinion operated carriages, or with lever operated carriages.

The 1½-in. motor driven double head staybolt cutter is equipped with a variable speed motor, having a speed variation of 4 to 1, which provides a wide range of speeds, thus making



Threading Die Showing Chaser and Holder.

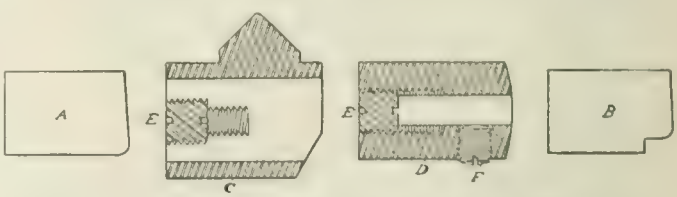
within the range of the machine by changing the gearing, no extra lead screw being required. The main spindles of all the machines are provided with recesses to allow the lubricant to return to the oil tank. The Landis type of die is used, and is held in different ways to suit the different requirements.

The chasers in the Landis die are held by means of a clamp which comes flush with the front edge of the die, so as to admit of cutting close to the shoulders or the heads of the bolts at any time. Dies with very short throats or with no throats at all can be used, and as no grinding is done in the throat of the die when sharpening the throat remains permanent, which gives a marked advantage on many classes of work. The holder is shown herewith with the mill type of clamp. This clamp is used especially for threading pipe as the clamp comes over the chaser in such a manner as to protect it when the pipe splits or catches the chaser. The die holders are made entirely of steel, as are also the die heads on all Landis machines. Any of these machines can be arranged for constant or variable speed motors as the case may require.

MICROMETER BORING TOOL.

A boring tool which makes the roughing and finishing cuts in one operation, and also has a micrometer adjustment, is shown in the accompanying illustrations. It is called the Twentieth Century boring tool, and is made by the Wellman Company, Medford, Mass. Four cutting tools are used, and they are so arranged that but ¼ in. additional feed over the length of the hole to be bored is required for the finishing cut. This tool is of special advantage in boring wheels for axle fits. By the micrometer adjustment the cutters may be set in or out accurately within .001 in. In the detail illustration, the cutters are shown at *A* and *B*. *C* is a vertical section of one of the cutter carriers, and *D* is a horizontal section. These carriers, as shown at *C* have a projection on the top, the faces of which make an angle of 45 degs. with the top of the carrier.

The outer, or right hand, surface of this projection bears on a corresponding beveled surface on the under side of the microm-

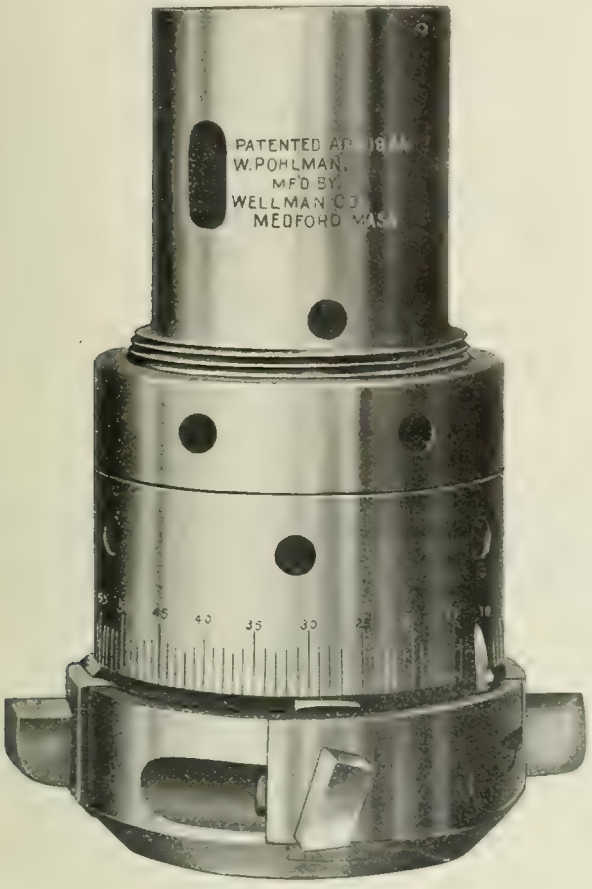


Cutters and Cutter Carrier for Micrometer Boring Tool.

eter ring. The inner surface bears on a beveled surface in a sliding bar. There are four of these bars, one for each tool, and they are held in longitudinal slots in the tool body under the micrometer ring. This part of the body is not threaded, and the micrometer ring is free to slide up or down. However, these sliding bars extend beyond the tool body and are threaded to fit the inside of the micrometer ring. By turning this ring they will be raised or lowered, as desired. When they are raised the beveled surface is lifted from the corresponding surface on the cutter carriers, and when the micrometer ring is pressed down, against the body of the tool holder, the tools are forced inward by the beveled surface on the inside of the ring until they again bear on the beveled surfaces of the sliding bars. When the micrometer ring is turned the other way the sliding bars are lowered, causing them to bear on the inside of the projection of the tool carrier, which forces the tool out.

The upper ring of set collars is threaded to the tool body, and after the tools are once adjusted, it is screwed down against the micrometer ring and holds it in place. The threads on the sliding bars have a pitch of .125 in. There are 125 micrometer graduations, so that the movement of the ring by one graduation means the moving of the tool carrier .001 in. The tool is held in the carriers by screws *E* and *F*, *E* being the adusting screw

and *F* the locking set screw. The cutters may be ground to any length, but when located in the cutter holders must be equidistant from the centre. The tool *A* shows the approximate shape of the tools and *B* shows the way in which the finishing

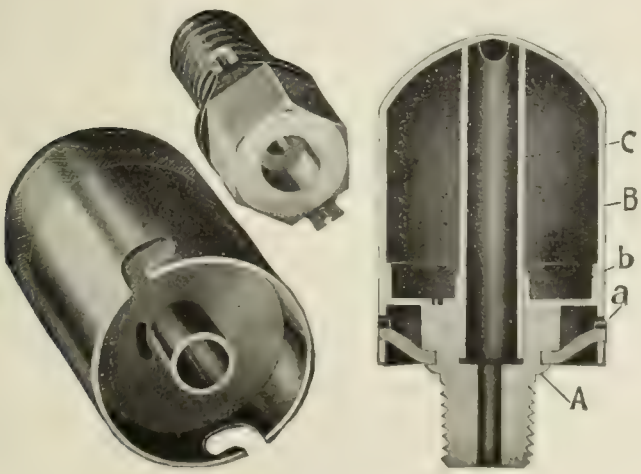


Micrometer Boring Tool.

tool is cut to follow the tool *A*. When adjusted for finishing, this tool is allowed to project about 1/16 in. beyond *A*. A record of 2 min. 28 sec. for roughing and finishing two 750 lb. car wheels, with 7¼ in. hubs, has been made with these tools.

LOOSE PULLEY AUTOMATIC OIL CUP.

A loose pulley automatic oil cup, which is made by the American Specialty Company, Chicago, is shown in the accompanying illustrations. The oil is contained in the pressed steel shell

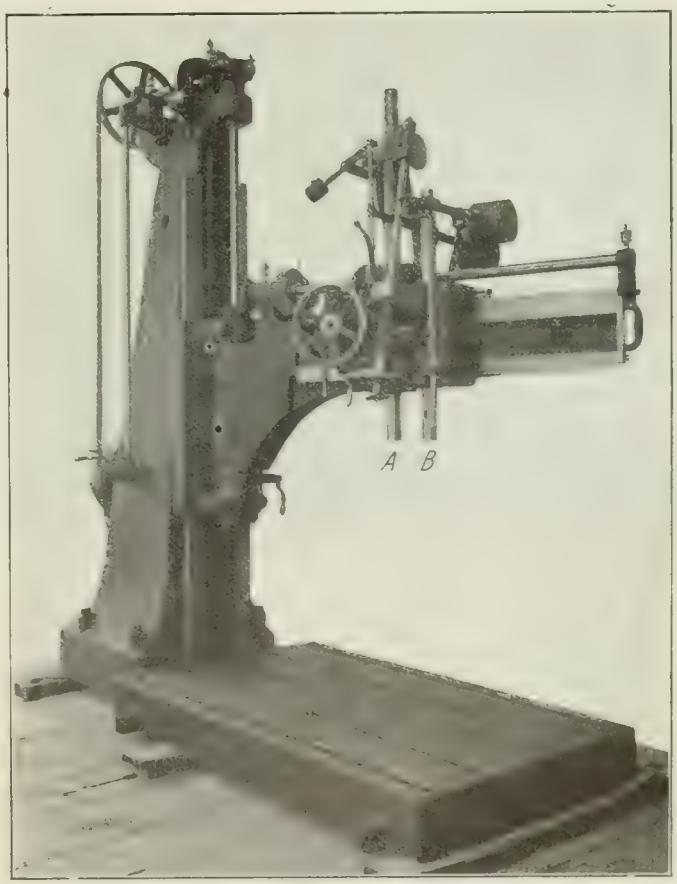


Automatic Loose Pulley Oil Cup.

B, and as the pulley revolves the oil is thrown to the top of the cup and is forced into the feeding tube *C*, which serves as a measuring tube. When the pulley stops the oil will work down from *C* into the bearing. To fill the cup, simply remove the shell *B* from *A*, which is screwed in the oil hole of the pulley, and pour the oil in through the hole shown in the bottom *b*; then replace the springs *a* which securely hold the cup to the nipple *A*. The supply of oil will last from one to three weeks, according to the number of starts and stops made by the pulley. Its value will be appreciated when it is considered that the chance of spattering oil over the floor, workmen, machines and belts is greatly reduced. The illustrations shown are full size, and the total weight of the cup is so small that no counterbalancing is necessary.

RADIAL DRILL AND TAPPING MACHINE.

A combination drill and tapping machine made by the Newton Machine Tool Works, Philadelphia, Pa., is shown in the accompanying illustration. The drill is held in spindle *A*, and the tap in spindle *B*, which revolves at a reduction of speed in the ratio of 2¼ to 1 from the speed of the spindle *A*. After the hole is drilled one revolution of the hand-wheel places the spindle *B* over it. The drive to the tapping spindle is arranged for reversing, the clutch controlling this operation being operated by a lever. The machine is belt driven, having a step pulley of four diameters, which with back gears, with a ratio of 2 to 1, provide eight different speeds. There are also four



Radial Drilling and Tapping Machine.

rates of feed to the spindle, which is provided with an adjustable automatic release. The spindle is counterweighted and may be operated by a hand-wheel which gives a rapid adjustment. The saddle arm has a square lock bearing on the upright and is operated by power; it may be raised or lowered rapidly. The trunions are mounted in roller cage bearings. The diameter of the spindle is 2 13/16 in., and the distance from the center of the trunion to the center of spindle *A* is 64 in. A length of feed of 17 in. is provided and the maximum distance from the base to the center of the spindle is 81 in.

General News Section.

At Meridian, Miss., indictments have been found against the New Orleans & Northeastern for falsification of records and bills of lading.

In the federal court at Buffalo, N. Y., September 27, fines aggregating $1,000 were imposed on the New York Central for violation of the law limiting the length of time which animals may be kept in cars.

Southbound train 29, of the Missouri, Kansas & Texas, was stopped by three masked men near Okesa, Okla., last Tuesday night, and the robbers rifled the mail and baggage cars, but got little of value. They did not enter the passenger cars.

The Alaska Steamship Company has bought large quantities of crude oil for fuel, and it is said that oil fuel is to be used on the locomotives of the Copper River & Northwestern and also in the power plants of many gold mines in Alaska.

The Southern Pacific, and the Corvallis & Eastern have filed suits in the Federal Court at Portland, Ore., against the enforcement of the 14-hour labor law of Oregon, enacted by the last state legislature. The companies hold that the law is in direct conflict with the 16-hour federal law.

Ture Tulien, a machinist apprentice on the Atchison, Topeka & Santa Fe, at Topeka, Kan., has been awarded the Santa Fe-Armour scholarship, which is maintained by the *Santa Fe Employees' Magazine* at the Armour Institute of Technology in Chicago. It provides for four years' free tuition to the boy having the best record for his four years' apprenticeship.

W. A. Garrett, who, as noted in the *Railway Age Gazette* of September 29, page 614, has resigned his position as vice-president of the T. H. Symington Company, has been elected chairman of the General Managers' Association of Chicago, and also of the Association of Western Railways. Mr. Garrett assumed his new position on October 2. His office is at 605 Western Union Building, Chicago. The former chairman of the General Managers' Association was W. J. Jackson, vice-president of the Evansville & Terre Haute and the Chicago & Eastern Illinois.

The University of Illinois opened its academic year 1911-12 on Wednesday, September 20. The registration of students in the College of Engineering during the first two days was 1,135. The new members of the faculty include C. R. Richards, formerly dean of the College of Engineering at the University of Nebraska, appointed professor of mechanical engineering in charge of the department; A. M. Buck, formerly professor of electrical engineering at the Clarkson School of Technology, appointed assistant professor railway electrical engineering.

Cromwell Dixon, 19 years old, flying in a Curtiss biplane, at an exhibition in Montana August 1, flew over the Rocky mountains, starting from Helena at 2:08 p. m., and arriving at Blossburg at 2:34. On his return to Helena he was presented with a purse of $10,000. A few days later Dixon was killed.

The postmaster-general has given a special order authorizing E. L. Ovington, an aviator, to carry United States mails. Mr. Ovington proposes to fly from New York to the Pacific coast. The order establishes special mail messenger route No. 607001.

The firemen of the Georgia & Florida Railroad struck and left [illegible] on September 28, and press despatches on October 1 reported all traffic on the road suspended. There was considerable violence by mobs; and a trestle 350 ft. long, three miles north [illegible] was destroyed by fire. On Monday, October 2, press despatches reported that a state of anarchy prevailed along the [illegible] road, two passenger trains having been captured on Sunday by armed mobs. The strikers include both white men and negroes, and the citizens along the line are said to sympathize with them. One Tuesday morning's telegraphs that the railway company is making steady progress in filling the places of [illegible] and that the company expects to resume full freight and passenger service soon.

George A. Burns, the oldest track-walker in point of service on the Pennsylvania Railroad, has just put his 177,000th mile behind him. He has walked the equivalent of 7½ times around the world in the last 35 years, journeying four times a day between Greensburg, Pa., and Youngwood yard, a distance of 3½ miles. Other Pennsylvania track watchmen who have distance records are William Young of Franklyn, Pa., with 154,144 miles in 22 years and 8 months; Dennis Watters, Norristown, Pa., with 111,624 miles in 24 years; Simon Owens, Washington, D. C., with 135,626 miles in 25 years and 4 months; and Julius Hein of Edgewood, Md., who has covered 101,100 miles in 23 years and 3 months. These five men together have walked nearly a million miles. The track inspectors on the Pennsylvania carry registering clocks. A patrolman registers in the tower at the end of his beat the hour and minute of his arrival; departs on his journey and registers similarly in the tower at the other end. His route usually covers about four miles, but is less than half this on stretches where special watchfulness is needed.

Disastrous Flood at Austin, Pa.

The town of Austin, Pa., on the Keating Summit branch of the Buffalo & Susquehanna was almost completely wiped out, on Saturday last, by a flood, caused by the failure of the dam of the Bayless Pulp & Paper Company, about 100 persons being killed. The damage to the property of the railway company is given by press despatches as amounting to many thousand dollars.

Who Was Dulce Glober?

"Dulce Glober" is a pseudonym which appears on the title page of a book of 224 pages entitled "Reminiscences in the Life of a Locomotive Engineer," which was published at Columbus, by Foster & Co., in 1861. A correspondent wishes to know the real name of the author. The book was re-issued in 1863 by J. Bradburn, New York City.

Mountain Type Locomotives.

Under the head of *Ratios* in the article on Mountain Type Locomotives for Heavy Passenger Service, published in the *Railway Age Gazette* of September 22, page 555, the last four ratios were given incorrectly. They should read as follows:

Volume of both cylinders, cu. ft.	21.40
Total heating surface ÷ vol. cylinders	193
Total equivalent heating surface ÷ vol. cylinders	252
Grate area ÷ vol. cylinders	3.12

Utopian Dreams of Travel.

Those persons who irk at the crude comfort of the Pullman and the parlor car will be pleased to learn of the new Train de Luxe which the Santa Fe is planning to put on between Chicago and Los Angeles.

This train will make travel such a dream of luxury that only the most blase traveler will be forced to look out of the window for amusement. It will have compartments, drawing rooms, parlors, bath rooms and barber shop, a lady's maid, a valet, a club car with a ticker in it, baseball and football bulletins, a library and pianola, observation balconies, a cigar counter, a wine cellar, a full assortment of millionaires to provide local color and other attractions which are bound to make it a great success.

Nevertheless we still believe that train designers lack imagination and ingenuity in their work. While the Santa Fe train will no doubt be a wonder and well worth the $25 extra fare which will be charged on it, think what would happen to it if some rival road should provide beside these attractions the following inducements:

A thermostat in each berth.

A moving picture machine which will provide plenty of scenery while the train is standing on side tracks [or passing through the dreary stretches of desert which the passenger agent forgot to mention].

A nursery for babies.

A special car for passengers who sleep with their mufflers cut out.

A full set of car window derricks.

A dining car that doesn't use the same kind of pie for dessert clear across the continent.

A democratic and approachable Pullman conductor.

A freight department which will not stand its freight trains against the choicest scenery whenever possible.

A rope with which to hang the observation platform hog.

Pullman seats in assorted sizes.

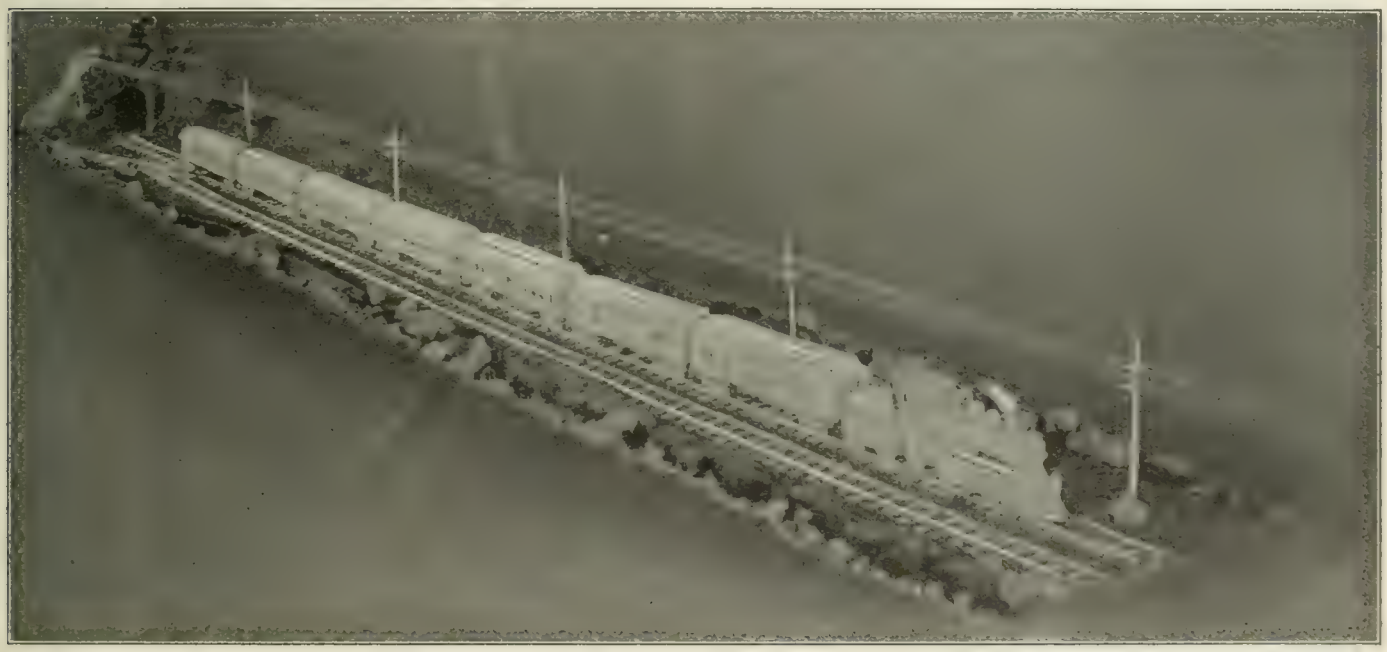
A newsboy who only comes when you press a button.

A transcontinental ticket neatly wound up on a hose reel which can be clamped to the car seat where the conductor can browse over it at his leisure.

We don't claim that all of these innovations can be procured at once successfully, but suppose the passenger department of some road should begin work along these lines. What chance would its competitors stand?—George Fitch in the *Peoria (Ill.) Transcript.*

A Train Made of Candy.

The Northern Pacific has produced the sweetest train ever made. It was one of the most interesting objects on the special train which the Northern Pacific ran from St. Paul to Duluth on the night of September 21 for the American Association of General Passenger and Ticket Agents. It was a reproduction of the Northern Pacific's crack train, the North Coast Limited, and was made of 80 pounds of sugar. It was made in the road's own bake shop by its chief pastry cook, and extended the full length of one side of the observation compartment of the buffet-observation car. The miniature train is illustrated herewith, and the illustration shows how faithfully all the details of the train, after which it was patterned, were reproduced. It was lighted by real electric lights and had an electric headlight glowing brightly. The track also was made of sugar.



A Train Made of Candy.

A New Idea in Promotion.

During the last four years the officers of your company have had a number of serious conditions to contend with—panics, crop failures, the Mexican insurrection, radical legislation, increased wages, increased cost of materials—all retarding the work of construction and making it cost more than was estimated; yet the line has been finished across Oklahoma and 340 miles completed in Texas, three disconnected sections joined. We now have 600 miles of continuous track in the states, and arrangements made for extension to Alpine, Tex., which will make 740 miles of line in the United States. Arrangements are also under way to build to a connection with the line east of Chihuahua, which will give us nearly 1,000 miles of continuous line, or, with the mountain and Pacific coast sections, 1,150 miles in the system. While results are not what we expected, under the conditions above referred to, they are remarkable.

Recently I have become interested in a telephone invention which is now, after 17 years of experiment, destined, I believe, to be adopted in the near future in every part of the world. This telephone holding came to me from the fact that I furnished the money to exploit it. If this invention works as well in actual service as in experimental tests, distant points can be connected at less than one-half the cost of any system in use. Talking tests have been made over the Illinois Central telegraph line from Chicago to New Orleans, 930 miles, and on an artificial circuit of 6,200 miles the voice was heard perfectly.

My interest in this invention I have decided to share with the railway stockholders, in order to reward their patience during the trying periods in the history of the company. The interest to be given them is: First, a 49 per cent. interest in the company that will own and exploit the device in England and the British possessions, except Canada; second, a 49 per cent. interest in the company or companies that will own and exploit the patents in France and its possessions, Germany, Spain, Portugal, Norway and Sweden. This will be represented by stock issues in each company of $2,499,000 of the common stock. The above interests will be transferred to the United States & Mexican Trust Company as trustee, the earnings on it to be used under conditions mentioned in a trust deed, first to make up any deficit in interest on the bonds of the railway company; second, to make up any deficit on the 4 per cent. dividends on the preferred stock, and the remainder for increasing dividends on the common stock of the railway.

I believe that the road will be rapidly finished, and that by the end of next year it will be connected with the track east of Chihuahua, and that when the earnings will justify the investment, and that the dividends from this telephone stock will so augment the annual dividends from the railway that the combined returns will be far greater than was expected originally.

This gift does not obligate the railway company in any manner, and I ask in return no financial compensation; but I do ask the hearty co-operation of all the stockholders in helping to finish this great transcontinental railway.

—From a circular sent out by *A. E. Stilwell* to stockholders of the Kansas City Mexico & Orient.

Railway Postal Regulations.

A conference was held in Washington on September 27 between committees representing the post office department and the railways regarding uniform specifications for postal cars. The fol-

lowing committee was organized by the Special Committee on Relations of Railway Operation to Legislation to represent the railways: R. B. Kendig, general mechanical engineer, New York Central; A. W. Gibbs, chief mechanical engineer, Pennsylvania; C. A. Seley, mechanical engineer, Rock Island Lines; R. E. Smith, general superintendent motive power, Atlantic Coast Line; A. Stewart, general superintendent motive power, Southern Railway; H. E. Mack, assistant traffic manager, Missouri Pacific; W. W. Safford, general mail and express agent, Seaboard Air Line. The following committee was appointed to represent the post office department: C. M. Reed, superintendent of railway mail service, Cincinnati, Ohio; G. D. Johnston, chief clerk, railway mail service, Chicago; C. H. Otis, chief clerk, railway mail service, St. Paul, Minn. These committees will work up uniform specifications for steel postal cars and wooden postal cars and specification for uniform interior arrangements of both steel and wooden cars. The committee will meet in Washington on November 1.

Old-Time Railroading in Missouri.*

BY J. K. MERRIFIELD.
Conductor Eastern Division, Missouri Pacific.

In March, 1870, I went from Great Bend, Pa., where I was conductor of a coal train on the D. L. & W., to Sedalia, Mo., to visit my sister. I was introduced to M. G. Cary, superintendent. I had been drawing $45 as conductor of a coal train on the D. L. & W, but soon got $85 as conductor of a freight train on the M. P., and lost no time when I laid off for sickness. This was quite a raise in salary. We had many disadvantages in those early days getting over the road with a train. The sidings were in most cases the house track, and cars were always standing on them. You would head in or back in as the case might be and couple up the cars; and that was no small job. In those days we never had links and pins enough, and the old wrought-iron open-mouth draw head was always robbed of pins and links by every crew that set a car out, so that of the three men we had on freight trains in those days, one was always busy carrying links and pins from the caboose to make the coupling. We had no air and "broke" by hand. Of course, we did not have the trains we have nowadays, as 15 to 20 cars was a loaded train no matter if the cars only contained one box each. If you had a waybill it was a load. Our engines were light; so were the cars. All freight trains were locals. The yard men at Jefferson City and Holden would put the cars on any train that was going out, whether the train was local or supposed to be a through train. We would arrive at a station any time of night, and if we had local freight to unload, we would pile it up on the platform and put the waybills through a hole in the door. We never checked freight out or in. No freight was ever stolen. No seals or locks were ever used on cars and many times I have unloaded a car to take it on to another station, where I needed a car; cars were a scarce article.

Railway men in those days enjoyed the work. It was no hardship to them, as we were all accustomed to hard work. There was no sixteen-hour law and no growling because we were long hours on the road. We got over the road doing all the work and overtime was not thought of. It all went in on the $85 per

I was called to go out on an extra with the cars. Andy Cope,

with handles at both ends. One man filled the boxes from a platform built high, even with the tender, and two men carried

we could not start the train and doubled to Centretown. We

at Jelston, returned to Scott, where there was a water tank, got

miles away. We doubled Johnson Hill, 2½ miles west of Centre-

trains expected to double. Doubled Muddy Hill, three miles west of Sedalia to Dresden, doubled Knobnoster, doubled Warrensburg and Centreview, arriving in Holden (107 miles) at 9:00 p. m., next day; just 29 hours after we left Jefferson City.

Strike of Shopmen on the Harriman Lines and the Illinois Central.

Pursuant to instructions issued by the heads of their unions, a large number of the shop employees of the Harriman Lines and the Illinois Central, belonging to the federations of shopmen on these lines, went out on strike on September 30 at 10 o'clock a. m. On the Harriman Lines the strike followed a demand made by J. W. Kline, president of the International Brotherhood of Blacksmiths and Helpers, that Julius Kruttschnitt, director of maintenance and operation of these lines, should further confer with the officers of the federation, and the refusal by Mr. Kruttschnitt to do so. Mr. Kruttschnitt, in his reply to the labor leaders said:

"If the essentials of admittedly fair and considerate treatment, the payment of the highest wages of any railways in the territories served by our lines and the guaranty of hospital and generous pension benefits have not been sufficient to deter our shopmen from terminating agreements insuring those conditions, made from time to time in conference with their labor unions, and from spending four or five months in devising new issues and means to destroy existing harmonious relations, and, moreover, are not sufficient to induce them to remain in our employ and to make them realize their duty to the public, I do not see that we can do anything more to convince them that they have no good reason to stop work, or to prevent your giving approval and permission to them to leave our service."

The payrolls of the Harriman Lines show that at the time the strike was called they had in their employ about 7,000 men belonging to the unions which compose the federation on their lines, that is, the blacksmiths', machinists', boiler makers', car men's and sheet metal workers' organizations. It is stated by officers of the roads that about 50 per cent. of these employees, or approximately 3,500 went out. A few men who were employed in the shops, but did not belong to the federated crafts also struck. The officers of the Harriman Lines expressed surprise and gratification at the smallness of the number of their employees who went out. They say that the number was smaller than they expected; that they are having no difficulty in getting as many employees as they desire to take the places of those who have quit, and that if present conditions continue the strike need not interfere with their service within eight or ten months. The "strike breakers" who thus far have been employed are all good machinists and are able to do at once the work for which they have been employed.

The situation on the Illinois Central is less favorable than on the Harriman Lines. The total mechanical force of the Illinois Central at the time the strike was called is estimated at 12,500 men, including clerks, common laborers and ashpit men. As has been stated, only five of the crafts employed in the shops of the Harriman Lines are included in the federation whose officers ordered a strike. On the other hand, nine of the crafts employed in the shops of the Illinois Central are included in the federation on its lines—the blacksmiths, machinists, boiler makers, car men, sheet metal workers, steamfitters, painters, federal labor union, and (south of the Ohio river) the freight clerks. It is estimated that of the total number of men in the shops all but 4,283 left the service of the company. At the Burnside shops where 2,980 men were employed only 800

at Memphis where 1,059 were employed only

at Water Valley (Miss.) out of 576 men only 263 stayed at work; at Vicksburg out of 524 men 394 stayed

at New Orleans of 642 men one half stayed at

The situation on the Illinois Central is complicated by the fact that the clerks in its freight offices south of the Ohio river

One act of vandalism which they committed was to take with them when they left the offices at New Orleans a large number of waybills and other records whose removal disabled the company from making proper deliveries of freight. The result was more or less of a congestion of traffic and the issuance by the company of an embargo against all freight (except perishable) from connecting lines moving to

Memphis and New Orleans. The freight clerks north of the river did not strike. The company has sent 450 men south of the river to take the places of the strikers.

On the Illinois Central, as on the Harriman Lines proper, business generally is moving much the same as before, and the officers express confidence in their ability to fully cope with the situation. At Memphis, at New Orleans and at Jackson, Miss., the federal courts have issued injunctions restraining the strikers from all interference with the company's property or with the transaction of its business, and at New Orleans, where the order was violated, the court sent three men to jail and indicated that unless its orders were obeyed it would send some of them to the penitentiary. The Burnside shops at Chicago are being guarded by large numbers of police, and while numerous strike breakers have been put to work there, but little trouble has been experienced.

At McComb City, Miss., on Tuesday of this week, following a clash between strikers and strike breakers, the entire Third regiment of the Mississippi National Guard was ordered out to prevent further disorder and to protect the property of the railway. In the fight ten men were injured, one of them fatally. Strikers wrecked three coaches occupied by strike breakers. The Illinois Central on Tuesday secured injunctions from the Federal courts at Chicago and Cairo covering towns throughout southern Illinois, restraining strikers from interfering with men at work.

At Houston, Tex., on Tuesday a special officer, was killed just inside the gates of the Southern Pacific shop yards while taking officers and strike breakers from a train to the yard.

On Wednesday, Major George Hoskins, in command of the troops at McComb City, Miss., fearing mob violence, and at the instance of a large number of citizens, escorted 150 strike breakers, brought into the town, to the railway station and sent them by special train to New Orleans. By Wednesday there was a full regiment of troops at McComb, and 17 deputy marshals have been stationed there to enforce the federal injunction secured by the railway company. According to the press reports, the sending of the strike breakers out of town was carried out in spite of the protests of the Illinois Central officers. Early Wednesday morning there was a bomb exploded on the railway track not far from McComb, but the extent of the damage is not reported.

No trouble was reported on Wednesday from any point on the Harriman Lines, but, according to the Thursday morning papers, the offer of the Harriman Lines to take back strikers up to noon Wednesday, and the decision that after that time the company would refuse to re-employ strikers, did not result in the return of very many employees.

Chicago Great Western's School for Railway Men.

The Chicago Great Western is conducting a railway school at Oelwein, Iowa, for the purpose of instructing young men in order to fit them for positions in railway work. Hiram J. Slifer, general manager of the road, is taking a personal interest in the project and invites the young men along the line to write to him for particulars if interested in taking up the work. It is the opinion of the officers that it is better for them to take a hand in the training of the men than to depend on recruits with no railway knowledge. During the past year 37 graduates were placed in position on the Chicago Great Western in various capacities. The lecture course, which is the most interesting and practical feature, will be on a more elaborate scale the coming year than it was last year, the dates, subjects and names of officers delivering them being as follows:

November 3.—Transportation. H. J. Slifer, general manager.
November 9.—The Station Agent E. R. Beem, station supervisor.
—Physical and Technical Examinations. W. F. Perdue, instructor and examiner.
November 15.—Telepraph and Telephone. G. O. Perkins, superintendent, telepraph.
—Relation of Agents to Trainmasters and Despatchers. S. R. Bunch, trainmaster and chief despatcher.
November 22.—Station Accounting. W. J. Purdy, station auditor.
November 29.—Freight Traffic—First Principles. F. S. Hollands, assistant general freight agent.
November 29.—Passenger Traffic—First Principles. A. C. Irons, assistant general passenger agent.
December 6.—An Agent's Ambition. C. E. Carson, superintendent north division.
—The Baggage End of It. E. R. Reynolds, general baggage agent.
December 15.—Freight Accounting. H. Ernest, auditor freight receipts.
—Passenger Accounting. J. F. Wade, auditor passenger receipts.
December 20.—Solicitation of Passenger and Freight Traffic. G. A. Smith, department of freight and passenger agent.
—As an Agent Sees It. W. J. Fowler, agent Allison.

1912.

January 4.—Solicitation of Passenger Traffic. Geo. Bristow, division passenger agent.
—Solicitation of Freight Traffic. H. B. Holbert, division freight agent.
January 6.—Demurrage and Storage. M. C. Shields, manager north demurrage bureau.
January 11.—Personal Injury—Preventives and Care of Injured. Dr. A. M. Pond, company surgeon.
—Loss, Damages and Personal Injury Claim. G. B. Winston, legal department.
January 18.—Engineering.—L. C. Fritch, chief engineer.
—Motive Power. J. R. Thompson, master mechanic Western division.
January 25.—Freight Claims. J. H. Howard, freight claim agent.
January 31.—Transportation Facilities. F. Kinsey, inspector transportation.
—Car Service. G. A. Brown, superintendent car service.
February 7.—Relation of Agents to Superintendents. W. B. Causey, superintendent Southern division.
—Mechanical Engineering. F. W. Stubbs, mechanical engineer.
February 14.—Relation of Agents to Superintendents. T. A. Sweeney, assistant superintendent Eastern division.
—Railway Signaling. Jos Beaumont, signal engineer.
February 21.—Solicitation of Passenger Traffic. C. J. Brooks, division passenger agent.
—Solicitation of Freight Traffic. L. M. Foss, division freight agent.
February 28.—Relation of Agents to Superintendents. F. R. Blunt, superintendent Western division.
—Relation of Agents to Executive Department. J. H. Ambruster, chairman Education Committee.
March 8.—Economical Use of Supplies. H. E. Rouse, general storekeeper.
—Relation of Agents to Trainmasters. I. E. Palmer, trainmaster.
March 13.—Terminal and Junction Operation. P. B. Vermillion, superintendent Oelwein terminals.
—Handling and Loading Merchandise. S. V. Rowland, inspector merchandise handling.
March 20.—Solicitation of Freight Traffic. B. J. DeGroodt, division freight agent.
—Solicitation of Passenger Traffic. E. J. Sawyer, division passenger agent.
March 27.—The Successful Agent. G. O. Somers, general freight agent.
—Railroading as a Profession. A. L. Craig, general passenger agent.
April 3.—The Treasury Department. J. F. Coykendall, secretary and treasurer.
Disbursment Accounting. W. J. Cunningham, auditor disbursements.

Waverly Transfer.

The freight transfer station of the Pennsylvania Railroad at Waverly, near Newark, N. J., employs a clerical force of 210, and a warehouse force of 249. The number of cars of freight transferred last year was over 100,000 and the result of the con-

solidation done here was a saving of 11,352 cars to the company, and much time to thousands of shippers. Into this station cars are fed from thirteen transportation companies, two terminal companies, and the docks of New York City; and, also freight originating in Jersey City and Newark. During rush seasons as many as 700 cars are taken care of in a day. The transfer platforms at Waverly afford standing room for 212 cars. Cars are despatched directly to 121 different points daily.

The clerical work is heavy. Besides the waybills, of which 3,500 are sometimes made in a day by a force of 52 clerks, there is the accounting to be done. Settlements must be made with fifteen outside companies. There are eight departments: a Pennsylvania Railroad accounting department, a Union Line accounting department, separate departments for east and west bound waybills and car records, a tracing department and a transfer record department.

The Waverly Transfer was opened in September, 1904. At first it was planned to handle only the freight from the New York, New Haven & Hartford and the Long Island Railroads. Its capacity was 96 cars. After six weeks it became necessary to employ day and night shifts to keep up with the business. The station was soon enlarged to accommodate 200 cars and later its capacity was increased to 212. The tonnage of less than carload lots has increased nearly twofold from 1905 to 1910. The number of inbound and outbound cars has grown in like proportion. The difference between the number of inbound and the number of outbound cars represents the saving made by handling the freight in solid car lots. This difference amounted to 10,872 cars in 1905 and 11,352 in 1910. The greater economy in the matter of car mileage which is being generally practiced by the railways is indicated by the increase in average load per car received at the transfer, this was increased from 5.67 tons in 1905 to 6.33 tons in 1910. The outgoing cars carried an average load of 6.44 tons in 1905 and 7.42 tons in 1910.

American Association of Railroad Superintendents.

The action taken by the superintendents' association of the central states looking to the reorganization of the association was briefly noticed in the *Railway Age Gazette* of September 22, page 567. The by-laws of the new association show that regular meetings are to be held on the third Friday of March and of September each year. Superintendents, assistant superintendents and trainmasters are eligible to membership. Officers of industrial roads are not eligible. Any officer of a railway whose superintendent, assistant superintendent or trainmaster is a member, will be welcome at the sessions of the association and to take part in discussions. Each member of the association is entitled to one vote. Votes cannot be cast by proxy.

The association is organized on the same plan as that of the American Railway Engineering Association. A paragraph in the articles of organization speaks of members as "representing" railways, though it does not appear that this has any official meaning; in other words, the association is a body of individual men. The essential change made by the reorganization is the complete severance of all connection between the general association and the divisional associations in the 12 cities which have hitherto made up most of the membership of the larger body. At the same time it is expected that matters which are of sufficient importance will be reported by the local bodies to the larger association, and that the larger association will report its conclusions to the American Railway Association when that course may seem desirable.

The following are the officers and committees of the association for the current year, which ends with September, 1912:

President, E. H. De Groot, Jr. (C. & E. I.); first vice-president, Chas. Burlingame (Wiggins Ferry); second vice-president, H. R. Saunders (C., R. I. & P.). Executive committee (in addition to foregoing), J. A. Somerville (Mo. Pac.), T. B. Fogg (Toledo Terminal), J. J. Geddes (Term. R. R. St. L.), Brent Arnold (L. & N.).

Committee on Transportation: John Fitzgerald (L. & N.); J. C. Hagerty (B. & O. S. W.); C. L. Gardner (T. & O. C.); C. L. Brevoort (C. H. & D.); J. J. Corcoran (C. H. & D.); [illegible]

Committee on Interchange Car Inspection: M. Matea (St. L. T. & E.); J. J. O'Brien (T. R. R. A. of St. L.); H. Boutet, chief interchange inspector, Cincinnati; J. E. Mechling (Vandalia); [illegible]

Committee on Train Rules: B. F. Hoehn (C. M. & St. P.); R. W. Edwards (K. C. Sou.); J. A. Cook (Wabash); J. M. Walsh (St. L. & S. F.); W. R. Hensley (L. H. & St. L.); also appointed by Train Despatchers' Association; J. E. Scott (G. C. & S. F.); R. C. Norton (H. V.); Benj. Breitegan (N. Y. N. H. & H.); E. A. Howard (C. & A.).

Secretary-treasurer, W. C. Cooder, Carew building, Cincinnati.

American Electric Railway Association.

The American Electric Railway Association has issued convention bulletin No. 4, giving a complete program of the convention to be held at Atlantic City, N. J., October 9-13. The meetings of the American Association will be held October 10-12. On Tuesday, October 10, there will be committee reports, an address on the Hudson & Manhattan Tunnels, by William G. McAdoo, president of the Hudson & Manhattan; and an address on The Effect of Railway Operation on Taxable City Property, by George H. Harries, second vice-president of the Washington Railway & Electric Company. Among the addresses on Wednesday, October 11, there will be one on Measures for the Welfare of Employees, by D. P. Pierce. On October 12 there will be committee reports and an address on Physical Valuation, by O. T. Crosby, president of the Wilmington & Philadelphia Traction Company. The meetings of the Accountants' Association will be held October 9-12. The meetings of the Engineering Association will be held October 9-13. On Monday, October 9, there will be, among others, a report of the committee on Education of Engineering Apprentices. On Tuesday, October 10, there will be the report of the committee on Heavy Electric Traction and of the joint committee on Block Signals for Electric Railways. On Thursday, October 12, there will be the report of the committee on Buildings and Structures and of the committee on Way Matters. On Friday, October 13, among the comimttee reports there will be the one of the committee on Equipment and the one of the committee on Standards. The meetings of the Claim Agents' Association will be held October 9-11. On Tuesday, October 10, there will be papers on getting Intelligent Accident Reports from Trainmen and also on The Prevention of Accidents. On Wednesday, October 11, there will be papers on The Education of the Public in the Prevention of Accidents. The meetings of the Transportation and Traffic Association will be held October 9-12.

International Association for Testing Materials.

The sixth congress of this association is to be held in New York City in September, 1912. The congress will meet in the Engineering Societies building, 29 West Thirty-ninth street, on September 3, and it is expected that the business will occupy about five days, and that thereafter the members will spend about a week visiting some of the principal cities of the country. Bulletins will be issued from time to time giving information concerning the congress. Suggestions are solicited from members of the American Society for Testing Materials and the International Association, also others who are interested, and will participate in the congress. All communications should be addressed to H. F. J. Porter, secretary of the organizing committee, 1 Madison avenue, New York City.

American Society of Civil Engineers.

At the meeting of the American Society of Civil Engineers, held October 4, a paper by Wilson Sherman Kinnear, M. Am. Soc. C. E., entitled The Detroit River Tunnel, was presented for discussion. The paper was printed in the *Proceedings* for August, 1911.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

Air Brake Association.—F. M. Nellis, 53 State St., Boston, Mass.

American Association of Demurrage Officers.—A. G. Thomason, Scranton, Pa.

American Association of General Passenger and Ticket Agents.—C. M. Burt, Boston, Mass.

American Association of Freight Agents.—R. O. Wells, East St. Louis, Ill.

American Association of Railroad Superintendents.—O. G. Fetter, Carew building, Cincinnati, Ohio. 3d Friday of March and September.

American Electric Railway Association.—H. C. Donecker, 29 W. 39th St., New York. October 9-13, 1911, Atlantic City, N. J.

American Railway Association.—W. F. Allen, 75 Church St., New York; November 15, 1911, Chicago.
American Railway Bridge and Building Association.—C. A. Lichty, C. & N. W., Chicago; Oct. 17-19, 1911, St. Louis, Mo.
American Railway Engineering Association.—E. H. Fritch, Monadnock Block, Chicago; annual convention, March 19-21, 1912, Chicago.
American Railway Master Mechanics' Association.—J. W. Taylor, Old Colony building, Chicago.
American Railway Tool Foremen's Association.—O. T. Harroun, Bloomington, Ill.
American Society for Testing Materials.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.
American Society of Civil Engineers.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.
American Society of Engineering Contractors.—D. J. Haner, 13 Park Row, New York; 3d Tuesday of each month, New York.
American Society of Mechanical Engineers.—Calvin W. Rice, 29 W. 39th St., New York.
Association of American Railway Accounting Officers.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.
Association of Railway Claim Agents.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 22, 1912, Los Angeles, Cal.
Association of Railway Electrical Engineers.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago; annual, November 6-10, Chicago.
Association of Railway Telegraph Superintendents.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.
Association of Transportation and Car Accounting Officers.—G. P. Conard, 75 Church St., New York; December 12-13, Louisville, Ky.
Canadian Railway Club.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.
Canadian Society of Civil Engineers.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.
Car Foremen's Association of Chicago.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.
Central Railway Club.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.
Civil Engineers' Society of St. Paul.—D. F. Jurgensen, 116 Winter St., St. Paul, Minn.; 2d Monday, except June, July and Aug., St. Paul.
Engineers' Society of Pennsylvania.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.
Engineers' Society of Western Pennsylvania.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.
Freight Claim Association.—Warren P. Taylor, Richmond, Va.; annual Buffalo, N. Y.
General Superintendents' Association of Chicago.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.
International Railway Congress.—Executive Committee, rue de Louvain, 11 Brussels; 1915, Berlin.
International Railway Fuel Association.—D. B. Sebastian, La Salle St. Station, Chicago.
International Railway General Foremen's Association.—L. H. Bryan, D. & I. R. Ry., Two Harbors, Minn.
International Railroad Master Blacksmiths' Association.—A. L. Woodworth, Lima, Ohio.
Iowa Railway Club.—W. B. Harrison, Union Station, Des Moines, Ia.; 2d Friday in month, except July and August, Des Moines.
Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York.
Master Car Builders' Association.—J. W. Taylor, Old Colony building, Chicago.
Master Car and Locomotive Painters' Association, of United States and Canada.—A. P. Dane, B. & M., Reading, Mass.
New England Railroad Club.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.
New York Railroad Club.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.
Northern Railway Club.—C. L. Kennedy, C., M. & St. P., Duluth, Minn; 4th Saturday, Duluth.
Omaha Railway Club.—H. H. Maulick, Barker Block, Omaha, Neb.; second Wednesday.
Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.
Railway Club of Pittsburgh.—C. W. Alleman, P. & L. E., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.
Railway Industrial Association.—G. L. Stewart, St. L. S. W. Ry., St. Louis, Mo.; annual, May 12, 1912, Kansas City, Mo.
Railway Signal Association.—C. C. Rosenberg, Bethlehem, Pa.; annual, Oct. 10, Colorado Springs, Colo.
Railway Storekeepers' Association.—J. P. Murphy, Box C, Collinwood, Ohio.
Richmond Railroad Club.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.
Roadmasters' and Maintenance of Way Association.—L. C. Ryan, C. & N. W. Sterling; September 10, 1912, Buffalo, N. Y.
St. Louis Railway Club.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.
Society of Railway Financial Officers.—C. Nyquist, La Salle St. Station, Chicago.
Southern Association of Car Service Officers.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.; annual, October 20, Atlanta, Ga.
Southern & Southwestern Railway Club.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.
Toledo Transportation Club.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.
Traffic Club of Chicago.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.
Traffic Club of New York.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.
Traffic Club of Pittsburgh.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.
Train Despatchers' Association of America.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.
Transportation Club of Buffalo.—J. M. Sells, Buffalo; first Saturday after first Wednesday.
Transportation Club of Detroit.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.
Traveling Engineers' Association.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.
Western Canada Railway Club.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.
Western Railway Club.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.
Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Wednesday in month, except July and August, Chicago.
Wood Preservers' Association.—F. J. Angier, B. & O., Baltimore, Md.; annual, January 16-18, Chicago.

Traffic News.

The Nashville, Chattanooga & St. Louis is to run a "good roads train" over its lines for about a month beginning October 9.

The Pennsylvania Railroad announces a reduction from 67 cents per 100 lbs. (first class) to 58 cents, in the freight rate from Altoona, Pa., to Chicago.

The night trains of the Canadian Pacific between Toronto and Montreal now have a compartment sleeping car, each way, each night, in addition to the standard sleepers.

A Mexican correspondent calls our attention to the fact that the fares on the Southern Pacific in Mexico, a reduction in which was recently announced in these columns, are computed in Mexican currency; that is to say, the standard rate for distances not greater than 250 kilometers, which is eight cents, is equal to four cents in United States currency.

The Southern Railway Company, which for years has advertised extensively the virtues of the southeastern states as farming territory, as well as the advantages of those states for general industries, has made plans for greatly enlarging its advertising during the coming year, and has assigned one man to give this work his undivided attention. Advertisements will be published in 150 newspapers in the northern, eastern and western states and in Europe.

Shipments of cotton by vessel from Savannah, Ga., September 30 amounted to 95,756 bales, said to be a greater quantity than was ever before shipped out of any port in one day. The last ship sailed just before midnight to make good contracts which called for September sailings. The value of the combined shipments is estimated at $5,250,000. The cotton went out on eleven ships, nine to foreign ports and two to ports in the United States. Great Britain is the destination of 34,340 bales, France 10,500 bales, the Continent 46,800, and 4,372 bales are destined for points in the United States. The figure for the Continent includes 1,100 bales which will go to Bombay, India.

Several express companies operating in Illinois, including the Wells-Fargo, American, National, United States, Adams, Western and Southern, have appealed to the circuit court of Sangamon county at Springfield, from the orders of the railway commission of that state making reductions in express rates. By an agreement between the chairman of the commission and representatives of the express companies the reduced rates went into effect on October 3, the commission agreeing that this should be done without prejudice to the express companies in contesting the decision of the commission. In the appeal filed by Wells-Fargo & Company it is contended that the order of the commission was made and the tariffs adopted without giving the company an opportunity to be heard and to present evidence; that the rates made are confiscatory, and that they interfere with interstate commerce by giving intrastate commerce in Illinois an advantage.

The Interstate Commerce Commission has received tariffs, filed to go into effect November 1 and November 15, making important increases in class freight rates from eastern cities to the Pacific coast. At present the basis of rates is $3 per 100 lbs (first class) from all points east of the Missouri river; but under the new tariffs, the rate from the Atlantic seaboard will be 40 cents (first class) higher than from the Missouri river. Increases are also made in certain commodities; while in certain other commodities reductions are announced. The class changes are summarized as follows:

Group A, consisting of Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, all of New York except a portion near Buffalo, all of Pennsylvania excepting the Pittsburgh territory, Rhode Island, Vermont, Virginia and West Virginia (north of the Norfolk & Western), the increase is from $3 per 100 lbs. to $3.70 (first class).

Group B, consisting of points in the Buffalo-Pittsburgh district, from $3 to $3.60.

Group C, consisting of territory between Buffalo-Pittsburgh group and Indiana and Illinois State line and west of the Mobile & Ohio from Cairo south to Mobile, and territory east of the Mississippi river, increase of from $3 to $3.50.

Group D—so-called Chicago-Milwaukee territory—increase from $3 to $3.40.

Group E, consisting of territory west of the Mississippi river and east of the Missouri, increase from $3 to $3.30.

Total Revenues and Expenses.

Logan G. McPherson, director of the Bureau of Railway Economics in presenting bulletin number 19, giving a summary of revenues and expenses of steam roads in the United States for the month of June, 1911, says:

"The railways whose reports are included in this bulletin cover 230,219 miles, or 94 per cent. of all the railway mileage in the United States. The total operating revenues for the month of June, 1911, amounted to $224,491,904. This includes revenues from passenger and freight traffic and from all less important sources, such as mail, express, and the like. Compared with June, 1910, these total operating revenues show a decrease of 4 per cent., amounting to $5,929,731, equivalent to $41 per mile.

"Operating expenses amounted to $153,878,087. This was $1,829,261 less than for June, 1910, the decrease per mile being $18 or 2.6 per cent. The only operating expense account showing an increase was the general expense account, in which are included salaries and expenses for general offices, legal and insurance expenses, and the cost of maintaining pension and relief systems for employees. In maintenance of way and structures, there was a decrease compared with June, 1910, of 5.4 per cent. The cost of conducting transportation decreased 2.3 per cent.

"Net operating revenue shows a decrease as compared with June, 1910, of $4,100,470, $23 per mile. This is equivalent to 6.9 per cent., a rate of decrease which would have been greater had maintenance expenses been normally sustained. The net revenue for each mile of track for each day of June was $10.22, for May $9.58. It should be recalled that net revenue is gross profits, before anything has been taken out for taxes, rentals, interest on bonds, appropriations for betterments, or dividends.

"Taxes for the month of June amounted to $9,129,199, or $40 per mile, an apparent decrease of 11.6 per cent., as compared with June, 1910. That this decrease is not actual is due to the fact that in this month of June, the last of the fiscal year, adjustment is made of the amounts estimated to represent one-twelfth of the annual taxes which are included in the returns reported month by month during the fiscal year. The tax item for the whole fiscal year increased 2.2 per cent. in 1911 as compared with 1910

"The operating ratio for June was 68.6 per cent. compared with 69.5 per cent. in May, 1911, and 67.6 per cent in June, 1910.

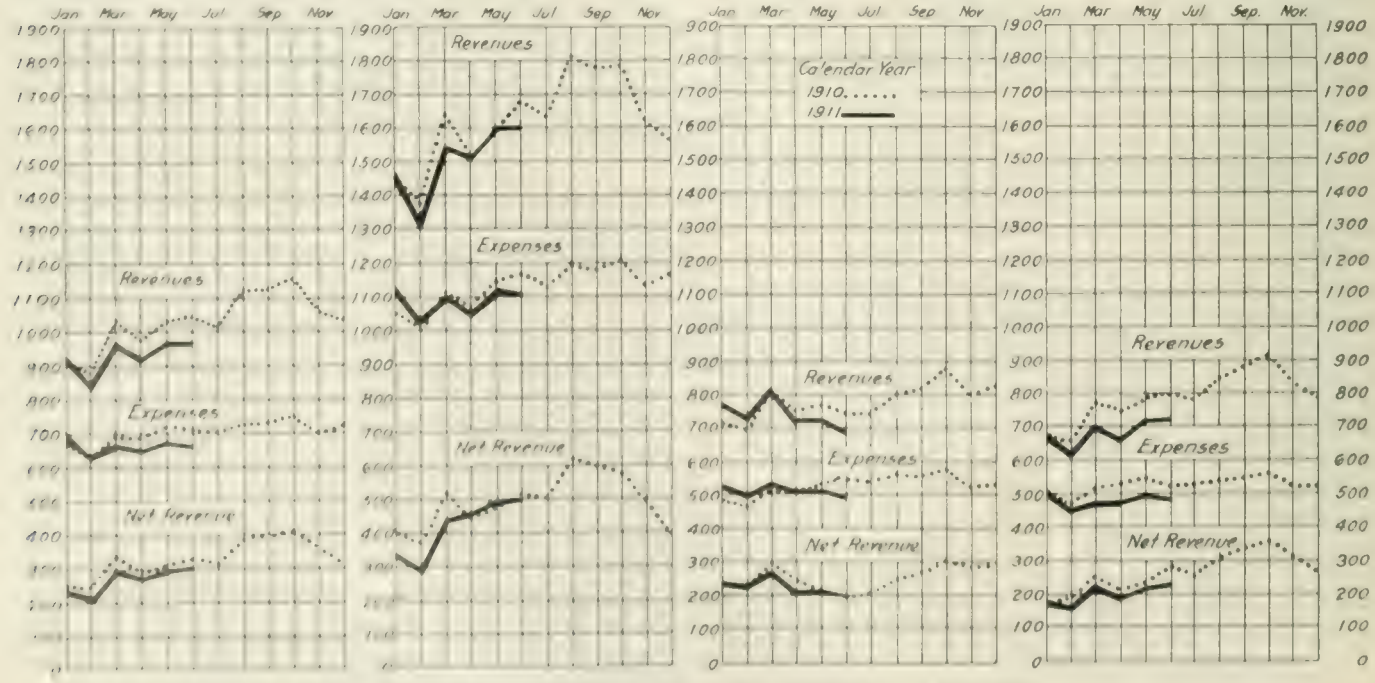
"The western group of railways in June showed a decrease in operating revenues per mile as compared with June, 1910, of 8.5 per cent., while the operating revenues of the eastern and southern groups were respectively very nearly the same as for June, 1910. While the western railways were able to do more towards reducing expenses than the eastern or southern groups, yet they did not succeed in overcoming the decrease in operating revenues. The result is that the net operating revenue of the western group per mile declined 17.2 per cent. in June, as compared with 1910, while the southern group shows an increase of 0.4 per cent., and the eastern group 2.9 per cent. Returns for the whole fiscal year show that taxes increased in 1911, as compared with 1910, 4.7 per cent. for the eastern group, 9.5 per cent. for the southern group, and decreased 1.8 per cent. for the western group."

The following table is an abstract of the selected percentages and averages published in Bulletin No. 19:

	June, 1911.	June, 1910.	Fiscal yr. ended June 30, 1911.	Fiscal yr. ended June 30, 1910.
Percentage of total operating revenues—				
Freight revenue	66.9	68.4	68.6	69.4
Passenger revenue	24.8	23.7	23.8	22.7
Maintenance of way and structures.	14.5	14.7	13.1	13.4
Maintenance of equipment	15.0	14.5	15.4	15.0
Traffic expenses	2.2	2.2	2.1	2.0
Transportation expenses	34.1	33.5	35.6	33.4
Total operating expenses	68.6	67.6	68.7	66.3

Fruitful Farms of Long Island.

The belief, formerly supposed to be quite prevalent in some sections, that the Republican party was the power which ought to be thanked for the favorable weather which gave the country its bountiful crops, was a facetious fiction. To accord to President Peters of the Long Island Railroad the whole credit for the recent great improvement in farming on the barren sands of Quoge, Shinnecock, Massapequa and Speonk, would perhaps also be wide of the mark; and yet, in view of the importance of his initiative in the promotion of scientific methods, beginning six or eight years ago, he can "point with pride," surely. The press agent of the road, in a statement just issued, says that the shipments of produce this year in the single month of August filled 887 cars; and the September record, when made up, will show more than twice as many. Weather conditions have been favorable, and the application of scientific farming methods has been more general than ever before. The August shipments aggregated 13,316 tons, and consisted of fruits, berries, potatoes, cauliflower, cabbage and other garden truck. This quantity represents an increase of 8,087 tons, or 154.7 per cent. over the corresponding month of 1910. The first 1,500 carloads sent to New York City and vicinity in September were made up as follows: Potatoes, 709 carloads; cucumbers, 424; mixed, 112; cauli-



A Comparison of 1910 and 1911 Total Revenues and Expenses.

flower, 88; cabbage, 88; pickles, 43; apples, 36; tomatoes, 22; pears, 6; carrots, 3; turnips, 2; cranberries, 1; watermelons, 1; beets, 1; onions, 1. Thousands of people interested in farm development visit the experimental stations of the road at Medford and Wading River annually to see the modern and model farms, and to learn how more than 350 varieties of vegetables are raised on a very limited acreage, which only six years ago was regarded as worthless property. At the New York State Fair in Syracuse this year Long Island was represented by an entire carload of fruits, vegetables, dairy products, preserves and other commodities.

Appeal to Commerce Court in Pacific Coast Rate Cases.

Counsel for the transcontinental railways on October 3 filed petitions with the Commerce Court, asking it to enjoin the Interstate Commerce Commission from enforcing its orders in the Spokane, Salt Lake and other western rate cases. The preliminary hearing is set for October 17. The roads claim they cannot comply with the commission's orders without unnecessary and harmful disturbances of business conditions and unreasonable reduction of their earnings. They believe the direct reductions in railway earnings which would be made by obedience to the orders would amount to not less than $12,000,000 a year.

In their petitions they deny the constitutionality of the long and short haul clause as amended by the Mann-Elkins act. They contend that even if it be constitutional the commission's orders are not legal. The orders issued by the Commission on June 22, 1911, in the Spokane and other cases forbid the roads in future to make their rates to intermediate points from St. Paul and the Missouri river any more than to the coast; from Chicago more than 7 per cent. higher than to the coast; from Pittsburgh more than 15 per cent. higher and from New York more than 25 per cent. higher. The Commission has specified in other opinions in these cases numerous commodity rates to Spokane, Salt Lake City, etc., which it has held would be reasonable; and the railways say that they could not obey the Commission's order of June 22, and continue to apply their present rates to the Pacific coast without making lower rates to the intermediate points than the very rates to Salt Lake City which the commission itself has held would be reasonable. The position of the roads is stated in the petition presented to the Court as in part follows (Union Pacific Railroad et al vs. United States of America):

"Though the rates now charged by your petitioners on transcontinental traffic moving to Pacific Coast terminals are not fully compensatory and are not as great as your petitioners might reasonably exact for the service rendered, they yield something in excess of the out-of-pocket expense incident to the handling of the traffic moving under said rates, and therefore contribute something to the return which your petitioners are entitled to earn upon their properties, and said order of said commission in requiring your petitioners to forego said terminal business or to reduce their rates to interior points below the just and reasonable rates which they are entitled to charge will result in the taking of your petitioners' property without due process of law and is confiscatory and void. If in order to continue in the business of moving traffic to the Pacific Coast terminals your petitioners were to comply with the requirements of said order of June 22, 1911, by depressing their rates to interior points so that the same should not exceed from Zone No. 1, the rates from Zone No. 1 to the Pacific Coast terminals and so that the same should not exceed from the other zones described in said order the rates to said Pacific Coast terminals by more than the differentials prescribed in said order, your petitioners would be required to accept and carry the business moving to said interior points at rates so low that the entire revenue therefrom, together with all other revenues accruing to your petitioners, would not be a fair return upon the fair value of your petitioners' property devoted to the public service."

INTERSTATE COMMERCE COMMISSION.

The commission has suspended until January 20 the new joint class and commodity rates for freight originating at, and destined to, points on the Birmingham Southern.

The commission on September 28 granted the application of the lines leading out of Minneapolis for leave to withdraw the reduced rates on flour to New York by lake, which had been filed to become effective October 6. The application of the eastern roads, a week previous, for leave to withdraw their consent to the reduced rates, was denied by the commission.

STATE COMMISSIONS.

The Railroad Commission of Louisiana has ordered that cow peas shall be classed as commercial fertilizer and given the same rates as other commercial fertilizer.

Alfred R. Craven, acting chief engineer in charge of rapid transit construction of the New York Public Service Commission, First district, has been appointed chief engineer, with a salary of $15,000.

The Board of Public Utilities of New Jersey has issued a preliminary order under which railways are compelled to sell commutation tickets to Jersey City, Hoboken, Camden and other points in the state. The railways had stopped issuing commutation tickets to these points following changes of rates.

The Railroad Commission of Louisiana has ordered the Louisiana Railway & Navigation Company to reduce its rates on milk to 1½ cents per gal. for 80 miles and under, and to 2 cents per gal. for over 80 miles. The railway is permitted to charge the full rate for the capacity of the can, whether the cans are filled or only partly filled, and shipments of cans having a capacity of more than 10 gal. may be refused. Empty cans are to be returned to the owners free, and shippers may be required to load or assist in loading cans into the cars.

The Railroal Commission of Louisiana, in dismissing a complaint brought by passengers traveling on excursion trains, says in part: "The commission realizes the difficulties which railways have in time of large excursions to run on schedule time or to keep ice water in coaches. Under ordinary circumstances there would have been no excuse for the violation of the rule requiring ice water in passenger coaches, but under the conditions of the excursion, the railway is excusable. However, complaints of this character indicate carelessness on the part of the company which must be limited without delay. The company is warned against reoccurrence in the future."

COURT NEWS.

The docket of the United States commerce court for the October session calls for 14 separate cases in which the railway has appealed from the decision of the Interstate Commerce Commission, two cases where the shipper has appealed from the Interstate Commerce Commission's decision, and one case where the intervener before the commission has appealed from the commission's decision. The total 17 is the number of cases that deal with separate subjects. The appeals from the orders of the Interstate Commerce Commission are as follows: Order fixing rail and water rates on boots and shoes from Boston and New York to Atlanta; order prescribing monthly reports of hours of service of employees; order denying reparation on lumber shipments; order prescribing proportional rates from Rock Island, Ill., to Des Moines, Iowa; order in regard to the allotment of coal cars by the Pennsylvania Rairoad; order establishing class rates from Sacramento, Cal., to points west of Ogden; order prescribing class rates from eastern points to Reno and other points in Nevada; order prescribing class rates from Kansas City, St. Louis, Chicago, Cincinnati and Pittsburgh to Phoenix, Ariz.; order prescribing the rate on beer from Pueblo, Cal., to Leadville; order prescribing rates on lumber from the Southwest to Omaha, etc.; order affecting lighterage charges on sugar at New York; order forbidding the railways to make a distinction in rates between railway fuel coal and other coal; order prescribing local class rates from Roanoke, Va., to Winston-Salem, N. C., etc.; order reducing from $30 to $7.50 per car the charges for refrigeration of pre-iced fruit; the ruling barring claims for reparation presented after two years from date of delivery of freight to consignee; order for reparation to the St. Louis Blast Furnace Co. for unreasonable rates on coke; order discontinuing the allowance of rebilling or reshipping of grain, etc., at Nashville, while refusing the same privilege at Atlanta. The October term of the court opened on Monday.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

N. M. Leach, traffic manager of the International & Great Northern and the Texas & Pacific, with office at New Orleans, La., has been appointed acting assistant to the president.

W. J. Stoneburner, general manager of the Texas City Terminal Company, at Texas City, Tex., has been elected vice-president and general manager, and R. E. Tipton, general freight agent, has been elected secretary.

The title of Henry Martin, whose appointment as general manager of the International & Great Northern, with office at Houston, Tex., was announced in these columns last week, is second vice-president and general manager, his election as second vice-president having been previously announced.

R. B. Hackney, commercial agent of the Cincinnati Northern at Cincinnati, Ohio, has been elected president and treasurer of the Ohio River & Columbus, the Cincinnati, Georgetown & Portsmouth and the Felicity & Bethel, with office at Cincinnati. C. J. Finger, secretary, treasurer and auditor of the Ohio River & Columbus, has been appointed auditor of the three roads.

Charles M. Hays, president of the Grand Trunk, who has been also president of the Canadian Express Company, has been elected chairman of the board of the latter company. John Pullen, heretofore assistant freight traffic manager of the Grand Trunk, has been elected president of the Canadian Express Company (not vice-president and general manager, as was announced in these columns last week) succeeding Mr. Hays.

G. R. Cottingham, secretary and auditor of the Galveston, Harrisburg & San Antonio, and the Texas & New Orleans, at Houston, Tex., has been appointed auditor of the Houston & Texas Central, the Houston East & West Texas, and the Houston & Shreveport, with office at Houston, succeeding C. C. Barry, who has been appointed auditor of the Texas & New Orleans, with office at Houston, succeeding Mr. Cottingham. The offices of assistant auditor, freight auditor and car accountant of the Texas & New Orleans have been abolished.

Incident to a change in the organization of the executive departments of the Harriman Lines, Judge R. S. Lovett, who has retired from the office of president, has been elected chairman of the executive committee of all those lines. The office of J. Kruttschnitt, director of maintenance and operation, has been moved from Chicago to New York. L. J. Spence, principal assistant to J. C. Stubbs, has been selected to succeed Mr. Stubbs on his retirement on January 1, 1912, as director of traffic, and his office will be in New York. A. L. Mohler, vice-president and general manager of the Union Pacific at Omaha, Neb., has been elected president of that road, with office at Omaha. William Sproule, president of Wells, Fargo & Company, has been elected president of the Southern Pacific Company, with office at San Francisco, Cal. J. D. Farrell, vice-president and general manager of the Oregon-Washington Railroad & Navigation Company at Seattle, Wash., has been elected president of that company with office at Portland, Ore. Thornwell Fay, vice-president and general manager of the Southern Pacific lines in Texas and Louisiana at Houston, Tex., has been elected president of those lines, with office at Houston, and Epes Randolph, vice-president of the Southern Pacific Railroad Company of Mexico at Tucson, Ariz., has been elected president of that company with office at Tucson

(See article on page 629.)

E. H. Fitzhugh, first vice-president of the Grand Trunk, at Montreal, Que., having been elected president of the Central Vermont Railway, the Central Vermont Transportation Co., the Southern New England Railroad Corporation, the Southern New England Railway and the Montreal & Southern Counties Railway, relinquishes his duties in connection with his former position to devote his time to the affairs of the companies named. He will also perform such duties in connection with other subsidiary lines of the Grand Trunk as may hereafter be assigned to him. The practice of designating the several vice-presidents of the Grand Trunk by numbers has been discontinued. William Wainwright, second vice-president, is now vice-president; M. M. Reynolds, third vice-president, is now vice-president, in charge of financial and accounting departments; Howard G. Kelley, chief engineer, has been elected vice-president, in charge of construction, transportation and maintenance departments. J. E. Dalrymple, assistant freight traffic manager of the Grand Trunk Pacific, has been elected vice-president of the Grand Trunk, in charge of traffic, as was announced in these columns last week. Mr. Dalrymple has been elected also fourth vice-president of the Grand Trunk Pacific, in charge of traffic. R. S. Logan, assistant to president of the Grand Trunk and the Grand Trunk Pacific, has been elected vice-president, in charge of land, tax, claims and mail departments, and D. E. Galloway, succeeds Mr. Logan, all with offices at Montreal.

B. D. Caldwell, vice-president of the Delaware, Lackawanna & Western, at New York City, has been elected president of Wells, Fargo & Co., succeeding William Sproule. Mr. Caldwell was born in Placerville, Cal., in 1858, and began railway work in 1873, as a clerk in the auditor's office of the Vandalia Railroad at Terre Haute, Ind. In 1881 he was appointed chief clerk in the general passenger and ticket department of the same road at St. Louis, Mo., and in 1885 he was appointed chief clerk in the general passenger and ticket department of the Missouri Pacific and the St. Louis, Iron Mountain & Southern railways at St. Louis. He remained in this position until 1888, when he was appointed assistant general passenger agent of these lines. In June, 1892, he was elected chairman of the Western Passenger Association, with headquarters at Chicago, Ill., which position he held until he was appointed traffic manager of the Delaware, Lackawanna & Western in July, 1899, and since April 25, 1902 he has been vice-president in charge of traffic of the same road.

B. D. Caldwell.

Operating Officers.

W. H. Beeks, car superintendent of the Georgia, Southern & Florida, at Macon, Ga., has resigned.

Warren B. Nissly has been appointed superintendent of the Schuylkill Navigation Company, succeeding E. F. Smith, retired.

H. W. Weems has been appointed trainmaster of the Shreveport, McKinney and Mineola divisions of the Missouri, Kansas & Texas.

Edward C. Hall, assistant general manager of the East Broad Top Railroad & Coal Co., has been appointed general manager, with office at Orbisonia, Pa.

J. W. Martz has been appointed trainmaster of the First and Second districts of the First division of the Denver & Rio Grande, with office at Pueblo, Colo., succeeding H. S. Monehan, resigned.

J. W. Roberts, car accountant of the Vandalia Railroad, at Terre Haute, Ind., has been appointed superintendent of car service, with office at Terre Haute, and his former office has been abolished.

H. Billings, district freight solicitor and agent of the Union Line of the Pennsylvania Railroad, at Philadelphia, Pa., has been appointed eastern superintendent, with office at Philadelphia, succeeding V. C. Williams, promoted.

William F. Ray, superintendent of the Concord division of the Boston & Maine, at Concord, N. H., has been appointed super-

intendent of the Portland division, with office at Boston, Mass., succeeding William Merritt, resigned.

R. M. White, division engineer of the Scranton and Bangor & Portland divisions of the Delaware, Lackawanna & Western, at Scranton, Pa., has been appointed superintendent of the Bangor & Portland division, with office at Easton, Pa.

M. C. Hughes, trainmaster of the Chicago, Burlington & Quincy at Burlington, Iowa, has been appointed trainmaster of the St. Joseph division, with office at St. Joseph, Mo., succeeding H. R. Lewellyn, transferred. N. C. Allen, trainmaster at Centerville, Ia., succeeds Mr. Hughes.

J. A. Fox, superintendent of the Ashland division of the Chesapeake & Ohio, at Ashland, Ky., has been appointed superintendent of the Chicago division, with office at Peru, Ind., succeeding M. S. McDonald, transferred. W. L. Booth, assistant superintendent of the Cincinnati division, succeeds Mr. Fox, and his former position has been abolished.

William J. English, chief trainmaster of the Erie Railroad, at Jersey City, N. J., has been appointed assistant superintendent of the New York division of the Erie and the New Jersey & New York, with office at Jersey City. J. G. June, engineer of the New York division, has been appointed assistant superintendent of terminals, with office at Jersey City.

John Dwyer, superintendent of the Wyoming division of the Colorado & Southern at Cheyenne, Wyo., has been appointed superintendent, with office at Denver, Colo., succeeding W. M. Bacon, resigned to accept service with another company. H. E. Renick, also superintendent at Denver, has had his jurisdiction extended over the Wyoming division, succeeding Mr. Dwyer.

H. B. Lancaster, W. H. Dressel, L. L. Wyckoff and M. C. Williams have been appointed assistant superintendents of the Oregon-Washington Railroad & Navigation Company, under the Hine system of operation, all with offices at North Yakima, Wash. The titles of master mechanic, division engineer and chief despatcher have been discontinued on the Yakima division.

W. Wackher, assistant superintendent of the Cherokee, Joplin and Neosho divisions of the Missouri, Kansas & Texas at Parsons, Kan., has been appointed assistant superintendent of the Parsons, Sedalia and Kansas City divisions and the El Dorado and Iola branches, with office at Parsons, succeeding K. A. Easley, promoted. F. P. Stocker succeeds Mr. Wackher.

The Chesapeake & Ohio of Indiana having been divided into two districts, W. B. Allen, formerly trainmaster with jurisdiction over the entire line, has been appointed trainmaster with jurisdiction over the Wabash district, from Marion to Hy Tower, with office at Peru, Ind. G. J. Derbyshire, train despatcher of the Chesapeake & Ohio at Ashland, Ky., has been appointed trainmaster of the Miami district, from Marion to Summit, with office at Richmond, Ind.

John Jermone Corcoran, who has been appointed superintendent of the Cincinnati, Hamilton & Dayton, with office at Dayton, Ohio, was born March 27, 1868, at Wood Lawn, Ohio, and graduated in 1884 from St. Xavier's College, Cincinnati, Ohio. He began railway work with the Cincinnati, Hamilton & Dayton in 1886 as a coach carpenter in the shops at Cincinnati. He was successively locomotive fireman, locomotive engineer and traveling engineer, and from December, 1905, to April, 1910, was trainmaster, with office at Lima, Ohio. He was then for six months traveling engineer of the Chicago Great Western at Des Moines, Iowa, returning to the Cincinnati, Hamilton & Dayton as inspector of transportation in September, 1910. He was appointed trainmaster, with jurisdiction over the Toledo division, three months later, which office he held until his promotion to superintendent as above.

James M. Shea, whose appointment as general superintendent of the Seaboard Air Line, with office at Portsmouth, Va., has been announced in these columns, was born June 5, 1859, at Philadelphia, Pa., and was educated in the public schools. He began railway work in 1873 as a telegraph messenger on the Philadelphia & Reading, and in 1875 was placed in charge of the telegraph office. Three years later he went to the Shenandoah Valley Railroad, now a part of the Norfolk & Western, as relief clerk, and two years later was transferred to the Norfolk & Western, he was consecutively, train despatcher, chief train despatcher and trainmaster on that road. In June, 1898 he went to the South Carolina & Georgia as trainmaster, and in 1901, when the Southern Railway took over this company, he was transferred to the Washington division as chief despatcher. In May, 1902 he went to the Seaboard Air Line as yardmaster, at Portsmouth, Va., and the same year was appointed trainmaster of the First division, becoming superintendent of the Sixth division in 1905. Mr. Shea was then superintendent of the Birmingham division, and later superintendent of the Second division, and at the time of his recent appointment was superintendent of the Third division, with office at Atlanta, Ga.

Traffic Officers.

L. S. Winslow has been appointed general baggage agent of the Chicago & Eastern Illinois, with office at Danville, Ill.

J. A. Hickman has been appointed assistant westbound agent of the Cleveland, Cincinnati, Chicago & St. Louis, with office at St. Louis, Mo.

S. Halline, traveling freight agent of the Missouri, Kansas & Texas at Denver, Colo., has been appointed commercial agent, with office at Denver.

G. F. Kay has been appointed soliciting freight agent of the Queen & Crescent Route, with office at Dallas, Tex., succeeding G. C. Whitney, promoted.

M. G. Murphy has been appointed district passenger agent of the Canadian Pacific, with office at Toronto, Ont., succeeding R. L. Thompson, resigned.

W. D. Jones, district passenger agent of the Chicago Great Western at Pittsburgh, Pa., has been appointed soliciting freight agent of the Tennessee Central, with office at Chicago.

George C. Whitney has been appointed an agent of the Alabama Great Southern and the Cincinnati, New Orleans & Texas Pacific, to solicit interstate freight from points in Texas.

George F. Hutchinson, assistant general agent of the Adams Express Company at Chicago, has been appointed general agent of the Northern Express Company, with office at Chicago.

C. J. Hooker has been appointed traveling freight and passenger agent of the Texas Central, with office at Waco, Tex., succeeding Elbert Blair, resigned to accept service with another company.

H. S. Hinton, formerly commercial agent of the Texas & Pacific at Shreveport, La., has been appointed tariff inspector, with office at Dallas, Tex., succeeding A. Baker, assigned to other duties.

John S. Moses, soliciting freight agent of the Cincinnati Northern at Cincinnati, Ohio, has been appointed commercial agent, with office at Cincinnati, succeeding R. B. Hackney, resigned.

R. B. Herrington, soliciting freight agent of the Tennessee Central at St. Louis, Mo., has been appointed traveling freight agent, with headquarters at St. Louis, and W. Morgan succeeds Mr. Herrington.

F. E. Pettibone, contracting freight agent of the Chicago Great Western at Milwaukee, Wis., has been appointed general agent in the freight department, with office at Milwaukee, succeeding J. H. Sayle, resigned.

R. H. Winchester has been appointed traveling passenger agent of the Chicago & Alton and the Toledo, St. Louis & Western, with office at Pittsburgh, Pa., succeeding J. W. O'Brien, resigned to accept service with another company.

L. J. Spence, assistant director of traffic of the Harriman Lines at Chicago, will become director of traffic of all those lines, effective January 1, 1912, on the retirement of J. C. Stubbs from that position, and his office will be removed from Chicago to New York. (See article on page 629.)

E. T. Willcox, assistant general freight agent of the St. Louis & San Francisco, at Memphis, Tenn., has been appointed assistant general freight agent, with office at St. Louis, Mo., and George F. MacGregor, freight claim agent at St. Louis, succeeds Mr. Willcox, the office of freight claim agent having been abolished.

R. J. Smith, general agent of the Great Northern at Cincinnati, Ohio, has been appointed district freight and passenger agent, with office at Grand Forks, B. C., succeeding V. Kistler,

assigned to other duties. W. E. Hunt, traveling freight agent at St. Louis, Mo., succeeds Mr. Smith, and R. C. Foote succeeds Mr. Hunt.

P. A. Marr, district passenger agent of the Illinois Central at Pittsburgh, Pa., has been transferred to Cincinnati, Ohio. G. G. Truesdale, city passenger agent at Chicago, succeeds Mr. Marr, and J. P. Brown, traveling passenger agent at Nashville, Tenn., succeeds Mr. Truesdale. H. C. Cantwell, Florida passenger agent at Jacksonville, Fla., succeeds Mr. Brown, and S. C. Baird succeeds Mr. Cantwell.

John William Loud, freight traffic manager of the Grand Trunk, the Grand Trunk Pacific and the Central Vermont, with headquarters at Montreal, Que., who was retired under the pension rules on September 30, as has already been announced in these columns, was born March 10, 1846, at Warwickshire, Eng. He received a commercial education and began railway work August 9, 1861, with the Midland Railway Company of England, remaining in the service of that company until August, 1872. The following month he went to the Grand Trunk as a clerk in the general freight agent's office at Montreal, and in January, 1875, was appointed freight agent at Hamilton, Ont. From April, 1875, to August, 1877, he was chief clerk to the assistant general freight agent at Toronto, and then for about four years was chief clerk to the general freight agent at Montreal. In November, 1881, he was appointed freight agent at Toronto, and in January, 1887, was appointed general freight agent in charge of through traffic, with office at Detroit, Mich. From September, 1889, to February, 1896, he was traffic manager of the Detroit, Grand Haven & Milwaukee, and from February, 1896, to April, 1900, was general freight agent of the Grand Trunk. Mr. Loud has been freight traffic manager of the Grand Trunk and the Central Vermont since May, 1900, and since September, 1907, was also freight traffic manager of the Grand Trunk Pacific.

Engineering and Rolling Stock Officers.

Frank L. Brooks has been appointed supervisor of bridges and buildings of the Rutland Railroad, with office at Rutland, Vt.

H. R. Safford has been appointed chief engineer of the Grand Trunk, with office at Montreal, Que., succeeding H. G. Kelley, promoted.

R. E. French has been appointed master mechanic of the Liberty-White Railroad, with office at McComb City, Miss., succeeding S. C. Honea, resigned.

J. P. Congdon, supervising engineer of the Oregon Short Line, with office at Pocatello, Idaho, has resigned to engage in the general practice of his profession at Boise and Pocatello.

Stephen Motta, general foreman of the Aguascalientes shops of the National Railways of Mexico, has resigned to become master mechanic of the National Iron & Steel Works, Mexico City, Mexico.

J. C. Baxter, division engineer of the Oregon Trunk Railway at Portland, Ore., has been appointed division engineer of the Oregon Electric Railway, in charge of construction of the line from Salem, Ore., to Albany.

C. D. Young, assistant engineer of motive power of the Pennsylvania Lines West, at Pittsburgh, Pa., has been appointed engineer of tests, of the Pennsylvania Railroad, with office at Altoona, succeeding E. D. Nelson.

J. W. Gibbs, foreman of locomotive repairs of the Southern Railway, at Alexandria, Va., has been appointed master mechanic of the Virginia & Southwestern, with office at Bristol, Va.-Tenn., succeeding R. G. Cox, resigned.

Charles H. Mayo, engineer of grade crossings of the Erie Railroad at New York City, has been appointed principal assistant engineer, with office at New York. Robert C. Falconer, assistant engineer at New York, has been appointed engineer of grade crossings, with office at Jersey City, N. J., succeeding J. G. June, transferred.

F. I. Cabell, chief engineer maintenance of way of the Chesapeake & Ohio at Richmond, Va., has been appointed chief engineer, with headquarters and office at H. Pierce, chief engineer of construction, has been transferred. The chief engineer will assume the duties of the chief engineer, have charge of all construction work and will in addition provide standards for the maintenance of way department.

D. W. Thrower, roadmaster of the Yazoo & Mississippi Valley at Memphis, Tenn., has been appointed roadmaster of the Illinois Central, with office at Chicago, succeeding G. E. Boyd, resigned to accept service with another company. J. L. Downs, roadmaster of the Yazoo & Mississippi Valley at Vicksburg, Miss., succeeds Mr. Thrower, and E. I. Rogers, engineer in charge of construction forces at New Orleans, succeeds Mr. Downs.

G. E. Boyd, formerly roadmaster of the Illinois Central, at Chicago, has been appointed superintendent of bridges and buildings of the Delaware, Lackawanna & Western, with office at Scranton, Pa., succeeding W. B. Hixson, deceased. L. L. Tallyn, superintendent of water service, at Scranton, has been appointed division engineer of the Scranton and Bangor & Portland divisions, at Scranton, in charge of engineering and water service, succeeding R. M. White, transferred.

W. P. Hobson, master mechanic of the Cincinnati division of the Chesapeake & Ohio, at Covington, Ky., has been appointed superintendent of motive power of the Kentucky & Indiana general division, succeeding W. T. Smith, retired. H. M. Brown succeeds Mr. Hobson, and H. C. Gillispie, general foreman at Russell, Ky., has been appointed master mechanic of the Chicago division, with office at Peru, Ind., succeeding C. H. Doebler, who becomes assistant master mechanic of the Huntington division, with office at Huntington, W. Va. M. I. Forbes, engineer of the Ashland division, has been appointed engineer of the Cincinnati division, with office at Covington, Ky., succeeding F. H. Haskell, transferred. A. E. Botts, assistant engineer of the Kentucky & Indiana general division, succeeds Mr. Forbes, and C. E. Roland succeeds Mr. Botts.

Purchasing Officers.

J. N. Shaw, secretary to the president of the Delaware, Lackawanna & Western, at New York, has been appointed general storekeeper, with office at Scranton, Pa., succeeding W. F. Girten, resigned.

M. S. McDonald, superintendent of the Chicago division of the Chesapeake & Ohio, has been appointed superintendent of stores, with headquarters at Huntington, W. Va., in charge of all stores of the company, both in the maintenance of way and motive power departments. He will report to the general manager. The general storekeeper will report to the superintendent of stores, and the division storekeeper will report to the general storekeeper, instead of to the master mechanics.

Special Officers.

Herman Von Schrenk has been appointed consulting timber engineer of the St. Louis & San Francisco, with headquarters at St. Louis, Mo., reporting to W. C. Nixon, vice-president.

OBITUARY.

J. V. Clayman, formerly traveling passenger agent of the Chicago, Burlington & Quincy at Cincinnati, Ohio, died at Spokane, Wash., on September 21.

Robert Given, assistant claim agent of the Missouri, Kansas & Texas of Texas with office at Dallas, Tex., died at his home in Oak Cliff, Tex., on September 22.

F. H. Scheffer, superintendent of machinery of the Nashville, Chattanooga & St. Louis, at Nashville, Tenn., died on October 2 at Chicago. Mr. Scheffer was born August 8, 1855, at Orebo, Sweden, and graduated from the Polytechnical Institute at Munich, Germany, in 1880. The following year he began railway work as a machinist on the Pennsylvania Railroad, and in March, 1882, he was appointed draughtsman. He left the service of that company in September, 1883, to go in the same capacity to the New York, West Shore & Buffalo, now a part of the West Shore Railroad. From December, 1883, to June, 1887, he was assistant chief draughtsman of the Norfolk & Western, and then for four months he was chief draughtsman of the Cincinnati, New Orleans & Texas Pacific. In October, 1887, he went to the Nashville, Chattanooga & St. Louis as chief draughtsman. From September, 1892, to February, 1903, he was general foreman on the same road, and was then appointed superintendent of machinery.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Oregon Electric, Portland, Ore., is in the market for 4 electric locomotives.

The San Pedro, Los Angeles & Salt Lake is said to be in the market for 6 mikado locomotives. This item has not been confirmed.

The Boston & Maine, it is said, is making inquiries for 50 locomotives. This item has not been confirmed.

The International & Great Northern is said to be in the market for 20 freight locomotives. This item has not been confirmed.

The Buffalo Creek & Gauley has ordered 1 consolidation locomotive from the Baldwin Locomotive Works. The dimensions of the cylinders will be 20 in. x 24 in., the diameter of the driving wheels will be 50 in., and the total weight in working order will be 137,000 lbs.

The Toronto, Hamilton & Buffalo has ordered 2 superheater consolidation locomotives from the American Locomotive Company. The dimensions of the cylinders will be 23 in. x 28 in., the diameter of the driving wheels will be 55 in., and the total weight in working order will be 201,000 lbs.

CAR BUILDING.

The New York Central is making inquiries for from 1,000 to 2,000 box cars.

The Oregon Electric, Portland, Ore., is in the market for 6 motor cars and 10 coaches.

The Delaware, Lackawanna & Western is making inquiries for from 100 to 200 refrigerator cars.

The Boston & Maine, it is said, is making inquiries for 50 passenger cars and 500 freight cars. This item has not been confirmed.

The International & Great Northern is said to be in the market for 20 coaches and 500 coal cars. This item has not been confirmed.

The Erie has ordered 100 refrigerator cars from the Pullman Company and 100 refrigerator cars from the Western Steel Car & Foundry Company.

The Florida East Coast has ordered 50 flat cars and 150 hopper cars from the Pressed Steel Car Company, and 16 passenger cars from the Pullman Company.

The Fidelity Securities Corporation, Nashville, Tenn., is making inquiries for 4 interurban single end operation steel passenger car bodies and 1 double end operation steel baggage car body.

The Lehigh Valley is taking prices on 15 four-wheel-truck combination baggage and postal cars, 5 four-wheel-truck combination baggage and passenger cars, and 5 six-wheel-truck combination baggage and passenger cars.

The Pennsylvania, mentioned in the *Railway Age Gazette* of September 22 as making inquiries for 1,150 freight cars and from 75 to 100 steel passenger and baggage cars, has ordered 850 gondola cars and 300 hopper cars from the Cambria Steel Company.

The Buffalo, Rochester & Pittsburgh has ordered 500 fifty-ton all-steel hopper cars from the Pressed Steel Car Company, 500 fifty-ton all-steel hopper cars from the Standard Steel Car Company and 500 fifty-ton all-steel hopper cars from the Cambria Steel Company.

The Louisville & Nashville, mentioned in the *Railway Age Gazette* of September 29 as being in the market for 1,000 steel underframes for reinforcing box cars and hopper cars, has divided this order equally between the Pressed Steel Car Company and the Mt. Vernon Car Manufacturing Company.

IRON AND STEEL.

The Boston & Maine has ordered 600 tons of bridge steel from the Boston Bridge Company.

The Pennsylvania has ordered 5,000 tons of structural steel from the Fort Pitt Bridge Company.

The Missouri Pacific has ordered 1,800 tons of rails for use on the St. Louis, Iron Mountain & Southern.

The New York Central is in the market for 1,500 tons of bridge steel for the bridge at Oswego, N. Y.

The Atchison, Topeka & Santa Fe has ordered 20,000 tons of 90-lb. open hearth rails from the Illinois Steel Company.

The Hagerstown & Clearspring, Hagerstown, Md., has placed an order for 1,200 tons of rails with the Maryland Steel Company.

The Hagerstown & Clear Spring, Hagerstown, Maryland, has ordered 1,200 tons of rails from the Maryland Steel Company.

The Pittsburgh & Lehigh Dock Company has divided an order for 2,050 tons of structural steel for coal handling bridges at Duluth, Minn., between the Milwaukee Bridge Company and the Minneapolis Steel & Machinery Company.

General Conditions in Steel.—Conditions in the steel industry are very unsettled. The mills are operating at a large percentage of their capacity, due to the large number of small orders. Prices are distressingly low and there is reason to believe that the bottom has not yet been reached. Price conferences between the heads of the Steel Corporation and the independent steel companies have been discontinued on account of the investigation, and the result is an open market. The margin of profit is very narrow, and in some cases almost nil, so any further reduction of prices will very likely be accompanied by a downward revision of wages. The strike on the Harriman Lines and the war are disturbing features.

MACHINERY AND TOOLS.

The Louisville & Nashville has ordered from the Ingersoll-Rand Company a cross compound, Corliss, type 0-6 air compressing engine having a 36-in. stroke and a capacity of 4,000 cu. ft. per minute. The machine will be used in the shops at South Louisville, Ky.

FOREIGN RAILWAY NOTES.

The Great Northern Central line in Columbia starts from Puerto Wilches, on the Magdalena river, and is under construction toward Bucaramanga, with the ultimate expectation of being built to the capital. Work was temporarily suspended in July, 1910, but the line is in operation for a short distance.

A concession has been granted for a new railway from Leoganes to Aux Cayes, in the southern part of Haiti. The line will pass through Leoganes, Grand Goave, Petit Goave, Miragoane, Aquin, St. Louis, and Cavaillon, to Les Cayes, a distance of 100 miles. Branch lines can be built to Port au Prince, Jacmel, Asile, Anse a Veau, Jeremie, and Port Salut.

Additions were made during 1910 to many of the northern lines of Brazil, which will tend to bring into close communication the states of Ceara, Rio Grande do Norte, Parahyba, Pernambuco and Alagoas. The Federal government entered into a new contract with the company controlling the lines in the last-named state, whereby certain extensions of existing lines and new branches are to be constructed, which, when completed, will form a system traversing the greater part of the state and connecting it with Goyaz on the west and Minas Geraes on the south. The Timbo and Propria line, which is to form part of this system, will, when completed, form the connecting link with the state of Sergipe. When a connection is established between this line and Maceio, in Alagoas, and those contemplated in Bahia and Minas Geraes have been completed, all the Atlantic ports from Natal south will have rail connection.

Supply Trade News.

The Chicago Pneumatic Tool Company, Chicago, has made the Holden Company, Montreal, Que., its general sales agency in Canada.

Morris M. Rosenwald, of Chicago, has been made a director of the Westinghouse Air Brake Company, Pittsburgh, Pa., succeeding George C. Smith, for many years connected with the Westinghouse interests, but who recently resigned from all the Westinghouse companies.

The Roberts & Schaefer Company, Chicago, has been awarded a contract by the Illinois Central for designing and constructing, complete in operation, a 500-ton Holmen counterbalanced bucket locomotive coaling station at Carbondale, Ill. The approximate contract price will be $12,000.

The Nathan Manufacturing Company, New York, has adopted the use of vanadium bronze in the manufacture of its products. After two years of tests a special mixture was adopted which has a tensile strength of 71,000 lbs., and an elastic limit of 28,000 lbs. It was found that by the use of this mixture the life of the metal was increased. The Nathan company is the exclusive user of this mixture in the manufacture of injectors, lubricators and other articles made by it.

The Western Electric Company, Chicago, recently established a new record by making and shipping 15,000 ft. of 100 pair lead covered cable in two days. This cable was ordered by the Southern Bell Telephone Company to re-establish communication at Charleston, S. C., after the hurricane. In filling this order, nearly 12,000 lbs. of copper conductor, over 40,000 lbs. of lead, and over 1,300 lbs. of tin were used. The Western Electric Company uses annually, in the manufacture of telephone cable, 20,000,000 lbs. of copper conductor, over 100,000,000 lbs. of lead, 3,000,000 lbs. of tin and 4,000,000 lbs. of insulating paper.

TRADE PUBLICATIONS.

Linseed Oil.—The Sterling Varnish Company, Pittsburgh, Pa., has published a small folder explaining the difference between the hot and cold pressed linseed oil and the company's raw refined linseed oil.

Pyroscope.—The Shore Instrument & Manufacturing Company, New York, has issued a pamphlet on the pyroscope, which is an optical pyrometer. The instrument is described, its advantages mentioned, and several rules are given concerning the heat treatment of different steels.

Electric Machinery.—The Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.; has issued Circular No. 1190, which gives a description of the construction and the power factor conditions of the company's type *E*, 50-1100 k. v. a., 2-phase, 60-cycle, 240-2400 volt, engine-driven, a. c. generators; also circular No. 1028, which describes the Westinghouse rotary converters.

Locomotives.—The American Locomotive Company, New York, has issued bulletin No. 1010 entitled What Mallet Locomotives Save and Why, based on results of recent tests on the Norfolk & Western. The tests were made on the division between Roanoke, Va., and Christiansburg where there is a continuous grade of about 1.32 per cent. and the results showed that one Mallet locomotive could haul a train of 1,180 ton that formerly required two Mallet locomotives and a class W consolidation locomotive working together, and that the Mallet used 36 per cent. less coal.

Locomotive Fireboxes.—The Jacobs-Shupert United States Fire-[illegible] Company, New York, has recently issued a complete catalog on the Jacobs-Shupert sectional firebox. It is printed on heavy 8 in. x 11 in. glazed paper, and is bound in stiff covers. There are 100 pages, well illustrated with photographs and drawings. It is divided into twelve chapters which give a general description of the construction, the advantages, its action, its service, the water circulation, the inspection, the cost of maintenance and repairs for this type of firebox. The important advantages claimed for this firebox are its safety and its improved water circulation. The catalog contains reports of tests.

Railway Construction.

New Incorporations, Surveys, Etc.

Aroostook Valley.—See St. John & Quebec.

Atchison, Topeka & Santa Fe.—This company is planning to carry out double-tracking work on 112 miles and put in sidings every five miles, between Denver, Colo., and Pueblo.

British Columbia Electric.—A contract has been given to Moore & Pethick for building an 18-mile extension along the Saanich peninsula, near Victoria, B. C.

Buckhannon & Northern.—This company is building from South Rivesville, W. Va., where connection is made with the Baltimore & Ohio, north to the West Virginia-Pennsylvania state line on the west side of the Monongahela river, under a West Virginia charter; and the Monongahela Railroad under a Pennsylvania charter, is being built from the West Virginia-Pennsylvania state line, north to New Geneva, to a connection with the existing line of the Monongahela Railroad. A grading contract has recently been given to McMennemin & Sireus, Morgantown, W. Va. Arrangements have been made to run trains from Fairmont, over the Baltimore & Ohio tracks, to South Rivesville. The Monongahela Railroad and the Buckhannon & Northern are owned by the same interests.

California Roads (Electric).—A line is to be built from Indian Falls, Cal., near Quincy, it is said, via Indian Creek, to a junction with the Western Pacific. G. H. Goodhue, Indian Falls, is interested.

An electric railway is to be built, it is said, from San Jose, Cal., to New Almaden, about 11 miles. C. P. Andrews is interested.

Canadian Northern.—This company has finished work, it is said, laying 80-lb. rail on the line between Saskatoon, Sask., and Regina, 160 miles. The entire line has been ballasted.

Canadian Pacific.—The Esquimalt & Nanaimo is to be extended, it is said, north to Comox, B. C., and Campbell river.

Chicago & North Western.—An officer is quoted as saying that the new line from Wyeville, Wis., northwest to Milwaukee, will be opened for freight traffic on November 1.

Colorado & Southern.—The new line from Wellington, Colo., north to Cheyenne, Wyo., is to be opened for traffic on October 8. (January 27, p. 183.)

Creston, Winterset & Des Moines.—An officer writes that the plans call for building from Creston, Iowa, north to Spalding, thence northeast via Macksburg and Winterset to Des Moines, about 70 miles. It is the intention to build the section from Creston to Macksburg next year. One half of the proposed cost of this section has been secured by the sale of stock, and it is expected that a bond issue will be made for the other half. Construction work will not be started until 1912. The contract for carrying out the work will be let as soon as the bond issue is secured. There will be only one steel bridge of any importance. Steam will be used as the motive power for handling freight traffic, and gasolene motor cars for the passenger and express service. R. Brown, president, Creston; C. E. Wilson, vice-president, Macksburg; M. F. Harris, second vice-president, Winterset; A. S. Lynn, secretary, Orient, and W. W. Walker, treasurer, Macksburg. (September 29, p. 615.)

Des Chutes Railway.—See Oregon-Washington Railroad & Navigation Company.

Esquimalt & Nanaimo.—See Canadian Pacific.

Florida, Alabama & Gulf.—An officer writes that work has been completed on this line from Falco, Ala., south to Galliver, Fla., 26 miles, where connection is made with the Louisville & Nashville. The principal commodities to be carried are lumber, naval stores, cotton, etc. W. K. Hyer, Jr., president, Falso, Ala.

Grand Trunk Pacific.—An officer sends us the following particulars of the work being carried out by that company: Melville-Regina branch, 98 miles, track laying has been finished. Regina Boundary branch, 130 miles is under construction, grading is 95 per cent. completed and track laying is to be started soon;

Regina-Moose Jaw branch, 40 miles, grading is finished on 30 miles, track laying has not yet been started; Moose Jaw Northwest branch, 48 miles, one-half the grading has been finished, track laying has not yet been started; Young Prince Albert branch, 112 miles, grading has been finished on 86 miles, and track laying on 67 miles; it is expected that all the track will be laid this coming fall. Alberta Coal branch, 56 miles, grading has been finished on 60 per cent. and track laying on 6 miles; Battleford branch, 48 miles, grading is finished on 70 per cent., and 22 miles is ready for track laying; this work has not yet been started. Grading has just been started on the Harte-Brandon branch, and on the Cut Knife branch, the latter is to be 50 miles long; Biggar-Calgary branch, 104 miles, is now under contract, and 50 miles is ready for track laying, work on the rest of the line has been started; Calgary branch, 202 miles, track has been laid on 105 miles, and grading beyond this point has been finished on 75 per cent.; track laying is now in progress. The contractors carrying out this work are J. D. McArthur, Winnipeg, Man.; Rigby & Plummer, Winnipeg; Phelan & Sherley, Bickerdike, Alb.; Lamoreux & Peterson, Battleford, Sask.; J. Daudelin, Battleford, and Duncan McArthur, Winnipeg. Contracts for the remaining 420 miles to complete the main line have been let to Foley Bros., Welch & Stewart.

Kettle River Valley.—An officer writes that work is now under way from Midway, B. C., to Merritt, on about 250 miles. Since the work began in June, 1910, about 65 miles of grading has been finished and track has been laid on 50 miles. It is expected that before the end of 1911, the company will complete an addition 25 miles of track and 10 or 15 miles of grading. Contracts have recently been let for 75 miles of new work, which includes a section of 40 miles to complete the line to Osprey lake, and on a section of 35 miles, from Mile 35 north of Midway, to the Kettle Okanagan summit. No additional contracts will be let for several months. L. M. Rice & Co. are the contractors and are associated with Boomer & Hughes and Grant, Smith & Co.

Louisville & Nashville.—According to press reports, a contract has been given to T. J. Asher, Wasioto, Ky., to build an extension from Harlan, up Clover fork to Ages creek. This line will reach coal fields in Harlan county. It is thought that the extension will eventually be continued to Appalachia, Va., about 40 miles.

Mexican Roads.—The construction of several new and independent lines of railway will soon be started in Mexico, if applications to the federal government for concessions that are now pending, are granted. These include the following lines: One from Balsas station, Guerrero, on the Mexacala river, southeast to the ports of Zihuatanejos and Acapulco, on the Pacific coast; another is for a line between Vera Cruz, Vera Cruz, and Tampico, via Tuxpam, with a branch to Beristain, Pueblo, also for the construction of an extension of the proposed Vera Cruz-Tampico line, from Tampico, Vera Cruz, north to Matamoros, on the Rio Grande. Application has also been made for the renewal of the concession for a line from Santa Lucrecia, Vera Cruz to Campeche, Campeche, to connect the United Railways of Yucatan with other railways in the republic. It is said that the application for building the line down the gulf coast to connect Matamoros with Vera Cruz and the branch line to Beristain, where connection is to be made with the National Railways of Mexico, has been made by the Frisco interests.

Monongahela Railroad.—See Buckingham & Northern.

Nevada Copper Belt.—Work has been started on an extension from Hudson, Nev., to Ludwig, 10 miles.

Northern Pacific.—Announcement has been made that plans are about ready for the construction of the Lake Union belt line in Seattle, Wash., at a cost of $500,000. It is expected that track laying will be started at once. The company will also shorten the Fremont and Ballard main line, build a bridge over the Lake Washington canal, and reconstruct its Seattle piers. It is expected to have all this work finished during the next 12 months.

Oakland & Antioch (Electric).—A contract has been given to the Shattuck-Edinger Company for building from Oakland, Cal., to Walnut Creek.

Oregon Trunk Line.—Track laying on this line, now under construction from Fallbridge, Wash., south to Bend, Ore., 156 miles, was finished on September 21, to Redmond, 139 miles, and is expected to be finished further south to Bend by October 5, when James J. Hill will drive the last spike. Regular passenger and freight service is now in operation south to Opal City, 126 miles, from Fallbridge. (May 12, p. 1133.)

Oregon-Washington Railroad & Navigation Company.—The Des Chutes Railway has been opened for regular passenger and freight service, from Des Chutes Junction, Ore., south to Madras, 101 miles. Track laying was recently completed south to Metolius, from which place the tracks of the Oregon Trunk Line will be used to Bend. (July 21, 159).

Puebla & Pacific.—An officer writes that as soon as conditions are improved construction work will be started on this line from a point on the Pacific coast, in the state of Oaxaca, north via Atoyaquilla, Putla, Juxtlahuaca, Tonala, Tecomatlan, Tezuntlan, Huehuetlan and Tetela, to Puebla, with a branch line northeast to a point near Cahuacua; another branch to San Rafial, and a third branch to Las Reyes. There will also be a branch from Tonala, southeast via Diquillu, Consuelo and Mixtepec. Most of the work will be difficult. Maximum grades will be 1.5 per cent. compensated, except on about 16 miles. Pusher grades will be 3 per cent. compensated in the Huehuetlan canyon. Maximum curvature will be 15 deg. The line expects to find a traffic in coal, corn, cotton, tobacco, timber and fine woods. A. B. Adams, president, New York, and H. N. Roberts, chief engineer, Oaxaca.

St. John & Quebec.—According to press reports the Aroostook Valley has entered into a contract with the New Brunswick provincial government for the construction of the St. John Valley Railway along the St. John river, from St. John, N. B., to Grand Falls and St. Leonards. It is understood that the new line is to be subsidized by the Canadian government. The work is to be started at once. (July 28, p. 198.)

Terminal Railway.—An officer writes that surveys are now being made to build in Oregon from a point at the head of the isthmus inlet via Millington, Flagstaff, Bayview, Bunker Hill, Marshfield, North Bend and Empire to Sunset bay, about 30 miles. The company expects to begin construction work this fall at Marshfield, and will lay at least one mile of track this winter. A. Mereen, president; W. S. Chandler, general manager, and P. A. Sandberg, engineer, Marshfield. (September 15, p. 545.)

Washington Roads.—A company is being organized to build from Vancouver, Wash., north to the south fork of the Lewis river, thence northeast to Klickitat pass, between 75 and 100 miles. H. L. Harmon, Chicago, is the principal promoter, and E. R. Ernsberger, of the Mount Hood Railway & Power Company, Portland, Ore., is interested.

RAILWAY STRUCTURES.

Baker City, Ore.—The Sumpter Valley will build four new steel bridges, it is said, on its line between Baker City and Sumpter.

Boston, Mass.—The improvements to be carried out at the South station in Boston by the Boston Terminal Company, include an addition of two stories to the height of the main five-story building, on Summer street, a distance of 235 ft., to continue on the Dorchester avenue frontage 180 ft., which will provide 250 additional offices. The improvements will cost about $500,000.

Burlington, Vt.—According to press reports, plans have been made by the Central Vermont for building a passenger station and eliminating grade crossings in Burlington, at a cost of about $315,000.

Los Angeles, Cal.—The San Pedro, Los Angeles & Salt Lake has been given a permit to put up a new freight house on Myers street, Los Angeles, at a cost of $11,500.

Lynchburg, Va.—An officer of the Southern Railway writes that a contract has been given to John P. Pettijohn & Co., Lynchburg, for building a passenger station at Lynchburg. The building will be two stories high, 40 ft. x 141 ft., of brick construction with green tiled roof.

North Yakima, Wash.—The Oregon-Washington Railroad & Navigation Co. is preparing plans for an eight-stall frame roundhouse, with a brick fire wall. It is also planned to build a large storehouse at Maple and Third streets.

Omaha, Neb.—The Chicago, St. Paul, Minneapolis & Omaha has let contracts for building a 15-stall roundhouse, semi-detached boiler and machine shop 50 ft. x 140 ft., and a store house 25 ft. x 75 ft. The cost of the entire group of buildings is estimated at $40,000.

Pittsburgh, Kansas.—The St. Louis & San Francisco is contemplating building a two-story brick passenger and freight station to cost approximately $50,000.

Sacramento, Cal.—Plans are being made by the Northern Electric, it is said, to put up a new terminal station at Front and Second streets in Sacramento.

Saskatoon, Sask.—The Canadian Northern will build a brick and concrete one-story storehouse adjoining the roundhouse at Saskatoon.

Seattle, Wash.—See Northern Pacific under Railway Construction.

The Great Northern and the Oregon-Washington Railroad & Navigation Co. have completed the new 1,000-ft. reinforced concrete viaduct on Fourth avenue in Seattle. The viaduct extends from Jackson street to Seattle boulevard and is said to have cost $300,000. The work was carried out jointly by the two roads. (Dec. 23, p. 1208.)

South Bend, Ind.—Track elevation work to abolish grade crossings has been ordered at South Bend. The city will pay about $1,000,000 as its share of the cost of the improvements. There are 23 grade crossings on the Lake Shore & Michigan Southern to be eliminated. (March 10, p. 483.)

Tacoma, Wash.—The Oregon-Washington Railroad & Navigation Company is building a new 150-ft. bridge over the Puyallup river at Tacoma.

The Chicago, Milwaukee & Puget Sound will soon start work, it is said, putting up an addition to its warehouses at Tacoma.

Tillamock, Ore.—The Pacific Railroad & Navigation Co. has given a contract to William Gibson for putting up a new station at Lake Lytle.

Whittier, Cal.—The Pacific Electric will build a new station, it is said, at Whittier.

There are in Haiti about 64 miles of railway in operation. Concessions have been granted from time to time for projects which promised to open up the fertile districts of the republic for exploitation, but until the latter part of 1910 little had been done to carry these plans into execution. There is no regular system of railways, but several short lines serving particular localities. A line is in operation at present running from Cape Haitien to Grand Riviere, a distance of 15 miles; another from Port au Prince to Lake Etang Saumatre, 28 miles, and the Port au Prince-Leoganes Railroad, 20 miles. In August, 1910, the president of the republic signed the contract with the Haitien National Railroad Co., which is building a railway which is to traverse almost the entire country from north to south, with several branches from the city of Gonaives in the northwest. The main line will run from Port au Prince, passing along the coast, through Arcahaie, to St. Marc, 53 miles distant, then following up the great valley of the Artibonite river for about 115 miles, passing Verrette, La Chapelle, Mirebalais, Las Cahobas, and Hinche, and from there running northward passing Pignon, Savannette, Bahon, and Grand Riviere, to Cape Haitien, the principal northern seaport of Haiti, 90 miles distant. There will be two branch lines. The longer branch will be from the vicinity of Cabaret, situated on the main line 21 miles from Port au Prince, to Gonaives, situated on the coast 81 miles from Port au Prince, having passed through Ennery, St. Michel, and Marmelade. The other branch will be from Gonaives to Grand Gosier, Morin, to Port de Paix, a seaport city near the Haitien frontier. The entire system will cover an extent of about 321 miles. The contracts provide that the railway shall have [illegible] which will be purchased at the [illegible] rate. The gauge of the road will be 3 ft. 6 in., and a maximum grade of 2% will be adopted on the main line. Active construction work has been in progress since early in 1911.

Railway Financial News.

Atlantic Northern & Southern.—George Adams, president of the Omaha & Iowa, bid $402,000 for the Atlantic Northern & Southern at the receivership sale on September 27. The money is payable to the court in ten days, if the court accepts the bid. The Atlantic Northern & Southern runs from Atlantic, Iowa, to Kimballton, and from Atlantic to Villiscala, a total of 54 miles.

Central of Georgia.—The income bondholders' protective committee is paying $45 per first income bond, $50 per second income bond and $14.58 per third income bond to holders of certificates of deposit of these bonds. The company declared the full 5 per cent. dividends on the first and second preference bonds, and $14.58 per third income bond, out of earnings for the fiscal year ended June 30, 1911. The $5 deducted from the payments to first income bondholders is for expenses of the committee, the second and third income bondholders having already paid assessments.

Chesapeake & Ohio.—Judge Landis, in the Circuit Court, has discharged the receiver of the Chicago, Cincinnati & Louisville. This property, which is now the Chicago line of the Chesapeake & Ohio, was sold under foreclosure in 1910 to the C. & O. of Indiana.

Chicago & Alton.—H. E. R. Wood, of Chicago, has been elected a director, succeeding George H. Ross.

Chicago, Rock Island & Pacific.—White, Weld & Co., New York, are offering $2,240,000 Rock Island Improvement Company 4½ per cent. series B guaranteed equipment trust certificates of 1905, and $1,575,000 guaranteed 4½ per cent. equipment trust certificates of 1905, both issues maturing semi-annually to 1915, at prices to yield 5 per cent. on the investment. These certificates are guaranteed principal and interest by the Chicago, Rock Island & Pacific Railway (the operating company). There were originally authorized $5,605,000 of the series B, of which $3,365,000 have matured and been paid and $4,500,000 of the second mentioned series, of which $2,925,000 have been paid. The two series of bonds now offered are secured on equipment originally costing $5,649,196, and $4,502,892 respectively.

The same bankers are offering $360,000 Chicago, Rock Island & Pacific Railway equipment trust 4½ per cent. series F bonds of August 1, 1911, maturing semi-annually from February 1, 1912, to August 1, 1926. These bonds are secured by equipment costing $400,252, and consisting of 24 sixty-foot steel postal cars, 11 seventy-foot steel baggage and mail cars, and six 40-ft. steel postal cars.

Detroit, Toledo & Ironton.—Sale of this property under foreclosure has been postponed from October 5 to January 9, on application of the trustee of the general lien and divisional 4 per cent. bonds.

Erie.—The New York Public Service Commission, Second district (state) has approved the issue and sale by the Erie of $4,550,000 3-year collateral notes at a price to be not less than 97. These notes are issued to refund the notes of the Erie & Jersey Railroad, and of the Genesee Railroad of June 1, 1907. These two companies were subsidiary companies which built the Guymard cut-off and the Genesee cut-off.

Kansas City, Mexico & Orient.—See an item in regard to this company in General News.

St. Louis Southwestern.—The directors were re-elected at a meeting of the board on October 3. R. Lancaster Williams, who had been associated with Frank Gould in asking for proxies in order to elect a representative of the minority stockholders to the board of directors, was not elected a director.

Southern Railway.—A semi-annual dividend of 1 per cent has been declared, payable October 30, on the $60,000,000 5 per cent non-cumulative preferred stock. In April, 1911, a dividend of 1 per cent. was declared, so that annual dividends in 1911 were at the rate of 2 per cent. From 1908 to 1910 inclusive no dividends were paid on the preferred stock; from 1902 to 1907 dividends were paid at the rate of 5 per cent annually.

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E. A. Simmons, *President.*

L. B. Sherman, *Vice-President.* Henry Lee, *Sec'y & Treas.*

The address of the company is the address of the officers.

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Bradford Boardman, *Managing Editor.*
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E. T. Howson
G. L. Fowler
William Forsyth
W. E. Hooper
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THE last report of the Interstate Commerce Commission fixes the amount of stock and debt of all kinds of the railways of the country at $18,417,132,238. This obviously is not an exact measure of the value of the whole railway property. But taking the return as it stands, it is interesting to compare it with a computation of the *Wall Street Journal* some time ago based on the returns of the Bureau of Statistics, and estimating the total corporate capital and debt of the country at $55,000,000,000, after allowing for duplications. In the computation, the railways would figure by approximately one-third of all the corporate wealth of the country, which, outside of the railways, would include banking, mercantile, manufacturing and other corporations. On the *Wall Street Journal's* basis of about $110,000,000,000 as the total wealth of the country, the railways would have more than 16 per cent. of the whole, and this not including street railway properties, which in general character are cognate with the steam lines, in some cases owned by them, and in other cases having an identity of interests. If investments directly dependent for values on the railways and not necessarily connected directly with transportation could be counted in, the railway percentage would rise still higher.

FOUR hundred and fifty-nine broken rails detected by track circuit signals in twelve months is the aggregate found recently by five chief engineers when they compared notes on the records of their respective roads. Whether these roads have a large mileage of such rails as were brought to light after the recent accident at Manchester, N. Y., we are not informed; nor do they tell us how many other rails failed on their lines during the year. It would be very interesting to see, if we could, in how many of these 459 cases the immediate cause was a change of temperature. If all (or most) of these rails were broken directly by the passage of a train in medium temperature, while yet that train was not derailed, the record would seem to indicate that to get bad enough to produce a derailment, rails must, in many cases, be pounded by a long succession of wheels, even after the break has been started. In such a situation an inspection after the passage of each train would be "indicated," as physicians say. But who could afford that? Or, where could be found men who would surely detect such breaks, even in daylight? But, whatever the result of any speculations that we may indulge in, such a figure as that given above ought to affect materially the use of automatic signals. Discovery of broken rails through the means of signals has been familiar to everybody for 25 years. The epidemic of bad rails of four years ago may possibly be followed by another. If such should be the case, track circuits would be especially useful; though one would not make the prevention of damage by broken rails a main purpose. The main purpose in connection with rails is to make them safe—to get rails of a quality that will not break; and the main purpose in connection with signals is to prevent collisions and increase the capacity of the railway. There ought to be incentive enough to get signals for these reasons alone.

THE report of the Railroad and Warehouse Commission of Illinois, which is dated March 13, 1911, but which was published only a short time ago, calls attention to the delay in publication of the volume. The report points out that when the legislature created the commission, in 1871, there were only 19 separate corporations owning railways in the state, with a total mileage of 3,730 miles, while in 1910 there were 151 separate corporations owning or operating steam railways in the state, with a main line mileage of 12,126 miles, and 63 separate corporations owning interurban electric railways, with a main line mileage of 1,376 miles. It is on this quite impressive increase in business brought under the supervision of the commission that a plea for larger appropriations is based. The commission says "in order that the value of information [contained in its report] should be appreciated, it is of the utmost importance that the report should be ready for distribution as soon after the date for which it is made as possible." Any one who has tried to get information on present day conditions from government reports will heartily agree with the Illinois commission in its opinion of the value of timeliness. The 1910 report of this commission unconsciously, probably, illustrates another point that ought to be urged in favor of prompt reports of railway commissions. The commission says: "In conclusion we desire your especial attention to the results as shown by the comparative tables. Notwithstanding the newspaper account of disaster to railway interests by adverse legislation and depression in business, the results here shown disclose the most prosperous year in the history of railways of this country." The report of the commission is for the fiscal year ended June 30, 1910. Presumably the newspaper accounts of adverse legislation and depression in business are of May or June, 1911, and such a statement without any explanation by the commission is apt to be misleading.

CHICAGO, ST. PAUL, MINNEAPOLIS & OMAHA.

A REPORT for the fiscal year ended June 30, 1911, such as that of the Chicago, St. Paul, Minneapolis & Omaha is rare, in that it shows larger gross, more business, larger net and a surplus of $730,000 after the payment of 7 per cent. dividends, an increase of $200,000 over the surplus of the year before. It is unusual among this year's reports also in showing an increase in working forces as well as an increase in the rates of wages. The amount paid to labor in 1911 was $5,950,000, an increase of $460,000 over the year before; and, of this increase, $198,000 was due to increases in rates of wages and $262,000 to increases in numbers of men employed.

Both the freight and the pasesnger business of the Omaha were better last year than they were the previous year. The figures for revenue from these sources is shown in the table at the end of these comments. The total number of tons of freight carried amounted to $7,230,000, an increase of 2.64 per cent. over the tonnage carried in 1910; but the ton mileage last year totaled 1,071,000,000, an increase of 9.40 per cent. In other words, the average distance each ton was hauled increased 6.60 per cent., averaging last year 158 miles. The considerable increase in ton mileage was handled with an increase of less than one-tenth of one per cent. in the freight and mixed train mileage, this mileage amounting to 4,270,000 miles last year. The average revenue train load was 274 tons, an increase of 9.33 per cent. The Omaha gets about as much, or a little more, per ton mile as other roads in its territory. Last year the average was 0.902 cents.

The total number of passengers carried last year was 4,420,000, an increase of 1.69 per cent. The average distance traveled, however, was 53 miles, an increase of a little over 2 per cent.; so that the increase in passenger mileage was 3.86 per cent. The average revenue per passenger per mile remained stationary at 1.920 cents.

The annual report does not classify the tonnage of freight carried.

Details of operating expenses show the effect of higher wages and also of higher fuel costs. Since train mileage did not increase to any extent, presumably the cost per ton of coal must have been higher last year than it was the year before. With a milder winter, the Omaha made some saving in a number of items under the maintenance of way and structures, and the total cost under this account amounted to $1,970,000, or only about $9,000 more than the cost in 1910. Maintenance of equipment, on the other hand, cost $1,860,000, an increase of $106,000, the principal increases being in cost of repairs of locomotives and costs of repairs of freight cars. The cost of repairs in 1910, even for a North Western line, was rather small.

Both the Chicago & North Western and its subsidiary, the Omaha, show in their annual reports the number of tons of rails laid during the year, as well as the number of tie renewals. In 1911, 11,440 tons of new rails was laid by the Omaha, an increase of 4,045 tons over 1910; but the net charge to operating expenses for rails was $79,000, a decrease of $6,000. Since the charge to operating expenses is only the cost of replacing old rails with the same weight of rail—the cost of the additional weight being charged to additions and betterments—the smaller charge last year presumably indicates that the company replaced lighter rails last year than those replaced the year before. The total number tie renewals was 585,000, or 155,000 more than used

During the year $1,360,000 was spent on capital account for ad-

Railway Construction news columns of some of the work now

in 1911.

The following table shows the operation in 1911, compared with 1910:

	1911.	1910.
Average mileage operated	1,743	1,739
Freight revenue	$10,563,204	$9,720,912
Passenger revenue	4,475,419	4,309,073
Total operating revenue	16,092,851	15,095,023
Maint. of way and structures	1,965,394	1,956,455
Maint. of equipment	1,863,984	1,758,143
Traffic	285,537	285,187
Transportation	6,155,616	5,553,190
Total operating expenses	10,656,054	9,888,479
Taxes	730,808	682,832
Operating income	4,693,452	4,523,065
Gross corporate income	4,833,220	4,665,504
Net corporate income	2,816,385	2,615,285
Dividends	2,086,910	2,086,910
Surplus	729,475	528,375

SOUTHERN RAILWAY.

IT was only a little over a year and a half ago that one of the higher officers of the Southern Railway was showing a visitor the modern, standard Hinman yard at Atlanta, then under construction, and expressed the strong conviction that the company would be able to finish it without any further interruption because of financial difficulties. On returning, however, to the Southern Railway's station this officer pointed out the site that had been selected some years before for the new inbound freight station at Atlanta, and said that plans had been made some time before for building a modern type of freight station, but that it was a hope, rather than an expectation, that the company would be in a position to begin this work within the next two or three years. In the fiscal year ended June 30, 1911, not only has the Southern Railway completed its Hinman yards, but has undertaken work on the new freight station, and this work is expected to be completed early in 1912. This is only one illustration of the remarkable progress that the company has made in strengthening its credit, increasing its earnings and improving its physical plant, as well as increasing its operating efficiency, since 1907.

The really remarkable thing about the change in standing of the Southern Railway, from a road that appeared almost on the verge of bankruptcy in 1907 to one which, in 1911, could pay 2 per cent. dividends on its preferred stock calling for $1,200,000 and have $5,470,000 surplus for the year to the credit of profit and loss, lies in the fact that this was accomplished during four years in which the railways of the country as a whole have not had remarkable prosperity. In these years there has been no steady and large expansion in the business of the United States such as there was in the years following the reorganization of such roads as the Northern Pacific and the Atchison, Topeka & Santa Fe. Moreover, the Southern Railway went through no reorganization and scaling down of funded debt, but instead sold at a heavy discount sufficient new securities to pay off floating debt and to continue imperatively needed improvements.

At the end of 1909 the company was carrying on its balance sheet $7,798,000 net discount on the securities sold to be charged off prior to the maturity of the securities, and at that time had a profit and loss credit of $6,962,000. At the end of 1911 the company had $1,688,000 extinguished discount on securities and had a profit and loss credit of $11,446,000; and although the company has $10,000,000 3-year notes falling due February 1, 1913, it has in the treasury free $16,101,000 securities issued or assumed, of which $13,667,000 are development and general mortgage 4 per cent. bonds.

These changes have been due to the development of the territory through which the Southern Railway operates and to the policy of the company in bending every effort to make this development as rapid and as scientific as possible. President Finley calls attention to a table published by the United States Department of Agriculture which gives the total value of farm products by states for the last 11 years. In the

was an increase in the annual value of crops in the 11 years

from $485,480 to $1,042,614,000, or 115 per cent., while for all the other states, including the western states, the increase in the same period has amounted to 73 per cent., and for the states north of the Ohio and Potomac rivers and east of the Mississippi, to 60 per cent. The agricultural possibilities of the South, the industrial development that is taking place there, and the opportunities that the country offers for the establishment of new manufacturing plants, have been discussed at length in the *Railway Age Gazette*. President Finley, in his comments on the report, discusses them with an insight and enthusiasm, founded on deep study and broad experience, that makes this year's annual report of the Southern Railway not only a document to be filed but a piece of

The Southern Railway.

contemporary history that is as interesting as any description of the pioneer progress in the "golden" West. Any one interested in the position of the United States in the world's cotton market or in the social regeneration of the South should without fail read the letter of transmittal of this year's report.

The table at the end of these comments gives the principal figures for earnings and expenses and the disposition of income of the Southern Railway. As will be noted, operating expenses amounted to $40,927,000 in 1911, an increase of 5.93 per cent. over the year before. The increase in expenses was due both to a larger business handled and to larger sums being spent for maintenance of way. In 1911, 3,332,000 cross ties were renewed, which is an increase of 13.28 per cent. over the renewals for last year, and an increase of 23.34 per cent. over the average renewals for the three previous years. A somewhat smaller tonnage of new rails was laid last year than in 1910, but of the 43,439 tons laid, 43,340 tons was 85-lb. rail, as compared with 36,570 tons of 85-lb. rail laid the year before.

The company also added to its equipment over and above repairs and renewals. The average number of locomotives in service in 1911 was 1,006, as compared with 968 in the previous year; of passenger cars, 1,076, as compared with 1,030; of freight cars, 51,188, as compared with 51,065; but the average capacity of each car was 69,872 lbs., or 4.40 per cent. greater than the year before.

The Southern Railway operates 7,042 miles of line. In 1911 it carried 26,091,000 tons of freight, with an average haul per ton of 157 miles. The number of tons increased 3.52 per cent. over the tonnage in 1910, and the ton mileage increased only 2.58 per cent., since the average haul was somewhat shorter last year. Freight train mileage amounted to 15,950,000 in 1911, an increase of 2.10 per cent. over 1910. Since the financial results of 1911 have been compared with those of 1907-1909, it is proper to compare the figures for operation to see if the great progress made in financial stand-

ing rests on a basis of higher operating efficiency. In 1908 the total revenue ton mileage carried was 3,420,000,000; in 1911 it was 4,088,000,000. In 1908 the mileage of loaded freight cars totaled 235,800,000, and in 1911, 281,200,000; in 1908 the mileage of empty freight cars amounted to 93,500,000, and in 1911 to 114,500,000. In 1908 there was an average of only 13.46 loaded cars in each freight train and 6.27 empty cars; in 1911 there was an average of 16.55 loaded cars and 7.67 empty cars. It will be noted that the percentage of loaded cars remained almost exactly the same, 68.22 per cent. in 1908 and 68.33 per cent. in 1911. But it is when we examine the figures for locomotive mileage that the greatest improvement is shown. Total freight locomotive mileage in 1908 was 17,018,000, and in 1911, 17,101,000; this notwithstanding that over 19 per cent. greater ton mileage was hauled, with a correspondingly greater mileage. The average revenue train load in 1908 was 195 tons; in 1911; 241 tons.

These ton mileage and car mileage figures do not look large when compared with similar figures for many western roads, and look quite small when compared with trunk lines, but the Southern Railway operates a very large proportion of branch line mileage on which traffic is, in many cases, hardly heavy enough to justify maintenance and operation were it not that they are essential to the general development of the country.

In 1911 products of mines furnished 40.10 per cent. of the total tonnage carried by the Southern Railway; manufacturers and miscellaneous articles furnished 30.61 per cent. of the total; products of forests furnished 16.88 per cent. and products of agriculture furnished 11.26 per cent., while products of animals furnished 1.15 per cent. These percentage figures correspond very closely indeed to the percentages furnished by each class of commodities in 1908, but the tonnage of each one of these general classes is considerably larger, of course, in 1911 than in 1908. Some of the most interesting of President Finley's remarks are devoted to a discussion of the efforts made by the Southern Railway to aid farmers and planters in raising more diversified crops and in convincing them of the profits that may be made from raising fruit and vegetables, as well as raising live stock. The motive in urging live stock raising is almost entirely to develop the country, because this industry can add very little indeed directly to the Southern Railway's traffic. Products of animals in 1908 furnished 272,000 tons; in 1911, 300,000 tons. This is only the normal increase that we find in all classes of commodities. On the other hand, melons furnished 29,000 tons of the traffic in 1908, and 46,000 tons in 1911; oranges, lemons, limes and grapefruit furnished 11,000 tons in 1908, and 33,000 tons in 1911. Other fruits and vegetables furnished 159,000 tons in 1908, and 248,000 tons in 1911; while the tonnage of cotton carried remained almost stationary, being 556,000 tons in 1908, and 557,000 tons in 1911.

President Finley, after thanking the officers and employees of the company, says that the standard of efficiency throughout the service "is sufficiently high to justify the management in pursuing a consistent policy of filling, by promotion, vacancies that may occur, thus preserving a wide field for opportunity for the advancement of all loyal and efficient employees." In President Finley's opinion it is the best practice to reduce to a minimum the number of men employed in the lowest grades of the service, and he says that the future of the Southern Railway is indeed bright. One of the distinctive features about the organization of the Pennsylvania Railroad is that vacancies are filled by the promotion of Pennsylvania Railroad officers and not by the importation of men from outside railroad service. President Finley has had some interesting things to say about labor conditions in general and the attitude of labor unions.

The following table shows the principal figures for operation in 1911, as compared with the previous year, 1910:

	1911.	1910.
Average mileage operated	7,042	7,050
Freight revenue	$39,498,964	$38,161,392
Passenger revenue	16,056,304	14,639,161
Total operating revenue	60,345,063	57,294,508
Maint. of way and structures	7,464,916	6,635,725
Maint. of equipment	9,460,757	9,876,729
Traffic	1,549,404	1,436,776
Transportation	20,662,086	18,934,427
Total operating expenses	40,926,790	38,635,746
Taxes	2,212,968	2,027,104
Operating income	17,163,277	16,650,638
Gross corporate income	20,455,806	19,878,566
Net corporate income	6,670,003	5,757,019
Dividends	1,200,000	.....
Additions and betterments	66,046	52,373
Surplus	5,403,958	5,704,646

ST. LOUIS SOUTHWESTERN.

WHEN Vice-President and General Manager Britton, of the St. Louis Southwestern, in the annual report of this company for the fiscal year ended June 30, 1911, says that the rice industry in Arkansas continued its remarkable development, one is inclined to think that this is an understatement rather than an overstatement, if an examination is made of the figures showing the tonnage of the various classes of commodities. The tonnage of rice increased 178 per cent. in 1911 over 1910. The 1911 report of the Cotton Belt is a graphic exhibit of the development of a rich new country with great traffic possibilities, but one of the interesting things about the report is an apparent indication that the St. Louis Southwestern's share of this traffic is to be a long haul inbound on all the products used by an agricultural community, with a comparatively short haul outbound on most of the products produced by that territory. Apparently the natural outlet for a goodly proportion of these agricultural products is to the Gulf, and on this movement the St. Louis Southwestern, of course, gets but a short haul, since its 1,487 miles of main line runs from St. Louis southwest through Stuttgart and Texarkana to Fort Worth and Dallas, with a considerable mileage in Texas tapping Hillsboro, Waco, White City and the territory northeast of these cities. The St. Louis Southwestern also taps Memphis, Little Rock and Shreveport.

In 1911 the company earned gross $11,890,000, as against $10,990,000 the year before; and although operating expenses increased, they increased only $430,000, so the company was able to save $1,220,000 net corporate income in 1911, as compared with $820,000 in 1910. The company paid 4 per cent. on its outstanding preferred stock, calling for $796,000, and, since the close of the fiscal year, has shown monthly earnings that continue to compare favorably with last years. It is evident, therefore, that, regardless of business conditions in trunk line territory, the progress in the development of the Southwest has received no serious check in the past year.

The figures that lead us to believe that the development of the Cotton Belt's long haul traffic will be largely from the commodities brought in to supply the wants of the territory served, and that it will get a short haul on the rapidly increasing agricultural products produced by the territory, are found in the classification of revenue tonnage taken in connection with the figures for loaded and empty mileage, etc. It must be remembered that in the figures for classification of revenue tonnage no indication is given of the length of haul, so that an increase from 577,000 tons to 660,000 tons in products of agriculture carried does not necessarily mean that the ton mileage of these products had increased proportionately. It is, however, a striking illustration of the rapid development of the territory served by the road, as is also the increase from 671,000 tons of manufactures and miscellaneous articles to 777,000 tons, an increase of 15.80 per cent., and it is reasonably certain that on this high grade tonnage of manufactures, the St. Louis Southwestern gets a long haul. The total tonnage originat-

ing on the system last year amounted to 2,064,000 tons, a decrease of 4.67 per cent. from the tonnage originating on the system in 1910; while the tonnage received from connections amounted to 1,293,000 tons, an increase of 44.15 per cent. The tonnage northbound totaled 1,665,000 tons, or slightly over half of one per cent. more than in 1910; while the tonnage southbound totaled 1,691,000 tons, an increase of 21.95 per cent. over 1910. Moreover, the number of loaded cars per train mile in 1911 was 17.47, as against 17.98 in 1910; while the number of empty cars per train mile was 7.74 last year, as against 6.31 the year before. The per diem amounts paid by the St. Louis Southwestern totaled $468,000 in 1911, an increase of $159,000, or 51.61 per cent. over 1910; while the per diem receipts amounted to $699,000, an increase of $142,000, or 25.42 per cent. While the number of tons of revenue freight carried was 9.62 per cent. greater in 1911 than in 1910, the ton mileage was only 3.48 per cent. greater; in other words, the average length of haul per ton was 246 miles in 1911, as against 260 miles in 1910. The average receipts per ton per mile were 1.08 cents in 1911, as against 1.04 cents in 1910.

Corresponding to the work that the Southern Railway is doing in the Southeast is the work that the St. Louis Southwestern is doing in the organization of farmers' institutes, corn clubs, hog clubs and special demonstration exhibits, and Mr. Britton says that, as a result, the farmers are rapidly gaining in ability to cope with climatic conditions. In 1910 Arkansas produced 24 bushels of corn to the acre of corn land under cultivation. A very important step in the development of the country is the reclamation of alluvial overflow lands in southeast Missouri and Arkansas, and in many places where this draining is done properly the cultivator of such reclaimed land is made almost entirely independent of droughts, since the water in the drainage ditches may be turned back under the land when occasion calls for it.

Increase in operating expenses has already been mentioned; it came largely from cost of maintenance of equipment and transportation expenses. Maintenance of equipment cost $2,064.000 last year, an increase of $207,000 over the previous year; and transportation expenses totaled $3,798,000, an increase of $522,000, or 15.92 per cent. The increase in transportation expenses was due not only to an increase of about 10 per cent. in wage schedules, but to a considerable increase in cost of fuel, due to a miners' strike in the coal producing districts tributary to the line. Of the increase in cost of coal, $189,000 was due to the increase in price, and $77,000 to the increased consumption resulting from increased locomotive mileage.

Maintenance of way and structures cost $1,800,000 last year, which is less by $351,000 than the amount spent in 1910; and Mr. Britton says that this decrease is explained by the heavy maintenance work of an extraordinary character done during the preceding year, notably the reconstruction of the steel bridges over the Arkansas and Saline rivers, the maintenance proportionately amounting to about $164,000; added to the fact that $158,000 less was spent last year than the year before for tie renewals. The standard on the St. Louis Southwestern for rails is now 75 lbs., and, of the total 1,324 track miles maintained in 1911, 1,024 was laid with 75-lb. rail, as against 936 in 1910. Of the total track mileage, 191 miles is ballasted with rock, 678 miles with gravel and sand, and 69 miles with cinders. This is an increase of 49 miles in track ballasted as compared with the year before.

The only financing that was done last year was the sale of $1,760,000 equipment trust certificates and the payment of $184,000 equipment trust certificates. The balance sheet shows $1,220,000 cash on hand at the end of 1911, which is less by about $500,000 than at the end of the year before. There is now an unusual amount of miscellaneous accounts receivable by the St. Louis Southwestern, the total amount at the end of 1911 being $3,097,000, an increase of $806,000 over the year before. At the same time loans and bills payable have increased from $150,000 to 950,000.

The Stevensville North & South Texas, which was bought the year before last, has been extended, as described in our Railway Construction news columns, and application has been made to the Texas Railway commission for authority to issue bonds to cover the cost of building this new line.

The following table compares the principal figures of operation for 1911 with those of 1910:

	1911.	1910.
Average mileage operated	1,487	1,473
Freight revenue	$8,866,846	$8,243,954
Passenger revenue	2,303,140	2,168,622
Total operating revenue	11,888,037	10,986,516
Maint. of way and structures	1,799,916	2,150,727
Maint. of equipment	2,064,046	1,857,527
Traffic	445,784	414,761
Transportation	3,798,103	3,276,478
Total operating expenses	8,578,155	8,146,057
Taxes	369,292	369,704
Net operating income	2,930,120	2,458,144
Gross corporate income	3,457,004	3,003,265
Net corporate income	1,215,823	816,466
Dividends	795,746	795,746
Surplus	420,077	20,720

CHICAGO & NORTH WESTERN.

THE Chicago & North Western, in the fiscal year ended June 30, 1911, made a saving of $200,000 in the total amount paid to labor. This sum is small compared to the total amount spent on this account, the total being $29,950,000 last year, but the saving of this $200,000 was effected despite an increase of $1,110,000 on account of higher rates of wages; in other words, there was a saving of $1,310,000 on account of less time worked by employees. It has been said that railways would be unable to cut down any further in their forces because of the cuts made in 1908 and 1909, but the North Western shows that one company at least made still further reductions.

The freight traffic on the North Western's 7,719 miles was less than in 1910, but the passenger traffic was greater. Last year the company earned gross $74,920,000, an increase of $740,000 over the gross of 1910, freight revenue amounting last year to $49,020,000; while the ton mileage of freight totaled 5,434,000,000 tons, a decrease of 2.32 per cent. from 1910. The average revenue per ton per mile was 0.90 cents last year, as against 0.89 cents in 1910; the average haul being 148 miles last year, as against 141 miles the year before. Passenger revenue in 1911 amounted to $19,120,000, an increase of 3.73 per cent. over 1910; and the total number of passengers carried was 30,330,000, an increase of 5.69 per cent. over 1910. The average rate per passenger per mile last year was 1.81 cents, and 1.82 cents the year before; the average journey was 34.74 miles in 1911, and 35.29 miles in 1910.

After the payment of taxes and fixed charges, the company had a net income of $12,600,000 available for dividends last year, an increase of $300,000 over the year before. Dividends at the same rate—8 per cent. on the preferred and 7 per cent. on the common—were paid last year as the year before, but a full year's dividend was paid on the $30,500,000 stock sold to stockholders in 1910. There was a surplus, therefore, after the payment of dividends, of $1,700,000 at the end of 1911, as against $2,470,000 at the end of 1910.

The great saving in labor forces was in the maintenance of way department. Roadway and track labor, and other expenses apparently coming under the Interstate Commerce Commission classification of roadway and track, and removal of snow, sand and ice, cost $4,170,000 last year, or $870,000 less than the year before; and this showing was made possible by the very much milder winter. Removing snow, sand and ice cost $170,000 last year, as against $710,000 the year before. There was nearly the same number of tie renewals, namely 2,490,000, in 1911 as in 1910; and 40,210 tons of new rails was laid last year, as against 22,646 tons the year before. On the other hand, there was very much less spent for renewal of ballast in 1911 than in 1910, the amount spent in 1911 being $180,000, which is less by $265,000

than was spent in 1910. Probably the ballasting of 27 miles of track with stone and 356 miles with gravel in 1910 had something to do both with the smaller sum spent for ballast this year and with the reduced cost of labor on roadway.

The Chicago & North Western has had for a number of years very low charges for repairs of its equipment, and in 1911 no saving was apparently made in the cost of repairs of either locomotives, passenger train cars or freight cars. Larger sums were charged for depreciation on equipment last year than in 1910. The company added 175 locomotives, 274 passenger train cars and 225 freight train cars to its equipment, but retired during the year 51 locomotives, 10 passenger train cars and 1,822 freight cars.

There was spent for transportation expenses $30,840,000 in 1911, as compared with $29,680,000 in 1910. Of this 3.91 per cent. increase, $288,000 was an increase in the amount paid to labor, and $164,000 was an increase in the amount charged for fuel; the remaining $707,000 was an increase in the amount charged for supplies.

The decrease in ton mileage, amounting to 2.32 per cent., already mentioned, was accompanied by a decrease of 7.91 per cent. in the mileage revenue freight and mixed trains; and the increase of 4.13 per cent. in the passenger mileage was handled with an increase of but 0.64 per cent. in the mileage of revenue passenger and mixed trains. The average revenue train load last year was 277 tons, as compared with 261 tons the year before. This is an increase of 6.07 per cent.

At the beginning of the year the company was still engaged on making a number of important and expensive improvements. During the year the new passenger terminal at Chicago was completed and opened for traffic; $4,190,000 having been spent during last year on this work. The elevation of tracks from Rockwell street, Chicago, to Sixteenth street has been completed, and the road complete now through Evanston, Ill., has been finished. Other important construction work completed or still in progress is mentioned in our Railway Construction news columns.

To pay for these improvements and to retire $6,347,000 bonds matured last year, the company sold $7,000,000 of its general mortgage 4 per cent. bonds of 1987. The Chicago & North Western also bought 30 per cent. of the stock of the Indiana Harbor Belt and 50 per cent. of Terminal Railroad of the company.

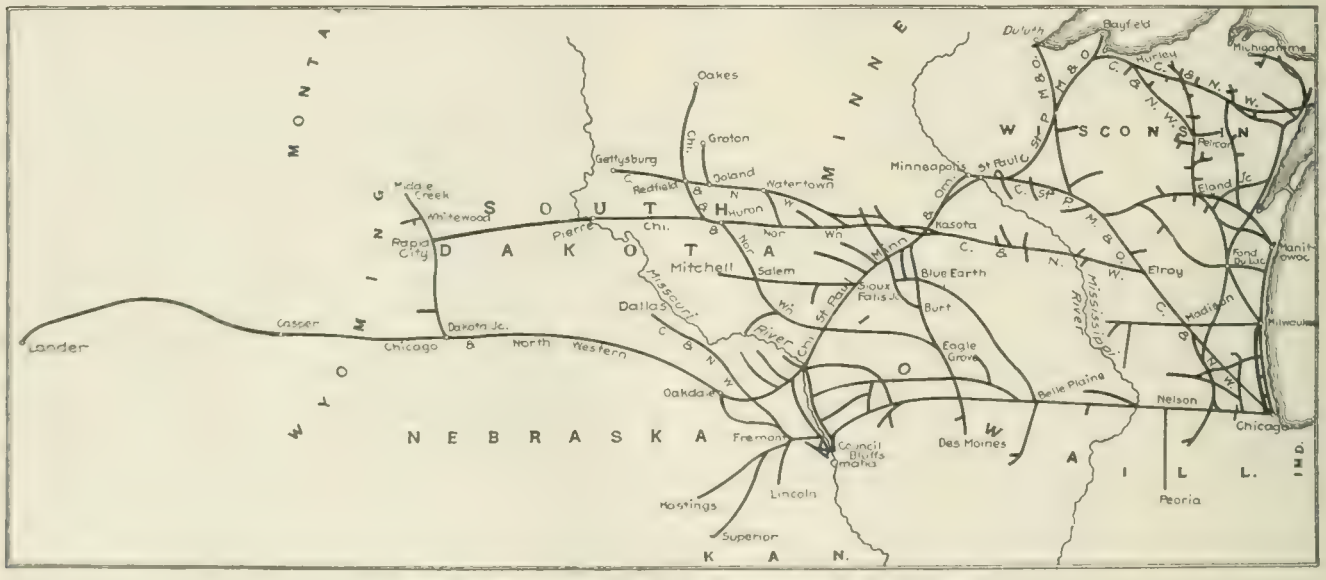
At the end of 1911 the North Western had $12,900,000 cash on hand, with working liabilities of $9,130,000. This compares with $10,000,000 cash on hand at the end of 1910 and working liabilities of $12,000,000.

The following table gives a comparison of the results of operations in 1911 and 1910:

	1911	1910.
Average mileage operated	7,719	7,629
Freight revenue	$49,024,958	$49,536,839
Passenger revenue	19,118,884	18,431,017
Total operating revenues	74,918,186	74,175,685
Maint. of way and structures	10,002,073	10,774,338
Maint. of equipment	9,307,196	9,149,217
Traffic	1,232,016	1,257,756
Transportation	30,836,561	29,677,354
Total operating expenses	53,012,710	52,153,619
Taxes	3,116,034	2,979,513
Operating income	18,735,765	18,985,612
Gross corporate income	21,759,231	21,525,371
Net corporate income	12,603,100	12,298,497
Dividends	10,899,615	9,832,038
Surplus	1,703,485	2,466,459

CHICAGO, MILWAUKEE & ST. PAUL.

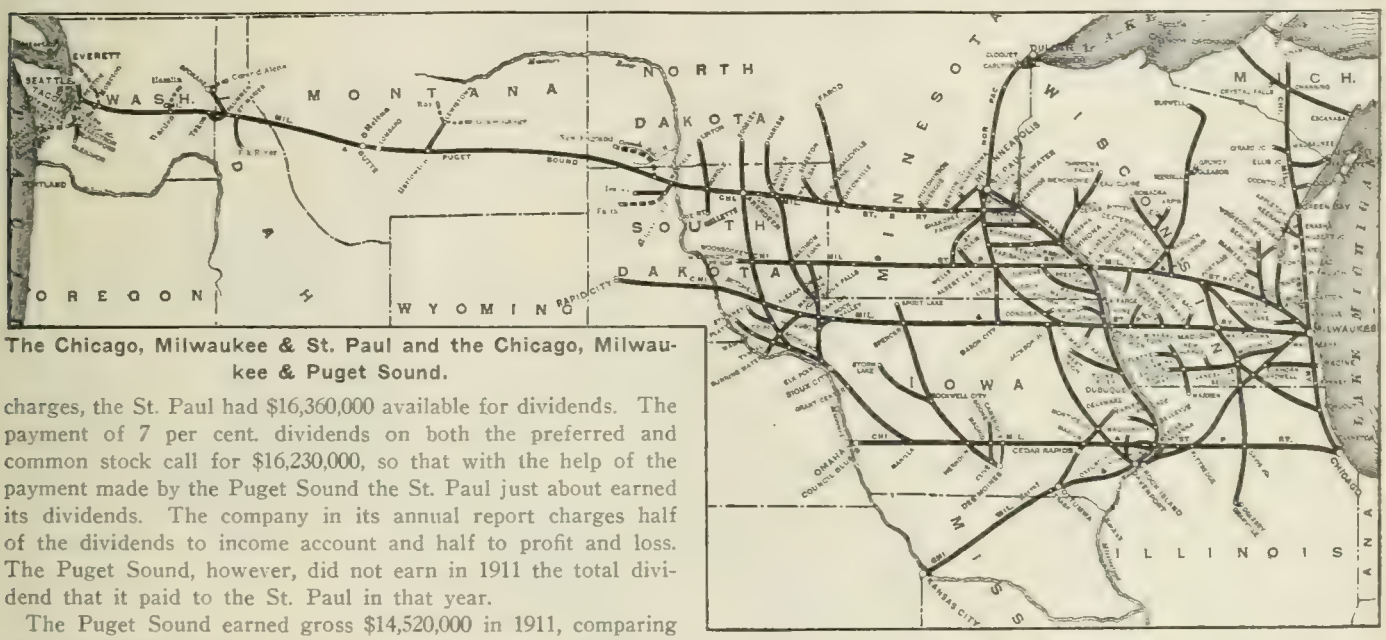
IT is possible that the interchange of traffic between the Chicago, Milmaukee & St. Paul and its Pacific coast extension subsidiary—the Chicago, Milwaukee & Puget Sound—accounts for the fact that the average haul of each ton of revenue freight on the St. Paul itself was 199 miles in the fiscal year ended June 30, 1911, as compared with 174 miles in the previous fiscal year. The traffic advantages of a connection with the Pacific coast was one of the reasons advanced for building the Puget Sound, and if this reasoning is borne out in practice, the results should be reflected in the St. Paul's traffic figures. The total tonnage of products of forests carried in 1911 by the St. Paul amounted to 3,620,000 tons, or 13.52 per cent. of the total tonnage carried, while in 1910 the tonnage of products of forests amounted to 3,850,000, or 12.55 per cent. of the total tonnage. Since the Puget Sound company's figures for commodities transported show that more than twice the tonnage of products of forests was carried in 1911 than in 1910, it is fairly safe to assume that the increased lumber tonnage on the St. Paul is the result of an interchange with its subsidiary. In 1911 the St. Paul itself carried 26,790,000 tons of freight, as compared with 30,700,000 tons carried in 1910. The Puget Sound carried 2,150,000 tons in 1911, as against 1,540,000 tons in the previous 11 months. Of the total tonnage carried last year, products of agriculture furnished 21.42 per cent. on the St. Paul, and 9.33 per cent. on the Puget Sound; products of animals furnished 6.45 per cent. on the St. Paul, and 5.37 per cent. on the Puget Sound; products of mines furnished 26.83 per cent. on the St. Paul, and 15.85 per cent. on the Puget Sound; products of lumber, as before mentioned, furnished 13.52 per cent. on the St. Paul and 42.61 per cent. on the Puget Sound; manufactures furnished 18.55 per cent. on the St. Paul, and 15.10 per cent. on the Puget Sound.



The Chicago & North Western.

The Puget Sound gets an extraordinarily long haul, being 532 miles in 1911 and 596 miles in 1910. These figures for the new line indicate a comparatively small local business. The shorter haul, however, in 1911 indicates the development of some local business.

Whether or not the Puget Sound is proving itself as useful to the St. Paul from a traffic standpoint, as was expected, it was highly useful last year from a financial standpoint. The St. Paul earned $64,980,000 gross in 1911, as compared with $64,850,000 earned in 1910. Both freight and passenger revenue were slightly less in 1911 than in 1910, the increase in earnings coming from other transportation revenue, which amounted to $5,520,000 last year, as compared with $4,630,000 the year before. Total operating expenses last year amounted to $47,050,000, as against $44,790,000 the year before. The St. Paul had an operating income last year amounting to $15,460,000, as compared with $17,730,000 the year before; but through the payment of dividends made by subsidiaries the St. Paul shows a gross corporate income of $27,340,000 for 1911, as against $25,490,000 the year before. The dividends received on stocks owned amounted to $5,070,000 in 1911; in 1910, to $800,000. After the payment of its own interest



The Chicago, Milwaukee & St. Paul and the Chicago, Milwaukee & Puget Sound.

charges, the St. Paul had $16,360,000 available for dividends. The payment of 7 per cent. dividends on both the preferred and common stock call for $16,230,000, so that with the help of the payment made by the Puget Sound the St. Paul just about earned its dividends. The company in its annual report charges half of the dividends to income account and half to profit and loss. The Puget Sound, however, did not earn in 1911 the total dividend that it paid to the St. Paul in that year.

The Puget Sound earned gross $14,520,000 in 1911, comparing with $10,770,000 earned in the 11 months in 1910. After the payment of expenses and 4 per cent. interest on the $123,000,000 bonds of the Puget Sound that were outstanding at the beginning of the year, the subsidiary company had a net corporate income of $2,770,000 available for dividends. A dividend of 5 per cent. was paid on the $100,000,000 stock held by the St. Paul. Of this dividend payment of $5,000,000, the Puget Sound charged $2,300,000 to income for 1911, and $2,700,000 to profit and loss account; the Puget Sound having begun the year with a balance of $2,610,000 to the credit of profit and loss. The credit to profit and loss at the end of 1911 was $480,000. As mentioned above, the interest payments of the Puget Sound in 1911 were on only the $123,000,000 bonds outstanding at the beginning of the year. During the year the company issued $31,960,000 first mortgage bonds to reimburse the St. Paul for extension, construction and equipment payments, so that at the end of the year there was $154,960,000 bonds of the Puget Sound outstanding; and, in addition to this, there was $15,700,000 obligations outstanding for advances for construction and equipment. This makes a total of $170,660,000, which at 4 per cent. would call for an interest payment of $6,800,000 in 1912, while the interest payment last year was but $4,920,000. In other words, if the St. Paul itself does no better in 1911 than it did in 1910, the Puget Sound would have to earn *net* over $4,000,000 more in 1912 than it did in 1911 to be able to show the 7 per cent. dividend on the St. Paul earned.

Cash on hand in the St. Paul treasury at the end of 1911 amounted to $13,508,000, and in the Puget Sound treasury to $1,330,000. Working liabilities of the St. Paul amounted to $5,530,000, and of the Puget Sound to $2,200,000. The St. Paul charged to profit and loss for the year $7,770,000 for discount, commission and expenses on debenture bonds of 1909 and on the 15-year European loan of 1910. During the year the company retired $3,180,000 bonds and sold $9,990,000 general mortgage bonds, $50,000 4 per cent. bonds, and $48,180,000 "European loan of 1910." The 15-year European loan bears 4 per cent. interest. Bonds in the treasury at the end of the year amounted to $39,710,000; these bonds representing expenditures for extensions, improvements and for underlying bonds canceled.

The expense account of the St. Paul shows that, like the Chicago & North Western, the annual report of which is commented on elsewhere in this issue, it was able to save in the maintenance of way and structures, partly because of a milder winter and partly also because maintenance forces were cut, and some important economies made in section work. Total maintenance of way and structures last year cost $8,470,000, a saving of $607,000. Removal of snow, sand and ice cost $598,000 in 1910, and only $130,000 in 1911, a saving of $468,000 in that one item. Maintenance of equipment, transportation expenses and traffic expenses all increased during the year, as shown in the table at the end of these comments. The St. Paul charged but $82,300 for depreciation of passenger train cars, $213,000 for depreciation of locomotives, and $433,000 for depreciation of freight train cars. These amounts do not seem very large. The St. Paul spent and charged to capital account $3,085,000 for additional equipment in 1911.

The following table shows the principal figures for the operation of the St. Paul and the Puget Sound in 1911 and 1910;

	St. Paul.		Puget Sound.	
	1911.	1910.	1911.	*1910.
Average mileage operated ...	7,513	7,513	1,041	1,484
Freight revenue	$44,776,454	$44,909,137	$12,501,958	$9,582,570
Passenger revenue	14,077,757	14,786,744	1,603,596	995,422
Total operating revenues	64,975,995	64,846,894	14,516,367	10,765,704
Maint. of way and structures	7,865,401	8,472,825	964,932	459,048
Maint. of equipment	8,839,384	7,724,559	1,502,344	889,727
Traffic	1,264,272	1,122,711	363,826	314,777
Transportation	27,965,953	26,347,283	5,278,859	3,488,837
Total operating expenses	47,053,719	44,790,997	8,290,129	5,274,860
Taxes	2,662,700	2,529,373	515,094	235,361
Operating income	15,455,245	17,734,144	5,711,205	5,293,312
Gross corporate income	27,335,031	25,493,587	7,790,617	5,943,950
Net corporate income	16,358,314	18,963,784	2,772,197	3,156,500
Dividends	16,231,453	16,231,453	5,000,000	.....
Surplus	126,861	2,450,331	†2,227,803	2,255,440

*For the 11 months ended June 30, 1910.
†Deficit.

NEW YORK, NEW HAVEN & HARTFORD.

THE New York, New Haven & Hartford policy of rapid extension, centrality and consolidation has been condemned on the one hand as rash, and on the other hand has been extolled as progressive and enterprising. In particular, the policy of maintaining the 8 per cent. dividend during the years when the main property has shown an operating deficit has been sharply questioned. During the last eight years, the property has grown from a system of moderate size to one the combined general balance sheet of which now amounts to $504,692,632, and this not including the controlled Boston & Maine and the New York, Ontario & Western.

When President Mellen took the presidency of the company some eight years ago, he found its property "inefficient" to the highest degree. It never had owned a real "operating" head, and even President C. P. Clark, while active and ever aggressive as an absorber of lines, and the president who developed the Harlem terminal and built two additional tracks between

The New York, New Haven & Hartford.

present and future strength of the system. In the annual report for the year ended June 30, 1911, the two for the first time are joined in a statement of income and expense, a balance sheet and other details, which in importance precede the regular statement of the parent corporation to be referred to later. The combination includes the New Haven proper and 13 other properties, the most important being the Central New England, the Connecticut and Rhode Island trolleys systems, the Berkshire Street Railway, the New England Navigation Company, and the Hartford and New York and minor Sound steamship lines. It does not include the controlled New York, Ontario & Western, the Boston & Maine, the Maine Central and controlled roads; nor does it include—an important gap—some hundreds of miles of trolley lines focusing at Springfield and Worcester, controlled by a holding corporation, direct ownership of which is not acknowledged by the New Haven, owing to requirements of the Massachusetts statute. Obviously, no results on these legally fictionalized trolleys are obtainable from property report, but they are understood to be a profitable asset of the New Haven company and rapidly developing their traffic.

The combined statement excludes all intercompany transactions. The total revenue is $87,230,963, with freight receipts returned as $36,930,489, passenger receipts $42,393,409, and express receipts $3,019,540. Operating expenses are $58,070,456, income over taxes ($4,682,384) is $25,876,461, which with income from other sources ($3,504,057) rises to $29,380,518. The major items for deductions from income are rentals, $5,063,855; interest on bonds, $2,884,379; interest on two sets of debentures, $8,012,430; and other rentals, $1,929,129; the total deductions being $18,807,116, leaving net income of $10,573,402, while actual dividends have called for $10,886,691, leaving a deficit of $313,288. This is the real dividend deficit of the New Haven system for the year. It shows the operation of the system as a whole and what would have been the deficit had the net surplus of the subsidiaries been used for dividends. Incidentally, by subtracting the $313,288 from the dividend deficit of the main corporation ($1,267,539) one obtains $954,254 as the net revenue over

all from the 13 subsidiary properties taken in their entirety, but, as stated, excluding any undivided surplus of the Massachusetts trolleys, except in the Berkshire lines.

Turning from the results for the year of the combined properties, one comes to the returns of the parent corporation, which are, as heretofore, given separately. Here the net over all shows the expected deficit, which has been anticipated by the Interstate Commerce Commission returns. Gross earnings from operation were considerably the largest in the corporation's history ($62,153,434) and compare impressively with the $60,693,667, especially when depression in many New England industries, notably the textiles, is taken into account. Freight revenue for the year, as compared with 1910, increased from $30,110,588 to $30,329,092, and passenger revenue, the size and growth of which is a striking feature of the New Haven's returns, rose from $24,885,864 to $26,212,670. But the company was hard hit in operating expenses, which rose from $38,689,215 to $40,898,632, with naturally, wages predominating, the item of conducting transportation rising from $22,942,674 to $24,526,959, and almost every operating item which has a large factor of labor in it showing some increase. For example, the pay of station employees increased to $4,708,031 from $4,478,827, trainmen from $2,432,910 to $2,779,436, and road enginemen to $2,039,270 from $1,786,881. Last year the president's forecast of the increase of wages was $1,757,506. It in fact has not proved so high, being $1,521,513, showing presumably, savings by reducing the force; and, as the president points out, "if the same rate of wages had prevailed in 1911 as was paid in 1910, the ratio of operating expenses to revenue would have been 63.35 per cent., a little less than the ratio for 1910, and the (dividend) deficit of $1,267,539, converted into a surplus of $253,973." Taxes decreased from $3,983,377 to $3,578,363, presumably due in part to lower state tax assessment based on market value of stock; and the steady increase of the returns from subsidiaries and other investments as a whole is in part indexed by the increase of income from other sources, from $6,737,146 to $9,178,928. Deductions from income show a decrease from $17,524,095, to $17,067,848, partly accounted for by the conversion of about $18,500,000 of 3½ debentures into stock. Increased stock forced the 8 per cent. dividend requirement for the year up to $12,454,852, as compared with $9,759,081 in 1910, leaving the deficit of the parent company $1,267,539 on total net income of $11,187,312 over all, as compared with $10,796,874 in 1910.

Considerable attention is given in the report to the New York, Westchester & Boston lines, one of the many prospective assets which the New Haven is carrying, and at pretty high cost; during construction. While no exact figures on this point are at hand, it has already cost the New Haven about $25,000,000, and will cost some millions more before the opening from New York City to White Plains, N. Y., and the Connecticut state line; and beyond is the cost of extensions northeast to Danbury, Conn., and northwest to connect with the Poughkeepsie bridge route. After completion, it will have to be carried for some years at a pretty heavy cash charge. But it will gain three entrances into New York City by subways and elevated lines; it will tap centrally the swiftly growing borough of the Bronx; it will shorten the line to the Berkshires and connect the Bronx, via the Poughkeepsie bridge, with the Ontario & Western and the coal fields; and, incidentally, it ought to reduce the Grand Central Station charges of the New Haven, besides developing considerable suburban business. Its future will be one of the most interesting as well as important phases of the New Haven's general policy. But it will require a number of years to work out.

The New Haven property is well maintained. Maintenance of way and structures, as compared with 1910, fell off slightly, from $7,132,375 to $6,980,036, but maintenance of equipment increased. In connection with equipment the receipts from hire of it ($409,802 as compared with but $1,055 in 1910) is a suggestive item. Bearing on the same subject directly or indirectly is a large part of the $15,443,641 spent in additions and betterments, the latter including $5,987,555 for new equipment and $308,698 for new bridges, while other betterments of plant amount to $9,456,085, including the western division double tracking, $1,025,373—extensive but relieving the New York division of freight congestion and the great cost of additional tracks on it. The extent of the various improvements is indicated by the fact that they number 234, besides 55 grade crossings eliminated.

In the way of the larger financing of the company, there has been a net decrease of the outstanding indebtedness in the hands of the public of $3,867,713. There will mature, before October, 1912, $29,665,000, which the company has the resources on hand to meet, indicated, for one thing, by $28,164,985 cash appearing in the general balance sheet, as well as marketable securities of $42,045,414. A very striking feature in the New Haven's financing is the large proportion of debentures in its debt. They amount to $151,593,200, as contrasted with $60,961,000 of bonded debt, including bonds of merged roads assumed. It calls attention to the unique fact that the company has no bonded debt on its main line. On the other hand, however, it is to be remembered that a considerable part of its debentures carry a provision for sharing in a mortgage should it be issued against the "debentured" properties. A noteworthy and favorable feature of the report is the increase ($746,768) of the various insurance funds of the corporation, all charged to operating expense. These funds are now large, the insurance fund amounting to $1,753,322 and the accident and casualty fund to $957,757. To the latter will be charged claims resulting from the Bridgeport wreck, and therefore no burden be imposed by it on operating expense during the current fiscal year or later. As to that wreck, President Mellen emphasized the company's immunity from blame and might have justly accented also the exculpating finding of the federal investigation.

During the last few months the policy of the corporation in maintaining the 8 per cent. dividend in the face of a deficit has been vigorously assailed, and the deficit has undoubtedly been the strongest force in playing on the fears of stockholders and reducing the market price of the stock.

The New Haven property has been for years a property in swift transition and is so still, although its pace has slowed down. During its long transition period it has encountered and was bound to encounter times of business depression. It was so in 1908 and in minor degree it is so now. And, in addition, along with other railways, it has had to encounter the rise in wages, adverse governmental action and other like forces. As a sequel, expansion has outrun earning power for a time. Gross and net receipts have not kept pace with new capitalization in various forms. Excluding, as exceptional, the panic fiscal year 1908, the dividend deficit for three years has been $683,360—small in itself and only suggestive as bearing on the future. The company has immense resources of a reserved and suspensive character in both capital, and, to a less degree, in net earning power. They are indicated by its return of $9,178,928 "income from other sources"; by its "combined" profit and loss surplus of $19,600,015; by its combined holdings of securities of proprietary, affiliated and controlled companies of $46,455,237, saying nothing of treasury stocks; by miscellaneous investments of $3,506,310; and by "marketable securities" of $56,954,545. The last four schedules alone run up to $126,516,107. In the way of future net earning power, reference may be made to the steadily increased earnings of the 1,400 miles of trolley roads, reduction of expense due to writing off of antiquated properties and last year charged to the expense account, and increased revenues to come from the Central New England and other properties now ripening into profits. There is also a sentimental element. For half a century the property has paid its 10 and 8 per cent. divi-

dends. In proportion to numbers, its stockholders probably represent the dependent class more than in any other large system. Its "widows and orphans" is a trite phrase, but it still has its meaning; and there is a certain sentimental equity pertaining to its stockholders who have taken up "rights" and subscribed for convertible bonds.

Under such conditions, how long will the dividend be maintained and how long ought it to be maintained to span a gap of business depression? The reply obviously depends on the length of that depression, with due regard to the fact that in such a region of intensive factory industries as that served by the New Haven, the reaction upward may come as quickly as did the reaction downward in December, 1907.

The following are the comparative figures for operation of the New Haven for 1911 as compared with 1910. Next year comparison can be made for the parent corporation and its subsidiaries combined:

	1911.	1910.
Miles operated, single track	4,521	4,460
Freight revenue	$30,329,092	$30,110,588
Passenger revenue	29,212,670	24,885,864
Total operating revenue	62,153,434	60,693,667
Maint. of way and structures	6,980,036	7,132,375
Maint. of equipment	7,193,484	6,461,772
Traffic expenses	351,999	350,943
Transportation	24,526,959	22,942,674
Total operating expenses	40,898,632	38,689,215
Taxes	3,578,363	3,983,377
Net operating income	21,254,802	22,004,451
Total income (less taxes)	28,255,160	28,320,969
Net income	11,187,312	10,796,874
Additions and betterments	15,443,641	4,197,070
Dividends	12,454,852	9,579,081
Deficit	1,267,539	*1,017,293

*Surplus.

ATCHISON, TOPEKA & SANTA FE.

IN his testimony before the Interstate Commerce Commission, President Ripley said that in his estimation the Atchison, Topeka & Santa Fe should spend $30,000,000 a year in the next two or three years for additions and betterments. In the fiscal year ended June 30, 1911, the Santa Fe spent a total of $32,000,000, of which $25,900,000 was for additions and betterments, and $5,900,000 for construction, chargeable to capital account. The Santa Fe operated last year an average mileage of 10,350 miles, so that the company spent over $3,000 a mile in the improvement of the property over and above what was spent for maintenance and renewals. This on the face of it seems a very large expenditure, even when it is taken into consideration that this includes new equipment above renewals, repairs and depreciation. The condition of parts of the property, however, calls for it, and the earning power of the road justifies it.

The Santa Fe operates over heavy grades on the lines west of Albuquerque and on the coast lines. Over the certain divides the grades run as high as 2.2 per cent., and the accompanying map shows the territory through which it operates. Of course, there is probably not a road in the country which has the misfortune to have a superintendent who does not think that his division merits certain improvement work; but on the Santa Fe, and especially on the coast lines and lines west of Albuquerque, operation at certain times of the year is particularly difficult, and the operating officer is under a particularly heavy strain because he [illegible] freight [illegible] single track [illegible] also [illegible] a very high class of fast passenger business, which has established for itself too high a reputation to allow delays. Add to this the fact that the Santa Fe has not been wholly successful in its experiments in motive power and rolling stock repair system, and the difficulties [illegible]

In 1911 the Santa Fe handled 20,090,000 tons of freight, with an [illegible] haul of 427 miles per ton. In 1910 the company handled 19,450,000 tons of freight an average haul of 361 miles per ton. The average revenue per ton per mile was 1.028 cents in 1911, and 1.015 cents in 1910. Total freight revenue amounted to $71,790,000 in 1911, and to $71,190,000 in 1910.

The company carried 14,100,000 passengers last year, with an average journey of 90 miles per passenger. The [illegible] company carried 13,680,000 passengers, with an average journey of 90.45 miles per passenger. The average revenue per passenger per mile was 2.144 cents in 1911, and 2.056 cents in 1910. Total passenger revenue last year amounted to $27,000,000, as compared with $25,440,000 the year before.

The increase of 2.60 per cent. in passenger business, on a mileage basis, was handled with an increase of 4.91 per cent. in passenger car mileage, and 7.19 per cent. in passenger train mileage. It appears that the company has increased its service to the public in rather greater proportion than the increase in business. There is very keen competition for transcontinental passenger business, and, while this passenger business yields a high average revenue per mile, it is expensive to handle. The Santa Fe has to meet the competition of the Southern Pacific's New Orleans route in winter, and the Rock Island-Southern Pacific competition and the North Western-Union Pacific-Southern Pacific competition in both winter and summer. Nevertheless, the Atchison's California Limited often has to be taken through in two, and sometimes three sections in the winter months.

The freight business, which decreased 2.63 per cent., on a mileage basis, was handled with a decrease in freight car mileage of 1.30 per cent. and a decrease in freight train mileage of 5.44 per cent. Car loading was not quite so heavy in 1911 as in 1910, the average tonnage per loaded car mile being 18.92 tons last year, and 19.08 tons the year before. Train loading, on the other hand, was better in 1911 than in 1910. The average revenue and company train load last year was 400 tons, as against 389 tons the year before. Of the total 20,090,000 tons of revenue freight carried, 5,700,000 tons, or 28.36 per cent., was furnished by products of mines last year. In 1910, of the total 19,450,000 tons of freight carried, almost exactly the same tonnage was furnished by products of mines, but this formed 29.28 per cent. of the total tonnage; while, on the other hand, products of agriculture furnished 4,490,000 tons, or 22.33 per cent. of the total last year, as against 4,020,000 tons, or 20.68 per cent. of the total, the year before. This increase in the tonnage of agricultural products carried reflects a particularly good crop year, and the high proportion of this tonnage justifies calling the Santa Fe a granger road. Grain and fruit move east, and last year the loaded car mileage east was 236,000,000, with an empty car mileage of 99,000,000, while in 1910 the loaded car mileage east was 228,000,000, and the empty car mileage 111,000,000.

In 1911 the company had the largest net corporate income, after the payment of expenses and fixed charges, of any year in its history, namely, $21,371,000. This compares with $20,430,000 the year before, and with $21,170,000 in 1907, the best year previous to 1911. While total operating revenues increased last year by $2,570,000, totaling $107,570,000, operating expenses increased by but $1,000,000, totaling $70,770,000. The increase of $1,360,000 in transportation expenses is only what we find on most roads during the past year, but a decrease of $1,750,000 in maintenance of way expenses is not all necessarily a permanent economy. The company showed an increase of $1,130,000 in the cost of maintenance of equipment.

The condition of the Santa Fe's equipment on the lines that compete directly with the Southern Pacific is probably not as good as that of the S. P. When the Interstate Commerce Commission's classification of operating expenses was first put into effect, the Santa Fe showed a considerable increase in the cost of maintenance of equipment and ascribed this increase to the charges for depreciation made necessary by the Interstate Commerce Commission's requirements. Since it has been left to the roads themselves to say at what rate they will figure depreciation, this appears to be a confession that heretofore depreciation had not been figured at a high enough rate. In 1911, however, $810,000 was charged for depreciation of locomotives and $1,230,000 for depreciation of freight train cars, in both cases a larger charge for depreciation than was made the year before. This depreciation in the case of locomotives was a little over 10 per cent. of the cost of repairs for the year, and in the case of freight train cars was about 34 per cent. of the cost of repairs.

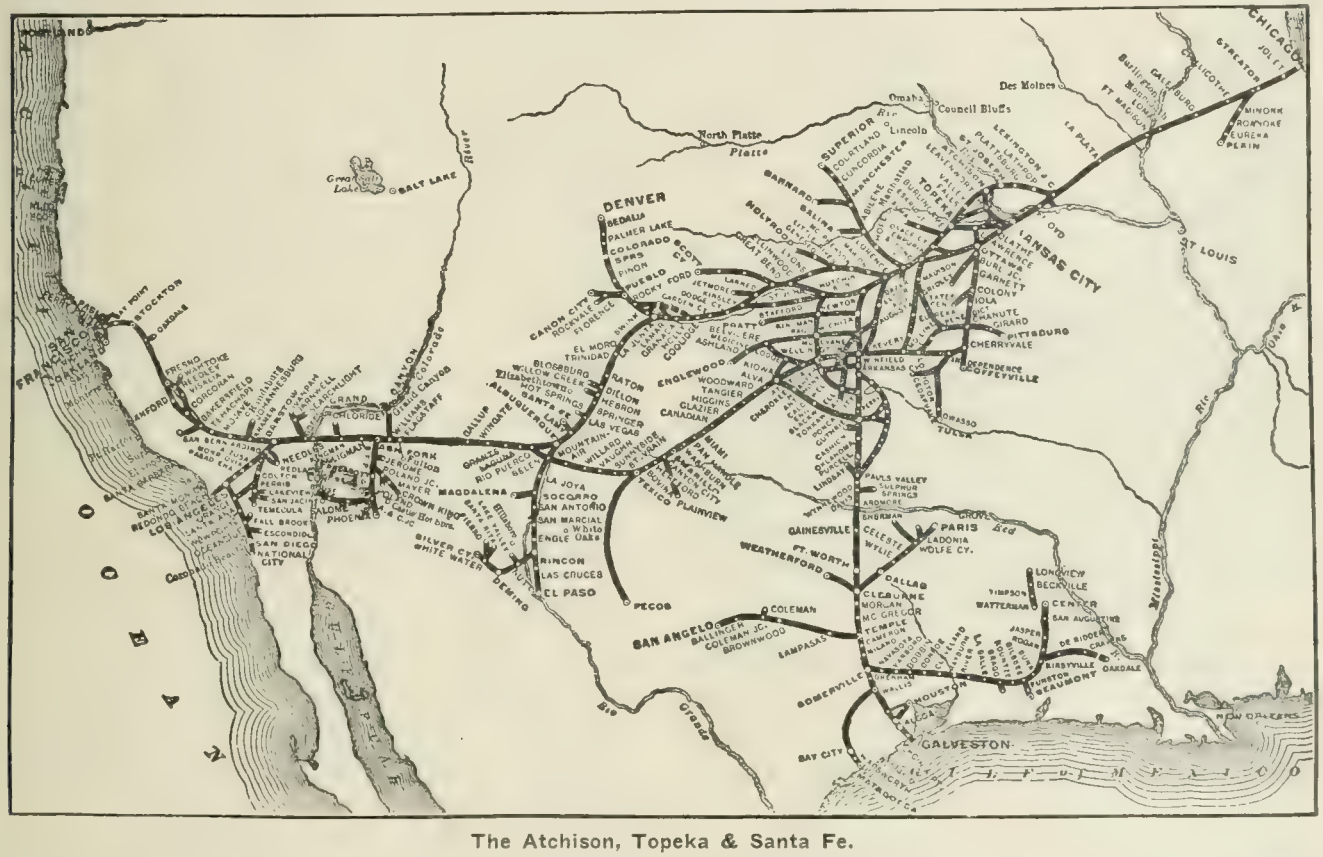
The Santa Fe has made experiments in "scientific management" of its shops, a discussion of which can form no part of these comments. Nevertheless, these experiments, together with a leaning toward a departmental form of organization, has led to a certain distrust of the motive power department by the operating department which, if it were allowed to continue, might result in a lower general efficiency of the whole transportation plant.

The Atchison, Topeka & Santa Fe, the Southern Pacific and the Union Pacific will be presumably directly benefitted in their passenger business when the Panama Exposition is held in San Francisco. The Union Pacific last year announced its intention of double-tracking its lines from Omaha to Ogden, and the Southern Pacific is apparently in a position to handle a considerably larger business than it does now with its present facilities. The Atchison, Topeka & Santa Fe will probably have to build considerable double track. During the past year $3,700,000 was spent for additional main track, and $640,000 for sidings and spur tracks. There is now in process of construction 89 miles of second track; in addition, second-track work has been authorized on the lines west of Albuquerque for about 40 miles, and extensive grade reductions and changes of line have been authorized preparatory to additional second-track work between Albuquerque and Gallup. It is expected to complete most of this work in the present fiscal year, and then the company will have in operation 816 miles of double track line.

As to the future, the company's preparations have been far-sighted and aggressive, both from the point of view of providing itself with additional capital and of making a bid for greater traffic. Since the close of the fiscal year, the company has authorized the issue of $100,000,000 convertible bonds and has increased its authorized stock to provide for the conversion of these bonds. Although none of the bonds have as yet been sold, the directors have authority to sell them when an opportunity offers and whenever addition and betterment work requires it. The company's line running from Texico, by way of Coleman, to Temple has been almost completed, and when this line is finished the Santa Fe will be in a position to make a bid for traffic originating at Galveston, or brought by water to Galveston, and destined for the Pacific coast to be routed over a line somewhat longer, but not prohibitively so, than the Southern Pacific's. Thus the Santa Fe will be in a position to compete not only with the Harriman lines from Chicago to the Pacific coast, but also with these lines from the Gulf to the Coast.

The following table shows the figures for operation in 1911 as compared with 1910:

	1911.	1910.
Average mileage operated	10,350	9,916
Freight revenue	$71,787,201	$71,194,056
Passenger revenue	27,204,868	25,437,182
Total operating revenues	107,565,116	104,993,195
Maint. of way and structures	16,059,787	17,807,136
Maint. of equipment	16,686,145	15,560,047
Traffic	2,249,899	2,114,260
Transportation	33,183,520	31,821,825
Total operating expenses	70,768,252	69,761,820
Taxes	3,474,607	4,006,419
Operating income	33,322,257	31,224,956
Gross corporate income	35,529,623	33,775,011
Net corporate income	21,371,068	20,425,784



The Atchison, Topeka & Santa Fe.

Dividends	15,641,150	15,356,720
Appropriated for fuel reserve fund	414,140	703,218
Appropriated for additions and betterments	5,000,000	4,000,000

THE AMERICAN LOCOMOTIVE COMPANY.

IN spite of the adverse conditions in the equipment market the report of the American Locomotive Company, New York, for the fiscal year ended June 30, 1911, shows that the gross earnings were $40,649,385, as compared with $32,203,392 in 1910 and $49,515,486 in 1907, the company's banner year. But although the gross earnings for 1911 showed a considerable increase over those for 1910, the company starts the present fiscal year with fewer orders received. At the beginning of the fiscal year 1910 the unfilled orders on the company's books were $6,150,000; they were $17,550,000 at the beginning of the fiscal year of 1911, and only $6,015,000 on July 1, 1911. An index of the present operations of the company upon which too much stress should not be laid, as an indication of its operations throughout the year is the contract work in course of construction at the end of the fiscal year. This was $740,550 in 1911, $2,218,812 in 1910 and $4,195,943 in 1907.

Manufacturing, maintenance and administrative costs and depreciation charges were $36,526,515 in 1911, $29,605,443 in 1910 and $42,744,381 in 1907. In 1911, $1,056,417 was charged to depreciation. Net earnings were $4,122,870 in 1911, $2,597,949 in 1910 and $6,771,105 in 1907. The surplus after the preferred dividends were paid were $1,815,562, or 7.26 per cent., in 1911, $334,758, or 1.34 per cent., in 1910 and $4,608,207, or 18.43 per cent., in 1907. The surplus credited to profit and loss, after all fixed charges had been paid, was $1,515,562 in 1911, $334,758 in 1910 and $1,358,207 in 1907. In 1911, $300,000 was placed in reserve for extraordinary additions and betterments, in 1910 nothing was held in reserve, but in 1907, $2,000,000 was credited to the reserve fund. In 1907 and 1908 dividends of 5 per cent., or $1,250,000, were paid on the common stock, but since then the directors have thought it wise to put back into the company as large a surplus as possible, the dividends on the common were passed.

Production varied during the year from a maximum of 80 per cent. of the capacity of the plants to a minimum of 38 per cent., and in only one month in the year did the receipt of orders represent work for more than one-half of the company's capacity. Several of the smaller plants were therefore closed and orders were confined to the larger plants with a resultant economy in the cost of plants operations as a whole. In the annual report of 1909 it was said that plans had been prepared and contracts made for extensive improvements at the larger works which are located at Schenectady, N. Y., Dunkirk, N. Y., Pittsburgh, Pa., and Richmond, Va. These improvements are now almost completed and the capacity of the company is now twice as great as it was at the time of its formation in 1901, being capable of an output worth about $60,000,000. In addition to these expenditures, the company has, during the year, spent on its plants for miscellaneous betterments $402,316 of the extraordinary additions and betterments fund. During the past ten years the company has spent on maintenance and betterments $11,256,787, all of which has been charged against income as a part of current expenses.

When it is realized that the fiscal year corresponds exactly with a year in which the railways felt the pinch of high wages and low rates and were forced to economy and retrenchment in order to pay their dividends, the showing of the American Locomotive Company is a good one.

It will be seen from the table below that current liabilities are kept down to about 50 per cent. of the value of the quick assets, showing the strong position of the company. Gold coupon notes now outstanding amount to $6,000,000, but $1,000,000 of these were paid off on October 1, 1911. During the year the Dickson Works, Scranton, Pa., were closed and dismantled, a contract was entered into for the sale of the real estate, and arrangements were made to retire during the ensuing year the bonds outstanding against the property, which amount to $562,500.

The quick assets and current liabilities as of June 30, 1911, June 30, 1910, and June 30, 1907, are as follows:

	1911.	1910.	1907.
	$17,673,013	$20,103,468	$24,124,167

Letters to the Editor.

"BACK TO THE RAIL."

Pittsburgh, Pa., September 9, 1911.

To the Editor of the Railway Age Gazette:

I have been reading with much interest Major Hine's letters which have been appearing in your paper. His "Back to the Rail" call is a warning which railways cannot safely fail to heed. Railway organizations are an organized system of shirking responsibility from the officers to the men in the ranks, and this inclination to throw the details onto somebody else has raised up many classes of aristocracy: the official aristocracy; the trainmaster aristocracy; and the chief clerk aristocracy; the worst of which is the chief clerk aristocracy. There was a time in the history of railways when superintendents were active, actual superintendent; when they were close to the men, close to the cars and close to the rails. Between them and actual railway operations there was but one other active agent, the yardmaster. Now a superintendent must have a trainmaster and several assistant trainmasters, a chief clerk of transportation, a chief clerk of maintenance of way, a chief clerk of motive power, a division engineer, a master mechanic and several yardmasters; and each and all of these must, in turn, have chief clerks and junior clerks; as a matter of fact railways today are governed by chief clerks. We see a bright young man enter a general telegraph office as a telegraph operator; thence he is transferred to a position as a clerk in a general superintendent's office; thence to a car distributor of a grand division; see him make himself invaluable as an encyclopedia of the number of cars in the various yards at certain hours of the day, of the size of the car movement, of what was done last year and the year before. We see him get a grip on all the details of operation and gather around him a robe of authority; he is in name a chief clerk: in power a general superintendent. Then he must have a chief clerk and an office force, for, with the semblance of power, comes that inclination to put the details on somebody else.

There being no defined line of promotion for clerks, their only opportunity for greater authority and compensation is in making themselves indispensable to their superior officers. This is accomplished by relieving their superiors of all the details, making red ink statements of statistics showing, in attractive form, performance, cost, earnings, etc. That a trainmaster or a superintendent may have before him each morning a picture of the previous day's work as compared with the work of the same period the year before, in neat and attractive figures, is to such trainmaster or superintendent undoubtedly a labor saver and a convenience; but the evil of such a practice is that these officers' time becomes exclusively devoted to examining and reviewing statistics. Moving cars is not a bookkeeping affair to anyone but the car accountant, but under the present system everybody is a car accountant and statistician.

Twenty years ago the superintendent's office force consisted of a chief clerk, and possibly a few junior clerks. Today each of these clerks is the head of a department in many instances larger than the superintendent's force was a few years ago. The forces of the trainmaster, division engineer, master mechanic, etc., have increased in the same ratio, and many new and subdepartments have been added. Everything is specialization run mad. What is the result? That everybody on a railway is running a correspondence and statistical bureau composed of attack and defense. The general superintendent attacks the superintendent, and he defends; the superintendent attacks the trainmaster, and he defends; the trainmaster attacks the yardmaster, and he defends; the yardmaster attacks the conductor, and instead of moving cars he is busy writing a defense. Railway transportation consists of getting cars to destination, not in writing letters and making records. Yesterday's work is ancient history and to get efficient service we should be on the job to-

day and see for ourselves how the work is being done. We have grown to depend too much on these statistics in spite of the fact that we all know how unreliable they are on account of the many details that figures do not show. For instance: the human element is the all important factor in efficient or inefficient service and a comparative statement of car movement and cars in yards will not show Jack's work was 90 per cent. efficient, and John's only 40 per cent.; it will not show that the men eat on the company's time and sleep during the regular meal hour; that it takes five to fifteen minutes to wake up and get on the job when lunch hour is up; that when one shifter is held by another the men lie down or wander away and it takes five to ten minutes to get them back on the job and moving again.

Statistics as history and guides are valuable and necessary, but actual operations must be directed on the ground and not by boards of strategy where orders are based on statistics that are too far from the actual operations to govern the solution of problems, the proper decision of which is contingent upon accurate and close knowledge of exact and constantly changing conditions, and it is impossible, where statistics cover a large area, to be in such close touch with the actual operation that the situation and requirements can be clearly seen and controlled.

The correspondence evil has grown until personal intercourse even between the subordinate officials and the men is practically a thing of the past. Everything has to be in writing, and unless a man is fairly well educated, and few men in the laboring service are, he is unable to state his case clearly. He gets around the question by having the grievance committee tell his troubles for him.

Reviewing this mass of statistics and correspondence, and keeping posted on the new regulation laws and labor grievances is taking so much of the superintendent's and trainmaster's time that an occasional trip over the division in a special train is about as near as they now get to the actual operation. The unit organization would always give you a responsible man in the office, and several constantly on the ground to observe the actual operation. This would bring them in personal contact with the men. The officials would get the men's point of view and *vice versa*, which would greatly decrease the activities of the grievance committee.

The solution of the question of personal supervision is by a cycle form of organization, or as Major Hine terms it "unit organization." In the actual operation there should be three cycles exclusive of the executive. First: General manager, in charge of all departments for the entire road. Second: Superintendent, in charge of all departments for each division. Third: Yardmaster, in charge of operation only, at each terminal or yard, but he should have complete authority over all factors affecting the operation. Each cycle should be a complete unit, in other words a complete organization within itself, each officer having absolute authority over all direct factors in his zone of responsibility. This lack of on-the-ground authority is largely responsible for the poor control of the men in the train service. As the superintendent got farther away from the actual direction of operations the authority went with the position, leaving only the responsibility.

YARDMASTER.

The African Midland Railway, by late reports, had construction trains running to a point 400 miles west of its eastern terminus at Dar-es-Salem, and it was expected that by September 40 miles more would be opened, to Tura, leaving 93 miles to be built to reach Tabora, which is 160 miles due south of Lake Victoria, and as far as construction has been provided for. The colonial interests hope to have aid from the Reichstag for a further extension which is projected westward about 200 miles to Ujiji, on Lake Tanganigika. This would give the line a total length of nearly 700 miles from the Indian ocean westward.

CONSTRUCTION WORK ON THE CLEVELAND SHORT LINE.

The Cleveland Short Line is a new built railway, being built by the Lake Shore & Michigan Southern around the city of Cleveland, Ohio, to provide facilities for interchange of traffic between all of the roads entering the city and for moving through freight around the city. In addition to connecting with the Lake Shore at Collinwood on the east and Rockport on the west, the new road will connect directly with the Cleveland, Cincinnati, Chicago & St. Louis, a branch of the Baltimore & Ohio, the C. & P. division of the Pennsylvania Lines, the Erie, the New York, Chicago & St. Louis, and the Newburgh & South Shore, through the latter road connecting with the Wheeling & Lake Erie.

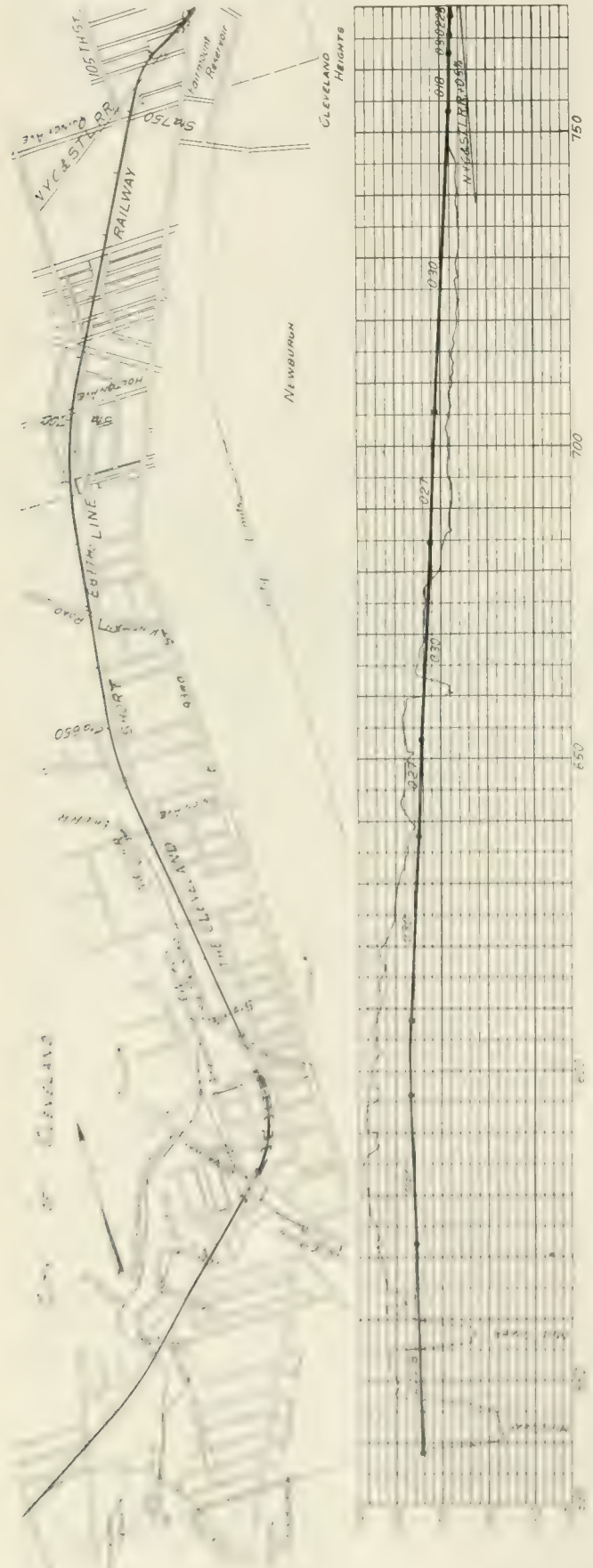
The building of the new road will greatly facilitate the Lake Shore's operation through Cleveland, and open up a new industrial territory. It will provide a double track freight line to carry through freight around the city, and will have sufficient switching facilities and connections with intersecting roads to enable it to perform its functions of a belt interchange line, as

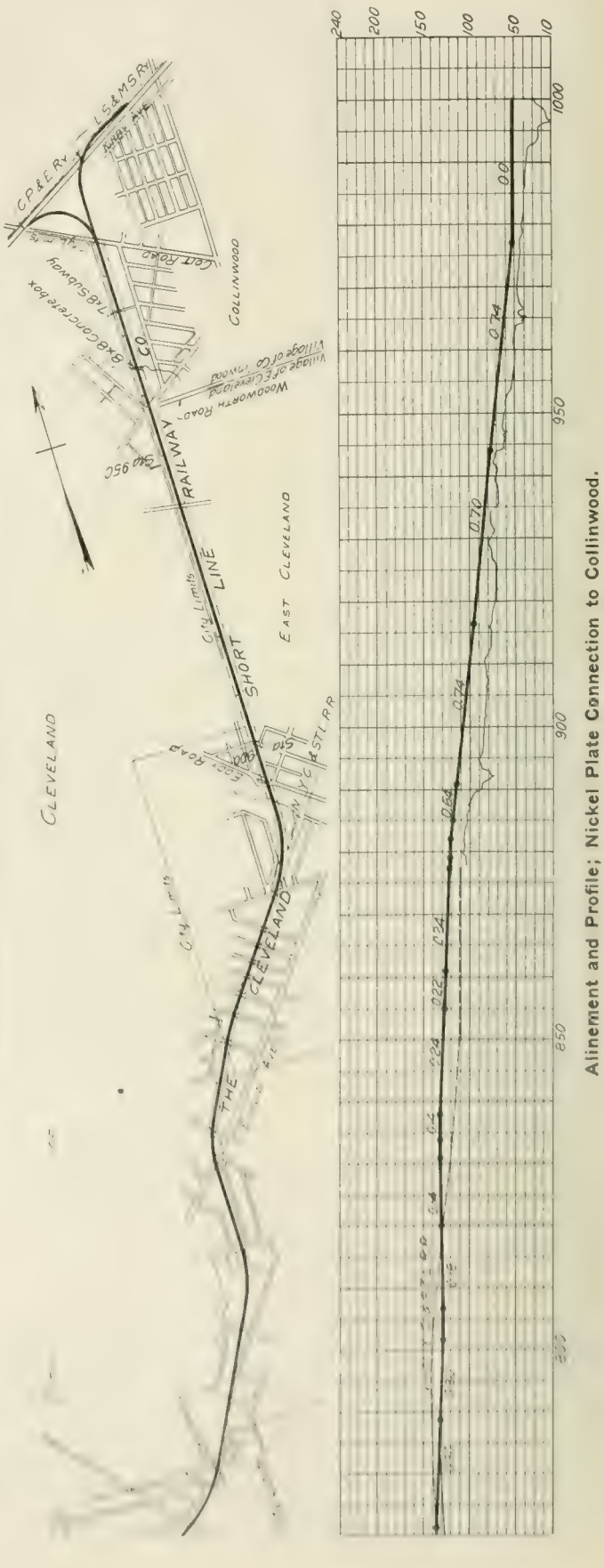
Cleveland and Vicinity, Showing Location of Cleveland Short Line.

well as to care for industrial business. The present line of the Lake Shore through a considerable part of Cleveland is on or closely adjacent to the water front, and is closely built up to industries, making track extensions very expensive. It is a four-track line through the city at present, with the exception of the crossing of the Cuyahoga river, which is made on a single track gauntleted bridge, which pending other developments in this territory it is not thought advisable to rebuild. The new belt line will relieve this territory of the through freight traffic, leaving it free for passenger and local business.

The proposition of building a belt line around the city of Cleveland has been considered for many years, the first record of the proposition dating back as far as 1873. Various engineers have since then run location lines for such a road, and in 1900 Samuel Rockwell, now chief engineer, and at that time principal assistant engineer of the Lake Shore, ran a line approximately the same as the one on which the road is being built, but the estimates of cost based on this survey caused the project to be abandoned for a time, and it was not again seriously considered until W. R. Hopkins, without much financial backing, had quietly made surveys and secured options on property along a similar route and was endeavoring to finance the proposition. Before his plans

were completed, however, the Lake Shore took over all the surveys in his possession, and in 1906 work was begun on the westerly section. Work was started on the westerly section from Rockport to Mill Creek Junction in 1908. Mill Creek Junction is 10 miles east of Rockport, and is the northern terminus of the Lake Erie & Pittsburgh, a new low grade line affording the Lake Shore and the Pennsylvania a direct line to Pittsburgh from both the Cleveland and the Lorain districts. The early



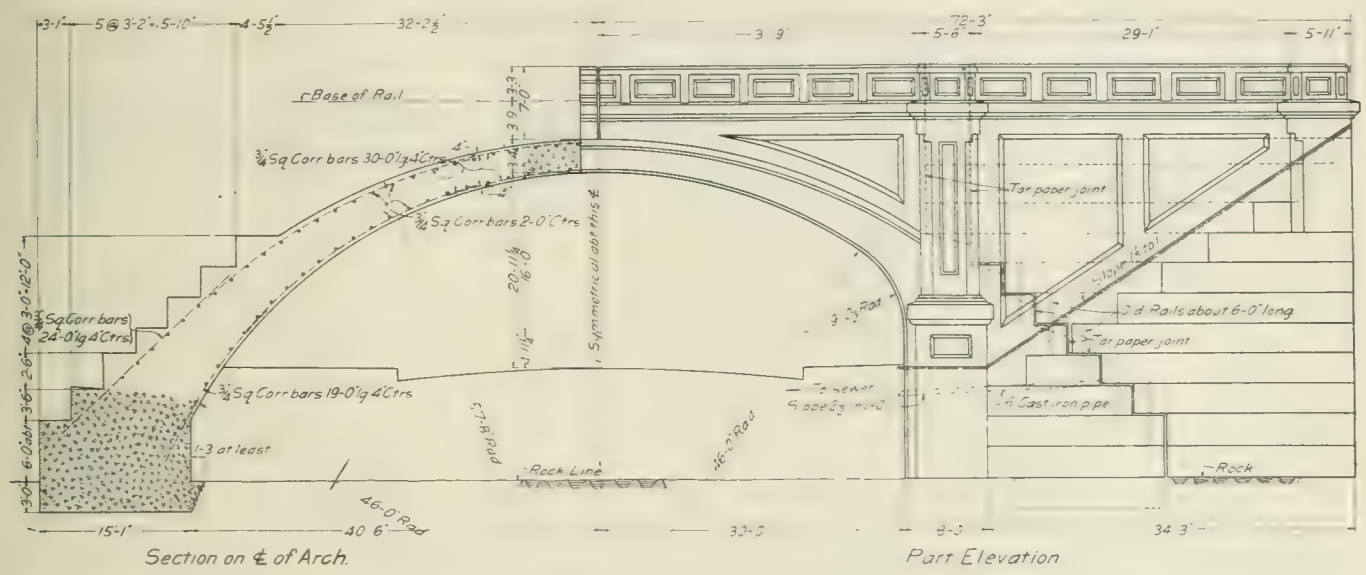


construction work on this westerly section was described in the *Railway Age* of December 20, 1907, page 875.

In September, 1909, the construction work was started east of Mill Creek Junction and extended about a mile, covering the tunnel territory hereafter described; construction work on the remaining portion of the line, east of the tunnels, was begun in April, 1910. The section from Rockport to Mill Creek Junction was placed in service early in 1910, and it is expected that the remainder will be in service in the spring of 1912.

The relation of the new line to the other roads and the city is shown on the general map reproduced herewith. From Rockport, about 9½ miles west of Cleveland, it runs almost directly east to Mill Creek Junction, and from this point turns northeast extending to the crossing over the Nickel Plate, which is then paralleled for about two miles, both lines being built on the same four-track roadbed, using similar construction. From the north end of this joint section the Short Line runs almost directly north to a connection with the Lake Shore just west of the Collinwood yard. The total length of the line, including the Nickel Plate section, is about 20 miles, and with the exception of about 2½ miles between the Collinwood connection and the Nickel Plate the maximum grade is 0.3 per cent. This 2½ miles is largely on a 0.74 per cent. grade, making a pusher grade, the intention being to use yard engines for the pushing service. The curvature is limited to 3 deg., except for one 4-deg. curve at the south approach to the Nickel Plate grade and line at 6-deg. curves at the Collinwood and Rockport connections with the Lake Shore. The connection at Collinwood is made on the north side of the Lake Shore tracks, to connect with the yard which is located north of the passenger tracks. Leaving the yard, the Short Line tracks run up between concrete retaining walls and over the Lake Shore tracks on through plate girders on concrete abutments, the Lake Shore tracks having been lowered about 7 ft. under this crossing to provide necessary clearance.

The section from Collinwood to the Nickel Plate contains nothing unusual in construction features, the principal structures being the reinforced concrete arches over Lake Front avenue and Eddy road. Eddy road was relocated to cross the new line at right angles, it having formerly crossed at a sharp angle. This is an arch with an 81 ft. span and a maximum clearance over the roadway of 20 ft. 11¼ in. The arch barrel is 58 ft. 6 in. long between spandrel walls, and is designed for four tracks. The arch crown is 3 ft. 4 in. thick, reinforced with ¾-in. square corrugated bars parallel with the center line of the arch spaced 2 ft. center to center, in both the upper and lower reinforcing planes, and similar bars, perpendicular to the center line of the arch, are spaced 4 in. center to center in both planes. The abutments are benched 3 ft. into solid rock. The entire extrados of the arch ring is waterproofed with Tartex waterproofing felt. The spandrel walls are ornamental in design, and are surmounted by a parapet cast in place after the completion of the structure.



Elevation of Eddy Road Arch.

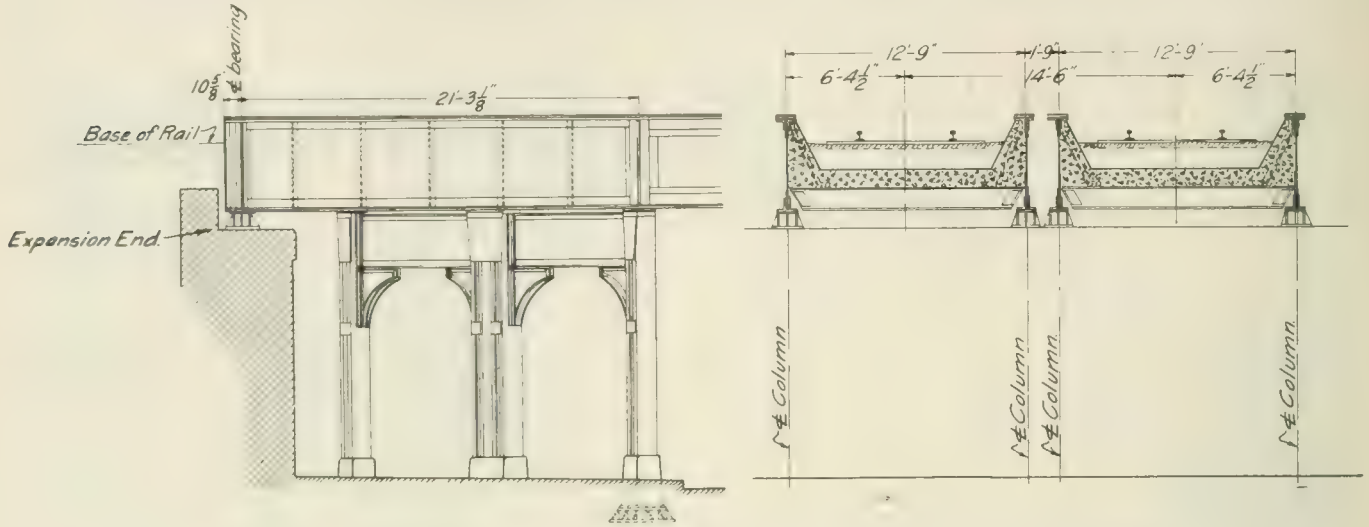
Cedar Avenue Subway and Doan Brook Crossing; Cleveland Short Line.

A 1:2:4 concrete mixture was used in the arch ring and ornamental work, and 1:2½:5 in the rest of the structure. The exposed surfaces are dense and smooth and all exposed edges chamfered. It is the intention to bush-hammer the exposed surfaces of this structure.

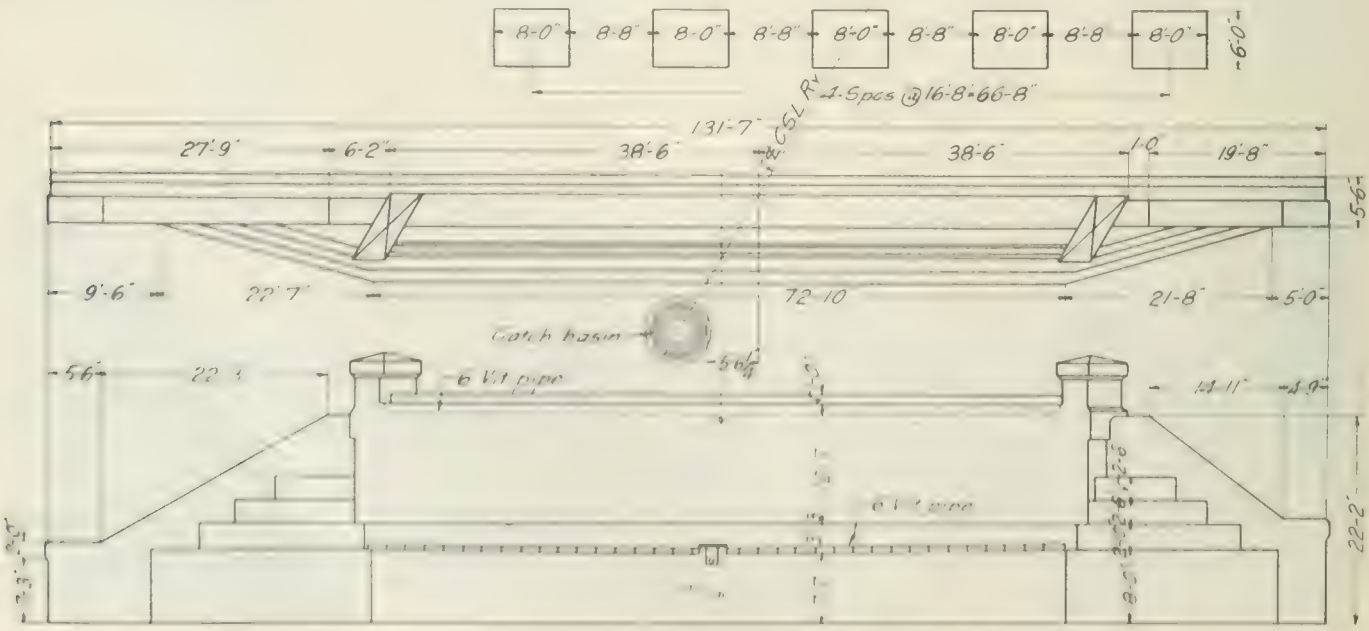
Through the section in which the Nickel Plate and Short Line are built on one roadbed, and for some distance either way, a total of about four miles, the Nickel Plate is separating railway and street grades. On the joint section, which is between 105th street and Superior avenue, the roadbed and structures carry four tracks, two for each company. This section is through a residential portion of the city and crosses a number of fine boulevards. The structures over these boulevards were very carefully designed, to secure pleasing effects. The bridge over the East boulevard is a through plate girder, with a false concrete arch side elevation and concrete spandrel walls. The facing concrete in this structure is red, this color having been secured by using red granite screenings and iron oxide. The line crosses Cedar avenue and Doan brook with one harmonious structure, consisting of a long arch for the avenue with a shorter span for the stream, illustrated herewith.

At the south end of the joint line the Nickel Plate dips on a 0.5 per cent. grade and the Short Line raises on a 0.3 per cent. grade, crossing over the Nickel Plate on a through girder, and then crosses a number of streets within a short distance. Similar designs were adopted for all of these subways, the one illustrated in the accompanying cuts being typical. Through plate girders with reinforced concrete floors are carried on concrete abutments and steel columns. The abutments are built for four tracks, are paneled on the street side and include short parapets above the bridge seat to hide the ends of the girders. The abutments of the bridge illustrated require 1,364 yds. of concrete.

South of these subways and extending as far as Mill Creek Junction, the road runs under the cross streets. At one of these, Kinsman road, a special design was adopted for the crossing. This is a prominent highway, crossing the line at an angle of 65 deg., and a 38 ft. roadway with double street car line and two 8 ft. sidewalks are provided. The structure has a clear span over the tracks of 87 ft. 6 in., providing for six tracks, which it is expected will be required at this point. The roadway is supported between steel arch ribs encased in concrete resting on concrete abutments, carried down to solid rock. The details of the abutments are shown herewith; also a photograph of the east abutment before the erection of the arch ring. Five steel hangers hung from each of the steel arch ribs and encased in concrete support the floor. The floor beams are built-up sections



Elevation of Columns and Side Walk Girder and Cross Section of Typical Subway.



Plan and Rear Elevation of Typical Subway Abutment; Cleveland Short Line.

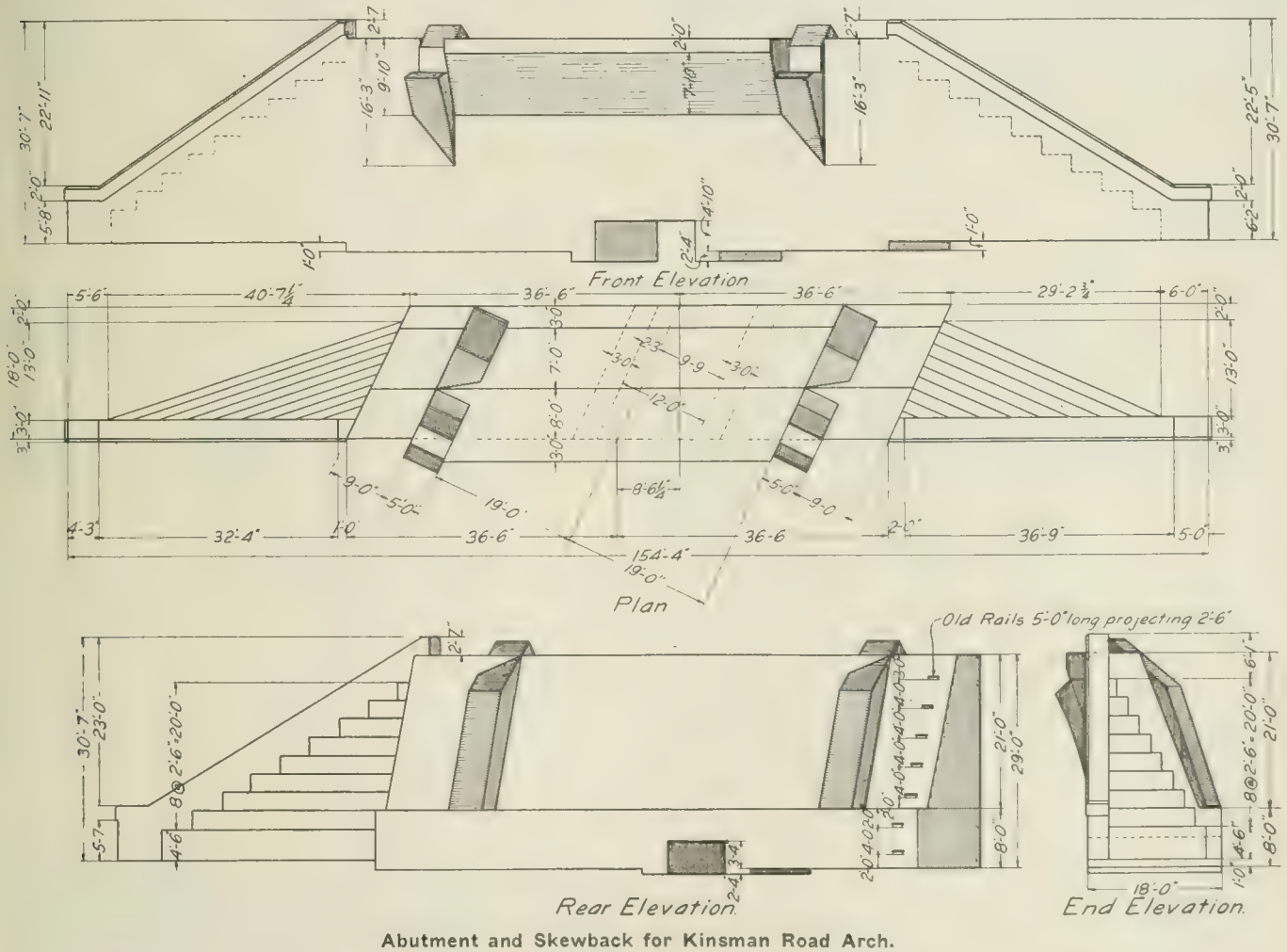
encased in concrete. The floor slabs are continuous, encasing steel stringers. They have a maximum thickness of 1 ft. 4 in. under the street car tracks and 9 in. under the roadway. The reinforcement in the floor slab under the track consists of ½ in. longitudinal bars spaced 9 in. center to center in both the upper and lower reinforced planes. In the remainder of the slab a single set of ½ in. longitudinal bars is spaced 12 in. center to center, and a single set of transverse bars of the same size, bent as shown in the detailed drawing herewith, are spaced 6 in. center to center, and in addition ¼-in. bars set on 6-in. centers, are looped around each stringer. The railing is of ornamental concrete with paneled faces. The lower surface of the concrete over each track is protected from locomotive gases by ¾-in. cast iron smoke plates 2 ft. 6 in. wide. The steel arch was 3-hinged, with pins at the shoe plates and at the crown. Concrete in the arch ribs are placed between A and B first, then between B and C, and after the erection of the closing angles at the center hinge, between A and A.

The Short Line at this point parallels the tracks of the Pennsylvania Company, and when the street was elevated over that company's tracks several years ago, the retaining wall on the south side of the street between the Pennsylvania and the then proposed belt line was designed to provide for an additional height to carry the street when it became necessary to raise it over the Short Line tracks. This wall connects with the south end of the west abutment. It is probable that in the future a yard will be built adjoining the line on the west between Kinsman road and tunnel No. 2, and to provide for that probability the west abutments of all street crossings in that section were designed to be used as piers in case the street bridges are lengthened.

The contractors for the concrete work on the eastern section of the line used high concrete distributing towers with good results.

At some points the vertical drop was as great as 40 ft. An open chute, supported on cables which also served as guys for the towers, carried the concrete to the forms. The pitch of these chutes was not less than 3½ to 12, as it was found that the concrete did not run freely on a flatter slope. For work close to the tower where the drop from the main trough would have been too high, an opening was made in the chute beyond the form and a second chute with the fall at right angles to the main chute carried the concrete to the desired location and elevation.

In excavating at Aetna road a good grade of gravel was found, and to utilize this a gravel washing plant was installed. The excavated gravel was dumped onto the platform of the washing plant from a clam shell bucket, and after washing it was elevated to 1 in. and ⅜-in. screens at the proper inclination. A gravel storage of 50 yds. and sand storage of 30 yds. was provided. The storage bins discharged to the level of the mixer-feeding platform, which also was connected with a cement car. A ½-yd. Smith mixer produced 15 yds. per hour under these conditions.



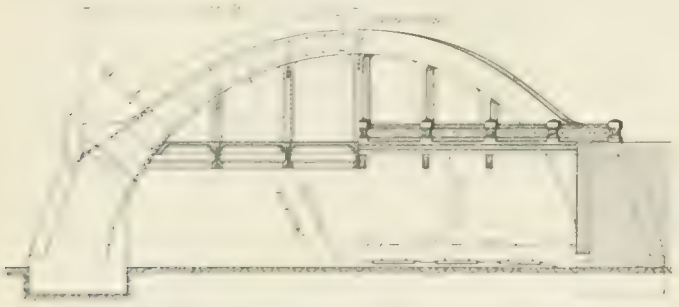
Abutment and Skewback for Kinsman Road Arch.

From Aetna road south to beyond the Pennsylvania tracks the road runs through a deep cut, with a maximum depth of about 55 ft., and at the points where it is necessary to carry existing streets or railway tracks over this cut concrete tunnel sections were built and were then back-filled to the original grade. The northerly tunnel, known as No. 2, is the longest, being 773 ft. The Erie, the Wheeling & Lake Erie and the Newburgh and South Shore, a switching road of the American Steel & Wire Company, all run over this tunnel, and the problem of caring for these railways during construction was difficult. The north portal is just north of the Erie crossing, and it was found advisable to shift the tracks of that company about 50 ft. north to

allow the tunnel work to be completed nearly to the portal and then to shift the tracks back over the completed section of the tunnel while the portal was built. The crossings of the other railways were maintained on deck girder spans resting on

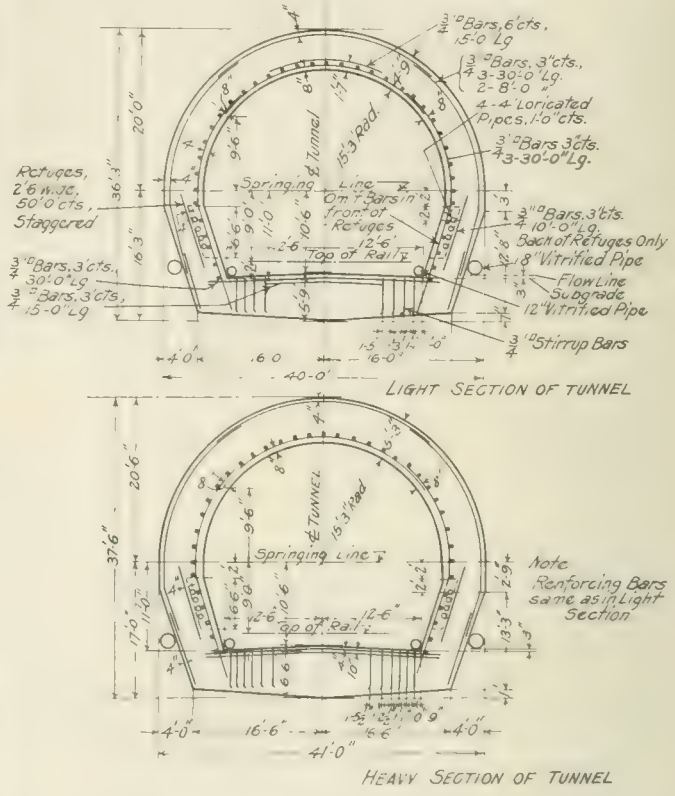
South Abutment of Kinsman Road Arch Bridge.

pile bents driven on each side of the cut as the work progressed. The girders thus used were the ones provided for the second track of the Cuyahoga river viaduct, and after they have served for these temporary crossings they will be erected in that struc-



Half Section and Half Elevation of Kinsman Road Arch.

ture. The opening of this cut blocked pedestrian travel in such a way that it was necessary to provide a temporary foot bridge south of the Wheeling & Lake Erie tracks to care for this travel. The location required a 240-ft. span, and to avoid driving piles in the slope, thus obstructing steam shovel and concrete work, a suspension bridge was decided on. This bridge is a good example of the incidental problems which must constantly be met and solved in connection with construction work of this character. It is of substantial frame construction suspended from two 1¾-in. cables, anchored in pits containing 50 tons of pig iron on old bridge ties. The cables are 7 ft. 4 in. center to center, the clear space between timber trusses being 6 ft.



Cross Sections of Tunnel No. 2.

The material encountered in tunnel No. 2 cut was gravel and fine water-bearing sand. The excavation was handled by steam shovel down to about the elevation of sub-grade and by a small Thew shovel below sub-grade for the tunnel invert. Some of the material was removed in scale boxes carried on narrow gage cars and used for back-filling over tunnel No. 1 and the Harvard avenue arch.

The concrete in the tunnel section was placed in three separate

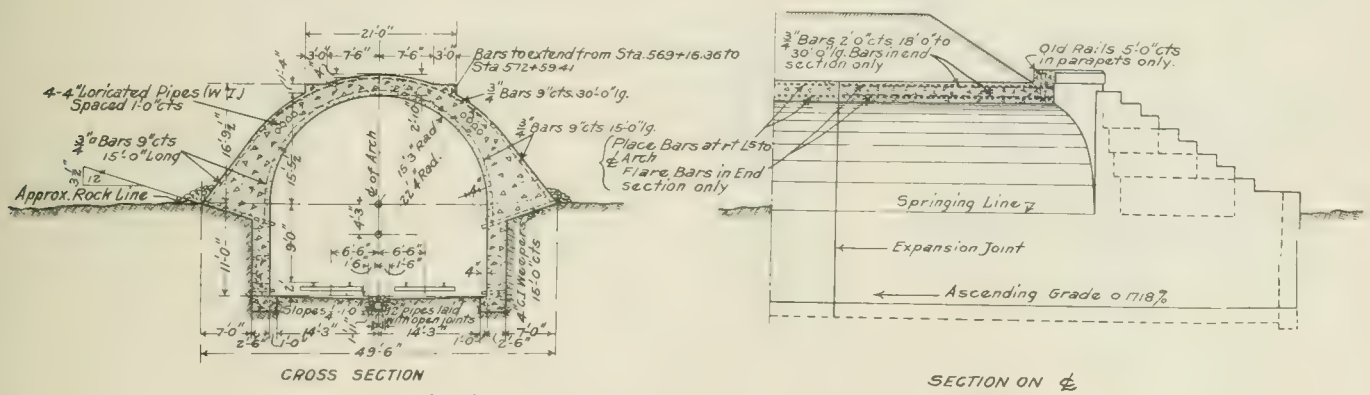
Plan of Kinsman Road Arch; Cleveland Short Line.

stages; first, the invert; second, the side wall up to the springing line; and third, the arch ring. Concrete was supplied by a storage and mixing plant on the original ground elevation located a short distance east of the work, this location being well adapted to bringing in the concrete materials shipped in over the W. & L. E. The material was hauled in cars to the mixer, which was located midway between the ends of the tunnel at the top of the east slope of the excavation. The concrete was handled from the mixer into small cars hauled on a narrow gage track in the bottom of the excavated section. The invert was placed direct from these cars. For placing the side walls the buckets were lifted from the car trucks by a locomotive crane and dumped into the wall forms. In placing the arch the car bodies were picked up in the same manner and the concrete dumped into small push cars running on a narrow gage track over the arch forms on the center line of the tunnel. The arch forms were supported on 8-in. wedges set between the wall plates, so that, when a section of concrete had set, the wedges could be drawn, the form dropped on rollers running on the lower wall plate, and 75-ft. sections of the arch form moved ahead by a donkey engine.

Two cross sections were used in tunnel No. 2, the lighter section being 222 ft. long, located at the south end, where the fill is about 10 ft. shallower than for the remainder of the distance. Both sections are reinforced with ¾-in. square bars. Longitudinal bars are placed in the end sections only, spaced about 2 ft. center to center in the inner reinforcing plane. The lateral bars are spaced 6 in. center to center in both the upper and the lower planes. Drainage is provided by two 18-in. vitrified pipes outside of the side walls and two 12-in pipes inside the section, approximately at sub-grade level. Expansion joints are spaced about 50 ft. apart.

Retaining Wall and Short Tunnel Under Street.

which are carried over arched sections similar to the tunnels. Cannon and Booth streets which have foundation conditions like tunnel No. 2, have sections identical with it. Tunnel No. 1 is considerably modified from the plan of No. 2, because rock level at that point is about at the same elevation as the springing line,


21'-0"
Bars to extend from Sta. 569+16.36 to Sta 572+59.41
4-4" Loricated Pipes (W.T.) Spaced 1'-0" cts
¾" Bars 9" cts. 30'-0" lg.
¾" Bars 9" cts 15'-0" lg.
¾"ø Bars 9" cts 15'-0" Long
Approx. Rock Line
Place Bars at rt. ∠s to ∠ Arch
Flare Bars in End section only
Old Rails 5'-0" cts in parapets only.
Springing Line
Expansion Joint
Ascending Grade 0.17.8%
Slopes ¼:1.0
Pipes laid with open joints
49'-6"
CROSS SECTION
SECTION ON ℄

Section of Tunnel No. 1; Cleveland Short Line.

Tunnel No. 1 is 343 ft. long and extends under Broadway and the C. & P. tracks. Between these tunnels there are three streets which are carried over arched sections similar to the tunnels. Cannon and Booth streets which have foundation conditions like tunnel No. 2, have sections identical with it. Tunnel No. 1 is considerably modified from the plan of No. 2, because rock level at that point is about at the same elevation as the springing line, permitting the section of the tunnel below that point to be considerably lightened. No invert is provided and the side walls are not reinforced. The section of the arch ring is spread at the springing line to secure ample bearing on the rock. The arch construction at Harvard avenue is similar to that of tunnel No. 1, except that the foundation of the skewbacks runs down to sub-grade elevation, at which point solid rock was encountered.

Tunnel No. 2, Showing Forms for Concrete Arch.

A large amount of water flows from the water-bearing material surrounding tunnel No. 2, and the space intervening between No. 2 and No. 1, to care for which one 24-in. pipe is laid along each side of tunnel No. 1 below sub-grade. Four-inch cast iron weepers are placed every 15 ft. just above sub-grade, and also at the springing line of the arch. Eight 4-in. wrought iron pipe telegraph and signal wire conduits are carried from end to end in the arch ring masonry of all these tunnel sections. The sewer in Broadway at the north end of tunnel No. 1 was so low that it encroached on the limits of the tunnel section, and a special design had to be made to care for it. Steel trusses each side of the sewer take the weight, and the entire construction was encased in concrete.

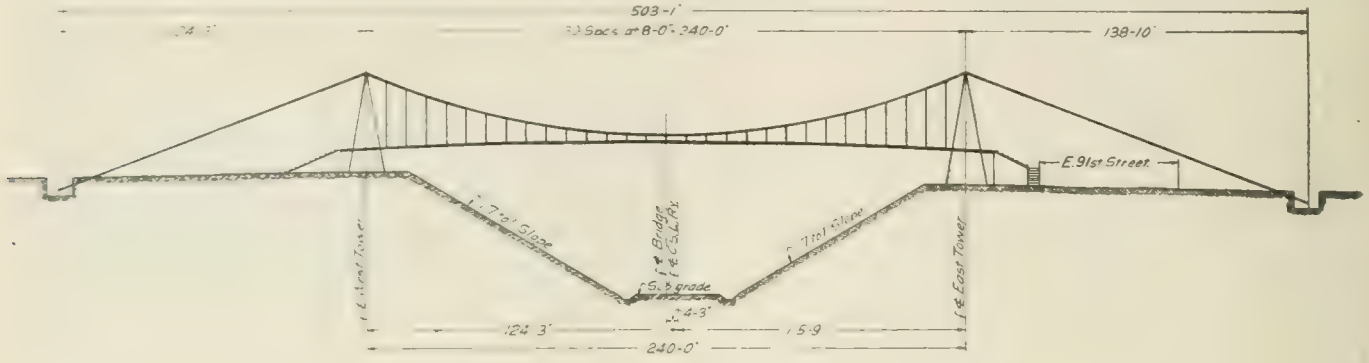
A short distance west of tunel No. 1 the line crosses Mill creek on a 60-ft. fill and the stream is carried under this fill with a 45-ft. arch; 1,500 ft. further west a second crossing of this same stream is made on an 85-ft. fill with a 50-ft. arch for the stream and a box subway for a branch track of the B. & O. On account of the height this fill was made in two lifts, the first lift being carried up half the height by laying a construction track on a

[illegible] the point of the hill, shown in the left of the photograph. A second trestle was built on this fill and material dumped from it to bring the grade to the desired level. The Mill creek arch and the method of making this fill are shown in an accompanying photograph.

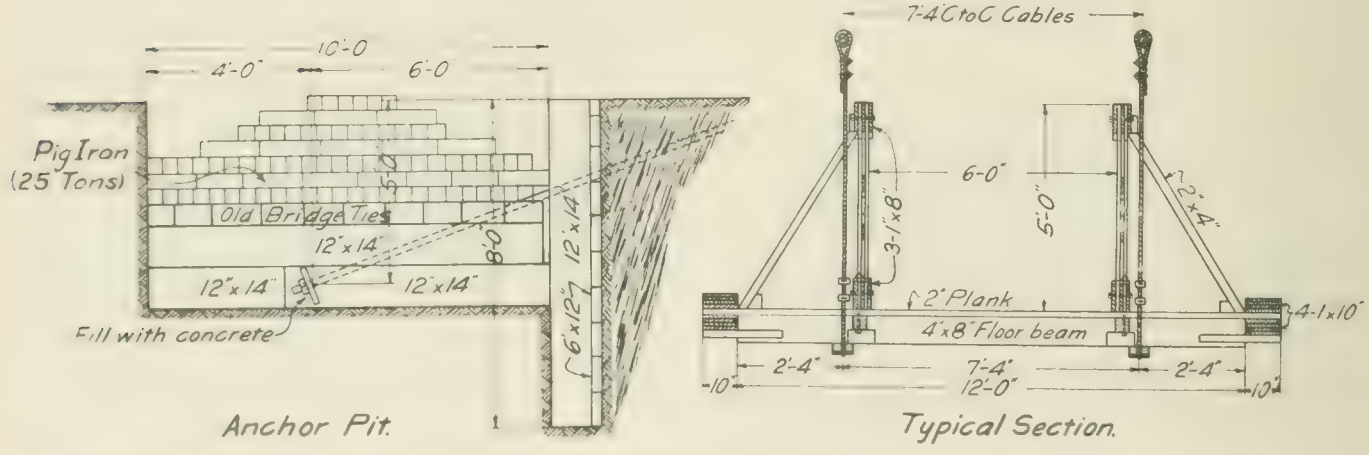
From Mill Creek Junction west, which is the point of connection with the L. E. & P., the line is now in operation. There was

Signal Company all-electric interlocking plant with upper quadrant indications. The illustration shows the plant at the B. & O. crossing. The interlocking tower of white concrete blocks is typical of the construction which the L. S. & M. S. has used extensively for this purpose in the last two years.

At the westerly connection of the Short Line with the Lake Shore at Rockport, the west bound track is depressed under the



Elevation of Suspension Foot Bridge.



Details of Suspension Foot Bridge.

[illegible] structure is a high steel viaduct over the Cuyahoga river, the Ohio canal and the C. T. & V. branch of the B. & O. This viaduct is 1,988 ft. long, with a maximum height of about 160 ft. Between the viaduct and the connection at Rockport the Big Four and the C. L. & W. branch of the B. & O. are crossed at [illegible]

Lake Shore tracks, which were raised about 15 ft. to allow this connection to be made without a grade crossing. This elevation of the Lake Shore tracks also involved the separation of grades with a country highway.

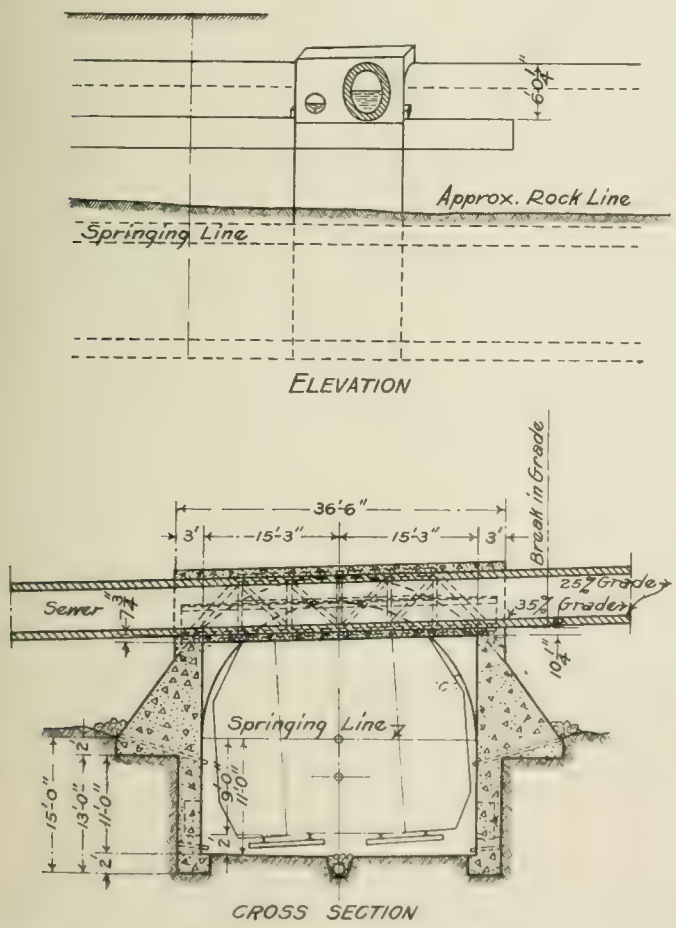
A great deal of granulated slag was used in the filling for this line and for the present this material is also used as ballast. The standard track construction is 80-lb. rail on 6 in. x 8 in. x 8 ft. ties.

Cuyahoga River Viaduct.

Mill Creek Fill, Showing Switchback Used in Construction.

One of the standard through girder highway crossings on the westerly section of the line is shown herewith, which also shows a portion of a concrete flume built to carry a small stream under the highway and under the track, where, on account of the very scant under-clearance, it was necessary to get an absolutely smooth waterway to insure proper flow.

The contractors on the section of the line now under construction are H. E. Culbertson & Company, J. C. Carland & Company,



Special Construction in Tunnel No. 1 to Care for Crossing of Sewer; Cleveland Short Line.

and the Robert Grace Contracting Company. The work is being done under the direction of Samuel Rockwell, chief engineer of the L. S. & M. S. and the lines directly operated and controlled by it, and under the personal supervision of J. H. Roach, division engineer, to both of whom we are indebted for the above information.

LETTERS FROM AN OLD RAILWAY OFFICIAL TO HIS SON, A GENERAL MANAGER.*

XX.

Tucson, Ariz., August 24, 1911.

My Dear Boy—Do you think it logical and just to pay a train (including engine) crew the same wages for going over the freight district with a light caboose as with 50 or 75 cars? Be careful how you answer.

As I understand it, the train-mile was adopted as a unit of compensation for employees on the theory that piece work rewards the deserving and promotes efficiency. Whatever the merits or demerits of the piece work theory, I have never been able to reconcile its applicability to train service. A man operating a machine in a shop can stop or start his individual machine, can save steam power or electric current without seriously inconveniencing his fellow workers or the general operation of the plant. A railway train cannot move regardless of all other trains on the road. Such independence of function will cause either a criminal collision or an expensive blockade. A train must, therefore, move according to a time-table and orders. The space occupied by a train, unlike a stationary machine, is so variable that time becomes the essence of the proposition. The train crew cannot be allowed that freedom of action which permits of piece work. Too many arbitrary conditions are necessarily imposed to warrant a very extended application of a practical bonus system. One delayed train will upset the whole day's combination. On the other hand, the task imposed upon a train crew is extremely definite and easy to measure, when the equation can be solved for all the variables.

So fallacious a unit of compensation as the train-mile breeds numerous illogical practices. We penalize ourselves every time we run a train without full tonnage. Conditions of traffic may demand quick movement regardless of tonnage. When business is heavy terminals are congested and empty equipment is scarce. We all know that the way to relieve congested terminals is to run light, fast trains. This serves a double purpose, relieving the terminals and increasing the earning power of the equipment. Unfortunately our fundamental conception is so distorted that we mulct ourselves in money by doing that which is an obvious necessity. Why not so arrange our methods that we can be rewarded for quick judgment and prompt action?

A shop workman sups, sleeps and breakfasts at his own home. A train crew must have increased expenses when away from the home terminal. A train crew would really be ahead of the game as far as expenses are concerned if a round trip could be made within the sixteen hour limit and the away-from-home terminal expenses avoided. We say that demurrage is imposed primarily to hasten the release of equipment. We claim that normally we would rather have the cars than the dollars of demurrage. If cars are so valuable, how much should we charge ourselves for the hire of the fifty cars which are twelve or fifteen hours getting over the district?

We can work out by a mathematical formula the most economical scheme for fuel consumption and maximum tractive effort. It is more difficult to devise a formula to express the effect of drastic laws caused by poor service. Attempting to club converging live stock runs in big trains has caused, in some states, legislation covering the movement of stock. Perhaps this is offset by the claims save for missing the market with delayed stock. Is it not a sad commentary to think that legislation is necessary to make us do what is for our own best interests?

There can be no doubt that for a heavy and regular movement of low grade commodities on two or four track roads the big train is logical and economical. Most of the prairie roads are single track. Most of the distances between the prairie cities are relatively long. Stock, perishable freight and merchandise must have rapid movement. Is it wise under such a disparity of

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ditions to make the train-mile rigid and sacred? Why not pay men by the hour, with a monthly guarantee, and run trains sometimes light and sometimes heavy, sometimes fast and sometimes slow, to meet actual controlling conditions of traffic? When business happened to be light, equipment plentiful, and terminals open we would penalize ourselves in wages for slower movement, but would save in fuel, in engine house expense, etc. Just where the economical limit would be, just how it would all work out, I do not pretend to say. I do say, however, that the old methods can be improved when we start from proper basic conceptions. I do not believe that we yet understand the relation between increased cost of maintenance of equipment and decreased wages for train crews.

Perhaps because I had the honor of braking on a way freight I have never outgrown the idea of the practical trainman that a local freight is a traveling switch engine and a peddler of L. C. L. merchandise. Whatever may be the showing as to percentage of tractive power utilized I am unable to see the wisdom of a way freight dragging in and out of passing tracks all day with a lot of through cars. The claim is often made that a few big trains can be easily handled by the despatcher, because the number of meeting points is decreased. My own opinion is that this seeming advantage is often more than offset by the unwieldiness of the big train. Fear of censure for delaying some important train makes the conductor "leary" about starting and the despatcher timid about directing a prompt movement. When we begin wrong, how not-to-do-it methods always follow. The chief despatcher will let freight be delayed in a yard for a full train with power needed at the other end, if he can start a light caboose without its being included in the average train load showing. How much better, and how much easier, to run two fractional trains in the direction of unbalanced traffic than one light caboose and another dreary drag! The shipper, only a hard-headed business man, takes the same view. He becomes skeptical of all our statements, before commissions or elsewhere, because of our frequent seeming lack of judgment.

Let us not spend too much time in discussion as to theoretical possibilities. My assertions can be either proved or disproved by actual demonstration. In the next labor agreements you make include a stipulation for experiment on some division. My prediction is that if you can convince the labor leaders of your fairness they will give the scheme a trial for the sake of more possible time at home. With a full trial the results will speak for themselves. Success in such matters is made possible only by enlisting the most intelligent efforts of all concerned. Let your officials and employees understand that you do not claim to know it all, that you believe in their practical intelligence as well as in your own, that ideas are greater than men, and that right wrongs no man.

[illegible] units have sometimes outstripped practical possibilities in performance. Too frequently we make the unit too large. There [illegible] have elasticity rather than rigidity in the size of our economical [illegible] tical experience and sound judgment must aid in interpreting and [illegible]

The inevitable tendency of the big train is to hold back and [illegible]

tem is ideal. The trouble begins with the small consignee. Instead of giving him a regular, systematic delivery of the five or ten cars which he can unload each day, our tendency is to bring in twenty-five or fifty cars every five days or so, and then express our horrified astonishment at his failure to release promptly. No, we should not run special trains of five or ten cars for each consignee. What we should do is to watch the matter so carefully that we can feel certain we are considering all the factors of expense as well as that of seeming light tonnage. It may, under given conditions, be cheaper to run light trains than to put on expensive switch engines, to relieve unnecessary congestion in receiving terminals than to increase overtime and demoralize the road by pulling out drawbars when sawing by at short passing tracks. Sometimes money can be saved by balancing motive power as between steep and level territory.

As a good soldier and a faithful hired hand you must build up for yourself and your superiors the best possible record for train load. Carry out the policy consistently and loyally. At the same time study the subject. Do not have to flag in, but be prepared to run as a section of a better unit of comparison when the train mile loses its first class running rights.

Speaking of running in sections, you have doubtless thought how inconsistent and almost criminally dangerous is the method of displaying signals. We drill our men to watch the rear of the train for the presence of something, the markers, a positive indication. When the markers are seen, the train is complete and the opposing train can proceed in safety. If the train happens to be complete without displaying markers, or the markers are overlooked, the opposing train declines to proceed. An avoidable delay occurs, but the error is on the side of safety and away from a collision. At the head end, however, we tell our men to watch for the absence of something, the classification signals, a negative condition. When classification signals are *not* seen the train schedule is complete and the opposing train proceeds in fancied safety. If the train happens to be *incomplete* without displaying signals or the signals are overlooked, the opposing train proceeds just the same. No delay occurs, but probably a collision, for the error is on the side of danger and toward a collision. The practice should be reversed. The last or only section should display classification signals. A positive indication should replace a negative. Can the train rules committee of the ladylike American Railway Association beat the Interstate Commerce Commission to this unprotected draw? Cases of such avoidable collisions can be cited, even though "we never had one on our road."

Some roads prefer special schedules and extra trains to movement in sections. On the good old Big Four we handled everything possible in sections. I think this latter method the better. Theoretically yardmen, section men, tower men and all others should be always prepared for extra trains. Practically, the more information that can be disseminated among intelligent men the more effectively can they co-operate in preventing disaster or delay. There are fewer unlocked switches and fewer unspiked rails when information is not locked in the despatcher's office and not spiked down by too many train orders.

Affectionately, your own,

D. A. D.

[illegible] line from the Pac. at Caraquez, Ecuador, to Quito, which is being constructed by a French company, is making rapid progress. In the early part of 1911 trains were in operation as far as Calceta, a distance of 51 miles. The total length of this line from the coast to Quito is 180 miles, being much less than that traversed by the older railway from Guayaquil. The route passes through a fertile region, capable of being developed so that [illegible] cocoa and other valuable agricultural products can be grown with a minimum outlay of capital and labor. A branch from Calceta to Ricauarte via Canuto and Chone has been authorized, also another branch which is to run along the Daule river and terminate at Guayaquil.

ELECTRIC RAILWAY CONVENTION.

The annual convention of the American Electric Railway Association was held in Atlantic City, October 10-13. The following abstracts of committee reports and discussions cover such of the subjects as are of the most interest to our readers.

BLOCK SIGNALS FOR ELECTRIC RAILWAYS.

The committee, acting on instructions from the two associations named, held meetings in New York in January, Chicago in March, and Pittsburgh in June; and conferences were had with manufacturers of apparatus and also with steam railway men. The report begins with a definition of the block system and a few brief historical paragraphs. The committee secured information by circulars from such electric railways as are using the space-interval system and from a list of 50 such roads it appears that 10 use automatic signals with continuous track circuits. Signals made by the Union Switch & Signal Company are in use on the Auburn & Northern, the Boston Elevated, the Hudson & Manhattan, the Illinois Traction, the Interborough Rapid Transit, the Philadelphia Rapid Transit and the Syracuse, Lake Shore & Northern. Signals made by the General Electric Company are used on the Aurora, Elgin & Chicago. Signals made by the General Railway Signal Company are used on the Hudson & Manhattan and the Washington Water Power Company's lines.

The Boston & Worcester Street Railway, operating 48 miles of line, of which 60 per cent. is double-track, uses the O'Bryan system, made by the railway company. This system is automatic, but without continuous track circuits.

Nineteen companies use some kind of automatic apparatus actuated by a trolley contact device, the principal makers represented being the United States Electric Signal Company, the Nachod Signal Company and the Eureka Automatic Block Signal Company. Sixteen companies use light signals controlled by hand levers operated by the conductor or motorman. The Toronto & York Radial Railway uses the Simmen despatching system. Three companies use the Blake signal (not a block signal), and three use the Stromberg-Carlson. Seventeen companies report trolley contact and hand-operated signals as having been in use five years or more; a few of them nine or ten years.

The report contains a copy of the bill to make block signaling compulsory, which was sent to congress by the Interstate Commerce Commission in 1903, with extracts from the commission's report on this subject. (This bill is still before Congress.) The committee also presents a transcript of the law of Wisconsin, passed this year, empowering the railway commission of that state to require the use of the block system "or other safety device or measure as may be necessary to render operation . . . reasonably safe." The similar action of Indiana, which goes into effect next January, is also noticed; and it is said that the Public Service Commissions appear to have authority to require the installation of block signals in Maryland, Massachusetts, Minnesota, New York, Nevada, Oklahoma, Oregon and South Dakota. No mandatory order has been promulgated in any of these states. The Indiana Commission is actively studying the subject.

Twenty companies have reported to the committee their plans for new signaling to be installed this year or in the immediate future. The principal items under this head are as follows:

Public Service Corporation, Newark, N. J.; 121 additional blocks; U. S. Electric.

Hudson Valley, Glens Falls, N. Y.; 5 miles additional; U. S. Electric.

Wheeling Traction, Wheeling, W. Va.; 45 miles trolley contact; is trying the Nachod and the U. S.

Worcester Consolidated, Worcester, Mass.; 25 miles; U. S. trolley contact.

Chattanooga R. & L., Chattanooga, Tenn.; 4 miles; Nachod.

Elmira & Seneca Lake, Elmira, N. Y.; one additional block; U. S.

Hudson & Manhattan, New York City; additional electro-pneumatic; one mile.

Boston Elevated, Boston, Mass.; additional electro-pneumatic; 3 miles.

Syracuse L. S. & N., Syracuse, N. Y.; 10.5 miles additional (single track); Union S. & S. Co.; also on Rochester S. & E.; 16.5 miles; same type.

Boston & Worcester, Boston, Mass.; 31.5 miles additional; O'Bryan system. These signals are mostly isolated sections on curves.

Ohio & Southern Traction, Columbus, Ohio; 7.5 miles; Stromberg-Carlson.

Oregon Electric, Portland, Ore.; 7 miles; automatic, continuous track circuit.

Washington & Rockville, Washington, D. C.; 3 miles controlled manual; Ramsey system.

Lehigh Valley Transit Company, Allentown, Pa.; plans being made by General Railway Signal Company for two block sections; signaling of 60 miles contemplated.

Waterloo, C. F. & N., Waterloo, Iowa, will install signals at ten curves.

Cedar Rapids & Iowa City, Cedar Rapids, Iowa; intends to signal 25 miles.

Roanoke R. & L., Roanoke, Va.; plans to signal ten miles.

This concludes the report proper. The committee deems it unwise to formulate definite conclusions because of the constant development going on in the art of signaling, but thinks that, perhaps, it may be practicable to make recommendations a year hence. The committee believes it desirable to divide electric railways for signaling purposes into five classes, namely: single track suburban, low speed; single track interurban, higher speed; single track interurban, highest speed, with long time intervals; same with more frequent trains; double track, with very frequent trains.

The appendices make up five-sixths of the pamphlet containing the report. These contain carefully prepared and elementary descriptions of track circuit systems and control circuits, most of the material having been furnished by the General Railway Signal Company and the Union Switch & Signal Company; light signals, as used on the lines of the Pennsylvania Terminal, New York City; relays and semaphore signal mechanisms; illustrated descriptions of recent installations on the Illinois Traction System and the Washington Water Power Company's line; Kinsman block system, with a counting-in and counting-out apparatus; the Nachod signal; the Blake despatchers' apparatus; the General Railway Signal Company's and the Western Electric Company's selectors; the Baird and the Stromberg-Carlson systems; the Sandwich selector; the United States Electric Company's selector system; the Gill selector and the Simmen despatching system. Prentice's wireless automatic train stop installed on the Canadian Pacific at Toronto, is mentioned, but only briefly described, reference being made to the illustrated account of the system which was published in the *Railway Age Gazette*, June 23, 1911.

EXPRESS AND FREIGHT TRAFFIC.

The committee on express and freight traffic gathered information from 110 companies concerning the way in which they deal with merchandise traffic and the success that has attended the operation of that department. The data is summarized in three tables: One for the north Atlantic states, one for the south Atlantic states and one for the northern central states. Of the 110 companies reporting 92 do either express or freight business. Only four companies report any restrictions in connection with their franchises. The 92 companies do merchandise business in 917 cities and towns. Twenty-seven companies employ solicitors and 37 do not; the rest do not answer as to this point. Eighty-one companies carry newspapers, 18 of which use express cars in addition to carrying papers on passenger cars; 26 companies do this work free and many others at very low rates. Most of the eastern roads carry baggage in express cars, but most of those in the West carry it largely on passenger cars. Of 30 companies in the Atlantic states reporting as to baggage, only 5

check it without charge, but in the West half the companies check baggage free. Sixty-three companies carry milk, the rate in nearly all cases being about 1½ cents a gallon. On most of the roads freight and express business has been established since the year 1900. Twenty-four companies report that it is profitable to carry freight at steam road rates, in motor cars, running singly, and 20 say that it is not. Twenty-two companies assist shippers by finding a market for their farm produce, six of them making a charge for the service. Forty-four companies carry carload freight.

The committee finds a great diversity of methods in operation in accounting and in equipment, but concludes that all of the different methods are in the main satisfactory, the differences having been necessitated by local conditions. But the time has come when standardization of methods is important. Electric lines now isolated are likely to be connected and through service will demand uniformity. Agreement should be had on uniform standard, for comparison, of car hours, car miles or ton miles. The express and freight business having proved profitable, all possible energy should be put forth towards its extension, and the association should promote study of the subject. Solicitors should be engaged; shippers and their interests should be studied, and the establishment of new industries should be fostered.

QUESTION BOX.

The Engineering Association issues a report each year called the Question Box, in which there are a large number of questions and answers bearing on the practical results obtained in street railway service. A number of the questions have a bearing on all railway operations.

Poles and Crossarms.—It has been the experience of the street railway men that crossarms or timber exposed to the air and not in contact with the ground should not be painted until thoroughly dry; because the paint, if prematurely applied, imprisons the sap and causes it to sour and so bring about rot. Some roads paint their crossarms as soon as they are received from the maker, "because they have no time to wait," and take the consequences, though it is recommended that it would be better to put them up as they are, if time is of value, and then paint them later when they have dried. This does not apply to the paint, which should in any event be applied to the surfaces in contact between any two pieces so as to keep moisture away from these surfaces. There is a difference of opinion, however, as to the value of creosoting crossarms. That it protects the wood and is economical from the standpoint of durability there is no doubt, but it is held that the painted arm is so much stronger than the creosoted that it is preferable on that account. As to the treatment of poles and arms best adapted to successfully withstand the ravages of an arid country, there were but two replies. One gave "avanarius carbolinium," and the other "none." There was comparatively little data produced regarding the relative life of treated and untreated chestnut and cedar to poles. The life of either in Pennsylvania average from 12 to 15 years when they are not treated; as to what they would be when treated there was no information. Westinghouse, Church, Kerr & Company said that cedar poles are benefited more by treatment than chestnut and that the treating of green chestnut poles adds but very little to their life. As for the substitution of concrete for wooden poles, it has been found to be "satisfactory but costly."

High Tension Voltage.—A peculiar condition of affairs is revealed by the question, "What do you call high tension? Why?" In every case but one the "why" was based purely on local conditions. That one was the case of the Canadian Board of Railway Commissioners, who specify as "high tension" conductors [illegible] a potential of 10,000 volts or over, though the Canadian Railway Journal making the report said that it is "our practice to call all transmission and distributing lines with a voltage of 6,000, or over, high tension lines for no particular reason except to distinguish transmission and feeder systems from the distributing systems of lower voltage." One said 11,000 volts was high tension because it is the only one "we have that cannot be handled while working." One called 33,000 a. c. high tension because it was a short way to distinguish it from d. c. Another took 13,000 volts because that was the only voltage in use on that road, where the linemen are not allowed to work with the current on. Some simply took the highest voltage in use and called that "high," whether it was 1,000 or 60,000 volts, while one dropped as low as 750 volts because anything above that is dangerous. In short, the term "high voltage" is merely a local technicality and is meaningless unless one knows the conditions governing its application.

Ballast.—In interurban work 8 in. is regarded as the proper depth of ballast to have beneath the tie, though some think that 6 in. is enough. This presumably relates to broken stone and gravel, though it is not always so stated. One reply puts it at 8 in. for broken stone, 15 in. for gravel and 18 in. for cinders.

Steel Ties.—It seems evident from the replies that steel ties are coming into favor, though experience with them has not yet been of sufficient duration to firmly establish them as an economical proposition.

Culverts.—The question hinged on the use of corrugated metal culverts, as compared with the smooth bore. The replies indicate that the use of such culverts has been satisfactory even up to a diameter of 72 in. It was suggested in one reply that it would be well to reinforce all corrugated culverts of 2 ft. and more in diameter where the depth of the fill is more than 10 ft. As for the small diameters, it is thought that the corrugations offer considerable obstruction to the passage of "water and trash" where the diameter is less than 24 in., which was, therefore, recommended by one road for the minimum diameter. From the replies received it apparently is not common practice to divide a culvert into a number of separate sections to prevent cracking, due to unequal settlement or poor foundations. Expansion joints are used to some extent whether the foundation be good or bad; and, where it is poor, poles, piles and timbering are used to stiffen it, but other than giving the culvert an ample bearing when built on a poor foundation no special provision is ordinarily made to prevent cracking.

Fuel.—The reports on the cost of unloading coal and delivering it to the boiler form a forceful commentary on the value of coal handling apparatus, especially where large quantities are to be moved. The best figures given for taking coal from cars, dumping into concrete pits and delivering to the hoppers above the boilers was 3 cents per ton. In this case the work was done with belt conveyors, but there is no statement as to whether this cost includes interest and depreciation charges or not. In another case, where the coal was unloaded from scows and was passed through a breaker and weighing machine, the cost was 5 cents, while the same company reported a cost of 22 cents per ton, where the work was done by hand and a wheelbarrow was the method of conveyance. With a grab bucket the cost was from 15 to 20 cents. The reason for burning wet coal seems to be, for the most part, that it is more easily handled and will not fall through the grates as readily as when it is dry. The opinion is expressed that this saving just about compensates for the extra amount of heat required to evaporate the water used. This saving in coal is estimated at 10 per cent., and the water is applied in the bunker, where, in one case where a mixture of pea and slack coal is used, it is given all the water it will hold. Such coal as this reaches the stoker carrying about 4 per cent. of moisture. It is considered that probably the greatest saving in burning pea and slack wet is in the labor. The damp coal mats and does not fall through the grate as badly as dry coal, thus lessening the handling cost. There is also, no doubt, a small saving due to the more even texture of the full bed, due to this matting cutting off the excess air and thus raising the percentage of carbonic acid gas. But when the cost in heat units of evaporating the moisture is taken into consideration, there is probably little gain outside the labor. Where bituminous coal is used it is considered better to burn it dry, as wet coal is unprofitable. There is no difference of opinion as to the effect of wet coal on the maintenance charges of the fur-

nace and stoker. While the use of a moderate amount of water has not, in one case, caused any excessive deterioration of the grate, it is generally conceded that the use of too much water on the coal is bad. For then the result is that the water will carry sulphuric acid from the coal with it, which, when coming in contact with the cast and wrought iron of the grate, will corrode it badly and in the course of time completely destroy the grates and stoker. The maintenance of the stoker will be greatly increased if the coal is burned too wet. The coal should never be wet enough to drip. As for the alternate wet and dry method of burning, there seems to have been no experience.

Center Plates.—Opinions as to the advantages of ball bearing center plates for trucks varies from the statement that they "have practically no advantage over well-lubricated oil bearing plates" and that they are "indispensable." The advantages cited for the ball bearings are that they lessen the flange wear of the wheels and make the cars ride more easily on curves. With decreased flange wear comes also a decrease in rail wear on curves. The disadvantage is that they may produce an objectionable swinging motion of the car, especially on the older types of trucks and particularly where the truck joints are somewhat out of surface. The ordinary lubricated center plate should be provided with a reservoir, which gives very satisfactory results as long as the oil remains. As for grease, it will not stay between the bearing surfaces of the center plates for more than one day's operation, and for this reason an oil must be used which will not change to grease in the winter. Machine fitted plates are recommended because they hold the car more steadily in the matter of longitudinal vibration than the ball or roller bearings, thus providing a better riding car. That the frictional resistance of the center plate has a decided influence on the flange wear is conceded, and it is therefore well to have the center plates thoroughly lubricated, because excessive friction will increase the flange wear. This applies especially to the steel wheel, one road saying that no difference in the wear of cast iron wheels could be detected. It is also necessary that the weights should be evenly distributed on the two sides of the truck. In one case, where this was not done, the flange wear was excessive, but it was almost entirely done away with by merely shifting the appurtenances on the car so that it was evenly balanced on its longitudinal axis. The heavy weight on one side produced an excessive side bearing wear, which prevented the truck from having a liberal lateral play, causing a lag on that side, resulting in excessive flange wear. This same rule holds good to some extent relative to producing an undue amount of friction in the center plates.

Wheels and Axles.—There seems to be some difficulty experienced in removing solid steel wheels from the axle. This is attributed, in part, to an improper fitting of the wheel to the axle, for which it is suggested that the axle should be highly finished at the wheel seat and the wheel center rough bored within 0.002 in. of the pressing fit and then taken to size with a smooth finish. White lead mixed with machine oil should be used. When these precautions are taken most of the difficulty will disappear. Still, it seems to be a common state of affairs that a pressure of 150 tons will have to be used to remove a wheel put on with 40 tons; and that, even then, heating or striking with a sledge may be needed to start it. The turning of steel wheels is governed, for the most part, by the flange and not by the tread wear. If they wear so that there is a variation of ⅛ in. in the circumference of wheels on the same axle they should be turned, but ordinarily they are run until the flange is cut, it being the aim to wear out 2 in. of tread with but one turning. The mileage of steel wheels on surface tracks is given at from 90,000 to 150,000 miles for a wear of 2 in. (radial) on the tread. On elevated service the Brooklyn Rapid Transit reports 200,000 miles for 2 in. radial wear. The difference in interurban and city service is shown by the statement that wheels will run 40 per cent. farther on the T-rail than on the girder rails. The rolled steel wheel has given a good account of itself in the matter of loose wheels, for there is an entire agreement of experience to the effect that, if properly fitted, they will not become loose. As for the built-up wheel, there seems to have been considerable trouble with bolts, nuts and tires working loose. It is pretty well agreed, too, that flanged brakeshoes are desirable and even necessary, especially on narrow tread wheels. It is claimed, in the first place, that a flanged shoe increases the braking effort fully 25 per cent., besides holding the shoe in its proper place on the wheel. Further than this, they wear down the wheel flange with the tread and, it is thought, eliminate the chatter. It has an advantage also at the start in that it adjusts itself nicely to the contour of the flange and tread and has a tendency to wear off the sharp edges of the flange. Slack adjusters are considered to have an important influence in increasing wheel and brakeshoe wear, and the estimates of this increase run from 10 to 15 per cent. Finally, it is recommended that axles on high speed cars be limited to a mileage of not over 300,000 miles, though one road recommends 200,000. When this mileage has been obtained the axle should be scrapped in order to safeguard against breakage.

EDUCATION OF APPRENTICES.

The committee made what was largely a progress report, and put forward some suggestions for a code of apprenticeship rules. The reason for the report was the need for well-trained men and the impossibility of obtaining them under existing conditions.

The discussion of the report brought out some interesting points. As matters stand, it is necessary to put up with incompetent workmen, men who want a job who are not really fitted for anything beyond the tasks of an ordinary laborer. The same condition holds, to a great extent, in the employment of apprentices. Through some personal influence a boy is put upon the apprentice force, not because he is anxious to learn a trade and make himself fit, but because he wants a job, and, having secured that, his interest is at an end.

It was urged that, in order for the apprentice to be of the greatest value afterwards, he should be given a somewhat broader training than that limited by the mere learning of his trade; that he should serve a part of his time in the power house, on the maintenance of way, and on line work, and that he should be given some experience in the offices, so that he may be somewhat conversant with the executive work and appreciate the relation existing between his own and the other departments. Then, too, he should be given some classroom work, taken in the company's time, so that he should know not only the "how," but the "why" of what he does. It was urged that theory was necessary to back up the practical, in order that he may do his work intelligently and to the best advantage. It is simply a case of teaching a boy to think, in order that he may work most efficiently. As an example of this method of training, it was urged that the system in use on the Atchison, Topeka & Santa Fe should be followed.

Speakers who had no system of classroom work to assist them, gave preference, in the selection of candidates for apprenticeship, to boys who had had the training afforded by manual training schools and the Young Men's Christian Association, because they had this necessary theoretical education.

The application of the course of apprenticeship, advocated by the committee, to power house work was opposed, because it has been found that theoretical and technical training is absolutely essential to a proper comprehension of the work. Here the training is carried to the point where the men are competent to fill supervising positions.

It was pointed out that in the last analysis the development of the man rested with the man and not with the course. And, for that reason, it was urged that the correspondence schools should be encouraged. With them the initiative and the advancement of the individual rests on the individual and not on some bolstering up he received from the outside.

Speaking for Boston, Mr. Winsor called attention to the many opportunities existing there for a man who wishes to

acquire a technical education, some of the night schools giving a training fully equal to the best technical schools of the country. Here then the need was for some system that would train men in a trade, and train men who would be willing to follow that trade when it was once learned.

Of course it was recognized that a strong specialist cannot be developed unless there is a broad general training back of it. But it is not specialists, but mechanics that are wanted.

BUILDINGS AND STRUCTURES.

The greater part of this report was applicable only to electric railway practice. Two of the subjects treated in appendices, however, are of broader application. These are: floor systems and fire protection.

Proper floor construction has an important bearing on the economical maintenance of permanent buildings. Concrete floors, with cement finish, probably come first for desirable construction. A cement floor properly installed hardly requires any maintenance and has proved very satisfactory. Some engineers go further than this, advocating cement floors for offices and men's rooms. It is doubtful, however, if the cement floor will be a satisfactory substitute for wood floor for the latter purpose. For portions of the machine shop, such as the wheel room and the smith shop, which are subject to excessive wear, the creosoted wood block on a concrete foundation is preferable. The wood block will wear better and is more easily repaired. On account of the difficulty of satisfactorily repairing cement floors, it is important that the installation be carefully made. It is recommended when the floor is laid on an earth bottom, generally to excavate first to a depth of 14 in., fill in 9 in. with good steam ashes, wet down and thoroughly tamp; over the steam ashes pour stone concrete 1-3-6, mix with ¾ in. broken stone, to a thickness of 4 in., and cut into blocks not larger than 6 ft. square. Before the concrete is set, the top, or wearing surface, is applied, which is composed of one part of Portland cement and two parts of clean, sharp sand, cut into blocks the same as the concrete underneath. Only as much concrete should be laid at a time as can be covered that day. The wearing surface should be thoroughly mixed dry, water added to give the consistency of plastic mortar, applied with a wooden float, and trowelled to a hard finish. The top, or wearing surface, should be made 1¼ in. thick. To get a permanent floor adjacent to the track it is necessary to lay the track in a substantial manner, with a good foundation, thus reducing the movement of the rail to a minimum. In 1905 the writer supervised 60,000 sq. ft. of cement floors installed as above described, and now, after seven years of hard usage, the floor is practically as good as when it was laid. Moreover, there is no breakage adjacent to the rail. Concrete floors improperly laid, especially when adjacent to unstable track, will rapidly break up, and are a very poor investment. A good substitute for the cement floor is ¾ in. broken stone, rolled down with screenings and ashes on 4 in. of good steam ashes, wet and rolled down. This will give good service. The rolled stone, or the ash floors are very satisfactory for small suburban waiting rooms, where loading platforms are wholly, or partly, exposed to the elements. It is surprising how dry these floors will be shortly after heavy rains. [illegible] the best floor for the heaviest service. Recently a treated cork block or brick, on a concrete base, has been advocated for heavy service floors. The principal advantage of this floor seems to be [illegible] to maintain, are a bad fire risk, and deteriorate rapidly.

Two systems of fire protection in yards are described. The first is by standpipes fitted with Monitor nozzle, mounted at a level higher than the car roofs. This is used by the Cleveland Railway in its Woodhill yards.

[illegible] river, New York City. The yard consists of 33 parallel tracks, having a total length of 26,510 lineal feet, and a storage capacity of about 560 cars. About 75 per cent. of the tracks are on an elevated trestle and 25 per cent. on an ash fill. About 80 per cent. of this trestle is built of steel, the remaining 20 per cent. of timber, and this timber trestle is about to be replaced with a steel trestle.

Lines of aisle sprinklers have been placed between all tracks with ½ in. open sprinkler heads spaced about 10 ft. apart and located about 4 in. below the bottom of the top sash rail of the car windows. The total number of open sprinkler heads installed is 2,804.

The sprinkler piping is sub-divided into 45 sprinkler sections; each section is in general intended to protect three tracks for a length of about 200 ft. On an average there are 84 open sprinkler heads in each section. The sprinkler sections are supplied with water from a system of underground water mains. The water is supplied into the system from two sources, a steel tank, located at an elevation of 170 ft. above the tracks, and two three-stage vertical turbine pumps, each having a capacity of 1,500 gal. per minute at a pressure of 150 lbs. per sq. in.

The supply of water to each sprinkler section is controlled by electrically operated hydrant valves, operated from a switchboard in a watch tower 50 ft. above the tracks, from which there is a clear and unobstructed view of the whole yard. These valves can also be operated by a hand wheel on the spindle.

STANDARD COUPLERS FOR INTERURBAN SERVICE.

This is one of the subjects taken up by the committee on equipment.

The subject of standard couplers for interchange with steam railway equipment was suggested by the Central Electric Railway Association. This association recently adopted as standard a coupler of the M. C. B. type, but equipped with certain auxiliary features not applied to steam equipment cars, and the question was presented whether the adoption of this coupler be recommended.

The committee feels that some form of automatic coupler will probably be required. The handling of steam road equipment by electric roads is a matter already prominently before certain companies. Any automatic coupler adopted as standard by the Electric Railway Association for interurban cars should be of the vertical plane M. C. B. type. The height of center line of standard couplers should conform to the Interstate Commerce Commission requirements and to steam railway practice.

Many roads have adopted couplers of standard M. C. B. contour, or, in lieu thereof, couplers embodying in their construction the essential features of the M. C. B. coupler, but containing certain additional parts not found in steam railway practice. The need for these additions is felt by certain roads that are required at times to operate trains consisting of two or more cars coupled together over tracks in which there are sharp degrees of curvature and sudden changes in grade.

The use of a vertical plane coupler of the M. C. B. type with radial drawbar also introduces consideration of resistance against lateral buckling under heavy pushing strains, or under sudden brake applications where there is a variation in the braking effect on cars in the same train. The practice followed by different electric roads using M. C. B. type couplers in providing special attachments on their couplers to safeguard them against vertical uncoupling and lateral buckling is not, however, uniform, some roads having equipped their cars with couplers having such attachments, while others have considered them unnecessary and have either not provided them at all, or, after trial, have discontinued their use.

[illegible] The committee feels that the question has become so acute on many of the interurban roads that an early adoption of a standard coupler is urgently needed. It presented a list of requirements essential to the coupler to be finally adopted as standard for interurban use.

HEAVY ELECTRIC TRACTION.

The committee presented for adoption as a standard a diagram of clearance lines for third rail structures and rolling equipment, after conferring with committees of the American Railway Association and the American Railway Engineering Association.

The committee also presented a diagram suggesting a standard location for automatic stops. This diagram conforms to the present practice of the Pennsylvania and the Long Island railways in New York City, and of the Hudson & Manhattan. In the third rail clearance diagram the distance from the gage line of the running rail to the nearest fixed structure at the side of the road is 19¾ in. For an automatic stop arm fixed on a sleeper at the side of the track, the committee proposes to allow a space 3½ in. wide, the center of which space is 12¼ in. from the gage side of the running rail. It is assumed that the stop arm will be 2½ in. wide. The proposed standard location for the third rail is 26 in. from the running rail (gage line to gage line); so that the automatic stop arm in the position proposed, would be 13½ in. from the third rail. Specifications for heat-treated carbon steel axles, shafts and similar parts were also presented. These are, in part:

A sufficient amount of discard must be made from each ingot to insure freedom from piping and undue segregation.

The steel shall conform to the following limits in chemical composition:

Carbon	Not over 0.60 per cent.
Manganese	0.40 to 0.80 per cent.
Phosphorus	Not over 0.05 per cent.
Sulphur	Not over 0.05 per cent.

Drillings shall be taken from the crop end of one axle, shaft, or similar part from each melt represented, parallel to the axis on any radius one-half the distance from the center to circumference, to determine whether the chemical composition of the heat is within the limits specified.

In addition to the complete analysis, the purchaser has a right to call for a phosphorus determination, to be made from turnings from each tensile test specimen, and the phosphorus must show within the limits called for.

The steel shell conform to the following physical properties:

Ultimate strength, lb. per sq. in.	85,000
Elastic limit, lb. per sq. in.	50,000
Elongation in 2 in., per cent	22
Reduction of area, per cent	45

The elastic limit shall be determined by extensometer. Above 40,000 lb. per sq. in., each increment of load shall not be more than 1,000 lb. per sq. in.

The test specimen used to determine the physical properties as specified above shall be taken from the crop end of one axle, shaft, or similar part, from each treating-plant heat, if more than one open-hearth heat is represented in a treating-plant heat, a test shall be taken from each open-hearth heat represented. A full-size prolongation shall be left on each axle, shaft or similar part.

A cold bend test shall be made from the crop end of one axle, shaft, or similar part, from each treating-plant heat; if more than one open-hearth heat is represented in a treating-plant heat, a test shall be taken from each open-hearth heat represented. The test shall be made with a ½ in. square specimen, not exceeding 6 in. in length, around a flat mandrel with edges of ½ in. radius, and the specimen shall bend, without fracture, 180 deg. around the said mandrel.

Specimens for tensile test and cold bend test shall be taken parallel to the axis of the axle or shaft and on any radius one-half the distance from the center to the circumference.

Each axle, shaft, or similar part shall be allowed to cool after forging, shall then be re-heated to the proper temperature, quenched in some medium, allowed to cool, and then re-heated to the proper temperature for annealing

There was no real discussion regarding the first portions of the report. It was urged that the recommendations be referred to the committee on standards, so that the matter of third rail location and clearances might be put to letter ballot and decided before the convention of the American Railway Engineering Association.

As for the specifications for the heat treated axle, there was a decided difference of opinion regarding it. It was asserted and deemed that it would be quite possible to obtain all of the physical qualities called for in the specifications with ordinary steel of the chemical composition required. It was urged that, in the matter of the discard, identification marks and heat numbers should be stamped on each billet and axle. As for the tensile test specimen it was suggested that to take it from the crop end would be to take it from a point too near the place where the heat treatment had the greatest effect, for it to represent average conditions. In reply to this it was shown that the end of the test piece, taken from this point, was farther from the surface than it would be, were it taken from the center of the wheel seat.

The high phosphorus and sulphur contents of .05 per cent. were criticised and it was suggested that the manufacturers could easily meet an .04 specification. To this the committee replied, that the .05 per cent. was used because some consumers used acid and some basic steel in their axles, and that while an .04 content could be easily met in the basic steel, it would be a hardship to require it of the acid steel makers.

In answer to the criticisms that the parargraph on heat treatment was very indefinite, and that it really tells nothing the committee said that it was left in that condition purposely. Every manufacturer has his own idea as to what the heat treatment should be, and it was considered best to leave him a free hand and simply state the physical requirements of the finished product and allow those requirements to be met by whatsoever process might seem best.

The committee further explained that the object of this specification was not to limit the association to the use of heat treated axles, but merely to furnish a guide for those members, who, for any reason, might need to use a better axle than could be produced in the ordinary way.

On closure the whole report was referred favorably to the committee on standards.

EXHIBITS.

Allis-Chalmers Company, Milwaukee, Wis.—[illegible] and automatic air-brake equipment, standard and interpole railway motors, self-cooled transformer, portable air compressor, section of brake cylinder showing Acco expander ring, sectional engineers' valve, sectional governor, repair parts for compressors and air-brake equipment, photographs of various apparatus and installations.

American Abrasive Metals Company, New York, N. Y.—Car step treads, floor plates, fire resistance surfaces, stair treads.

American Brake Company, St. Louis, Mo.—American automatic slack adjuster.

American Brake Shoe & Foundry Company, Mahwah, N. J.—Brake shoes and brake heads.

American Mason Safety Tread Company, Boston, Mass.—Karbolith flooring and safety treads.

American Railway Supply Company, New York, N. Y.—Time checks, conductors' badges, buttons, souvenirs, etc.

American Steel & Wire Company, New York, N. Y.—Rail bands and appliances for installing electrical wires and cables, right of way fencing, concrete reinforcement.

Anglo-American Varnish Company, Newark, N. J.—Reception booth.

Atlas Railway Supply Company, Chicago, Ill.—Atlas rail joints, compromise joints, special joints and one-piece joints, tie-plates and braces.

Automatic Ventilator Company, New York, N. Y.—Samples and models of the Automatic car ventilator.

Badger Fire Extinguisher Company, Boston, Mass.—Chemical engines both for buildings and outdoor use, hand chemical extinguishers for buildings and cars and a new small one-quart capacity extinguisher for use around electrical machinery.

Baldwin Locomotive Works, Philadelphia, Pa.—Motor and trailer trucks.

Berry Brothers, Detroit, Mich.—Railway varnishes.

Blake Signal & Manufacturing Company, Boston, Mass.—Despatchers' selective semaphore signals, soldering flux and wire specialties.

Brill Company, J. G., Philadelphia, Pa.—Semi-convertible prepayment car, trucks of various types, springs, fare boxes, car seats and seating material.

Cambria Steel Company, Johnstown, Pa.—Coffin process and heat-treated axles, 100 per cent. joints, Morrison guard rails, wire products, rails.

Carnegie Steel Company, Pittsburgh, Pa.—Schoen and slick wheels, slick rolled steel gear blanks, rolled steel car wheels, forged and heat treated axles, steel sheet piling, steel hoops for slack barrel cooperage, Duquesne rail joints, steel cross ties, sections of track showing steel cross ties in concrete construction, vanadium steel axles, springs and bars.

Chicago Pneumatic Tool Company, Chicago, Ill.—Portable electric track drills, grinders and spike drivers, pneumatic hammers, drills.

[illegible] Company, Chicago, Ill.—Co Ve painting and varnishing process.

[illegible] Railway Equipment Company, Chicago, Ill.—Creco brake beams and side bearings.

Cleveland Frog and Crossing Company, Cleveland, Ohio.—Tongue switches, mates, frogs, crossings, switch stands, split switches, Kerwin portable crossover and other kinds of steam and electric railway special work.

Coe Manufacturing Company, W. H., Providence, R. I.—Ribbon gold and silver leaf, gilding wheels, bronzing powders and liquid.

Consolidated Car Heating Company, Albany, N. Y.—Car heaters, heat deflectors, thermostat for heat control, car signal system, switches and fuse boxes, ventilating stove.

Curtain Supply Company, Chicago, Ill.—Curtain fixtures, "Rex" all-metal rollers, "Rex" steel sash balance.

D. & W. Fuse Company, Providence, R. I.—Inclosed fuses, insulating materials, field and armature coils, magnetic chucks for grinding and milling machines and planers.

Dearborn Drug & Chemical Company, Chicago, Ill.—Reception booth.

Detroit Steel Products Company, Detroit, Mich.—"Detroit-Fenestra" solid steel window sash, Critall casement windows.

Dixon Crucible Company, Joseph, Jersey City, N. J.—Graphite lubricants, silica-graphite paint, belt dressings, dynamo and motor brushes, graphite wood grease and crucibles.

Drouvé Company, G., Bridgeport, Conn.—Anti-Pluvius puttyless steel constructed skylight for carhouses and Straight-Push sash operator for controlling long lines of sash from one point.

Duff Manufacturing Company, Pittsburgh, Pa.—Barrett track and car jacks, Barrett armature lifts, Duff ball-bearing screw jacks and Duff-Bethlehem hydraulic jacks.

Edwards Company, O. M., Syracuse, N. Y.—Window fixtures, all-metal shade rollers, metal trap doors, steel filing cabinets and furniture.

Electric Railway Equipment Company, Cincinnati, Ohio.—Tubular poles [illegible]

Electric Service Supplies Company, Philadelphia, Pa.—Keystone block signals, highway crossing signal, flag station signal, track drills, pneumatic gong ringers, lightning arrestors and other specialties adaptable to electric railway equipment.

Flood & Conklin Company, Newark, N. J.—Varnishes and surfacers of the Simplex system.

Flood Concrete Tie Company, Bridgeport, Conn.—Reinforced concrete ties, insulated ties and rail fastenings.

Forsyth Brothers Company, Chicago, Ill.—Pressed-steel doors, brass and steel window sash, weather strips, sash locks, pressed-steel step ladder, carline posts, unit-section side formations, deck sash operating devices, including ratchets, models of draft gear, buffing device, drawbar centering device.

Galena Signal Oil Company, Franklin, Pa.—Reception booth.

General Electric Company, Schenectady, N. Y.—Motors, portable air compressors, control equipment, air brake equipment, gears and pinions, rail bonds, headlights, transformer, oil dryer and purifier, high-pressure turbine, gas-electric car, fan motors, etc.

General Railway Signal Company, Rochester, N. Y.—The absolute permissive system of automatic block signals is shown by a working model. The miniature signals used are in circuit with full-sized universal signals; reactance bonds, semaphores, relays, light signals, switch box, signal transformers, switch indicators, selective system for use with either automatic signal systems or train despatching systems.

Goldschmidt Thermit Company, New York, N. Y.—Appliances for welding by the Thermit process, moving pictures showing process of welding locomotive frames and rails.

Gold Car Heating & Lighting Company, New York.—Electric car heaters and Cyclone ventilators.

Griffin Wheel Company, Chicago, Ill.—F. C. S. chilled-iron car wheels.

Hale & Kilburn Company, Philadelphia, Pa.—Walkover seats in iron and pressed steel designs, steel interior finish, steel sash, steel doors, steel [illegible] Wakefield Manufacturing Company [illegible]

[illegible]

Hunt Company, C. W., West New Brighton, N. Y.—Models of coal and ash-handling machinery, bucket conveyor, valves, industrial cars and [illegible] Pittsburgh Pipe Line Company [illegible]

Jenkins Brothers, New York.—Valves, packing, water gages and other [illegible]

[illegible] New York, N. Y.—Babbitt metal and bearings [illegible]

National Brake & Electric Company, Milwaukee, Wis.—Interurban air-brake equipments, compressors and governors, samples of steel castings.

National Carbon Company, Cleveland, Ohio.—High-grade carbon products.

National Lead Company, New York.—Babbitt metal, anti-friction metal, bar and wire solder, bearing metal.

National Lock Washer Company, Newark, N. J.—Car curtains and fixtures, National lock washers.

National Tube Company, Pittsburgh, Pa.—Tubular poles, pipe, Shelby and Spellerized steel boiler tubes, cast and malleable fittings, valves and cocks, Kewanee specialties.

Nelson Valve Company, Philadelphia, Pa.—Hand and electrically operated valves of all types.

New York Swith & Crossing Company, Hoboken, N. J.—Anti-straddle manganese tongue switch and mate, 9-inch rail hard-center combination tongue switch, T-rail hard-center anti-straddle tongue switch, frogs and crossings.

Pantasote Company, New York.—Pantasote material for seats, curtains, etc., and Agasote headlining.

Pennsylvania Steel Company, Steelton, Pa., and Maryland Steel Company, Sparrows Point, Md.—Switch points, switches, frogs, crossings, built up Manard hard center and solid Manard construction track work.

Perfectol Company, Philadelphia, Pa.—Perfectol car cleaner.

Pittsburgh Steel Company, Pittsburgh, Pa.—Mechanical and boiler tubes, standard railway fencing, wire nails, galvanized barbed wire.

Positive Clutch & Pulley Works, Buffalo, N. Y.—Positive combined jaw and friction clutch models.

Pressed Prism Plate Glass Company, Chicago, Ill.—Special ornamental glass designs for railway cars.

Pyrene Manufacturing Company, New York, N. Y.—Pyrene fire extinguishing guns and Pyrene liquid.

Rail Joint Company, New York.—Continuous, Weber and Wolhaupter rail joints.

Railway Age Gazette, New York.—Reception both and copies of the *Railway Age Gazette, The Signal Engineer*, the Railway Signal Dictionary and other books.

Railway Motor Car Corporation, Philadelphia, Pa.—Reception booth with literature on self-propelled passenger cars.

Ramapo Iron Works, Hillburn, N. Y.—Automatic switch stands and manganese track work.

Roebling's Sons Company, John A., Trenton, N. J.—Insulated wire and cables, wire, wire rope and fittings.

St. Louis Steel Foundry, St. Louis, Mo.—Solid manganese steel crossings, frogs, mates.

Samson Cordage Works, Boston, Mass.—Cord.

Sangamo Electric Company, Springfield, Ill.—Indicating wattmeters and ampere hour meters, street railway meters.

Sherwin Williams Company, Cleveland, Ohio.—Passenger coach finishes, railway varnishes, insulating varnishes, rattan seat, enamel paint and varnish specialties.

The Signal Engineer, Chicago.—See the *Railway Age Gazette*.

Standard Coupler Company, New York, N. Y.—Shim slack adjuster.

Standard Leather Packing Company, Boston, Mass.—Packing.

Standard Paint Company, New York, N. Y.—Insulating varnishes, compounds and tape.

Standard Underground Cable Company, Pittsburgh, Pa.—Lead-covered and armored power cables, bare and insulated wires, Colonial copper clad wire, Davis open air and station terminals, manhole junction boxes, cable jointing materials.

Steel Tie Specialty Company, Cleveland, Ohio.—Kohlmeyer clips for fastening steel rails to steel ties.

Sterling Varnish Company, Pittsburgh, Pa.—Reception booth.

Stromberg-Carlson Telephone Manufacturing Company, Rochester, N. Y.—Despatcher's signal system, iron clad magnetos and jack boxes, loud ringing signal bells connecting poles and magneto switchboard.

Symington Company, T. H., Baltimore, Md.—Journal boxes, dust guards, ball-bearing center plates and roller side bearings.

Taylor Stoker Company, Providence, R. I.—Built-up stoker.

Templeton, Kenly & Company, Chicago, Ill.—Truck and car jacks.

Tool Steel Gear & Pinion Company, Cincinnati, Ohio.—Gears and pinions.

Transportation Utilities Company, New York, N. Y.—Acme vestibule curtain and revolving shield, Acme vestibule diaphragms, Perfection sash balance and screen, National steel trap door, roofing, Flexolith composition flooring, Eclipse deck sash ratchet, Tuco curtain and rack fixtures, Resisto insulation and miscellaneous devices.

Union Switch & Signal Company, Swissvale, Pa.—In the regular booth on the pier are shown three working models of automatic block signals operated by miniature cars, a model demonstrating curve protection, full-size semaphore and light signals in operation; track transformers and relays, impedance bonds, electric train staff system and Union "Style B" electric semaphore signal. On the Columbia hotel, 1,200 ft. from the pier booth light signals are installed to demonstrate the clearness of the signals. Alongside the Aquarium, 300 ft. away, [illegible] Union "Style B" signal in constant operation and on a large electric sign on the outside of the pier, facing north is another set of light signals.

United States Electric Signal Company, West Newton, Mass.—Block recording clock, train [illegible] and automatic signal.

U. S. Metal & Manufacturing Company, New York, N. Y.—Reception booth.

U. S. Wood Preserving Company, New York, N. Y.—Wood Paving Blocks.

Universal Voting Company, New York, N. Y.—Charts showing an analysis of [illegible] and complete commercial organization, books, etc.

[illegible] Tread Company, Boston, Mass.—Safety treads for car [illegible] and platforms.

[illegible] & Battery Company, Niagara Falls, N. Y.—National tower batteries.

[illegible] Company, W. H., Chicago, Ill.—M. C. B. drawbars complete with draft gear and anchor casting and M. C. B. couplings.

[illegible] & Motor Company, Cleveland, Ohio.—Railway motor cars and [illegible]

[illegible] Company, Philadelphia, Pa.—Vose two-man rail planer and Vose [illegible]

Watson-Stillman Company, New York, N. Y.—Rail bender, 40-ton hydraulic press, Hale & Kilburn seat and hand compression Universal beam bender, [illegible] and turbine pump.

Western Electric Company, Chicago, Ill.—Telephone train-despatching equipment, Blue Bird batteries, Reference overhead railway material, Hastings drill and screwdriver, Crane Hinds headlights, Schwarzenberg [illegible] and conductors' punches, etc.

Westinghouse Traction Brake Company, East Pittsburgh, Pa.—[illegible] and switch control circuit breakers, [illegible] and repair parts.

Westinghouse Lamp Company, Bloomfield, N. J.—Railway incandescent lamps.

Westinghouse Machine Company, East Pittsburgh, Pa.—Several turbines [illegible]

Westinghouse Traction Brake Company, Wilmerding, Pa.—Electro-pneumatic brake, A. M. M. automatic brakes, S. M. E. brake equipment, electric compressor governors.
Wharton, Jr., & Company, Wm., Philadelphia, Pa.—Switches, mates and frogs of manganese steel construction new and used, spring boxes, models, blue prints and pictures of the company's work.
Wheel Truing Brake Shoe Company, Detroit, Mich.—Abrasive brake shoes.
Whipple Supply Company, New York, N. Y.—Anti-climbers, gears and pinions; Universal safety treads.
Wilson Remover Company, New York, N. Y.—Paint and varnish removers.

RAILWAY SIGNAL ASSOCIATION.

Committee No. 1 of the Railway Signal Association (A. H. Rudd, chairman), in its report presented at the annual meeting at Colorado Springs, October 11, recommended a revised scheme of signal aspects; or, rather, two schemes, one for roads desiring to get along as cheaply as possible and the other a complete scheme of indications. The conclusions presented by the committee this year are based on its consideration of reports on this subject made at previous meetings, during the past five years, and on the recommendations of the Committee on Transportation of the American Railway Association and considered at the meeting of the A. R. A. last April (though not adopted by that association.) It will be recalled that the A. R. A. committee, acting on requests of the American Railway Engineering and the Railway Signal associations formulated a declaration as to requisites, holding that the fundamental and essential signal indications are (1) stop; (2) proceed with caution; (3) proceed; and that "proceed with caution" may be used with the same aspect to govern any cautionary movement; for example, as an ordinary distant signal or as a permissive indication at the home signal. Two additional indications were approved; namely: (4) proceed at low speed and (5) proceed at medium speed.

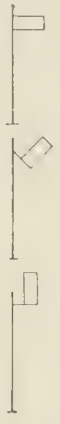
To provide a system corresponding to these declarations of the A. R. A. committee, the R. S. A. committee makes the following recommendations.

Simple Aspects.

1. Stop

2. Proceed with caution

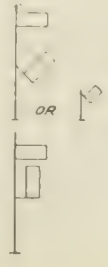
3. Proceed



"Having in view, and not desiring to depart from, the established practice of indicating diverging routes and incidentally low and medium speeds, your committee recommends that the medium and low-speed indications be given by an additional arm or arms. The simplest method (although incapable of expansion to provide additional aspects or even combinations of the fundamentals and supplementaries) is to use a second arm for both of these indications. The [A. R. A.] committee on Transportation rules that the fundamental, "Proceed with caution," may be used to govern any cautionary movement. Therefore, for those roads which desire to operate under this plan and deem the five indications entirely sufficient, two additional aspects are necessary.

4. Proceed at low speed

5. Proceed at medium speed



"At interlocking plants which are also block stations it may be desirable, even on such roads, to give passenger trains caution signals for diverging movements but not for entering occupied block stations; this would, with the system outlined above, require a separate signal beyond the interlocked switches. It may frequently also be desirable to display the fundamental, "Proceed with caution," on the medium-speed route, and to logically and consistently apply the fundamental aspects for "Proceed with caution" and "Proceed" to those signals indicating medium-speed and low-speed, the 45 deg. position should be used for caution and the vertical for proceed.

"Again, as the Committee on Transportation merely makes optional the combination of various indications under caution, and as several roads have found it desirable to differentiate between such indications, the committee recommends for such roads a low arm as a low-speed arm and a middle arm where the indication of medium speed is desired.

"The Committee on Transportation states that 'stop signals operated under automatic block system rules should be designated by some distinctive mark to be determined by each road in accordance with local requirements.' The instructions to this committee are to design a uniform system, which end is defeated if each road uses a different method of designating the automatic home signal. Therefore, the committee recommends as follows:

"Conclusion No. 1.

"On roads desiring to operate with the three fundamentals and the two additional indications without expansion or combination of these indications the following aspects may be used:

Scheme No. 1.
Fundamentals

1. Stop

2. Proceed with caution

3. Proceed

Supplementary Indications.

4. Proceed at low speed

5. Proceed at medium speed

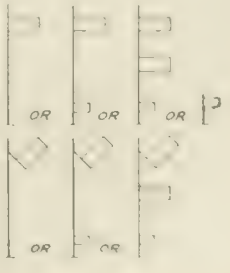
"Conclusion No. 2.

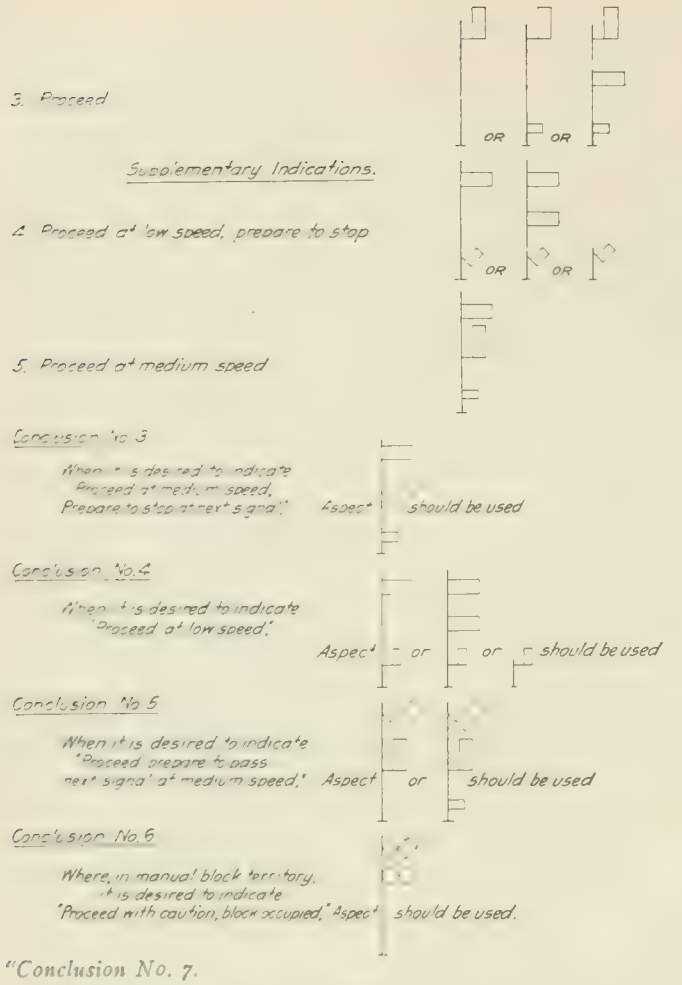
"On those roads desiring combinations of the fundamentals and supplementary indications and different aspects for the various caution indications, permissible under the ruling of the committee on transportation, the following aspects should be used:

Scheme No. 2.
Fundamentals.

1. Stop

2. Proceed, prepare to stop at next signal



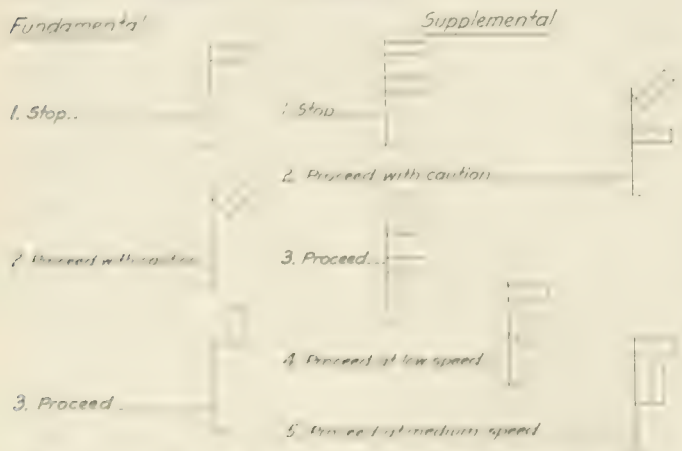

3. Proceed
OR OR
Supplementary Indications.
4. Proceed at low speed, prepare to stop
OR OR
5. Proceed at medium speed
Conclusion No 3
When it is desired to indicate
Proceed at medium speed,
Prepare to stop at next signal.
Aspect should be used
Conclusion No 4
When it is desired to indicate
"Proceed at low speed."
Aspect or or should be used
Conclusion No 5
When it is desired to indicate
"Proceed prepare to pass
next signal at medium speed."
Aspect or should be used
Conclusion No 6
Where, in manual block territory,
it is desired to indicate
"Proceed with caution, block occupied." Aspect should be used.

"Conclusion No. 7.

"That the arms of automatic signals be pointed and the arms of other signals giving the stop indication have square ends; that, on roads using Scheme No. 1, a number plate be added on the automatic signal and, on roads using Scheme No. 2, a red marker light below and to the left of the active light be provided."

MINORITY REPORT.

Four members of the association disapproved the more comprehensive scheme of the majority of the committee and presented in a minority report the following indications recommending them for adoption as all-sufficient.



The opinions of the minority as to the other aspects recommended by the majority are set forth under ten heads. These are substantially the same as those presented by Mr. Clausen in a paper read at Montreal which was published in the *Railway Age Gazette* of March 30 last. In addition the minority say that a number of serious rear end collisions in the past few years show the inadequacy of these positions, but most of these accidents are named. The report is signed by W. B. Scott, Harriman Lines; T. S. Stevens, Santa Fe; J. C. Young, Union Pacific; L. R. Clausen, C. M. & St. Paul.

ACTION OF THE CONVENTION.

The meeting on Wednesday at noon adopted the majority report by a vote of 40 to 22, and ordered it to be sent to letter ballot. This was after a very lively and interesting discussion which lasted three hours.

CAPITALIZATION AND DIVIDENDS OF THE RAILWAYS OF TEXAS.*

In this study, prepared by request, it has been the purpose to ascertain the capitalization of the railways of Texas, their dividends, and the proportion of non-dividend-paying stock, and to make a comparison in these respects with the railways of the United States as a whole, and with those of other sections of the United States.

The study is for the fiscal year ending June 30, 1909, the latest year for which requisite statistics are available. The data has been obtained from the annual report of the Railroad Commission of Texas and the statistical report of the Interstate Commerce Commission.

From the table which is printed hereafter with explanatory comment, it will be perceived that the capitalization of the Texas roads per mile is $32,070, or less than half the average for the whole United States, which is $73,829. It is of interest to compare this further with Interstate Commerce Commission Group V, which has the lowest capitalization per mile,† $46,364, and with Group II, which has the highest capitalization per mile, $147,300. It should be noted that these amounts represent the *gross* capitalization per mile, in which are included duplications due to intercorporate ownership. The *net* capitalization of the railways of the United States as a whole, that is, the gross capitalization less deductions due to the ownership of the securities of one railway by another, and less deduction of securities covering property other than railway property, is $59,259 per mile. The net capitalization of the railways in each group or in each state is not ascertainable. It has therefore been necessary in this comparison to use the figure of gross capitalization. While it is likely that the *net* capitalization of the railways of Texas, if it were ascertainable, would not show the same relative reduction from the gross as that of the United States as a whole, it is significant that the *gross* capitalization per mile of the Texas lines is 45 per cent. less than the *net* capitalization per mile of the railways of the country as a whole.

On the same basis of comparison of gross figures, the table shows that the amount of stock per mile is $9,839 in Texas, $32,450 for the United States as a whole, $15,495 in the lowest group (Group V), and $65,456 in the highest group (Group II). The amount of bonds per mile is $22,231 for Texas, $41,380 for the United States, $30,869 for Group V, and $81,844 for Group II.

The average rate of dividend on railway stock is lower in Texas than elsewhere. The average dividend paid in 1909 on the aggregate of dividend-paying and non-dividend-paying stock was less than three-tenths of one per cent. On the similar aggregate of stock for the entire United States, the dividend rate averaged 4.2 per cent. In the lowest group (Group IV) this dividend rate averaged 1.6 per cent., and in the highest group (Group VII) 6.8 per cent. That is, the average dividend rate on the total railway stock of the United States was more than seventeen times as high as that of Texas; in Group IV it was over six times as high, and in Group VII twenty-eight times as high.

*Texas Bulletin 18 of the Bureau of Railway Economics, Washington, D. C.

†In the comparisons of Texas with the various groups, Group IX is omitted from consideration because the state of Texas comprises the major part of Group IX and largely determines its character.

The low dividend rate on Texas stock would lead one to expect that the proportion of railway stock paying no dividends would be higher in Texas than in the country as a whole. This proves to be the fact to an extraordinary degree. The ratio that the stock of non-dividend-paying railways bore to the stock of all railways was 95.8 per cent. in Texas, in the United States as a whole, 29 per cent., in the group with the highest ratio (Group IV) 58.7 per cent., and in the group with the lowest ratio (Group I) 6.7 per cent. It should be noted that, for reasons given later in the discussion of the table, this comparison of the proportion of stock not paying dividends is based on the *total stock* of dividend paying roads compared with the *total stock* of non-dividend-paying roads, and not on the *issues of stock* paying dividends compared with the *issues of stock* that paid no dividends.

Certain discrepancies exist between the data published by the Texas commission and that published by the Interstate Commerce Commission. If the higher figures given by the Interstate Commerce Commission had been used as the basis for the foregoing comparison, instead of the lower figures of the Texas commission, the amounts entering into the comparison would have been but little changed, and the relation between the status in Texas and that in other parts of the country, not at all. Therefore it has not seemed necessary to present these discrepancies in the summary.

The amount given in the table as representing the stock of all American railways on which no dividend was declared in 1909 is $2,227,650,417, or 29 per cent. of the total stock outstanding. This amount is ascertained by adding together the total outstanding stocks of all railways that declared no dividends in 1909. The corresponding item in the Interstate Commerce Commission's statistical report for 1909, page 57, is $2,766,104,427, and the corresponding percentage 35.99 per cent. The discrepancy between these two sets of figures is due to the fact that the Interstate Commerce Commission added together all *issues* of stock on which no dividends were paid, instead of the total stocks of all railways declaring no dividends. Thus the Interstate Commerce Commission's total includes a considerable amount of common stock of railways that paid a dividend on their preferred, but not on their common issues. It has proved impossible to secure from the Interstate Commerce Commission or from its reports a statement of non-dividend-paying stocks in each group corresponding to the amount reported by the commission for the United States, which has made it necessary to make up the item in the way described. For comparative purposes this data is as valuable as that of the Interstate Commerce Commission, for it gives information of the capitalization of railways paying no dividends whatever on their capital stock.

Switching and terminal companies have not been included in the statistical reports of the Interstate Commerce Commission since 1907. In order to make the statistics comparable, these companies have been omitted from the Texas figures.

Certain differences exist between the returns of the Interstate Commerce Commission when computed for the state of Texas and those of the Texas commission. These differences fall into three main groups—differences due to variations in classification, differences arising out of the failure of roads to file reports, and differences in methods used in apportioning capital to those portions of interstate railways that lie within the state of Texas. Among the differences due to varying classification may be mentioned the inclusion of notes, debentures, pledged bonds, and miscellaneous obligations with funded debt, and the inclusion of branches and spurs with miles of line. For all the roads failing to file operating statements with the Interstate Commerce Commission, mileage figures are reported by that commission, but nothing more. Differences due to methods of capital assignment are as follows: Where a railway lies in more than one group, the Interstate Commerce Commission usually apportions the capitalization of such road among the several groups in the proportion of the mileage lying within the respective groups. The Texas commission, however, apportions the capitalization of each railway entering or passing through the state on its own merits; that is, on the basis of what it considers to be the proper valuation of that part of the railway lying in Texas. As the tendency of the Texas commission is always toward a low valuation, it is not strange that it assigns a lower capitalization to the Texas portion of the interstate railways than does the Interstate Commerce Commission.

This study, the method of which was determined in the request for its preparation, was based, as already shown, upon the Texas commission's figures. Yet the discrepancies between the Texas commission figures and the Interstate Commerce Commission figures, the reasons for which have already been explained, are not sufficient to vitiate in any respect the conclusions of this study. It does not therefore seem worth while to present in detailed tables the statistical variations in the two reports.

Capitalization and Dividend Returns of the Railways of Texas, of the United States as a Whole, and of the Several Groups: Year Ending June 30, 1909.

(United States and Group figures from Statistical Report of the Interstate Commerce Commission for 1909; Texas figures from 1909 report of the Texas Railroad Commission).*a*

Group.	Mileage Owned.	Stock. Amount.	Stock. Per Mile.	Bonds. Amount.	Bonds. Per Mile.	Total Railway Capitalization. Amount.	Total Railway Capitalization. Per Mile.	Dividends Declared in 1909. Amount.	Dividends Declared in 1909. Avg. Rate Based on Total Ry. Stock of Group.	Total Stock of Railways which Paid No Dividends in 1909. Amount.	Total Stock of Railways which Paid No Dividends in 1909. Per cent. of Total Stock of All Railways of Group.
Texas	13,079.41	$128,686,677	$9,839	$290,768,626*b*	$22,231	$419,455,303*b*	$32,070	$307,750	0.24	$123,337,265	95.8
United States..	236,868.53	7,686,278,545	32,450	9,801,590,390	41,380	17,487,868,935	73,829	321,071,626	4.2	2,227,650,417*c*	29.0
Group I.....	7,950.14	324,754,673	40,849	445,333,910	56,016	770,088,583	96,865	19,575,320	6.0	21,739,094	6.7
" II....	23,236.94	1,520,991,520	65,456	1,901,806,200	81,844	3,422,797,720	147,300	71,484,423	4.7	420,996,237	27.7
" III...	24,880.48	997,639,248	40,097	1,310,905,552	52,688	2,308,544,800	92,785	35,153,385	3.5	368,252,631	36.9
" IV....	14,880.97	396,395,222	26,638	553,027,315	37,163	949,422,537	63,801	6,471,801	1.6	232,639,792	58.7
" V....	28,377.26	439,709,547	15,495	875,969,066	30,869	1,315,678,613	46,364	9,251,150	2.1	253,874,556	57.7
" VI...	50,190.75	1,398,398,631	27,862	1,594,510,949	31,769	2,992,909,580	59,631	67,187,584	4.8	241,928,577	17.3
" VII..	13,638.76	407,959,786	29,912	426,517,621	31,272	834,477,407	61,184	27,793,005	6.8	28,166,800	6.9
" VIII.	32,450.48	883,554,572	27,228	1,297,095,370	39,971	2,180,649,942	67,199	25,029,670	2.8	232,382,171	26.3
" IX...	18,162.90	318,121,840	17,515	448,028,456	24,667	766,150,296	42,182	4,681,471	1.5	211,028,138	66.3
" X....	23,099.85	998,753,506	43,236	948,395,951	41,056	1,947,149,457	84,293	54,443,817	5.5	216,642,421	21.7

a The figures exclude switching and terminal companies.
b Includes equipment trust obligations amounting to $7,956,426.
c Includes $25,666,134 held in treasury, pledged as collateral security, held in sinking and other funds, etc. Amounts assigned to groups are as follows:

Group I.....	$29,749	Group III....	$9,152,575	Group V.....	$744,720	Group VII.....	$1,500	Group IX.....	$155,675
" II.....	8,327,444	" IV.....	1,948,900	" VI.....	603,285	" VIII.....	2,486,386	" X.....	2,215,900

Tenders have been invited by the coal exchanges in behalf of the Egyptian State Railways for 40,000 tons of American coal. This is intended as an experiment to determine whether American coal is a suitable substitute for the Welsh coal now used.

General News Section.

The Texas & Pacific is equipping all its passenger cars with steel tired wheels. It is probable that this company will also convert the greater part of its coal burning locomotives to oil burning.

President Taft, in addressing the people of Bellingham, Wash., on Monday of this week, said that unless there should be unexpected delays, the Panama Canal could and probably would be opened for traffic July 1, 1913.

The educational department of the Railroad Y. M. C. A., at St. Louis, had last year a course of instruction in freight rates, which was so successful and attracted so much favorable comment that the course is being repeated this year.

A press despatch from San Francisco says that on Thursday of last week messages were exchanged by wireless telegraph direct between that city and a station in Japan—on Hokushu Island in the northern part of the Japanese archipeligo—a distance of about six thousand miles.

On Sunday last 800 men from the Renovo car shops of the Pennsylvania Railroad went to Austin, Pa., and assisted in clearing up the great masses of rubbish deposited by the recent flood in that town, the railway company carrying them in a special train. The men carried their own food. They propose to contribute one dollar each to the fund for the relief of the people of Austin.

Postmaster General Hitchcock, in his estimates for the next fiscal year, which were given out last week, includes a proposal to appropriate $50,000 for the preliminary expenses of establishing a parcels post on rural mail routes and a similar amount for an experimental parcels-post test in cities. A further sum of $50,000 is asked for to provide for an investigation as to the propriety of establishing a general parcels-post.

The school for the education of young men in railway work, which is maintained by the Chicago Great Western at Oelwein, was noticed in the *Railway Age Gazette*, October 6, page 681. In connection with this enterprise, General Manager Slifer not only has given a general notice that young men will be encouraged to apply to the school, but has issued a circular to station agents, asking them to "get next to" promising young men in their several towns, and when they find those who are capable and willing, to submit their names to the division superintendent. The circular to agents says: There are undoubtedly a number of young men who might be interested in railroading, if the matter were brought to their attention in the proper light and by a person in whom they have confidence, men of this character, who live along the line and have family ties in the vicinity, and whose circle of friends reside in the territory adjoining the line, will in the long run make more suitable employees than many of those who have not such ties. It is desired that each agent study the young men in his particular locality and pick out the most promising ones.

General Manager S. C. Long of the Pennsylvania Railroad last week awarded the usual annual prizes to supervisors and assistant supervisors, based on the result of the monthly inspections. In the last competition Mr. Long had with him a party of 300 [illegible], and the prizes were awarded on the arrival of this party at Pittsburgh. The total amount of the prizes was $1,600. The first prize, amounting to $800 for the supervisor and $400 for the assistant, was given to C. M. Wyman, supervisor, and William F. Miller, assistant supervisor, who have charge of the track between Tullytown, Pa., and Deans, N. J., 23 miles. Four prizes of $800 each for the supervisor and $400 for the assistant, for the best line and surface on a main line [illegible] between New York and Pittsburgh and Philadelphia and Washington were awarded to John Schimmel, Jr., and H. S. Gass, D. F. Eagle and E. S. Stewart, George Churchill and C. W. Curtiss, George Goldie, Jr., and S. D. Young. A special improvement premium of $1,000 ($700 to the supervisor and $300 to the assistant) for the greatest improvement made in the line and in the surface of a supervisor's section of track was awarded to F. W. L. Schneider and J. M. [illegible].

Strikes.

No important change has taken place in the strike situation on the Harriman Lines and the Illinois Central. Officers of the railways report that the strikers are quieter, that passenger and freight traffic is being handled without interruption, and that they are having no difficulty in securing men to take the places of the strikers. At a conference which took place at Jackson, Miss., on October 9, and which was arranged for by Governor Noel of that state, President C. H. Markham of the Illinois Central discussed the situation with Senator Williams of Mississippi, Mayor Crowder of Jackson and the union leaders, but no agreement was reached. Governor Noel announced that he would ask the governors of other states affected by the strike on the Illinois Central to meet in joint conference with representatives of the road and striking employees. Strikers in the south are trying to get business men to use their influence in bringing about a settlement. Injunctions were secured by the Southern Pacific on October 5, at New Orleans, and at Houston, restraining the strikers and others from interfering with the affairs of the road.

Acts of violence on the Harriman Lines were reported at Portland, Oregon., and on October 6 a mob of strikers attacked strikebreakers brought to work in the Southern Pacific shops at Algiers, La.

Boilermakers and machinists on the Grand Trunk Pacific from the lakes to the Rocky mountains went on a strike on October 9. They demand a nine-hour day and 45½ cents an hour.

Work has been resumed in the shops of the Missouri, Kansas & Texas at Sedalia, Mo., on a reduced scale.

Elimination of Grade Crossings.

Following the appropriation of $350,000, which was made by the legislature of 1911 for the elimination of grade crossings in New York state outside of Greater New York, the New York Public Service Commission, Second district, has selected 21 cases which provide for the elimination of 30 crossings, considered most dangerous. The estimate of the cost of this work is $1,200,000, of which the state will pay one-quarter, the municipalities one-quarter, and the railways one-half. The crossings proposed to be eliminated are: On the New York Central & Hudson River, at Pearl and Van Woert streets, in Albany; at South William street, Kemp street, Renwick street and South Water streets in Newburgh; at Front street in Corning; at West Somerset avenue in the town of Newfane; at Bolts crossing in Reading, and at Aldrich road crossings in the towns of Phelps and Junius, in Ontario and Seneca counties. On the Erie Railroad, at First and Columbia streets in Corning; at two crossings in Mt. Hope, known as Caldwell crossing and the crossing of a road leading to Bloomingburgh; at Nyack turnpike crossing in Clarkstown, and at Main street crossing in Tusten. On the Long Island Railroad, at the South Country road and East Tiana road crossings, and Goodales crossing in Southampton. On the New York, Ontario & Western, at Otters crossing in Hamptonburgh; at Dennistion road crossing in New Windsor; at Railroad street in Stockbridge, and at Munn's crossing in Stockbridge. On the Delaware, Lackawanna & Western, at Pleasant street crossing in Utica; at Robinson street crossing in Binghamton, and at three crossings in Lafayette. On the Delaware & Hudson, at the crossing at Slingerland station. On the Boston & Maine, at Middleburgh street crossing in Troy. In addition there are pending in the office of the commission, 20 petitions for the elimination of crossings. This work cannot be done, because the commission has no authority to make orders eliminating crossings without having an appropriation which will cover the state's proportion of the cost. The estimated cost of eliminating the twenty crossings is approximately $1,600,000, of which the state's proportion would be $400,000. The last report of the commission shows there are in the state outside of Greater New York, 8,632 places where public highways cross steam railway tracks at grade, of which 6,563 are absolutely unprotected, and 2,069 are protected by gates, flagmen or electric bells. In Greater New York there are reported 433 crossings at grade, of which 282 are protected and 151 unprotected, making a total of 9,065 highway crossings at grade in the entire state.

A Heart-Rending Appeal.

The following is a translation of a circular anonymously distributed last May in Changsha, China, while the negotiations for the railway loan were under way. The translation is literal, preserving the astonishing grammar and metaphor of the Chinese original. The circular was headed: "To Inform Our Countrymen of the Distressing Railway."

"Also; The death of our people of our whole Hunan province is to hand. The old and the young of our whole providence should hasten to devise a plan to save our lives. The plan is to unite all our Hunan people to fight desperately against the traitorous thief who sold our Hunan Railway to the foreigners. We remember that ten years ago, the Hunan people lost their railway. It was sold to the United States by Zian Sien Way and it was through our 'lose our lives and die' Hunan people that the railway was claimed back. The amount of money spent for the reclaiming of the railway was over seven million taels [$4,200,000], and this whole amount was from the poor and hard-working Hunan people, who subscribed this amount of money simply on the question of life and death.

"We beg to quote below the distresses resulting from the control of railways in China by the foreigners.

"Our Yunan railway is constructed by the Frenchmen. At the places along the railway, forts are built and are manned with foreign soldiers. They capture the Yunan people, force them to do hard labor and exert every barbarous act, which to describe it adequately would mean gnashing of everybody's teeth.

"Our Manchurian railways are constructed by the Russians. They forced us to give our Manchurian land, burnt the people's houses and robbed their money. One day, Russian soldiers happened to be out and they threw a number of living men into a lake. Is it not pitiful to think of this?

"Now, do the traitorous railway thief take any care of people's life and death? We, Hunan people, knowing these above-mentioned distresses are sure that railways built by the foreigners are not good. Every one of us is therefore willing to take out his money, to claim back the railway and to build it ourselves. The money we have had from the shares cannot be said as little, and we are thinking in every way to get more money. Thus you can readily see that the step our Hunan people take in the matter of selling the shares is exhaustive. We do this for we know that when our railway is lost, not only will our land be lost, but our people's lives and property will also be in the tiger's mouth. Every one has kept this in mind, so the people of the whole Hunan province can get aproximately an amount of $5,000,000 [Mexican; about $2,500,000 gold] yearly as the money for the purchase of railways, and in five or six years' time the Hunan Railway of about 1,500 miles could be built.

"The traitorous railway thief, only thinking of the 5 per cent. commission do not care of the future life and death of the Hunan people. He secretly proposes an agreement for a loan from the German, English, French and American people, without letting the Hunan people know of it.

"Our railway was sanctioned by the late Emperor Kwany Hsu to be built by the people. In the spring of last year, four representatives were chosen by the Provincial Assembly to proceed to Peking and a petition written with blood was also forwarded to the Board of Posts and Communications. The request was granted and the railway was again sanction by the Board of Posts and Communications that the Hunan Railway was to be built by the Hunan people. Thus the railway has been sanctioned by the late Emperor and the present. Cannot this be considered an 'iron' [a sound] case?

"Today the change is again made by that Zian Sien Way and we heard that the agreement for a loan from four countries has already been signed with the likin [tax] as pledge, in spite of the sanctions given by the late Emperor. This is the same as to present the railway to the foreigners.

"We, Hunan people, have spent ten years' time and used several million dollars, and the railway which can be completed in a fixed day is to fall into the foreigner's hands. Henceforth, everybody's life and family will be in danger. If we Hunan people do not unite into one and fight with all our effort against this, the day would not be far when we will see swords hanging just over our neck. But we have our ways. Firstly, to ask everyone to take out more money to build the railway at once; one foot built is one foot of the railway; ten feet built is ten feet of the railway. Secondly, we want our governor to send petition to the Waiwupu for immediate cancellation of the Hunan Loan Agreement. When a piece of meat is in the traitorous railway thief's mouth, it is hard to take it out. We can only have one idea; to build the railway ourselves. If he loans the foreigners' money, we do not care of him, nor do we wan him to care of us. If we build our railway, who will press us down by force? We, the people, being in every respect having no hope of life, ought to have a desperate fight. Let the students leave the school, merchants stop their business, tax be not paid by the whole Hunan people, and see what he will do to our Hunan people."

Railway Signal Association.

The sixteenth annual meeting of this association was opened at the Antlers, Colorado Springs, on Tuesday morning of this week, with President C. E. Denney (L. S. & M. S.) in the chair. Mr. Denney, in his address, commended especially the work of committees Nos. 10 and No. 12. He also emphasized the value of a good manual of standards. He proposed that the association co-operate even more fully than in the past with the Electric Railway Association. The Board of Direction has recommended the appointment of a special committee of four signal engineers to report on technical signaling features to the Committee on the Relations of Railway Operation to Legislation, of which F. O. Melcher (C. R. I. & P.) is chairman.

The secretary-treasurer reported the membership of the association on September 30 as 1,378, an increase during the past year of 141. The assets of the association exceed the liabilities by $4,847, a large increase over the preceding year.

The subject of most general interest discussed at this meeting was that of signal aspects. This was reported on by Committee No. 1, and this report, with the action of the association on it, will be found in another column.

An account of the rest of the proceedings of the meeting must be deferred to a future issue.

American Railway Bridge and Building Association.

The twenty-first annual convention of the American Railway Bridge and Building Association will be held at the Planters Hotel, St. Louis, Mo., October 17-19. The reports of 11 standing committees will be presented for discussion. The convention will adjourn on October 19 at noon, and the afternoon will be devoted to short trips about the city. The Committee on Arrangements has planned several side trips, which will be announced at the convention. The Bridge & Building Supply Men's Association will meet at the same place in connection with this convention, and there will be an exhibit of the various types of equipment of interest to members of the association. Besides the reports of committees on the morning of October 17, there will be an address by the mayor of St. Louis, an address by the president of the association, and the appointment of committees. On the afternoon of October 17 there will be committee reports and a discussion of last year's commitee reports. On October 18 there will be committee reports and discussions on the same. On the morning of October 19 there will be committee reports, the election of officers, and the selection of location for the 1912 convention, followed by adjournment.

Car Service Officers.

The Central & Western Association of Car Service Officers will hold its semi-annual meeting at Indianapolis, Ind., Thursday, October 19. The members will remain over until Friday, and take a trip around the Indianapolis terminals, the Belt Railway and the stock yards.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next meetings, and places of meeting.

Air Brake Association.—F. M. Nellis, 53 State St., Boston, Mass.

American Association of Demurrage Officers.—A. G. Thomson, Scranton, Pa.

American Association of General Passenger and Ticket Agents.—C. M. Burt, Boston, Mass.

American Association of Freight Agents.—R. O. Wells, East St. Louis, Ill.

American Association of Railroad Superintendents.—O. G. [illegible], Carew building, Cincinnati, Ohio; 3d Friday of March and Sept.

American Electric Railway Association.—H. C. Donecker, 29 W. 39th St., New York.

American Railway Association.—W. F. Allen, 75 Church St., New York; November 15, Chicago.

American Railway Bridge and Building Association.—C. A. Lichty, C. & N. W., Chicago; Oct. 17-19, 1911, St. Louis, Mo.

American Railway Engineering Association.—E. H. Fritch, Monadnock Block, Chicago; annual convention, March 19-21, 1912, Chicago.

American Railway Master Mechanics' Association.—J. W. Taylor, Old Colony building, Chicago.

American Railway Tool Foremen's Association.—O. T. Harroun, Bloomington, Ill.

American Society for Testing Materials.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.

American Society of Civil Engineers.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

American Society of Engineering Contractors.—D. J. Haner, 13 Park Row, New York; 3d Tuesday of each month, New York.

American Society of Mechanical Engineers.—Calvin W. Rice, 29 W. 39th St., New York.

Association of American Railway Accounting Officers.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.

Association of Railway Claim Agents.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 22, 1912, Los Angeles, Cal.

Association of Railway Electrical Engineers.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago; annual, November 6-10, Chicago.

Association of Railway Telegraph Superintendents. P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.

Association of Transportation and Car Accounting Officers.—G. P. Conard, 75 Church St., New York; December 12-13, Louisville, Ky.

Canadian Railway Club.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.

Canadian Society of Civil Engineers.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

Car Foremen's Association of Chicago.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

Civil Engineers' Society of St. Paul.—D. F. Jurgensen, 116 Winter St., St. Paul, Minn.; 2d Monday, except June, July and Aug., St. Paul.

Engineers' Society of Pennsylvania.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

Engineers' Society of Western Pennsylvania.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

Freight Claim Association.—Warren P. Taylor, Richmond, Va.; annual Buffalo, N. Y.

General Superintendents' Association of Chicago.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

International Railway Congress.—Executive Committee, rue de Louvain, 11 Brussels; 1915, Berlin.

International Railway Fuel Association.—D. B. Sebastian, La Salle St. Station, Chicago.

International Railway General Foremen's Association.—L. H. Bryan, D. & I. R. Ry., Two Harbors, Minn.

International Railroad Master Blacksmiths' Association.—A. L. Woodworth, Lima, Ohio.

Iowa Railway Club.—W. B. Harrison, Union Station, Des Moines, Ia.; 2d Friday in month, except July and August, Des Moines.

Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York.

Master Car Builders' Association.—J. W. Taylor, Old Colony building, Chicago.

Master Car and Locomotive Painters' Association of United States and Canada.—A. P. Dane, B. & M., Reading, Mass.

New England Railroad Club.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston

New York Railroad Club.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

Northern Railway Club.—C. L. Kennedy, C., M. & St. P., Duluth, Minn; 4th Saturday, Duluth.

Omaha Railway Club.—H. H. Maulick, Barker Block, Omaha, Neb.; second Wednesday.

Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

Railway Club of Pittsburgh.—C. W. Alleman, P. & L. E., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

Railway Interchange Association.—G. L. Stewart, St. L. S. W. Ry., St. Louis, Mo.; annual, May 12, 1912, Kansas City, Mo.

Railway Signal Association.—C. C. Rosenberg, Bethlehem, Pa.

Railway Storekeepers' Association.—J. P. Murphy, Box C, Collingwood, Ohio.

Richmond Railroad Club.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August

Railroad Men's Mutual Benefit Association.—L. C. Ryan, C. & N. W., Sterling, Sept. 10, 1912, Buffalo, N. Y.

St. Louis Railway Club.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

Society of Railway Financial Officers.—C. Nyquist, La Salle St. Station, Chicago.

Southern Association of Car Service Officers.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala., annual, October 20, Atlanta, Ga.

Southern & Southwestern Railway Club.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

Toledo Transportation Club.—J. G. Macomber, Woolson Spice Co., Toledo, O., 1st Saturday, Toledo.

Traffic Club of Chicago.—Guy S. McCabe, La Salle Hotel, Chicago, meetings held, Chicago.

Traffic Club of New York.—C. A. Snope, 290 Broadway, New York, last Thursday in month, except June, July and August, New York.

Traffic Club of Pittsburgh.—D. L. Wells, Erie, Pittsburgh, Pa.; meet Pittsburgh.

Traffic Department Associations of America.—J. E. Mackie, 7041 Stewart Ave., Chicago, annual, June 18, 1912, Louisville, Ky.

Traffic Club of Buffalo.—J. M. Wells, Buffalo, last Saturday [illegible]

Transportation Club of Detroit.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.

Transportation Club of New York.—W. O. Thompson, N. Y. C. & H. R. R., [illegible]

Railroad Transportation Club.—W. H. Bassett, P. O. Box 1707, Wm. [illegible] Meet 3d Monday, except June, July and August, Washington.

Western Railway Club.—W. M. Taylor, C. & N. W., Chicago, 1st Monday, except June, July and August, Chicago.

Women's Transportation Club.—Meets 1st Wednesday, except July and August, Chicago.

Wrecking Foremen's Association.—E. E. Sage, B. & O., Baltimore, Md., [illegible]

Traffic News.

The Judson Freight Forwarding Company, with offices at Chicago, New York, Boston and St. Louis, has been appointed joint contracting and forwarding freight agents of the Pacific Mail Steamship Company and the Toyo Kisen Kaisha.

Referring to the recent revisions of rates and ratings made by the Western Classification Committee on various commodities, the Missouri Railway Commission has given notice that any increases proposed will not be approved or allowed to become effective in that state on intrastate business until the commission has had time to investigate the changes and hold a formal hearing on them if that is considered necessary.

The State Agricultural College of Oklahoma has arranged with the St. Louis & San Francisco to run a lecturing train throughout the lines of that company, in the western part of the state, for about four weeks in November. The train will carry ten lecturers, and will stop a half day in each place visited. Besides the usual exhibits there will be a car of pure bred, live stock and poultry. The college has received an invitation to make a similar trip over the Missouri, Kansas & Texas.

Through the efforts of the Railway Ticket Protective Bureau ticket scalping in Colorado has been practically suppressed. An anti-scalping law was passed on August 6, after it was shown that a petition formulated by the ticket brokers to defeat the law bore several thousand alleged signatures of persons either fictitious or not legally entitled to vote. The newspapers of Denver were prevailed upon to decline to advertise the ticket brokers and many of the scalpers have now abandoned the business. All of the roads belonging to the Transcontinental Passenger Association, except the Chicago, Milwaukee & St. Paul, have decided to continue as members of the bureau.

A new train to run twice weekly between New Orleans and the Pacific coast will be put on by the Sunset-Central lines of the Southern Pacific beginning December 4. Under the proposed schedules, which will reduce by 30 hours the running time between the places mentioned, and which provides for connection with steamboats at other ends of the route, trains will leave New Orleans at 12:30 noon on Mondays and Thursdays of each week, arrive in Los Angeles at 9:15 p. m. Wednesdays and Saturdays, and reach San Francisco at 11 a. m. of the following days. Eastbound, trains will leave San Francisco at 6:30 p. m. Tuesdays and Saturdays, leave Los Angeles at 8:30 a. m. the following days, and arrive in New Orleans at 7:20 p. m. Fridays and Tuesdays. The equipment will be of steel throughout and will consist of a dynamo and baggage car, dining car, three drawing room sleepers and an observation smoking car. The service will be of the highest order, and it is planned to charge $10 excess fare on this train.

The Department of Agriculture acting on a request from a fruit shippers' association has taken measures to confiscate any shipments of unripe oranges or other fruit from Florida which may be found to violate the law. Any attempts to ship artificially ripened fruit out of Florida or to "process" unripe fruit on its journey to the North will be frustrated. A shortage in citrus fruits has developed throughout the North, with accompanying high prices. Much of this shortage is due, it is claimed, to the enforcement of the Florida state law prohibiting the shipment of unripe fruit and the federal pure food decision, which prohibits the transportation of artificially ripened or colored fruit. Dr. Harvey W. Wiley, chief of the Bureau of Chemistry, says: "Fruit may be picked green and ripened by natural processes without running counter to the pure food regulation, but green fruit ripened by the 'sweating process,' without the aid of chemicals, or by transportation in steam heated cars, cannot be transported without violation of the pure food regulations."

Car Surpluses and Shortages.

Arthur Hale, chairman of the committee on relations between railways of the American Railway Association in presenting statistical bulletin No. 103 A, giving a summary of shortages and surpluses by groups from May 25, 1910, to September 27, 1911, says:

"The total car surplus continues to decrease, decreasing from

70,722 cars on September 13, 1911, to 58,382 cars on September 27, 1911, a decrease of 12,340 cars, or 36.29 per cent. The greater part of the decrease is in box and coal cars, box cars decreasing from 19,419 cars on September 13, 1911, to 12,372 cars on September 27, 1911, and coal cars decreasing from 23,795 cars on September 13, 1911, to 19,543 cars on September 27, 1911. Miscellaneous cars show a decrease of 1,638 cars, while flat cars increased 597 cars. The decrease in surplus cars is reported throughout the country, with the exception of groups 2 (New York, New Jersey, Delaware, Maryland and Eastern Pennsylvania); 4 (West Virginia, Virginia, North Carolina and South Carolina), and 5 (Kentucky, Tennessee, Mississippi, Alabama, Georgia and Florida), each of which reports a very small increase.

There is an increase of 1,905 cars reported in the total shortage. Box car shortage increased from 3,452 cars on September 13, 1911, to 6,632 cars on September 27, an increase of 3,180 cars or 92.12 per cent. Miscellaneous cars also show an increase of 174 cars, while flat and coal cars decreased 755 cars and 694 cars respectively."

The accompanying table gives the figures for the last period covered by the report and the chart shows total bi-weekly surpluses and shortages in 1907 to 1911.

National Association of Railway Commissioners.

The National Association of Railway Commissioners began their twenty-third annual convention on Tuesday.

Among other subjects to be considered on reports from subcommittees are the following: Grade crossings and trespassing on railways, railway taxes and plans for ascertaining valuation of railway property, simplification of tariff sheets, legislation, safety appliances, rates and rate making, railway capitalization, car service and demurrage, telephone and telegraph rates and service, express service and rates, etc.

Following the address of Chairman Clements, which was of conservative character, President H. Burr, in the course of his address said:

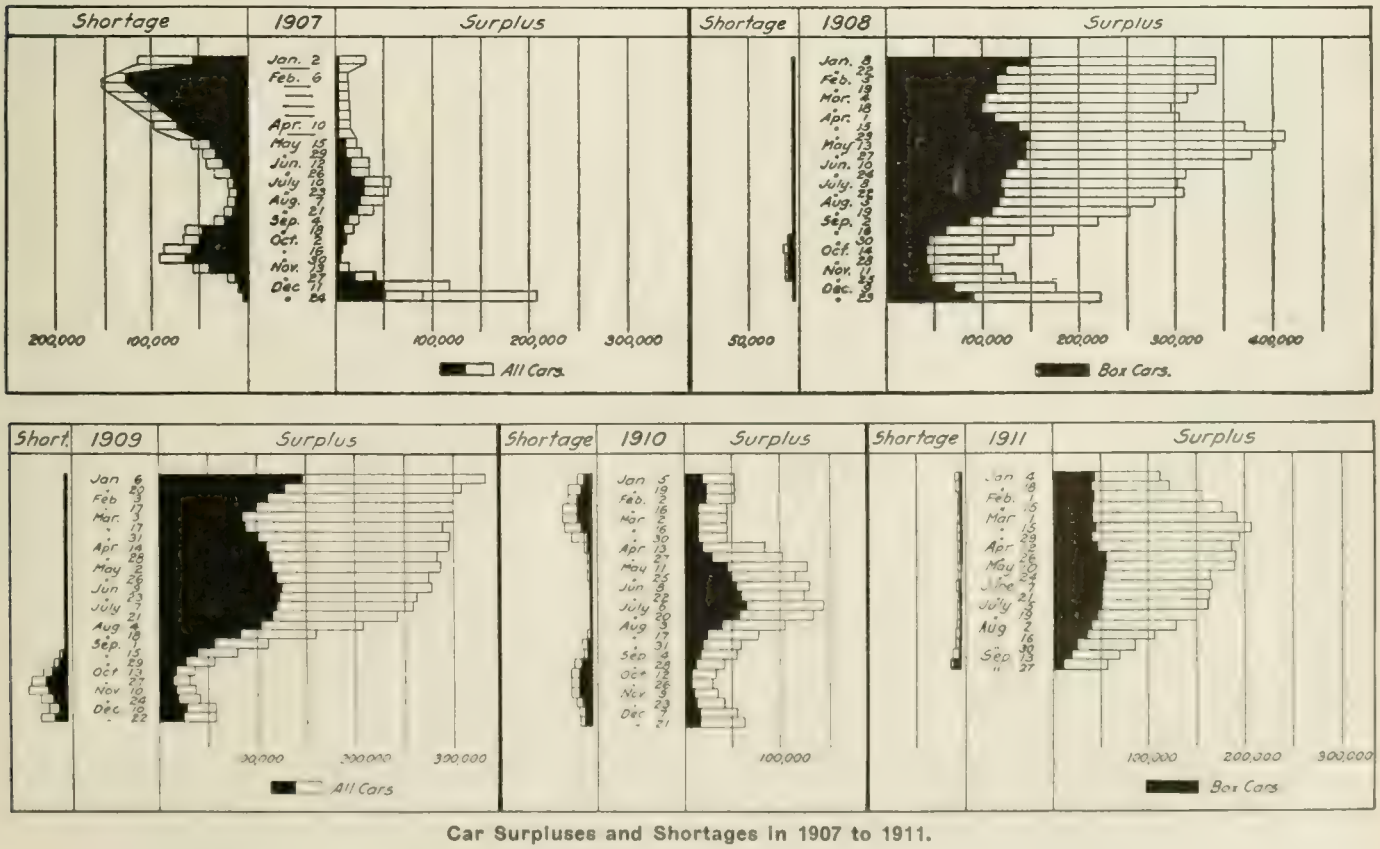
"There should be an act of congress to limit the powers of federal courts to enjoin proceedings of state railway commissions and providing that the federal courts should acquire jurisdiction only by appeal from the highest state court to the Supreme Court of the United States. I think that the National Association of Railway Commissioners should endorse a bill to this effect and see that it is made an issue in the next congressional elections and keep it up until we succeed."

Saying that for the past few years there has been a great migration of homeseekers from one section of the United States

Car Surpluses and Shortages.

Date.	No. of roads.	Surpluses					Shortages				
		Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.	Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.
Group *1.—September 27, 1911	7	447	592	422	185	1,646	285	90	0	0	375
" 2.— " 27, 1911	23	1,103	77	5,893	2,337	9,410	228	4	91	27	350
" 3.— " 27, 1911	25	1,250	252	6,904	1,920	10,326	329	4	50	89	472
" 4.— " 27, 1911	10	111	146	553	1,346	2,156	1,138	6	700	0	1,844
" 5.— " 27, 1911	16	411	14	1,263	1,021	2,709	667	110	20	15	812
" 6.— " 27, 1911	24	6,100	783	1,505	4,733	13,121	180	2	64	6	252
" 7.— " 27, 1911	3	32	30	0	233	295	0	0	30	0	30
" 8.— " 27, 1911	16	1,677	474	1,115	3,088	6,354	95	0	0	0	95
" 9.— " 27, 1911	11	610	384	460	829	2,283	30	0	0	0	30
" 10.— " 27, 1911	20	499	997	1,341	6,197	9,034	1,610	0	0	150	1,760
" 11.— " 27, 1911	5	132	95	87	734	1,048	2,070	151	0	103	2,324
Total	160	12,372	3,844	19,543	22,623	58,382	6,632	367	955	390	8,344

*Group 1 is composed of New England lines; Group 2—New York, New Jersey, Delaware, Maryland and Eastern Pennsylvania lines; Group 3—Ohio Indiana, Michigan and Western Pennsylvania lines; Group 4—West Virginia, Virginia, North and South Carolina lines; Group 5—Kentucky, Tennessee, Mississippi, Alabama, Georgia and Florida lines; Group 6—Iowa, Illinois, Wisconsin, Minnesota and the Dakotas lines; Group 7—Montana, Wyoming and Nebraska lines; Group 8—Kansas, Colorado, Missouri, Arkansas and Oklahoma lines; Group 9—Texas, Louisiana and New Mexico lines; Group 10—Oregon, Idaho, California and Arizona lines; Group 11—Canadian lines.



Car Surpluses and Shortages in 1907 to 1911.

to another, President Burr, who comes from Florida, said that household goods seem to be one class of freight in the handling of which carriers invariably make errors. These errors are a source of great annoyance and inconvenience, as well as causing unnecessary expense to the owners of the goods. He recommended legislation for the recovery by the party aggrieved of a penalty of $250 and attorney's fees for the misquotation of rate or the dropping of prepay from billing, to be collected in an action against the initial carrier.

Continuing he said: "I believe the express business of the country should be conducted as a department of the railway business. I see no sound reason for the existence of a separate and distinct express company as a means of transportation. It is one of the factors of the transportation business which should properly belong to the railway companies and for which they should receive extra compensation for the service rendered. Of course, it will take time to work this out, but there should be a beginning. Congress should take hold of the question and the states should follow."

In admitting that more strict application of cost accounting methods to railway accounts will entail more work and more expense on the carriers, President Burr said that it was necessary, first to determine the proper expense to each state; second, to determine the proper freight and proper passenger expenses; third, the amount chargeable to interstate and to intrastate passengers; fourth, the amount chargeable to interstate and intrastate freight; fifth, the expense to any class of traffic, whether interstate or intrastate.

"These five questions," he said, "are daily before some court or commission in the United States, and it seems, therefore, absolutely essential that cost accounting should be applied to all railway accounts and that if we are to determine these matters justly and intelligently it must be so applied."

Crop Conditions.

The Department of Agriculture estimates the condition of the crops as follows:

For the United States:

Crops.	Condition Oct. 1, at time of harvest.			Acreage, 1911.		
	1911.	1910.	10-yr. av.	Sept. 1, 1911,	P. C. of 1910.	Acres.
Corn	70.4	80.3	78.6	70.3	101.7	115,939,000
Buckwheat	81.1	81.7	84.2	83.8	97.0	801,000
Potatoes	67.3	71.8	75.3	59.8	97.3	3,495,000
Tobacco	80.5	80.2	83.4	71.1	72.4	893,200
Flax	66.9	47.2	*75.9	68.4	103.3	3,013,000
Rice	85.4	88.1	86.3	87.2	97.6	705,700
Sugar	97.8	46.4	85.4	56.2	...	.....

*Eight-year average.

The yields indicated by the condition of crops on October 1, 1911, or at time of harvest, the final yields in 1910, and the average for 1906-1910, follow:

Crop.	Yield per Acre.			Indicated total production, 1911, compared with total production in	
	1911, indicated by condition.	1910, Final.	1906-1910, Average.	1910. P. C.	1906-10. Average. P. C.
Corn ..... Bus.	23.8	27.4	27.1	88.3	97.9
Buckwheat .... Bus.	19.6	20.9	19.6	91.1	98.8
Potatoes ..... Bus.	97.3	94.3	96.5	103.3	97.0
Tobacco ..... Lbs.	801.1	797.8	826.0	72.7	88.7
Flax ..... Bus.	8.1	8.1	8.9	117.9	104.1
Rice ..... Lbs.	44.0	44.9	45.1	97.3	104.7

Preliminary estimates of production have been made as follows:

Crops.	Yield per Acre.			Production.		
	1911.	1910.	1906-1910 Average.	1911.	1910.	1906-1910 Average.
Spring wheat	15.6	16.3	16.4	30,677,000	33,039,000.	32,414,000

The yield of spring wheat is 79.8 per cent, compared with a 10-year average of 77.1 per cent, 84.6 per cent, compared with a 10-year average of 87.6 barley, 84.9 per cent, compared with a 10-year average of 87.

STATE COMMISSIONS.

H. H. Corey, for four years chief clerk in the office of the secretary of state of Oregon, has been appointed secretary of the Oregon Railway Commission, succeeding George O. Goodall, resigned on account of ill health.

The California commission has ordered the Southern Pacific to reduce its freight rates between Los Angeles and the harbor, at San Pedro. The reductions vary from 16 to 40 per cent., and are ordered to be put in effect November 10.

The Railroad Commission of Louisiana, finding that conditions did not warrant ordering a passenger and freight station to be built at Woodlawn, has ordered the St. Louis, Iron Mountain & Southern to build a passenger pagoda with closed freight room connected therewith.

The railway commission of Florida recently issued an order forbidding the transportation of perishable freight on passenger trains 1, 2, 78 and 79, which run between Jacksonville and Pensacola over the joint line of the Louisville & Nashville and the Seaboard Air Line; but the railways refused to comply, and the supreme court of the state, having been appealed to by the commission, has issued a mandamus requiring compliance with the order. The order of the court is returnable October 24. The order of the commission was issued on complaint that the trains did not make reasonably fast time, the complainants demanding that a separate fast freight train be provided for the perishable freight. The order is objected to by the roads on the ground that the commission has prescribed schedules for the passenger trains which involve a meeting point at a blind siding, and on the general ground that a commission should not fix train schedules arbitrarily.

COURT NEWS.

Ouster proceedings brought by the state of Ohio against the Hocking Valley have been ended on the promise of the railway company to relinquish control of the Toledo & Ohio Central, the Sunday Creek Coal Company and other railways and coal companies, and to manage its business hereafter in accordance with the statutes.

The commerce court has overruled an appeal of the Omaha & Council Bluffs Bridge Company, which operates an electric passenger railway between points in Iowa and Nebraska. The court holds that the Interstate Commerce Commission has the right to regulate affairs of an electric railway company doing an interstate passenger business.

The New York State Court of Appeals decides that a trunk which is being moved by an express or transfer company, or otherwise apart from and disconnected with the transportation of the person who owns the trunk, is not baggage, and such company receiving and losing it is liable for its full value. The action was against the New York Transportation Company, which contended it was liable only for $100. A judgment of $1,200 was rendered.

The commerce court has overruled the Interstate Commerce Commission in the socalled lemon rate case. The commission had ordered a reduction in the rate on lemons from California to eastern points from $1.15 to $1 per 100 lbs. The commerce court finds that the ruling of the commission in this case was based entirely on an assumed authority to protect the industry from foreign competition, and the court denied the right of the I. C. C. to issue an order on such grounds. The court did not pass on the reasonableness of the rate.

The commerce court has held that the Interstate Commerce Commission has not got the authority to control in any way that part of the business of water carriers which is called port to port interstate business, although the commission has authority over that part of the business of water carriers which is covered in a joint rate made with the railway. This decision was on an appeal against the order of the I. C. C. to compel certain water carriers to make reports in a form prescribed by the commission on *all* their business. The court expresses the opinion that it is highly important that water carriers should not, in intrastate and interstate commerce, be held to published rates except those which are made with railway companies.

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF AUGUST, 1911.

Name of road	Mileage operated at end of period.	Operating revenues			Operating expenses							Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or dec.) comp. with last year.
		Freight.	Passenger.	Total, inc. misc.	Maintenance—Way and structures.	Maintenance—Of equipment.	Traffic.	Transportation.	General.	Total.						
Alabama & Vicksburg	142	$73,534	$46,111	$128,749	$23,333	$24,668	$3,613	$41,456	$4,954	$98,024		$30,725	—$82	$4,600	$26,043	—$23,914
Alabama Great Southern	309	215,095	118,849	364,144	41,613	84,340	9,872	107,039	8,440	251,304		112,840	174	14,748	98,266	—13,075
Ann Arbor	7,612	4,903,016	1,902,179	7,381,812	1,324,248	1,225,350	158,584	2,028,767	163,026	4,899,975		2,481,837	.....	278,564	2,203,273	—664,210
Atlanta & West Point	97	53,183	43,853	104,117	12,080	19,894	5,362	29,994	4,509	71,839		32,278	115	5,189	27,204	12,277
Atlantic Coast Line	4,493	1,356,009	670,001	2,110,223	344,293	384,928	40,947	808,112	96,079	1,644,359		475,864	.....	107,000	368,864	—58,291
Baltimore & Ohio System	4,433	6,293,838	1,520,316	8,290,515	1,090,822	1,467,186	163,141	2,668,933	155,233	5,482,315		2,808,200	41,507	239,702	2,526,991	89,577
Baltimore & Ohio Chicago Terminal	77	.....	2,602	143,816	33,725	14,587	1,056	54,086	1,767	107,721		36,095	742	18,206	18,631	15,784
Bangor & Aroostook	627	197,247	64,642	374,530	50,149	36,997	3,431	80,632	10,897	182,106		92,424	.....	9,250	83,174	16,993
Bessemer & Lake Erie	203	982,650	49,810	1,042,418	82,353	151,075	7,468	209,951	7,726	458,573		583,845	.....	7,000	576,845	111,870
Boston & Maine	2,244	2,491,361	1,753,337	4,230,739	599,135	507,191	57,458	1,639,777	91,642	2,876,703		1,354,036	33,866	172,236	1,215,666	104,402
Buffalo, Rochester & Pittsburgh	572	718,457	119,995	866,779	147,038	160,740	10,772	258,851	16,633	594,031		272,748	325	17,000	256,073	78,210
Buffalo & Susquehanna R. R.	706	143,616	9,890	161,554	31,076	26,407	1,217	37,256	6,386	117,342		44,212	.....	2,600	41,612	19,030
Buffalo & Susquehanna R.	91	42,319	13,626	58,185	5,286	28,953	537	24,706	2,796	62,378		4,093	.....	1,400	5,614	—10,961
Bush, Arizona & Phoenix	46	74,870	14,960	95,639	9,853	17,894	914	39,400	2,315	70,376		25,263	.....	2,000	23,263	—17,773
Cambria, Clearfield & Ohio	238	171,883	16,039	191,225	12,515	23,704	5,277	35,785	7,654	84,535		106,690	954	8,000	99,645	46,835
Cambria, Clearfield & Ohio of N. Y.	17	9,273	1,466	10,886	448	72	1,036	2,681	444	4,681		6,205	.....	500	5,705	4,048
Canadian Pacific Lines	1,915	614,390	360,724	1,047,779	152,613	230,093	32,578	353,391	34,147	802,822		244,957	7,188	47,400	204,745	- 9,088
Central New England	276	121,968	35,733	169,873	39,219	21,058	1,423	70,109	2,907	154,005		15,868	27	9,000	106,888	5,918
Central of New Jersey	671	1,512,033	591,483	2,307,728	295,486	299,293	35,102	636,703	37,088	1,233,642		974,086	68,481	93,994	948,573	149,680
Central Vermont	411	721,148	130,597	881,333	82,764	146,306	9,768	161,027	7,497	477,362		103,961	1,310	11,750	93,521	33,110
Chesapeake & Western	340	166,284	37,167	231,109	47,561	21,747	2,635	51,527	4,193	127,663		43,746	.....	5,000	38,746	5,743
Chesapeake & Ohio Lines	2,241	813,307	586,414	3,019,132	357,161	566,871	52,846	817,075	58,842	1,882,796		1,136,336	6,616	93,100	1,049,852	12,182
Chicago, Indianapolis & Louisville	9,074	5,078,303	2,743,868	8,018,070	1,205,089	1,340,675	115,745	2,315,875	182,841	5,159,695		2,858,375	4,454	264,442	2,589,509	99,538
Chicago & Eastern Illinois	1,178	986,269	294,920	1,373,790	175,533	232,663	29,284	440,971	40,488	918,940		454,850	807	38,500	415,543	—49,340
Chicago & Erie	96	372,272	70,706	484,171	85,743	83,427	11,621	186,281	8,785	385,857		98,264	.....	16,450	81,814	30,516
Chicago Great Western	1,490	741,779	316,059	1,144,331	165,898	158,861	51,453	419,971	35,650	831,833		312,488	929	33,037	280,380	—36,631
Chicago, Indiana & Southern	341	962,854	33,850	304,510	43,510	69,339	9,214	105,610	8,041	234,713		69,797	491	13,900	56,388	26,301
Chicago & North Western	5,786	4,165,656	2,030,365	6,788,915	985,449	833,043	136,563	1,499,038	128,022	4,583,115		2,206,890	7,835	275,000	1,939,635	193,471
Chicago, Milwaukee & Puget Sound	2,088	1,061,899	238,289	1,351,410	107,418	141,917	59,173	474,171	16,817	799,500		551,910	18,489	79,334	491,065	59,270
Chicago, Milwaukee & St. Paul	7,511	3,485,635	1,458,186	5,495,460	1,119,398	796,529	103,908	1,961,605	96,015	4,176,785		1,318,675	7,088	240,562	1,085,201	—459,982
Chicago, Peoria & St. Louis	355	109,076	39,219	185,338	21,951	33,579	7,225	60,048	5,260	127,814		57,524	.....	4,300	53,224	— 6,250
Chicago, Rock Island & Pacific	7,551	3,335,814	1,869,333	5,538,483	940,315	793,837	154,896	2,034,321	139,064	4,062,433		1,476,050	9,093	266,655	1,260,302	—170,470
Chicago, St. Paul, Minneapolis & Omaha	1,733	787,504	443,758	1,320,517	157,465	176,598	35,913	467,407	28,110	955,193		365,024	1,759	65,309	301,474	-146,412
Chicago, Terre Haute & Southeastern	353	134,509	71,346	259,805	27,328	34,957	2,947	44,953	7,831	107,916		51,889	107	8,700	43,082	—
Cincinnati, Hamilton & Dayton	1,014	711,918	183,342	1,004,308	111,082	147,656	20,429	363,589	18,185	661,341		343,067	.....	40,716	302,351	87,184
Cincinnati, New Orleans & Texas Pacific	337	565,685	171,217	804,189	70,009	139,646	18,902	217,116	17,630	463,303		340,886	847	21,800	319,933	— 29,964
Cincinnati Northern	45	98,817	30,720	143,151	22,690	27,259	3,382	43,180	2,757	98,268		44,883	.....	5,700	28,183	— 6,006
Clarendon, Mena & Cumberland	344	130,067	94,800	316,214	55,989	45,141	4,180	107,817	5,263	221,385		124,829	.....	22,600	102,229	— 4,025
Colorado, Consolidated Cripple Creek & Victor	2010	1,745,341	857,768	2,816,418	302,551	482,090	87,537	983,634	50,445	1,806,256		1,010,161	578	100,000	909,583	261,278
Colorado Midland	337	176,946	40,378	181,134	23,006	30,153	8,097	68,477	5,312	135,002		46,132	136	8,000	37,996	3,263
Colorado & Southern	1,[illegible]	504,007	184,476	737,001	98,504	135,358	11,517	215,460	21,921	482,760		249,241	331	24,700	224,210	- 219
Cumberland Valley	79	160,485	64,130	238,161	43,935	28,097	4,484	77,337	6,833	160,186		74,975	499	5,141	70,333	43,307
Delaware & Hudson Co. & D. & H. Loan	811	1,487,713	407,767	1,984,748	120,958	251,714	25,842	617,499	40,373	1,049,336		933,412	1,607	50,692	884,327	103,203
Delaware, Lackawanna & Western	791	2,566,748	971,593	3,746,817	490,001	482,405	62,785	891,681	63,606	1,990,478		1,749,999	49,617	143,500	1,156,116	45,322
Denver, Northwestern & Pacific	118	65,404	70,434	139,619	16,935	15,697	3,090	33,846	3,341	72,309		67,314	.....	3,000	64,314	4,850
Denver & Rio Grande	1,[illegible]	1,[illegible]	[illegible]	2,188,086	323,630	352,698	54,689	710,164	46,295	1,487,446		700,640	8,251	70,000	638,891	—71,776
Detroit & Mackinac	348	69,459	37,140	115,066	19,856	18,366	3,182	34,095	2,878	78,297		36,769	424	8,109	29,084	7,013
Detroit, Toledo & Ironton	441	1[illegible]	16,996	161,305	27,201	19,785	2,760	67,207	5,410	121,863		39,442	245	7,528	32,159	8,389
Detroit & Lake Erie	147	1[illegible]	[illegible]	1,059,812	101,777	61,268	1,166	148,314	10,332	323,765		737,047	5,202	42,789	699,490	140,765
Detroit, Monroe & Southern	[illegible]	1[illegible]	41,172	1,130,927	115,358	81,404	2,148	143,470	11,[illegible]	351,539		776,388	12,845	46,041	743,192	—785,603
Duluth, South Shore & Atlantic	736	634,702	949,035	9,633,634	688,127	701,789	110,004	1,317,239	74,419	2,891,878		1,741,756	29,662	163,015	1,599,393	86,591
El Paso & Southwestern Co.	993	4[illegible]	74,986	540,467	80,713	85,660	12,611	149,043	3,167	351,179		189,288	1,545	21,076	166,667	—60,295
Erie, Lake & Eastern	441	791,401	3	835,459	70,774	139,614	4,092	1,169	13,344	448,993		386,466	.....	16,725	369,741	177,424
Florida East Coast	441	107,106	78,675	213,392	55,485	51,990	4,915	93,316	7,683	213,419		73	.....	15,500	—15,427	—7,076
Fort Worth & Denver City	453	23[illegible]	178,097	424,587	31,115	58,659	6,774	119,277	12,058	228,883		195,704	370	12,000	183,334	1,518
Galveston, Harrisburg & San Antonio	1,[illegible]	6[illegible]	241,703	942,162	114,689	145,809	30,365	319,805	29,104	639,772		302,390	5,000	30,442	266,948	- 1,842
Georgia	307	1[illegible]	87,163	267,275	27,304	43,170	11,484	107,990	8,004	197,882		59,393	.....	2,100	57,293	26,368
Grand Rapids & Indiana	187	2[illegible]	203,384	503,538	49,901	62,460	11,498	184,990	14,107	322,951		180,587	404	22,964	158,027	36,807
Great Northern	7,[illegible]	4,2[illegible]	1,861,861	6,000,950	708,358	656,274	81,018	1,503,773	91,531	3,130,184		2,869,996	40,989	275,723	2,635,263	352,850
Gulf, Colorado & Santa Fe	1,[illegible]	6[illegible]	297,608	958,339	200,959	160,167	30,779	351,176	29,812	776,813		195,496	.....	35,761	159,735	- 29,620
Gulf & Ship Island	307	116,740	38,332	165,789	29,693	28,685	1,748	15,561	7,033	111,740		53,049	.....	5,311	47,738	—6,662
Hocking Valley & Toledo Central	736	39,504	17,668	553,993	75,473	71,163	19,170	193,146	1,213	379,045		174,949	1,551	17,834	155,564	13,624
Illinois Terminal & West Illinois	130	76,608	31,466	109,648	18,931	9,605	1,957	31,878	3,596	66,367		43,381	.....	3,354	39,027	— 9,911
Illinois Central	4,737	3,[illegible]	1,[illegible]	5,506,601	851,145	1,145,072	133,508	1,841,579	115,355	4,088,009		1,418,592	- 5,352	231,000	1,182,240	7,514
Iowa Central	7[illegible]	[illegible]	58,411	300,497	38,799	48,914	7,595	113,193	8,092	216,733		83,764	.....	9,643	74,121	1,749
Kanawha & Michigan	175	88,162	34,455	134,731	31,859	51,084	5,340	27,875	6,617	173,210		151,521	29	9,378	142,114	5,341
Kansas City Southern	827	543,662	173,041	792,284	83,863	107,817	21,387	270,783	29,238	516,088		276,196	.....	34,612	241,584	—59,152
Lake Erie & Western	886	466,677	112,397	644,700	63,530	66,208	13,011	184,512	10,780	362,043		282,658	.....	19,883	162,775	15,050
Lake Shore & Michigan Southern	1,[illegible]	2,[illegible]	1,[illegible]	4,655,514	475,[illegible]	540,377	97,307	1,[illegible]	76,337	3,445,315		2,210,199	5,262	135,000	2,080,461	711,968
Lehigh & Hudson River	96	119,884	6,794	139,490	20,825	17,798	993	38,454	2,869	80,999		48,491	.....	3,500	44,991	3,434
Lehigh Valley	[illegible]	6[illegible]	[illegible]	[illegible]	[illegible]	579,459	80,110	1,167,[illegible]	65,718	2,206,496		1,216,989	21,189	105,200	1,090,599	79,416
Long Island	395	253,049	858,703	1,160,112	109,040	100,412	16,176	431,640	17,948	675,516		484,596	92,404	53,553	523,447	88,698
Louisiana & Arkansas	355	81,910	19,153	105,408	26,168	18,413	2,193	28,030	5,128	79,933		25,475	.....	3,150	22,325	30,593

REVENUES AND EXPENSES OF RAILWAYS.

(PART OF ACCOUNT, FULL CONTINUED)

					Operating expenses						Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
				Maintenance of Way and structures.	Maintenance of Equipment.	Traffic.	Transportation.	General.	Total.						
					17,034	6,387	54,678	3,481	108,836	46,349	.....	4,600	41,749	10,677
					11,068	4,413	30,280	3,025	81,778	8,437	363	3,000	25,815	—2,578
					881,[illegible]	8[illegible]881	1,305,993	80,691	3,150,449	1,437,634	7,645	116,950	1,300,231	116,016
					58,888	8,187	43,887	6,855	108,869	57,212	418	6,402	51,728	—1,400
					103,[illegible]	13,836	81,998	9,884	668,179	330,976	3,690	41,411	293,305	55,390
					[illegible]	7[illegible]337	[illegible]61,535	47,445	1,531,048	1,539,589	9,670	110,000	1,139,259	460,537
					37,133	3,660	37,896	5,836	101,913	9,002	.....	6,484	3,518	2,012
					[illegible]2,804	11,667	161,[illegible]	11,583	290,995	121,850	99	18,121	103,330	—14,313
					38,615	440,716	41,[illegible]	1,089,019	367,365	366	88,800	304,331	—50,434
					28,763	319,638	30,386	664,643	93,887	1,03[illegible]	24,595	296,997	55,961
					[illegible]	[illegible]48	20,881	1,874	46,411	49,774	.....	1,900	47,374	—8,001
					14,[illegible]	139,170	13,865	279,776	57,433	—3,456	18,698	75,289	—7,253
					37,[illegible]	359,891	34,282	774,672	244,961	363	23,816	221,508	20,372
					14,[illegible]	[illegible]36	23,724	2,077	55,688	65,006	.....	4,925	60,081	—3,418
					8,847	92,944	10,186	191,561	83,940	1,171	9,280	73,519	—34,931	
					27,[illegible]	1,[illegible]3,878	161,842	3,478,071	2,122,949	132,885	310,000	1,945,836	4,797	
					[illegible]4,899	306,053	15,983	601,384	347,113	2,039	17,917	331,235	—44,622	
					3,[illegible]80	109,542	12,293	202,953	108,428	.....	7,500	100,928	10,179	
					[illegible]3,005	93,038	4,411	156,151	110,888	3,572	24,014	90,446	28,313	
					[illegible]1,664	45,016	6,886	93,778	55,662	—112	2,000	53,550	—4,724	
					16,780	2,636	45,586	7,163	98,827	50,705	—318	4,493	45,894	—8,554
				1,[illegible]3,[illegible]	1,[illegible]7,186	171,582	3,057,818	198,861	5,878,541	3,547,872	37,837	418,069	3,167,640	780,938
				[illegible]2,[illegible]	91,[illegible]	44,608	879,798	16,991	662,035	351,528	476	39,000	312,052	81,343
				[illegible]4,[illegible]	596,860	46,369	914,639	56,649	2,104,535	1,387,326	—3,348	115,000	1,268,977	160,582
				[illegible]37,[illegible]	84,[illegible]	6,965	84,444	11,192	164,585	95,946	—3,471	7,500	84,975	— 871
				[illegible]40,[illegible]	[illegible]08,186	14,678	494,117	21,383	878,615	186,372	850	40,337	146,985	62,743
				[illegible]41,[illegible]	[illegible]67,[illegible]	103,489	1,[illegible]9,066	78,1[illegible]	3,215,442	2,308,294	54,280	276,187	2,086,387	— 267,292
				[illegible],[illegible]	184,300	26,775	392,795	33,949	917,447	839,002	667	76,666	763,003	— 50,225
				[illegible],[illegible]16	[illegible]07,[illegible]	142,[illegible]	470,[illegible]31	36,664	900,655	544,061	10,345	71,332	483,075	.....
				[illegible]1,[illegible]	28,057	1,445	41,350	4,428	94,935	46,032	.... ..	3,447	42,585	—11,414
				[illegible]59,[illegible]	778,295	77,488	1,514,049	84,749	3,047,482	1,922,980	—670	170,598	1,751,712	—159,449
				1,[illegible]3,[illegible]	1,543,[illegible]6	2,[illegible]2,780	173,871	4,831,042	335,271	9,456,650	4,307,018	—143,406	605,931	3,557,681	—282,332
				[illegible]5,[illegible]4	39,569	35,766	6,404	114,250	5,276	201,767	93,266	.....	10,500	82,766	— 19,719
				[illegible],[illegible]60	166,161	216,787	42,486	614,907	31,002	1,071,337	445,063	—1,672	56,275	387,116	18,472
				[illegible]68,[illegible]83	218,[illegible]27	273,724	22,695	635,878	32,193	1,182,767	501,194	.....	50,697	450,497	3,115
				[illegible]3,[illegible]31	488,698	591,825	74,545	1,156,514	65,816	2,377,398	1,213,994	1,063	128,013	1,084,918	39,499
				[illegible]2,[illegible]82	142,589	148,881	15,048	313,188	23,275	742,981	785,201	84	30,000	755,285	—121,097
				178,[illegible]	41,051	24,051	2,483	71,136	5,479	124,200	54,598	.....	1,000	53,598	— 446
				81,[illegible]83	42,168	36,234	8,104	112,636	6,312	205,454	114,079	.....	10,843	103,236	—1,431
				[illegible]52,[illegible]81	33,934	17,747	5,478	57,308	5,197	109,664	42,717	10	5,711	37,016	17,127
				210,[illegible]48	44,[illegible]53	12,199	2,634	67,119	8,390	135,295	74,753	.....	4,500	70,253	38,370
				184,[illegible]85	28,547	6,948	535	72,561	5,331	113,922	20,463	.....	5,700	14,763	—50,155
				[illegible],[illegible]19	12,400	12,099	3,309	49,532	4,275	81,615	7,795	.....	1,360	6,435	2,844
				611,[illegible]08	52,[illegible]63	121,648	25,954	146,842	20,649	367,956	243,452	— 785	19,564	223,103	- 13,515
				[illegible]7,[illegible]14	43,825	89,126	10,812	123,066	15,599	282,428	40,882	—151	10,000	30,731	71,253	
				487,[illegible]63	57,047	52,543	5,576	155,113	9,107	279,386	204,477	.....	11,000	193,477	22,040	
				759,[illegible]44	155,601	144,139	31,539	265,909	16,374	613,562	137,282	4,150	24,700	108,432	14,201	
				[illegible]35,[illegible]34	22,983	13,848	2,506	38,288	5,179	82,804	52,530	.....	4,333	48,196	10,477	
				[illegible]65,669	613,832	868,493	141,855	1,736,591	141,974	3,502,745	1,762,874	7,625	196,774	1,573,725	77,777	
				85,674	22,120	10,868	1,758	35,770	3,638	72,154	16,520	.....	5,216	11,304	3,594	
				[illegible]10,656	10,357	18,391	1,386	37,466	4,130	71,730	38,926	.....	1,981	36,945	1,502	
				7,944,[illegible]11	1,076,813	896,369	917,092	2,096,379	206,037	4,492,690	3,451,821	36,319	301,144	3,186,996	442,850	
				[illegible]03,[illegible]76	12,647	1,457	22	22,515	425	37,066	66,660	.....	3,673	62,987	8,643	
				[illegible]03,[illegible]63	21,381	5,951	2,666	30,879	2,267	63,144	38,617	.....	6,220	32,397	- 5,602	
				136,[illegible]0	21,993	18,731	4,927	47,819	7,626	101,116	35,704	.....	4,212	31,492	17,545	
				[illegible]16,[illegible]49	36,891	21,466	765	71,267	5,323	135,712	75,207	14,262	26,000	63,469	18,993	
				[illegible]15,[illegible]80	69,093	60,493	7,231	113,376	9,806	259,999	59,001	180	12,248	46,573	—12,107	
				1,[illegible]93,[illegible]09	175,175	184,385	28,719	512,503	41,242	942,024	369,136	- 250	38,000	323,886	100,655	
				[illegible]07,[illegible]76	65,397	56,[illegible]0	7,981	147,111	8,597	285,406	222,330	735	25,706	195,889	11,728	
				[illegible]17,[illegible]92	17,993	22,985	2,377	40,659	3,377	87,392	30,300	.....	4,800	25,500	6,041	
				[illegible]37,[illegible]04	9,772	.....	927	5,584	2,172	18,455	117,349	.....	5,923	111,426	7,378	
				464,[illegible]05	27,443	81,254	108	131,684	2,399	242,888	222,017	4,560	3,250	223,327	42,399	
				4,364,572	465,650	417,603	111,985	1,097,792	90,805	2,183,835	2,170,737	4,654	151,650	2,023,741	355,925	
				[illegible]3,[illegible]93	137,236	158,389	28,737	317,049	20,060	651,421	221,671	.....	28,301	193,370	59,197	
				143,[illegible]08	21,034	26,676	3,081	35,462	4,389	90,642	22,866	- 221	6,300	16,345	18,504	
				404,004	48,987	66,379	5,095	102,753	7,953	231,167	172,837	4,872	17,300	160,409	51,001	
				[illegible]49,[illegible]62	16,358	26,515	1,853	38,579	3,580	86,885	63,077	.....	4,860	58,217	17,812	
				2,790,639	377,942	422,464	85,132	933,559	78,903	1,898,000	802,639	641	71,655	731,625	—186,633	
				[illegible]3,[illegible]44	18,165	11,716	1,174	35,362	2,428	68,845	19,306	.....	3,244	16,062	—20,993	
				42,248	19,918	22,104	5,370	29,578	5,518	82,488	26,113	—246	4,612	21,255	6,296	
				672,[illegible]13	92,938	130,101	13,544	275,803	9,582	528,968	342,846	—1,229	23,473	318,144	— 89,443	
				765,609	108,757	121,621	7,389	203,872	12,517	454,156	311,453	784	31,618	280,619	34,793	
				809,[illegible]21	176,564	117,472	17,587	278,670	25,049	615,342	184,479	.....	38,000	156,113	120,885	

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

The financial, accounting, traffic and purchasing officers of the Keweenaw Central have been removed from Hancock, Mich., to Phoenix.

Wilson & Dabney of Houston, Tex., have been appointed general attorneys of the International & Great Northern, succeeding John M. King.

A. H. Mansfield, assistant general claim agent of the Missouri Pacific at St. Louis, Mo., has been appointed claims attorney, a new position, with office at St. Louis, W. E. Jones, general claim agent, having resigned, that office has been abolished.

George H. Campbell, vice-president of the Kentucky & Indiana Terminal Railroad Company at Baltimore, Md., has been elected president, succeeding Fairfax Harrison (president of the Chicago, Indianapolis & Louisville), whose term expired. Mr. Campbell is also assistant to the president of the Baltimore & Ohio.

Newman Erb, chairman of the board of the Ann Arbor and president of the Tennessee, Alabama & Georgia with office at New York City, has been elected president also of the Minneapolis & St. Louis and the Iowa Central, succeeding T. P. Shonts, resigned. Mr. Shonts remains a director of both these companies.

B. C. Cushman, treasurer of the Galveston, Harrisburg & San Antonio, and the Texas & New Orleans, at Houston, Tex., having retired on a pension, Eugene Dargan, treasurer of the Houston East & West Texas, has been elected treasurer of the Texas & New Orleans, succeeding Mr. Cushman; and C. B. Udell, treasurer of the Houston & Texas Central, has been elected also treasurer of the Galveston, Harrisburg & San Antonio, succeeding Mr. Cushman and of the Houston East & West Texas, succeeding Mr. Dargan.

J. E. Dalrymple, who was recently elected vice-president of the Grand Trunk and fourth vice-president of the Grand Trunk Pacific, with office at Montreal, Que., as has been announced in these columns, has been elected also vice-president of the Central Vermont, in charge of traffic. Mr. Dalrymple began railway work on July 1, 1883, as an apprentice in the treasurer's office of the Grand Trunk at Montreal, and from 1886 to 1889 was clerk in the same office. In April, 1890, he was appointed secretary to the traffic manager at Chicago, of the Chicago & Grand Trunk, now a part of the Grand Trunk System, and on February 1, 1896, he became secretary to the general traffic manager of the Grand Trunk at Montreal. He was appointed division freight agent of the same road in May, 1899, at Hamilton, Ont., and the following August was transferred in the same capacity to Detroit, Mich, and was also made manager of the Grand Trunk Despatch Fast Freight Line, operating in connection with the Grand Trunk and West Shore Railroad. On May 1, 1900, he was appointed general freight agent of the Central Vermont at St. Albans, Vt. The following March he was appointed assistant to the second vice-president and general manager of the Grand Trunk at Montreal, Que., and from April, 1902, to August, 1905, he was general freight agent of the Central Vermont at St. Albans, Vt. He was then appointed general freight agent of the Grand Trunk at Montreal, Que., and on May 1, 1908, was made assistant freight traffic manager of the Grand Trunk Pacific at Winnipeg, Man., and since June 1, 1910, he was also assistant freight traffic manager of the Grand Trunk Pacific Coast Steamship Company.

J. E. Dalrymple.

Operating Officers.

Charles J. O'Neil has been appointed trainmaster of the St. Paul & Kansas City Short Line of the Rock Island System, with office at Des Moines, Iowa.

C. L. Mayne, acting superintendent of the Southern Kansas division of the Missouri Pacific at Coffeyville, Kan., has been appointed superintendent, with office at Coffeyville.

J. A. Cook, assistant trainmaster of the Wabash, in charge of Kansas City and Randolph terminals at Kansas City, Mo., has been appointed trainmaster of the 15th and 16th districts, with office at Moulton, Iowa., succeeding C. A. Ross, assigned to other duties. J. P. Shields succeeds Mr. Cook.

G. R. Carlton, trainmaster of the Seaboard Air Line at Plant City, Fla., has been appointed superintendent of the Third division, with office at Atlanta, Ga., succeeding J. M. Shea, promoted. T. H. Furman, trainmaster at Abbeville, S. C., succeeds Mr. Carlton; T. W. Parsons, trainmaster at Birmingham, Ala., succeeds Mr. Furman; W. E. Guess, chief despatcher at Atlanta, Ga., succeeds Mr. Parsons, and J. P. Crumley, a despatcher, succeeds Mr. Guess.

William F. Ray, whose appointment as superintendent of the Portland division of the Boston & Maine, with office at Boston, Mass., has been announced in these columns, was born in 1857 at South Vernon, Vt. He was educated at Ft. Wayne and at the University of Notre Dame, South Bend, Ind. He began railway work in 1874 with the Connecticut River Railroad, now part of the Boston & Maine, at Springfield, Mass., as locomotive fireman and later held various positions in the freight train service, including that of brakeman and conductor, and then entered the passenger train service as conductor. He was then appointed trainmaster and was later assistant superintendent. In 1903 he was appointed superintendent of the Concord division, which position he held at the time of his recent appointment, as above noted.

A. E. Boughner, who has been appointed superintendent of transportation of the Missouri, Kansas & Texas System, with office at Denison, Tex., as has been announced in these columns, was born in 1861 at St. Thomas, Ont., Can. He received a common school education and began railway work in 1876 with the Canada Southern, now part of the Michigan Central, where he was consecutively until 1880 messenger, call boy and telegraph operator. In the latter year he went with the Illinois Central as an operator in the despatcher's office at Centralia, Ill., and in 1881 was appointed to a similar position with the Missouri, Kansas & Texas at Denison, where he remained for three years. From 1884 to 1886 he was chief despatcher at Fort Worth, Tex. He was out of service then for two years on account of illness and in 1888 was appointed a despatcher of the Missouri, Kansas & Texas at Sedalia, Mo. He was chief despatcher at Sedalia for nine years from 1893, and was then promoted to assistant superintendent at Parsons, Kan. He was appointed superintendent at Franklin Junction, Mo., in 1903, and was transferred with the same title to Sedalia in 1910, which position he held at the time of his appointment above.

Traffic Officers.

E. S. Le Gette has been appointed soliciting agent of the Central of Georgia, with office at Albany, Ga.

W. D. Miller has been appointed a soliciting freight agent of the Tennessee Central, with office at Nashville, Tenn.

James B. Irvine has been appointed soliciting agent of the Central of Georgia, with office at Chattanooga, Tenn.

Richard Townsend has been appointed general agent of the Missouri, Oklahoma & Gulf, with office at Pittsburgh, Pa.

D. W. Agnew has been appointed soliciting freight agent of the Georgia Southern & Florida, with office at Cincinnati, Ohio.

J. J. Clarke has been appointed contracting freight agent of the Illinois Central, with office at Chicago, succeeding H. E. Wilson, resigned.

Archibald Gray, assistant general freight and passenger agent of the Great Northern at Portland, Ore., has been appointed general freight agent of the Western Pacific, with office at San Francisco, Cal.

P. B. Wolcott has been appointed immigration agent of the Chicago, Milwaukee & St. Paul, with office at Chicago, succeeding George B. Haynes, recently promoted to assistant general passenger agent.

Leo B. Hendrix has been appointed district passenger agent of the Chicago Great Western, with headquarters at Pittsburgh, Pa., and Buffalo, N. Y., succeeding W. D. Jones, resigned to accept service with another company.

H. E. Williams, freight soliciting agent of the Southern Railway, at Atlanta, Ga., has been appointed a traveling freight agent, with office at Macon, succeeding Harvey Kidwell, resigned. W. N. Hill succeeds Mr. Williams, and A. E. Dicks has been appointed freight soliciting agent, with office at Raleigh, N. C., succeeding R. L. Potts, resigned.

W. J. Doyle, traveling freight agent of the St. Louis Southwestern of Texas at Waco, Tex., has been appointed assistant agricultural and industrial agent of the St. Louis Southwestern System, with office at St. Louis, Mo., succeeding L. E. Saupe, resigned to engage in other business. C. D. Bowman, city passenger and ticket agent at Fort Worth, Tex., succeeds Mr. Doyle.

H. E. Heller, general agent in the freight and passenger departments of the Chicago, Burlington & Quincy at Philadelphia, Pa., has been appointed general agent, with office at Kansas City, Mo., succeeding W. H. Hill, assistant general freight agent, transferred. William Austin, general agent at Cincinnati, Ohio, succeeds Mr. Heller, and H. K. Miles, traveling freight agent at Cincinnati, has been promoted to general agent, freight department, succeeding Mr. Austin. W. B. Kelby succeeds Mr. Miles.

S. C. Nash, general agent in the freight and passenger departments of the Texas & Pacific at Los Angeles, Cal., has been appointed Pacific coast traffic agent, with offices at Los Angeles and San Francisco. All freight and passenger representatives of the road in California, Washington, Oregon and Nevada will report to him and will be under his jurisdiction. Communications should be addressed to him at Los Angeles. W. J. Moylan, traveling freight agent at San Francisco, has been appointed commercial agent, with headquarters at San Francisco, and Irwin Wapple has been appointed commercial agent, with office at Los Angeles, the position of district freight agent at Los Angeles having been abolished.

Engineering and Rolling Stock Officers.

W. H. Tool has been appointed master of bridges and buildings of the Grand Trunk, with office at Allandale, Ont., succeeding E. Brown, resigned.

H. H. Hale has been appointed superintendent of motive power of the Cincinnati, Hamilton & Dayton, with office at Cincinnati, Ohio, succeeding W. L. Kellogg, resigned to accept service with the Pere Marquette.

W. L. Kellogg, superintendent motive power and car department of the Cincinnati, Hamilton & Dayton at Cincinnati, Ohio, has been appointed superintendent of motive power of the Pere Marquette, with office at Detroit, Mich.

[illegible] announced in these columns, was born October 31, 1885, at Geneva, [illegible] graduated at high school at Geneva and began railroad work on January 1, 1900 with the Tifton Thomasville & Gulf road, a part of the Atlantic Birmingham & Atlantic. He continued with that company two years and then went to the Georgia, Florida & Alabama as a machinist, and was later [illegible] to April, 1907, when he went to the Great Northern as general foreman, which position he held at the [illegible]

Special Officers.

[illegible] has been appointed [illegible] with office at Chicago, his work to be [illegible] the interests of railway employees in the territory through which the road runs.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Akron, Canton & Youngstown, Akron, Ohio, is in the market for 5 six-wheel switching locomotives.

The Grand Trunk has ordered 25 locomotives from the Canadian Locomotive Company, and is in the market for 4 Mogul locomotives.

The Kentucky & Tennessee has ordered 1 ten-wheel locomotive from the Baldwin Locomotive Works. The dimensions of the cylinders will be 20 in. x 24 in., the diameter of the driving wheels will be 51 in., and the total weight in working order will be 110,000 lbs.

CAR BUILDING.

The Erie has ordered 300 automobile cars from the American Car & Foundry Company.

The Grand Trunk is taking prices on ten 30-ft. and ten 40-ft. steel underframe flat cars.

The Delaware, Lackawanna & Western is in the market for 1,000 steel underframes.

The Chicago, Rock Island & Pacific is in the market for 500 furniture cars and 250 flat cars.

The Akron, Canton & Youngstown, Akron, Ohio, is in the market for 50 fifty-ton four-door drop-bottom gondola cars, 35 forty-ton box cars and 15 fifty-ton flat cars.

The Missouri Pacific has ordered 1,000 gondola cars, 500 flat cars and 400 stock cars from the American Car & Foundry Company; and 500 stock cars from the Mt. Vernon Car Manufacturing Company.

IRON AND STEEL.

The Norfolk & Western is making inquiries for 30,000 tons of Bessemer rails.

The Boston & Maine has ordered 4,500 tons of rails from the Carnegie Steel Company.

The Buffalo, Rochester & Pittsburg is in the market for 1,000 tons of bridge steel.

The Southern has ordered 2,100 tons of rails from the Tennessee Coal, Iron & Railroad Company.

The Baldwin Locomotive Works is in the market for 5,000 tons of structural steel for the new addition to its plant at Eddystone, Pa.

The New York Central has placed orders for 1,050 tons of structural steel and is in the market for 1,500 tons of bridge steel for the bridge at Oswego, N. Y.

General Conditions in Steel.—The steel industry shows little change and there are no indications of an early advance in prices from the present low level. The policy is to maintain the high rate of production rather than to obtain a reasonable margin of profit. The independent companies suffer more from this policy than does the Steel Corporation, for the latter can practise economies that would be impossible for the former. The railways are buying heavily, and in fact all classes of buyers are taking advantage of the low prices.

MACHINERY AND TOOLS.

The Delaware, Lackawanna & Western has placed orders for machine tools to cost about $8,000 for the shops at Scranton, Pa.

The Pecos Valley Southern has issued a small list of machine tools for its shops at Pecos, Texas, including a drill press, bolt cutter, lathe and air compressor.

Supply Trade News.

Halsted Little, for many years in the sales department of Manning, Maxwell & Moore, New York, has been made eastern sales agent of the Detroit Twist Drill Company, Detroit, Mich., with office in New York.

Louis E. Welsh has been made district manager of the MacArthur Concrete Pile & Foundation Company, New York, for New Jersey, Pennsylvania, Delaware, Maryland and the District of Columbia, with office in the Perry building, Philadelphia, Pa.

The Circuit Court of Appeals, Seventh district, has decided the case of the Lemac Carriers Company vs. the Live Poultry Transportation Company, both of Chicago, regarding an infringement of patents, in favor of the former company, reversing the decision of the lower courts.

The Independent Pneumatic Tool Company, Chicago, has opened a branch office in the Candler building, Atlanta, Ga. J. J. Keefe, southern traveling representative, has been made manager of the new office. A full line of Thor air tools and parts will be carried in stock.

The Corrugated Bar Company, St. Louis, Mo., will on October 14 move its general offices to the Mutual Life building, Buffalo, N. Y. This change was decided on because the company's warehouse and plants are near Buffalo. A district office will be maintained at the present headquarters.

The Calumet Car Company, East Chicago, Ind., has filed articles of incorporation with $75,000 capital. It is the purpose of the company to build a plant and manufacture, rebuild and repair cars and industrial equipment of all kinds. Thomas C. McCalla, Arthur N. Eroe, Walter L. Lytton and Daniel W. Rodgers are directors.

The Oeking Company, 50 Church street, New York, has been incorporated to sell the punching and shearing machines made by the Stahlwerk Oeking, Dusseldorf, Germany. A large stock of machines will shortly be on hand for prompt deliveries in Jersey City, N. J., where warehouse facilities have been provided. The management of the Oeking Company is in the hands of the Wiener Machinery Company, New York, which has made a specialty of importing similar machines. The German Oeking plant makes its own steel castings.

TRADE PUBLICATIONS.

Turbines.—The De Laval Turbine Company, Trenton, N. J., has published a 32-page pamphlet on steam turbines for driving direct current generators, in which it discusses the different types of turbines and their comparative merits. The pamphlet includes illustrations and diagrams.

Blasting Supplies.—The E. I. Du Pont De Nemours Powder Company, Wilmington, Del., has published a very full booklet on blasting and blasting supplies describing various materials and appliances especially designed for blasting. The booklet is illustrated and contains useful information on the methods of using, preserving and testing blasting equipment.

Air Pumps.—The Wheeler Condenser & Engineering Company, Carteret, N. J., has issued bulletin 103 describing the Wheeler-Edwards air pump which is used in connection with surface condensers. The bulletin contains 32 pages and over 50 illustrations, which include photographs of the various types of the company's air pumps. A sectional view of the pump is given, with the different parts numbered and listed; also instructions for installing and operating.

Dump Wagons.—The Troy Wagon Works, Troy, Ohio, has issued an illustrated folder entitled Tests That Tell showing four tests that this company recently made to ascertain the maximum load a Troy wagon will carry, the resistance the rear wheel has against the strain brought to bear upon it when the wagon is resting on the side of a steep hill, the resistance of the rear wheel to the strain exerted when it is caught in a rut and when the horses attempt to pull it out, and the strength of the Troy square solid steel rear axle. The tests were made in the laboratory of Purdue University at Lafayette, Ind.

Railway Construction.

New Incorporations, Surveys, Etc.

Atchison, Topeka & Santa Fe.—The report of this company for the year ended June 30, 1911, shows that the total number of miles in operation on lines of the Atchison system, was 10,400.37 miles, as compared with 9,961.25 miles for the previous year, an increase of 439.12 miles. In addition, there was completed on June 30, 242.64 miles, all of which will be ready for operation in the near future. The company also controls through ownership of stock and bonds other lines aggregating 101.78 miles, and is interested jointly with other companies in 578.72 miles. During the year there was finished on the line between Coleman, Tex., and Lubbock, a section of 17.54 miles between Lubbock and Slaton Junction, and it is expected that the entire line between Coleman and Lubbock will be completed by November, 1911. The branch line from Slaton Junction to Lamesa, 54 miles, has been opened for traffic and the line from Lometa to Eden, 98 miles, has been completed to Brady, 66 miles, and is open for traffic. The work of reducing the grades and curvature on the San Angelo branch of the Gulf, Colorado & Santa Fe between Temple and Coleman has been continued. Work between Temple and Lometa is about finished. An extension of the Fresno County Railway, built under the name of the Kings County Railway, from Wahtoke, Cal., to Piedra, 11 miles, and the Laton & Western, extending from Laton, Cal., to Lanare, 15 miles, have been opened for traffic and have been leased to the Santa Fe. An extension of the Sunset Western, northerly from Fellows, to Shale, has been constructed jointly with the Southern Pacific Co., 2.25 miles, and is now opened for traffic. At the close of the year there was in operation 687.58 miles of second-track, as compared with 526.95 miles at the close of the previous year, an increase of 160.63 miles. and second-track work is now under way as follows: Missouri division, Mendon, Mo., to Carrollton, 25.64 miles; lines west of Albuquerque, N. Mex., Rito to Laguna, 9.16 miles; McCartys to Horace, 10.82 miles; Flagstaff, Ariz., to Williams, 32.97 miles, and Supai to Fairview, 10.57 miles, a total of 89.16 miles. In addition to the above, second-track work has been authorized on the lines west of Albuquerque, N. Mex.; on about 40 miles near Needles, Cal., and extensive grade reductions and changes of line have been authorized preparatory to the construction of additional second-track between Albuquerque and Gallup. Most of this work will be finished by the close of the present fiscal year, when second main track in operation will approximate 816 miles.

Chicago & North Western.—The report of this company for the year ended June 30, 1911, shows that the elevation of the roadway and the main tracks in Chicago, from a connection with the Rockwell street line at Taylor street to the Sixteenth street line at Leavitt street, 0.81 mile, is about finished. The elevation of the main tracks, on the Milwaukee line through the city of Evanston, Ill., has been completed. Progress is being made in the elevation of the two existing main tracks, and the construction and elevation of four additional main tracks on the Galena division through the village of Oak Park, which adjoins the city of Chicago at its western limits. The work now under way to complete this improvement, consists of the construction and elevation of two additional main tracks from Austin avenue to Clinton avenue, 1.22 miles; the elevation of the two existing main tracks and the construction and elevation of four additional main tracks from Clinton avenue to Harlem avenue, 0.41 mile, and the construction of a retaining wall from Humphrey avenue to Harlem avenue, 1.27 miles. The company has undertaken the elevation of two existing main tracks and the construction and elevation of four additional main tracks through the villages of River Forest and Forest Park, on 1.43 miles. Work is now under way putting in additional track from Lake Shore Junction, Wis., to connect with the Milwaukee, Sparta & North Western near Lindwerm, 4.11 miles, and work is about finished on an additional track from West Allis to a connection with the Milwaukee, Sparta & North Western, 1.28 miles west of West Allis, including the revision of the grade and alinement of the existing main track. A single-track line has also been finished from a point about two miles north of Lake Shore Junction to Lindwerm, one mile. During the year a total of 136.06 miles of yard tracks, sidings and industrial spurs were added. Work is under way at the Proviso, Ill., yard, putting in 52.30 miles of yard tracks, which will increase the ca-

pacity of the yard to 4,967 cars, and a system of yard tracks with a capacity of 300 cars has been completed at Nelson. A terminal yard has been finished near Fulton, and work is under way at the Boone, Iowa, yards, constructing 17 miles of yard track, to increase the capacity of the yard to 1,400 cars. The existing yard tracks at Waseca, Minn., are being rearranged, and four additional yard tracks are being constructed, increasing the capacity of this yard 209 cars. At Tracy, a new freight yard, containing 3.75 miles of track, with a capacity of 400 cars, was constructed

Satisfactory progress has been made during the year toward the completion of the following lines now under construction:

Des Plaines Valley, this is to be a double-track line from Blodgett, Ill., to a connection with the Wisconsin division, near Des Plaines, thence to a connection with the Galena division at Proviso, about 21 miles.

Milwaukee, Sparta & North Western, this line is being built from a connection with the Chicago & North Western near Lindwerm, Wis., to Sparta, 169.03 miles, where connection is being made with the Madison division, and from a connection with this line at a point about six miles west of Lindwerm, to a connection with the Milwaukee and Madison line near West Allis, 8.16 miles, in all, 177.19 miles. This mileage includes an existing branch between Necedah and Wyeville, 13.05 miles, which is being reconstructed, and will be used as part of the main line. At Butler, a terminal yard, to contain 21.10 miles of track with a capacity for 1,525 cars, is being constructed.

St. Louis, Peoria & North Western, this company was organized to build from a connection with the Chicago & North Western, near Peoria, Ill., to a connection with the Macoupin County Railway, near Girard, 90.4 miles, the right-of-way is now being secured. The line is to be built to provide access to the company's extensive coal fields in southern Illinois.

An extension of the Bonesteel-Dallas-Colome line has been completed from Dallas, S. D., northwest to Winner, 21.48 miles.

Chicago, Rock Island & Pacific.—An officer writes that the company is now relaying the present 65-lb. rail, with 85-lb. rail, between Mile Post 193 and Mile Post 235.3 on the Arkansaw division.

Chicago, St. Paul, Minneapolis & Omaha.—The report of this company for the year ended June 30, 1911, shows that the extension from Kennedy, Wis., to Kaiser, 4.93 miles, was completed and the line has been opened for traffic. Construction work has been started on the line from Black River Falls, to a connection with the main line at Vaudreuil, 2.23 miles. It is expected that this line will be completed and opened for traffic in the fall of 1911. Contracts have been let and work has been started on a new double-track line from Eau Claire, west for 3.18 miles, with a double-track bridge over the Chippewa, connecting with the old line at a point 1.25 miles east of Truax. It is expected that this line will be finished before the close of the next fiscal year. Second track is being constructed on 40.23 miles between Merrillan and Wyeville. In connection with this work a change will be made in the line and grade on 3.80 miles between Millston and Warren, shortening the distance 144 ft., eliminating two curves, reducing the curvature and grade. It is expected that the line will be opened for traffic during the fall of 1911. The net increase in the length of side and

nue, at Minneapolis, Minn.

Dickinson, Chicago; T. H. Jones, St. Louis, Mo.; C. H. Pond, project.

Iowa, Nebraska & Dakota (Electric).—Incorporated in S. D., with $500,000 capital, and principal office at Pierre, to build an electric line from Valentine, Neb., east to Sioux City, Iowa, 225 miles, at an estimate cost of $100,000,000. The incorporators include C. H. Cornell, W. E. Haley and J. H. Bachleor, Valentine; W. Martens, C. Goldsmith, J. R. McKnight and A. P. Edgar, Pierre, S. D. The company proposes to utilize the water of the Niobrara and Keyapaha rivers for power to operate the line.

New York, New Haven & Hartford.—The report of this company for the year ended June 30, 1911, shows that work is being continued on the New York, Westchester & Boston. The plans call for a line from the Harlem river, at Willis avenue, New York City, through the borough of the Bronx to Mount Vernon, where the line diverges, one line is to extend north to White Plains and the other line east to the Connecticut state line at Port Chester. From the Harlem river to about 174th street, the company will operate over the tracks of the Harlem River & Port Chester, which will be completed so as to be available for such operation under rights granted to the New York, Westchester & Boston. Work on the line from 174th street, through Mount Vernon to New Rochelle, and on the line from Mount Vernon to White Plains is nearing completion. Operation over the lines from the Harlem river to New Rochelle, and on the line from Mount Vernon to White Plains is expected to be begun within the next six months. Of the total of 74.57 miles of track, the company owns 50.57 miles, and has perpetual rights to operate over 24 miles additional. The road is to be four-tracked from 174th street to Mount Vernon, where two tracks diverge to White Plains and two tracks to New Rochelle. There will be no grade crossings. The company has been given permission to build at 180th street and Morris Park avenue, in the borough of the Bronx, a transfer station, at which point interchange will be made with the West Farms branch of the Interborough Rapid Transit Company. Interchange will also be made with the Second and Third avenue elevated lines at Willis avenue. The plans also provide for interchange with the proposed Tri-borough route, either at the transfer station at 180th street, or at Westchester avenue. It is thought that with the completion of the Westchester Northern, which was organized in 1910 to build a connection from White Plains, northerly to Danbury, Conn., that this connection will make it practicable to interchange traffic to and from the Berkshire Hills, also with the New York, Ontario & Western, and other roads. On the Harlem river branch of the New Haven, between Harlem river and Oak Point, four tracks have been completed, and a re-arrangement of tracks, on account of reconstruction of the New York Connecting Railroad, will be required later. At Oak Point four miles of yard tracks for classification purposes and for serving the transfer bridges, have been provided. A double-track Y, connecting the Shore line with the Western division at Naugatuck Junction, Conn., has been completed and is now in service. The construction of second-track between Hawleyville and Shelton is now under way. The section between Hawleyville and Bottsford was to be placed in service as a double-track line about October 1, and it is expected that the work will be finished by June, 1912, between Bottsford and Shelton. At Brookfield Junction, the improvement of lines and grades and the elimination of nine grade crossings has been finished. Double-track work has been finished between Waterbury and Bristol, as well as on a 3,700-ft. tunnel, and seven grade crossings have been eliminated on this section. The double-track work between East Providence, R. I., and East Junction is progressing slowly, owing to

crossings. Work is now under way double-tracking between Providence and Fall River, Mass., as well as on the elimination of grade crossings at Worcester. At South Worcester a double-

Norwich & Worcester and the

Worcester is being built. Double-track work between Wilpole and South Framingham has been completed,

on the elimination of nine grade crossings, and the construction of third and fourth tracks in Boston between Harrison Square and Atlantic and Savin Hill to Neponset.

between Oakland and Greenbush

work in the elimination of the grade crossings at Lowell and Pleasant Street in Lowell has been completed. The most important work being carried out by the electrical department includes the electrification for freight and

Harlem River line, including the

between Woodlawn, N. Y., and

Stamford, Conn., the electrification of the New York, Westchester & Boston, and the rehabilitation of the Warren power station with attendant increase in the capacity of the East Providence substation. The New Haven has acquired a half interest from the New York Central & Hudson River of the Rutland Railroad, which is to build a line between Swanton, Vt., and Alburg, connecting the Rutland Railroad with the St. Johnsbury & Lake Champlain. A further connection is planned between Stateline, on the Berkshire division of the New Haven, and New Lebanon, on the Rutland Railroad. The New Haven will join with the Pennsylvania Railroad in building the New York Connecting Railroad, which is projected through the boroughs of Brooklyn and Queens, New York City, and over the East river on a bridge to a connection with the New York, New Haven & Hartford, at Port Morris, on the Harlem river.

New York Subways.—A contract for the construction of section 15 of route 5 of the new subway system has been let to the Haggerty-Drummond Company, of Philadelphia, Pa., at $3,820,129. The section includes two branches. The west branch begins at the end of East 135th street and Mott avenue and runs to a point on private property on River avenue south of 157th street, with stations at East 138th and 149th streets. The east branch begins at the end of section 14 and extends under Park avenue, Canal street (Bronx), West and East 138th street to the center line of Alexander avenue, with a station between Third and Alexander avenues.

St. Louis, Peoria & North Western.—See Chicago & North Western.

St. Louis Southwestern.—The report of this company for the year ended June 30, 1911, shows that construction work has been continued on the Central Arkansas & Eastern. This line, which originally extended from England, Ark., to Gregor, 9.5 miles, has been extended from Gregor to Stuttgart, 18 miles, and from Rice Junction to Hazen, about 17 miles. The Stephenville North & South Texas, which had built 42.6 miles, from Stephenville, Tex., to Hamilton, when it was taken over by the St. Louis Southwestern, has been extended from Hamilton to Gatesville, the extreme southwestern terminus of the St. L. S. W. of T., 31.6 miles, and from Edson, near Hamilton, to Comanche, 31.5 miles.

San Diego Southern.—The electric division of this line from San Diego, Cal., to National City, 5.9 miles, is to be rebuilt, it is said. New 65-lb. rail will be laid on the line.

San Benito & Rio Grande Valley.—This company is building in the lower Rio Grande valley, Texas, and has completed more than 50 miles. A contract for extending the line to Mission, thence north to the new town of Monto Cristo, 15 miles, has been let recently. Surveys are also being made for extending the road further up the valley into the coal fields of Zapata county, about 175 miles from San Benito. C. E. Ensminger, chief engineer, San Benito. (April 7, p. 878.)

Southern Pacific.—This company is said to have under consideration the question of building an extension from Marfa, Tex., north via Ft. Davis, towards Pecos City.

Southern Railway.—The report of this company for the year ended June 30, 1911, shows that during the year the new double track line through Lynchburg, Va., was completed and put in service. A new double track line between Citico, Tenn., and Ooltewah Junction, has also been completed. A number of lap sidings to facilitate train movement at points where traffic is heavy, have been constructed, thirteen additional lap sidings are being put in at various places between Atlanta, Ga., and Macon, between Knoxville, Tenn. and Chattanooga, and three between Morristown, Tenn. and Ashfield, N. C.; the total length of which will be 28.4 miles. Work has been started on 38 miles of double track, north of Atlanta, Ga., between Crosskeys and Gainesville, the company has also undertaken the completion of the Knoxville Tennessee Belt Line river front extension, this work calls for the construction of about seven miles of track. Additional spur tracks to industrial plants were constructed during the year, aggregating 11.31 miles, and new side tracks constructed and extensions to existing tracks, amounting to about 14.72 miles. Additional yard and track improvements were carried out at Birmingham, Ala., North Birmingham and at Hamburg, S. C.

Taloga, Putnam & Southern.—Incorporated in Oklahoma, with $100,000 capital to build from Chickasha, Okla., to Woodward, 150 miles. The incorporators include C. W. Musgrove, I. M. Willey, F. W. Darby, all of Taloga; C. S. Dunn, P. Skelton, C. Miller and W. M. Phelps, all of Putnam.

Tidewater & Southern.—A contract is said to have been given to Hahn & Son, Modesto, Cal., and work is now under way on a gap of four miles, near Stockton. This work is on the line now under construction from Modesto to Stockton. (May 5, p. 1185.)

Toronto Roads.—Bids are wanted by G. R. Geary, mayor and chairman of the Board of Control, up to November 1, 1911, for the construction of three miles of reenforced concrete subways and subway stations in Toronto, Ont.

RAILWAY STRUCTURES.

See an item in general news section, regarding the elimination of grade crossings at a number of towns in the state of New York, outside of Greater New York.

Ashland Junction, Wis.—The report of the Chicago, St. Paul, Minneapolis & Omaha, for the year ended June 30, 1911, shows that work has been completed or is now under way on the following structures: New stations were completed at Ashland Junction, Wis., Mankato, Minn., and Jordan, Fordyce, Neb., and at South Sioux City. Work has been started on a new station at Craig, and a new brick passenger station was constructed at Sioux Falls, S. D., to replace the old station, which was removed to a new location and is now being used as a freight house. A brick freight house was constructed at Minneapolis, Minn.; the passenger station at New Richmond, Wis., and the combined freight and passenger station at Bayfield were remodelled and enlarged. A five-stall addition was made to the engine house at Altoona, and four stalls of the engine house at St. James, Minn., were extended 17 ft. Work is now under way on a 15-stall engine house, also a machine shop and oil house at Omaha, Neb., to replace buildings destroyed by fire. An addition was made to the engineroom and work is now under way on a 20-ft. addition to the passenger car shop at Hudson, Wis. Work is also under way on an addition to the machine shop at St. Paul, Minn. Water tanks were built at Osseo, Wis., at Chetek and at Hudson.

Atlanta, Ga.—The report of the Southern Railway for the year ended June 30, 1911, shows that work on the construction of a new in-bound freight station of modern type, at Atlanta, Ga., has been started and is expected to be finished in the early part of 1912. The upper floors will provide office accommodations for the company's forces at that place. Freight transfer facilities at the Inman yard (Atlanta) were finished and a large number of new station buildings and extensions to existing structures were also completed during the year. In connection with the Georgia Southern & Florida, an additional freight station and platform facilities are being provided at Macon, Ga., ested in the Kentucky & Indiana Terminal Railroad, which has made plans to build a new double track bridge over the Ohio river between Louisville, Ky., and New Albany, Ind., also to double track its belt line and improve and enlarge the terminal facilities in Louisville, Ky. A number of water and fuel stations, also some shop buildings, were constructed during the year at various points, and new boiler houses and store houses are being built at Spencer, N. C., and at Coster, Tenn.

Baltimore, Md.—Plans are being made by the officials of the city of Baltimore to build a steel bridge to have three spans over the tracks of the Baltimore & Ohio, in Baltimore. The estimated cost of the improvement will be between $40,000 and $50,000. The Board of Awards, Baltimore, may be addressed.

Binghamton, N. Y.—The New York Public Service Commission, Second district, has ordered the elimination of the grade crossing on the Delaware, Lackawanna & Western at Conklin avenue in Binghamton. The highway is to be carried over the tracks of the railway from a point 500-ft. west of the crossing and in connection with the Mobile & Ohio, additional wharf facilities are being made at Mobile, Ala. These improvements consist of a wharf and two-story warehouse. The company is also interchanged location of the crossing. The railway company is to by an over-head bridge, and a new highway is to be built to the pay the entire cost of the improvements.

Buffalo, N. Y.—A viaduct is to be built on the Hamburg turnpike, over the tracks of the Buffalo Creek Railroad. The structure will be 300 ft. long, together with the necessary approaches. Plans for this improvement are now ebnig made. The New York Public Service Commission, Second district, has ordered crossings constructed at Elmwood avenue, and underneath the tracks of the Erie Railroad and the Delaware, Lackawanna & Western, This work is to be carried out by the railway companies.

Chicago.—The report of the Chicago & North Western for the year ended June 30, 1911, shows that the company's new passenger terminal in the city of Chicago was completed and opened for traffic on June 4, 1911; also that five modern passenger stations were built in the city of Evanston, and work is now under way on a passenger station at Oak Park. New passenger stations were built at Wheaton, Ill., Harvard, Ravinia and Hubbard Woods; Madison, Wis., Allis; Negaunee, Mich.; O'Neill, Neb., and at Aberdeen, S. D. At Wheaton, Ill., and Rockford, brick freight stations were put up, and the company's shop plant at Chicago was improved and enlarged by the construction of a 15-stall machine shop, a wheel and stripping shop, a transfer table and pit, and the installation of six electric traveling cranes. At Nelson, a 10-stall brick engine house, clinker pit and turntable were constructed. Improvements were carried out near Fulton, including a 58-stall engine house and other buildings, and work is under way at Boone, Iowa, on a 36-stall engine house, also a power house, machine shop and miscellaneous buildings. At Chadron, Neb., a 20-stall engine house and a brick shop building were put up, and work is now under way at Manitowoc, Wis., on a bituminous coal bridge 446 ft. long, and coal screening plant to be electrically operated also on a brick power house.

Cleveland, Ohio.—The Pennsylvania Lines West have let the contract to the Fort Pitt Bridge Company, Pittsburgh, Pa., for the grade separation work at Cleveland, involving about 5,000 tons of structural steel. (September 22, p. 574.)

New York.—The report of the New York, New Haven & Hartford for the year ended June 30, 1911, shows that permission has been granted to build a transfer station at 180th street and Morris Park avenue in the borough of the Bronx, New York City. On the Harlem River branch five stations have been renewed, and new stations were built at Westchester avenue and at Morris Park. Satisfactory progress has been made during the year in the construction of piers 39, 40 and 41 on the East river, and in Brooklyn a pier has been constructed and is now in service at North First street. The new six-track concrete bridge over Humphrey street, New Haven, Conn., is now in service, and at Cedar Hill there is under construction a new brick and concrete roundhouse containing 43 stalls, additions to the water supply, a locomotive coaling plant machine shop and storage facilities. Preliminary plans, incidental to the construction of a new passenger station at New Haven are in progress. This work necessitates changes to the gas, water mains and sewerage systems, and it is expected that this improvement will not be finished for several years. A new passenger station has been built at Terryville, Conn. An extension has been built to the [illegible] at New Bedford, Mass., and [illegible] are expected to be finished about January 1, 1912. At Worcester an express building is to be built, also a steel viaduct, connecting the tracks of the Boston & Maine with the tracks of the New Haven. New coach, car and engine facilities at South Worcester are under construction and new passenger stations are being put up in Boston at Harrison Square, Popes Hill, at Neponset, and a shelter shed at Atlantic. Improvements are also [illegible] to the power station at Warren, R. I., and at East Providence substation. Grade crossings have been eliminated as follows: In New York, one; Connecticut, 30; Rhode Island, one, and in Massachusetts, 17; a total of 48. A large number of new [illegible] and [illegible] were built and improved facilities were provided during the year, and further improvements are under way at various places. A large number of new bridges were constructed or strengthened during the year.

[illegible] Louis Southwestern has issued proposals for [illegible] and for a freight house, [illegible] [illegible] purchase of the property have been completed and such [illegible] may be [illegible]

Railway Financial News.

Alberta Railway & Irrigation Company.—This subsidiary of the Canadian Pacific has called for redemption on January 1, 1912, its $3,250,000 5 per cent. debenture stock.

Boston Terminal Company.—This company has asked authority of the Massachusetts railway commissioners to issue $500,000 3½ per cent. bonds of 1897-1947.

Canadian Pacific.—See Alberta Railway & Irrigation Company.

Delaware & Eastern.—The New York Public Service Commission, Second district (state) has approved the plan of reorganizing this company as the Delaware & Northern. (September 22, page 578).

Delaware & Northern.—See Delaware & Eastern.

Erie.—Kissel, Kinnicutt & Co., New York, are offering $250,000 of the new $4,550,000 3-year 5 per cent. collateral trust notes of October 2, 1911, at 98⅝ to yield about 5.50 per cent. on the investment. These are the notes which are secured by the deposit of $4,000,000 first mortgage 4 per cent. bonds of the Erie & New Jersey; and $3,000,000 first mortgage 4 per cent. bonds of the Genessee River Railroad.

Florida Railway.—This company has filed suit to recover $6,000,000 alleged damages from the Seaboard Air Line, the Knickerbocker Trust Company and others. The Florida Railway claims that the Seaboard Air Line and the Knickerbocker Trust Company entered into a conspiracy several years ago when the company had plans for an extension and prevented these plans from being carried out.

Great Northern.—The New York Stock Exchange has authorized the listing of $20,000,000 first and refunding mortgage 4½ per cent. series A bonds, due 1961. The mortgage securing these bonds covers 7,429 miles of road.

Iowa Central.—See Minneapolis & St. Louis.

Macomb & Western.—This property was sold under foreclosure for $50,000 to the Chicago Wrecking Company. The legality of the sale, it is said, will be protested by creditors of the company. The road runs from Macomb, Ill., to Littleton, 26 miles.

Minneapolis & St. Louis.—Stockholders are to be asked to authorize an increase of $8,000,000 of the preferred stock and an increase of $9,000,000 of the common stock; and authorize a new issue of bonds amounting to $75,000,000 for refunding purposes and for new construction. The new bond issue is to be secured by a first lien on the Minnesota, Dakota & Pacific, which is to be taken over by the Minneapolis & St. Louis. It is not proposed to issue the new stock at once, but this proposition is made for future financing. A committee consisting of Edwin Hawley, Newman Erb and F. H. Davis are to confer with a committee consisting of T. P. Shontz, Frank Trumbull and J. J. Slocum, which was appointed by the Iowa Central to agree on terms of a lease of the Iowa Central to the Minneapolis & St. Louis.

Mississippi River & Bonne Terre.—A. G. Edwards & Sons, St. Louis, are offering the unsold portion of $2,500,000 first mortgage sinking fund 5 per cent. bonds of October 2, 1911-1931, of the Mississippi River & Bonne Terre at 101. The Mississippi River & Bonne Terre runs from Riverside, Mo., to Doe Run, 46 miles.

New Orleans, Mobile & Chicago.—Douglas, Fenwick & Co., New York, are offering the unsold portion of $250,000 first and refunding 5 per cent. bonds of 1909-1960 at 75, yielding about 6¾ per cent. interest on the investment. Of the total $4,000,000 of these bonds authorized, there are outstanding $1,[illegible],000 subject to $34,000 underlying bonds.

Northern Pacific.—Thomas W. Lamont, of J. P. Morgan & Co., and George F. Baker, Jr., of the First National Bank of New York, have been elected directors, succeeding George W. Perkins and Alexander Smith Cochran, resigned.

[illegible] Pacific.—Julius Kruttschnitt, director of maintenance and operation of the Harriman Lines, has been elected a member of the board.

ANNUAL REPORTS

SIXTEENTH ANNUAL REPORT OF THE ATCHISON, TOPEKA & SANTA FE RAILWAY COMPANY.

OFFICE OF
THE ATCHISON, TOPEKA & SANTA FE RAILWAY SYSTEM,
No. 5 Nassau Street, New York City.

SEPTEMBER 19, 1911.

To the Stockholders:

Your Directors submit the following report for the fiscal year July 1, 1910, to June 30, 1911, inclusive.

The Lines comprising the Atchison System, the operations of which are embraced in the following statements, are as follows:

	June 30, 1911.	June 30, 1910.
Atchison, Topeka & Santa Fe Railway	7,549.69 miles.	7,439.64 miles.
Rio Grande & El Paso Railroad	20.21 "	20.21 "
Gulf, Colorado & Santa Fe Railway	1,537.48 "	1,518.18 "
Eastern Railway of New Mexico	225.21 "	225.21 "
Pecos & Northern Texas Railway	296.12 "	225.29 "
Pecos River Railroad	54.24 "	54.26 "
Santa Fe, Prescott & Phoenix Railway	364.24 "	257.40 "
Southern Kansas Railway of Texas	124.92 "	124.92 "
Texas & Gulf Railway	96.14 "	96.14 "
Gulf & Interstate Railway of Texas	71.97 "	—
Concho, San Saba & Llano Valley Railroad	60.15 "	—
	10,400.37 "	9,961.25 "

Increase during the year 439.12 miles.

The average mileage operated during the fiscal year ending June 30, 1911, was 10,350.13 miles, being an increase of 433.80 miles as compared with the average mileage operated during the preceding fiscal year.

In addition to lines covered by this report there were completed on June 30, 1911, 242.64 miles of additional line, all of which will be ready for operation in the near future.

The Company also controls, through ownership of stock and bonds, other lines aggregating 101.78 miles and is interested jointly with other companies in 578.72 miles.

INCOME STATEMENT.

The following is a summary of the transactions of the System for the years ending June 30, 1910 and 1911:

	1910.	1911.
Total operating revenues	$104,993,194.67	$107,565,115.62
Income from other sources	2,550,055.49	2,207,366.07
Income from all sources	$107,543,250.16	$109,772,481.69
Expenses, including taxes, rentals and other charges	75,133,314.54	75,689,094.83
	$32,409,935.62	$34,083,386.86
Fixed charges, including accrued interest on Adjustment Bonds	11,984,151.36	12,712,319.31
Balance	$20,425,784.26	$21,371,067.55

From the net income for the year the following sums have been deducted:

DIVIDENDS ON PREFERRED STOCK—		
No. 25 (2½%) paid Feb. 1, 1911	$2,854,345.00	
No. 26 (2½%) paid Aug. 1, 1911	2,854,345.00	
	$5,708,690.00	
DIVIDENDS ON COMMON STOCK—		
No. 21 (1½%) paid Sept. 1, 1910	$2,482,777.50	
No. 22 (1½%) paid Dec. 1, 1910	2,482,777.50	
No. 23 (1½%) paid Mar. 1, 1911	2,482,777.50	
No. 24 (1½%) paid June 1, 1911	2,484,127.50	
	9,932,460.00	
Appropriation for Fuel Reserve Fund	414,139.59	
Appropriated for Additions and Betterments	5,000,000.00	
		21,055,289.59
Surplus carried to Profit and Loss		$315,777.96
Surplus to credit of Profit and Loss June 30, 1910	$20,231,803.67	
Additions to Profit and Loss Account	19,125.00	
		20,250,928.67
Surplus to credit of Profit and Loss June 30, 1911		$20,566,706.63

Income from sources other than earnings from operation consisted of interest on cash in banks and sums collected as interest and dividends upon bonds and stocks of companies, the operations of which are not included in the System accounts.

During the fiscal year the sum of $240,000 in cash was received as the net proceeds of sales of land embranced in the Santa Fe Pacific Land Grant, but this was directly written off the book value of Railroads, Franchises and Other Property, and the transaction does not appear in the Income Account.

CAPITAL STOCK AND FUNDED DEBT.

The outstanding Capital Stock (deducting stock in treasury) on June 30, 1910, consisted of:

Common	$165,518,500.00	
Preferred	114,173,730.00	
		$279,692,230.00
Issued during the year:		
Common Stock Issued in exchange for Convertible Bonds retired		2,912,000.00
Capital Stock outstanding June 30, 1911		
Common	$168,430,500.00	
Preferred	114,173,730.00	
		$282,604,230.00

The outstanding Funded Debt of the System (deducting bonds in treasury) amounted on June 30, 1910, to..... $302,004,952.71

The following changes in the Funded Debt occurred during the year:

Obligations issued:		
Convertible 4% Bonds—Issue of 1909	$967,750.00	
Convertible 4% Bonds—Issue of 1910	29,307,617.29	
		$30,275,367.29
Obligations Purchased or Retired:		
Serial Debenture 4% Bonds,		
Series H	$7,000.00	
Series I	81,000.00	
Series J	105,000.00	
Convertible 4% Bonds	2,659,000.00	
Convertible 5% Bonds	253,000.00	
Miscellaneous Divisional Bonds	73,500.00	
		3,178,500.00
Increase of Funded Debt		$27,096,867.29
Total System Funded Debt outstanding June 30, 1911		$329,101,820.00

Interest charges for the year ending June 30, 1912, will be approximately $13,426,200, or an average monthly charge of about $1,118,850.

CAPITAL EXPENDITURES AND REDUCTION OF BOOK VALUES.

The total charges to Capital Account, as shown by the General Balance Sheet page 22, at June 30, 1911, aggregated $609,287,764.18 as compared with $577,180,953.11 at June 30, 1910, an increase during the year of $32,106,811.07 which analyzes as follows:

Construction and acquisition of new mileage, including the acquisition of bonds and stocks of other railway and terminal companies:

Atchison, Topeka & Santa Fe Ry.	$36,751.75	
Arizona & California Ry.	41,177.64	
Bradshaw Mountain R. R.	21,993.64	
Cane Belt R. R.	1,000.00	
Concho, San Saba & Llano Valley R. R.	191,668.94	
Eastern Ry. of New Mexico	3,468,483.50	
Fullerton & Richfield Ry.	86,362.34	
Garden City, Gulf & Northern R. R.	530,838.79	
Grand Canyon Ry.	27,111.94	
Gulf, Beaumont & Kansas City Ry.	70,440.00	
Gulf, Colorado & Santa Fe Ry.	1,724,535.66	
Houston Belt & Terminal Ry.	10,390.80	
Kings River Ry.	159,306.48	
Prescott & Eastern R. R.	64,803.68	
St. Joseph Terminal R. R.	24,640.10	
Santa Fe Dock & Channel Co.	618,124.86	
Sunset Western Ry.	33,289.94	
Texas & Gulf Ry.	6,909.23	
Wichita Union Terminal Ry.	2,500.00	
		$7,120,329.29
Additions and Betterments—System Lines:		
Right of Way, Station Grounds and Real Estate	$132,047.27	
Widening Cuts and Fills, including Protection of Banks	403,081.18	
Grade Reductions and Changes of Line	1,301,946.22	
Bridges, Trestles and Culverts	796,565.33	
Ballast, including cost of spreading and putting under track	1,145,989.38	
Increased Weight of Rail	448,209.97	
Frogs, Switches, Track Fastenings and Appurtenances	668,092.11	
Additional Main Tracks	3,757,569.85	
Sidings and Spur Tracks	639,709.04	
Terminal Yards	387,309.80	
Track Elevation, Elimination of Grade Crossings and Improvements of Over and Under Grade Crossings	191,778.93	
Interlocking, Block and Other Signal Apparatus	338,233.42	
Telegraph and Telephone Lines	206,801.03	
Buildings, Shops, Dock and Wharf Property	1,199,677.20	
Shop Machinery and Tools	179,673.01	
Additional Equipment	13,383,752.46	
Betterments to Equipment	52,957.60	
Other Additions and Betterments	633,230.62	
		25,866,624.42
Fuel Lands and Other Properties:		
Fuel Lands	$155,000.00	
Ice Plant, San Bernardino	69,010.18	
Tie and Timber Lands	85,904.23	
Real Estate held for future use	214,334.85	
Miscellaneous Items	163,778.20	
		688,027.46
Other Investments		803,867.41
Total Charges		$34,478,848.58
Reduction of Book Values:		
Cane Belt R. R.	$1,000.00	
Gulf & Interstate Ry. of Texas	7,479.00	
Gulf, Beaumont & Kansas City Ry.	72,500.00	
Santa Fe Pacific R. R.—Land Sales	240,000.00	
Santa Fe, Prescott & Phoenix Ry.	86,759.32	
Sunset R. R.	33,000.00	
Santa Barbara Tie & Pole Co.	29,348.42	
Texas Tie & Lumber Preserving Co.	27,749.57	
Reserve for Accrued Depreciation	1,874,163.20	
		2,372,037.51
Net Increase in Capital Account during the year		$32,106,811.07

MAINTENANCE OF EQUIPMENT.

The following statement shows the sums charged to Operating Expenses for Maintenance of Equipment during each year since July 1, 1896:

Year Ending June 30.	Average Operated Mileage.	Total Expenditure.	Expenditure Per Mile.
1897	6,443.81	$3,443,884.82	$534.45
1898	6,936.02	4,659,277.99	671.75
1899	7,032.62	4,810,795.64	684.07
1900	7,341.34	5,267,832.40	717.56
1901	7,807.31	6,257,456.57	801.49
1902	7,855.38	7,864,951.25	1,001.22
1903	7,965.13	8,510,543.09	1,068.48
1904	8,179.59	10,006,135.41	1,223.31
1905	8,305.40	10,914,864.47	1,314.19
1906	8,433.99	10,720,040.43	1,271.05
1907	9,273.15	11,779,846.64	1,270.32
1908	9,415.01	14,246,621.44	1,513.18
1909	9,794.86	13,903,897.37	1,419.51
1910	9,916.33	15,560,047.44	1,569.13
1911	10,350.13	16,686,145.45	1,612.17

For the year ending June 30, 1911, maintenance charges, including renewals and depreciation, averaged as follows:

[illegible]	[illegible]
Per locomotive mile	.1580
Per passenger car, including mail and express	1,158.10
Per passenger car mile	.0130
[illegible]	[illegible]
Per freight car mile	.0083

The foregoing average maintenance charges include a proportion of unlocated expenditures for Maintenance of Equipment charged to Superintendence, Shop Machinery and Tools, Injuries to Persons, Stationery and Printing, Other Expenses and Maintaining Joint Equipment at Terminals.

The following charges were made to Additions and Betterments in respect of additional equipment purchased and built during the year and in respect of payments made for equipment received during prior years:

90	Locomotives	$2,952,157.37
119	Passenger-Train Cars	1,343,894.63
8,753	Freight-Train Cars	10,606,499.40
154	Miscellaneous Cars	178,207.16
1	Ferry Boat	366,255.63
		$15,447,014.19

[illegible] equipment retired during the year as follows:

22	Locomotives	$349,531.23
20	Passenger-Train Cars	37,363.77
2,519	Freight-Train Cars	1,655,114.86
23	Miscellaneous Cars	18,066.87
1	Car Float	3,185.00
		2,063,261.73
		$13,383,752.46

A statement of the locomotives in service and of their tractive power will be found on page 37.

MAINTENANCE OF WAY AND STRUCTURES.

The following statement shows the sums charged to Operating Expenses for Maintenance of Way and Structures during each year since July 1, 1896:

Year Ending June 30.	Average Operated Mileage.	Total Expenditure.	Expenditure Per Mile.
1897	6,443.81	$6,282,923.15	$975.03
1898	6,936.02	8,281,397.88	1,193.97
1899	7,032.62	7,672,107.62	1,090.93
1900	7,341.34	6,354,372.10	865.56
[illegible]	[illegible]	[illegible]	[illegible]
1902	7,855.38	6,141,466.39	781.82
1903	7,965.13	9,304,892.04	1,168.20
1904	8,179.59	9,170,234.07	1,121.11
1905	8,305.40	11,385,418.33	1,370.85
1906	8,433.99	12,475,407.97	1,479.18
1907	9,273.15	15,286,062.66	1,648.42
1908	9,415.01	14,120,828.02	1,499.82
1909	9,794.86	12,884,406.81	1,315.43
1910	9,916.33	17,807,136.20	1,795.74
1911	10,350.13	16,059,786.90	1,551.65

[illegible]

	June 30, 1911.	June 30, 1910.	or Decrease.
[illegible]	[illegible]	[illegible]	[illegible]

32 and 33

The average freight revenue per freight-train mile increased from $3.00 to $3.19, or 6.33 per cent.

The average passenger revenue per passenger-train mile was $1.21, or the same as in the previous year.

The average passenger-train revenue per passenger-train mile decreased from $1.53 to $1.51, or 1.31 per cent.

The tons of freight carried one mile (revenue and company) decreased 242,574,954, or 2.63 per cent., while freight-car mileage (loaded and empty) decreased 8,963,680, or 1.30 per cent., and freight-train mileage (freight and mixed) decreased 1,291,745.45, or 5.44 per cent.

The number of passengers carried one mile increased 32,100,551, or 2.60 per cent., while passenger-car mileage increased 6,175,217, or 4.91 per cent., and the passenger-train mileage (passenger and mixed) increased 1,509,636, or 7.19 per cent.

The following is a consolidated statement of the business of the System for each fiscal year during the period since January 1, 1896:

Fiscal Year Ending June 30.	Average Miles Operated.	Gross Revenues, Including Income from Other Sources.	Expenses, Including Taxes, Rentals and Other Charges.	Interest on Bonds.	Net Revenue.
1897 (18 mos.)	6,443.81	$44,532,628.99	$36,038,455.30	$8,440,387.91	$53,785.78
1898	6,936.02	39,396,126.41	30,513,553.17	7,045,988.30	1,836,584.94
1899	7,032.62	40,762,933.47	29,332,964.11	7,241,972.00	4,187,997.36
1900	7,341.34	46,498,899.04	29,414,427.56	7,345,166.50	9,739,304.98
1901	7,807.31	54,807,379.78	34,502,039.87	7,830,810.83	12,474,529.08
1902	7,855.38	60,275,944.33	36,272,432.45	8,438,985.00	15,564,526.88
1903	7,965.13	63,668,390.99	40,635,576.48	9,134,485.24	13,898,329.27
1904	8,179.59	69,419,975.41	44,641,434.10	9,418,770.00	15,359,771.31
1905	8,305.40	69,189,739.65	47,835,883.50	9,611,510.09	11,742,346.06
1906	8,433.99	79,390,749.05	51,035,355.71	10,622,184.22	17,733,209.12
1907	9,273.15	94,436,574.68	61,779,916.16	11,487,934.70	21,168,723.82
1908	9,415.01	91,289,770.61	65,031,582.67	12,579,301.77	13,678,886.17
1909	9,794.86	95,424,091.89	61,458,019.13	13,548,081.93	20,417,990.83
1910	9,916.33	107,543,250.16	75,133,314.54	11,984,151.36	20,425,784.26
1911	10,350.13	109,772,481.69	75,689,094.83	12,712,319.31	21,371,067.55

The following statement shows the gross operating revenues of the System (exclusive of income from other sources) per mile of road operated for each fiscal year since July 1, 1896:

Year Ending June 30.	Gross Operating Revenues.	Average per Mile of Road.
1897	$30,621,230.10	$4,752.04
1898	39,214,099.24	5,653.69
1899	40,513,498.63	5,760.80
1900	46,232,078.23	6,297,49
1901	54,474,822.61	6,977.41
1902	59,135,085.53	7,527.97
1903	62,350,397.28	7,827.92
1904	68,171,200.18	8,334.31
1905	68,375,837.25	8,232.70
1906	78,044,347.25	9,253.55
1907	93,683,406.91	10,102.65
1908	90,617,796.38	9,624.82
1909	94,265,716.87	9,624.00
1910	104,993,194.67	10,587.91
1911	107,565,115.62	10,392.63

The following statement shows the development of the freight and passenger revenues of the System since July 1, 1896:

Year Ending June 30.	Freight Revenue	Passenger Revenue.
1897	$22,067,686 77	$5,574,288.31
[illegible]	28,588,716.76	7,347,361.59
[illegible]	29,492,586 65	8,126,141.85
1900	[illegible]	9,334,661.57
1901	39,052,557 43	11,678,017.25
[illegible]	41,815,607.05	13,439,884.57
1903	44,622,438.71	13,469,985.78
1904	47,762,653.23	15,433,773.63
1905	47,408,982 36	16,045,380.27
1906	54,598,902.82	18,013,988.56
1907	65,500,309 42	21,171,629.08
1908	61,848,638 51	21,643,427.49
1909	64,212,638.10	22,734,505.32
1910	71,194,055 59	25,437,181.98
1911	71,787,200.89	27,204,867.66

TREASURY.

Neither this Company nor any of its auxiliaries has any notes or bills outstanding.

[illegible] Company held in Treasury on June 30, 1911, $36,204,747.06 cash, and [illegible] $2,500,000 General Mortgage Bonds, including bonds not [illegible] by the Lessee. The Company also has in the Treasury unpledged a large amount of stocks and bonds of other companies, of which part are carried in the balance sheet as Investments and part are included [illegible] Investments and Other Property.

The remaining installments of principal subscriptions to Convertible [illegible] of 1908 and 1910, aggregating $59,175,267.29, referred to in the last annual report, were received during the year.

FUEL RESERVE FUND.

The fund has been increased during the year by earnings derived from certain fuel properties as follows:

[illegible]	$1,016,915.80
[illegible]	114,161.55
[illegible]	$1,131,077.35

WEST TEXAS CONSTRUCTION.

[illegible] to the construction of lines in West Texas were made in the [illegible] report. Of the two branches Colorado and Lubbock there were [illegible] built [illegible] the year, the [illegible] Lubbock to [illegible] Between Colorado and Sterling [illegible] have been [illegible] the [illegible] between Colorado and Lubbock will [illegible] and opened for traffic by November 1, 1911. The branch [illegible] Junction to Ballinger, a distance of 51 miles, was completed and opened for traffic October 1, 1910, and the line Ballinger to Eden, a distance of 66 miles, has been completed to Eden, a distance of 66 miles, and was opened for traffic September 21, 1911.

[illegible] work in connection with the tracks and structures of the San Angelo [illegible] Colorado & Gulf Railway, between Temple and

Coleman has been pushed throughout the year, the work between Temple and Lometa being practically completed. The improvement of this branch will facilitate the handling of traffic between points on or near the Gulf of Mexico and the Pacific Coast, for which traffic the line between Coleman and Lubbock, in connection with the railways of other companies comprised in the System, will afford a new trunk line.

The new West Texas mileage above referred to goes through a very important territory which as yet is almost entirely undeveloped. It is reasonable to anticipate that by virtue of this new mileage this part of the State of Texas will enjoy great development and that the system eventually will derive substantial benefit from such development and also from the new through business which it is believed will result from the opening of this new through line between the Pacific Coast and the Gulf of Mexico.

GARDEN CITY, GULF & NORTHERN RAILROAD.

This line, 38 miles in length, extending from Garden City, Kansas, on your main line, to Scott City, Kansas, the former terminus of the Great Bend Branch, was acquired during the year and is now being operated by The Atchison, Topeka & Santa Fe Railway Company as a part of the System, under lease dated July 1, 1911.

KINGS RIVER RAILWAY.

An extension of the Fresno County Railway from Wahtoke to Piedra, Fresno County, California, has been constructed during the year under the charter of the Kings River Railway Company. The extension is 11 miles in length and was completed and opened for traffic March 19, 1911, as of which date it was leased to The Atchison, Topeka & Santa Fe Railway Company and is operated as a part of the System.

LATON & WESTERN RAILWAY.

This line, extending from Laton to Lanare, Kings County, California, a distance of 15 miles, constructed during the year and opened for operation February 22, 1911, has been leased by your company for a term of 5 years with option of purchase at any time during that period.

SANTA FE DOCK & CHANNEL CO.

This company was organized during the year to take over and operate dock facilities at Port Bolivar, Texas, formerly owned by The Gulf & Interstate Railway Company of Texas.

SUNSET WESTERN RAILWAY.

An extension of this line in a northerly direction from Fellows to Shale, Kern County, California, to serve more adequately the Midway Oil Field, has been constructed jointly with the Southern Pacific Company. The extension is 2.25 miles in length and was completed and opened for traffic April 20, 1911.

ADDITIONAL MAIN-TRACK MILEAGE.

The mileage of second track in operation on June 30, 1911, was 687.58 miles as compared with 526.95 miles at the close of the preceding fiscal year, being an increase of 160.63 miles.

Second Track Work in Progress:

Missouri Division:		
Mendon to Carrollton, Mo.	25.64	miles.
Lines West of Albuquerque, N. M.		
Rito to Laguna, N. M.	9.16	"
McCartys to Horace, N. M.	10.82	"
Flagstaff to Williams, Ariz.	[illegible]	"
Supai to Fairview, Ariz.	10.57	"
	89.16	"

In addition to the above, second track work has been authorized on the Lines West of Albuquerque for a distance of about 40 miles in the vicinity of Needles, California, and extensive grade reductions and changes of line have been authorized preparatory to the construction of additional second track between Albuquerque and Gallup. Most of this work will be completed by the close of the present fiscal year, when second main track in operation will approximate 816 miles.

The death of Mr. Paul Morton on January 19, 1911, deprived the Board and the stockholders and bondholders of this Company of a strikingly effective and valuable representative. Although only fifty-three years old he had spent thirty-eight years in active business life, and all that he achieved served to make singularly complete his training for the post of Director of this Company. His long railroad career, eight years of which were in the service of the Company as its Vice-President, gave him an intimate knowledge of its affairs and all aspects of the railroad problem, which with his integrity and soundness of judgment, gave to his directorship a value which cannot be overestimated.

Your Directors take pleasure in again recording their appreciation of Faithful and efficient service rendered by officers and employes.

EDWARD P. RIPLEY,
President.

NEW YORK, NEW HAVEN AND HARTFORD RAILROAD COMPANY—FORTIETH YEAR.

In accordance with the By-Laws of The New York, New Haven and Hartford Railroad Company, the Board of Directors have caused to be prepared a general statement of its affairs for the year ending June 30, 1911, as follows: (For earnings of the New Haven System see annexed statement.

FOR TWELVE MONTHS, JULY 1, 1910, TO JUNE 30, 1911, INCLUSIVE.

Operating Revenue:		
Freight Revenue	$30,329,092.32	
Passenger Revenue	26,212,670.51	
All other Revenue from Transportation	4,200,645.74	
Revenue from Operations other than Transportation	1,411,026.23	
Total Operating Revenue		$62,153,434.80
Operating Expenses:		
Maintenance of Way and Structures	6,980,036.18	
Maintenance of Equipment	7,193,424.77	
Traffic Expenses	351,999.10	
Transportation Expenses	24,526,959.38	
General Expenses	1,846,213.20	
*Total Operating Expenses		40,898,632.63
Net Operating Revenue		21,254,802.17
Net Revenue from Outside Operations		1,399,792.67
Total Net Revenue		22,654,594.84
Taxes		3,578,363.15
		19,076,231.69
Income from Other Sources:		
Dividends on Stocks	5,487,150.59	
Interest on Bonds	[illegible]	
Miscellaneous Income	1,832,316.30	
Rents Received	356,687.66	
Hire of Equipment	409,802.11	
Total Income from Other Sources		9,178,928.35
Total Income		28,255,160.04
Deductions from Income:		
Interest on Bonds, Debentures and Other Liabilities	10,710,388.97	
Rentals of Leased Lines	[illegible]	
Rentals other than above	1,874,134.74	
Miscellaneous	5,000.00	
Total Deductions from Income		17,067,848.03
Net Income		11,187,312.01
Dividends Nos. 124 to 127 inclusive, 7% per annum, on Preferred Stock	[illegible]	
Dividends Nos. 3 to 6 inclusive, on Pref. Stock	[illegible]	[illegible]
Deficit		[illegible]

*The Operating Expenses and Taxes were 71.56 per cent. of the Total Operating Revenue.

The increase of wages granted to employes, referred to in the General Statement for 1910, has added very materially to the cost of conducting the business and the expected partial offset to result from increases of freight rates failed of realization because of the refusal of the Interstate Commerce Commission to consent to such increases.

It was estimated that the advances in wages to employes effective with the beginning of the fiscal year of 1911 would aggregate $1,757,506.00. Compared with the wages paid in 1910 these advances have increased the operating expenses of 1911 by $1,521,513.42. If the same rate of wages had prevailed in 1911 as was paid in 1910 the ratio of operating expenses to revenue would have been 63.35 per cent., a little less than the ratio for 1910 and the deficit of $1,267,539.99 converted into a surplus of $253,973.43.

Your property has been well maintained during the year and is now in fine condition and capable of handling a very much larger volume of business than has so far been offered, in fact, any additional business within the range of reasonable expectation can be handled with economy and efficiency.

Deferring to the wishes of many investors, a combined income account and general balance sheet of all companies comprised in the New Haven System have been prepared, excluding only the New York, Ontario & Western, Boston and Maine and controlled lines and Maine Central and controlled lines, your interest in which has been treated as investments.

From this account it will be seen that had all of the surplus earnings of all of the companies for the fiscal year been turned into the treasury of your Company they would have failed by only $313,288.60 of meeting the New Haven dividend for the year.

The surplus earnings in the treasuries of subsidiary companies available for dividends were more than sufficient, if paid into the treasury of the parent company, to have met the deficiency of its earnings to pay its dividends, but your directors did not deem it advisable to deplete the treasuries of the subsidiary companies for that purpose.

The expenses of the combined companies include some of an extraordinary nature, it is believed may be avoided in the future. Among these may be mentioned the cost of the appraisal of the companies' properties in connection with the validation of the companies' securities claimed to have been issued in violation of the laws of the Commonwealth of Massachusetts; the trolley properties were found to have a large amount of equipment that had been carried upon their books for many years that was obsolete for their purposes, but was still in shape to be used in emergencies,—the value of which has been written off to the expenses for the year; the steamboat companies have sold and broken up boats that stood upon their books at very considerable valuations, which have been also written off in the year's expenses, so that the property of the companies stands upon their books at a much more conservative valuation than heretofore.

The interest during construction on the investment in the New York, Westchester and Boston Railway, the New York Connecting Railway, the Berkshire Street Railway, and the electrification work upon the Harlem River Branch, the double tracking of the Poughkeepsie Bridge line, none of which has reached a stage to make returns in earnings, has been included in the interest charges of the companies, (and not offset in any way by the securities eventually to be received, which will be available for sale), and the results from these investments and economies from these improvements, nearly all of which will be available during the next fiscal year, will be reflected in the statements for that and future years' operations.

It will be noted that many of the items that have made up the charges to the expense accounts for the past year, could have properly been charged to the profit and loss and investment accounts, and have thereby resulted in a surplus for the year instead of the deficit shown, but the net result to the property would have been unchanged.

In addition to the earnings shown in the general statement and combined statement, there were the following earnings from funds established by the Board of Directors, at the expense of the operating expense accounts of the past year and the accumulation of the surplus of such charges to accounts for previous years, as below, viz.:

Insurance Fund, see page "36"	$317,569.53
Accident and Casualty Fund, see page "38"	434,638.87
Coal Insurance Fund, see page "39"	9,815.82
Total	$761,024.22
Less decrease, the Marine Insurance Fund, see page "40"	15,255.38
Total	$745,768.84

Not since the disaster at Norwalk in 1853 has your Company experienced the misfortune of such a serious accident as that which occurred to one of its principal passenger trains at Bridgeport on July 11, 1911. Deplorable

as to this accident in the destruction of life and injury to person, a most thorough investigation by the Company has proven to its satisfaction that the accident was not due to any lack of provision as far as human foresight could make for the absolutely safe movement of trains supplemented by specific printed instructions for the government of employes. The cost of settlement of death and personal injury claims will impose no burden on the operating expenses as ample reserves have been made out of the income of previous years for just such a contingency through the establishment in 1906 of an Accident and Casualty Fund.

As yet your Company has received no return from its investment in the New York, Westchester & Boston Railway Company, although its income account has been charged with the interest upon the money required to be raised for the purpose.

Part of this investment is represented by $16,300,000 of bonds no part of the interest on which amounting on June 30, 1911, to $1,238,926.47 has been credited to income.

While notes have been given for this interest and for interest on advances amounting to a further sum of $58,465.29, or a total of $1,297,391.76, which notes will eventually be paid, your directors feel that it is in consonance with conservative accounting to defer the consideration of the crediting of this interest to the earnings of the Company until the money has actually reached the treasury.

Had this interest been available as a credit to earnings during the fiscal year of 1911, the deficit of The N. Y., N. H. & H. R. R. Co. proper, would have been converted into a surplus of $29,851.77, and the deficit of all companies into a surplus of $984,103.16.

The New York, Westchester & Boston Railway extends from the Harlem River about Willis Avenue, New York City, through the Borough of The Bronx and Westchester County to Mount Vernon, where the line diverges, one line extending north through Eastchester, New Rochelle, Scarsdale and White Plains; and the other line extending to the east through North Pelham, New Rochelle, Larchmont, Mamaroneck and Rye to the Connecticut state line at Port Chester. From the Harlem River to about 174th Street the railroad will be operated over the tracks of the Harlem River & Port Chester R. R. Co., which will be completed so as to be available for such operation, under a contract granting perpetual rights to the New York, Westchester & Boston Railway, which has received the approval of the Public Service Commission for the First District. From 174th Street through Mount Vernon to New Rochelle and the line from Mount Vernon to White Plains, the road is nearing completion and is being constructed upon its own private right of way. Actual operation over the lines from the Harlem River to New Rochelle and on the line from Mount Vernon to White Plains is expected to begin within the next six months. Of the total 74.57 miles of track, 50.57 miles are owned in fee, the Company having perpetual rights to operate over 24 additional miles.

The physical property of the New York, Westchester & Boston Railway is of the best of construction known to engineering science. The entire mileage is built to conform with the main line standard of The New York, New Haven and Hartford Railroad. The road is four-tracked from 174th Street to Mount Vernon, where two tracks diverge to White Plains and two to New Rochelle. The entire line will be fenced in private right of way [illegible]. There will be no grade crossings.

[illegible] from the City of New York and the Public Service Commission, the necessary rights to construct at 180th Street and Morris Park Avenue, Borough of The Bronx, a transfer station at which point interchange will be made with the West Farms Branch of the Interborough Rapid Transit Company. Interchange will also be made with the Second and Third Avenue Elevated lines at Willis Avenue. The plans of the Company also provide for the interchange with the proposed Tri-Borough route, either at the transfer station at 180th Street, or at Westchester Avenue. The third tracking of the Second and Third Avenue Elevated Systems will give fast express service to and from all points in the Borough of Manhattan. The connection via the transfer station and via the Second and Third Avenue Elevated Lines at Willis Avenue offers rapid transit in connection with those lines to and from the west side, centre, and east side of Manhattan.

The territory served forms one of the most desirable and rapidly growing residential sections in and adjacent to New York City. Between 1900 and 1910 the population of the Borough of The Bronx increased from 200,507 to 430,980, or 115%, and the population of Westchester County from 184,257 to 283,000, or over 53%. In addition to the income to be [illegible] in the transportation of passenger and freight in this already large and rapidly growing section, it is believed that with the completion of the Westchester Northern Railroad, which was organized in 1910 and is authorized to construct from a point of connection at White Plains, northerly through the towns of Harrison, North Castle, Bedford, Pound Ridge, Lewisboro and North Salem in the County of Westchester and the town of South East in the County of Putnam, and through the towns of Greenwich, Ridgefield and Danbury, in the State of Connecticut, to pjoints [illegible] The New York, New Haven and Hartford Railroad, [illegible] be made, inasmuch as this extension will [illegible] to interchange traffic to and from the Berkshire Hills, shortening the distance and time materially. It also makes it possible to interchange traffic with the New York, Ontario & Western Railway and other roads similarly located, with a more direct all rail delivery of coal [illegible] reached.

By [illegible] of the Public Service Commission of New York, Second District, the New York, Westchester & Boston Railway Company was authorized to execute a new mortgage dated July 1, 1911, [illegible] July 1, 1930, under which the total amount of bonds [illegible] shall not exceed $60,000,000, but no bonds shall be issued [illegible] of present issue except [illegible] additional construction, betterments or improvements to the property of the railroad.

[illegible] leased to The New York, [illegible] exchange for the old [illegible] [illegible] of principal and [illegible] [illegible] Harlem River Branch and Port Chester [illegible] Pelham and New Rochelle [illegible] Mount Vernon and Pelham [illegible] Mount Vernon and Portchester

The New York, Westchester & Boston Electrification.

This property, consisting of a four-track system between West Farms and Mt. Vernon, and two tracks from there on to White Plains, with a branch connection of two tracks to a point on our main line just east of New Rochelle, will be electrified by an overhead system conforming practically in all details to that of our Harlem River Branch Electrification. The work of pier installations for the catenary bridges was started in October, 1910, and is practically completed for the four-track section, together with the two-track branch connection above referred to. The route between Mt. Vernon and White Plains having not yet been fully graded, only a small percentage of the foundations have been installed between these two points.

Rehabilitation of Warren Power Station, with Attendant Increase of Capacity in the East Providence Sub-Station.

In order to increase the capacity of the Warren Power Station and place it upon a straight alternating current basis, rather than a division of electric generation between A. C. and D. C., a 300 k.w. turbo generator has been ordered, with necessary switchboard and exciter equipment, and its installation will be completed by the end of this month. The old direct current engines, which are badly depreciated, will be removed and the two 750 k.w. steam turbines which have been serving for a number of years will be overhauled and new windings applied to their generator parts.

Number of Grade Crossings Eliminated.

State of New York	1
State of Connecticut	36
State of Rhode Island	1
State of Massachusetts	17
Total	55

New Passenger Stations or Improved Facilities have been provided during the year at the following points:

New Stations.

Cedar Hill, Conn.	East Providence, R. I.	South Windsor, Conn.
Charles River, Mass.	Foxboro, Mass.	West Barnstable, Mass.
East Hampton, Conn.		

Improved Facilities.

Bartow, N. Y.	Harlem River, N. Y.	Pelham, N. Y.
Berlin, Conn.	Hartford, Conn.	Pemberton, R. I.
Bethel, Conn.	Highland, Mass.	Port Chester, N. Y.
Bristol, Conn.	Leominster, Mass.	Providence, R. I.
Canaan, Conn.	Litchfield, Conn.	Rowayton, Conn.
Collinsville, Conn.	Meriden, Conn.	Sheffield, Mass.
Congamond, Mass.	Millvile Heights, Mass.	Southbridge, Mass.
East Dedham, Mass.	Mystic, Conn.	South Hanover, Mass.
East Greenwich, R. I.	Naugatuck, Conn.	Stockbridge, Mass.
Esmond, R. I.	Needham, Mass.	Wallingford, Conn.
Fairhaven, Mass.	New Britain, Conn.	West Chatham, Mass.
Fall River, Mass.	New Rochelle, N. Y.	West Hanover, Mass.
Hanover, Mass.	Norwalk, Conn.	West Haven, Conn.

New Passenger Station or Improved Facilities upon which work is under way, and will be completed during the ensuing year:

New Stations.

Bartow, N. Y.	Harrison Square, Mass.	Pope's Hill, Mass.
Esmond, R. I.	Highland Lake, Mass.	Sound View, Conn.
Farm St., Mass.	Milton, Mass.	Southbridge, Mass.
Guilford, Conn.	Neponset, Mass.	Terryville, Conn.

Improved Facilities.

Atlantic, Mass.	Clicquot, Mass.	New Preston, Conn.
Bethel, Conn.	Crescent Park, R. I.	North Bellingham, Mass.
Bridgeport, Conn.	Larchmont, N. Y.	Norwood, Mass.
Caryville, Mass.	Medway, Mass.	Whitman, Mass.

New Freight Houses or Increased Freight Facilities have been provided during the year at the following points:

New Stations.

Bethel, Conn.	South Windsor, Conn.	West Hanover, Mass.
Pratts Junction, Mass.	Wallingford, Conn.	

Improved Facilities.

Andover, Conn.	Leominster, Mass.	Rowayton, Conn.
Broad Brook, Conn.	Midway, Conn.	Rye Street, Conn.
Buckland, Conn.	Milford, Mass.	Sheffield, Mass.
Congamond, Mass.	Mount Vernon, N. Y.	Sterling, Mass.
Dighton, Mass.	New Bedford, Mass.	Summit, R. I.
Ellington, Conn.	New Canaan, Conn.	Tremont, Mass.
Fitchburg, Mass.	North Dighton, Mass.	Uxbridge, Mass.
Foxboro, Mass.	Norwich, Conn.	West Barnstable, Mass.
Harlem River, N. Y.	Plymouth, Mass.	West Falmouth, Mass.
Hartford, Conn.	Portland, Conn.	Wollaston, Mass.
Lenoxdale, Mass.	Putnam, Conn.	

New Freight Houses or Increased Freight Facilities upon which work is under way, and which will be completed during the ensuing year:

New Stations.

Esmond, R. I.	Providence, R. I.	Woonsocket, R. I.
Larchmont, N. Y.		

Improved Facilities.

Allyns Point, Conn.	Harrison Square, Mass.	Neponset, Mass.
Ansonia, Conn.	Mansfield, Mass.	New Bedford, Mass.
Bridgeport, Conn.	Middleboro, Mass.	New Preston, Conn.
Harlem River, N. Y.	Milton, Mass.	

New Turntables have been installed during the year at the following points:

Cedar Hill, Conn. (1 complete; 1 under construction). Westfield, Mass.

Steam and Interlocking Improvements and Additions have been made during the year at the following points:

Berlin, Conn.	Harrison, N. Y.	Port Chester, N. Y.
Brookfield Jct., Conn.	Hartford, Conn.	Providence, R. I.
Canton Junction, Mass.	Hawleyville, Jct., Conn.	South Bridge, Mass.
Cedar Hill, Conn.	Manchester, Conn.	South Framingham, Mass.
Concord Junction, Mass.	Medfield, Mass.	South Norwalk, Conn.
Cumberland Mills, R. I.	Middleboro to Buzzards Bay.	Wallingford, Conn.
East Bridgeport, Conn.		Warren to Bristol, R. I.
East Hampton, Conn.	New Haven, Conn.	Westerly, R. I.
East Lyme, Conn.	New London, Conn.	Westport, Conn.
East River, Conn.	North Scituate, Mass.	Wickford Junction, R. I.
Guilford, Conn.	Oak Point, N. Y.	Windsor, Conn.

New Bridges, both Track and Overhead, Bridge Repairs, Strengthening and Renewals, to permit heavier loading have been made as follows:

Avon, Conn.	North Newtown, Conn. 2
Boston Switch to Valley Falls 2	North Scituate, Mass.
Brookfield Junction 6	Orange, Conn. 2
Clark's Corner, Conn.	Providence to Willimantic.
Clinton, Conn.	Plainville, Conn., to Westfield, Mass.
Concord, Junction, Mass.	Redding, Conn.
Dedham Road, Mass.	Sandy Hook, Conn.
Deerfield, Mass.	Saybrook Junction to Middletown, Conn.
Framingham to Mansfield	
Groton, Conn., to Plainfield, Conn. (entire work not done)	Shelton to Hawleyville. (9 done, others in progress.)
Harrison Square to Neponset, Mass. 10 (approaching completion)	Somerset Junction, Mass.
Hartford, to Bristol, Conn.	South Bay, Mass.
Jewett City, Conn.	South Framingham to Walpole
Lowell, Mass.	Truro, Mass.
Middletown, Conn. 2	Upper Falls, Mass.
Marshfield, Mass.	Walpole, Mass. 3
Middletown to Hartford 10 (entire work not done)	Warren, R. I.
Mount Bowdoin, Mass.	Weatogue, Conn.
Naugatuck Junction, Conn.	West Mystic, Conn. 2
New Bedford, Mass.	Willimantic, Conn.
New Haven, Conn.	Windsor, Conn.
	Worcester, Mass. 5

Additional Protection Against Fire Hazard has been provided at the following points:

Brockton, Mass.	Manchester, Conn.	Providence R. I. (gas plant).
Harlem River, N. Y.	New Bedford, Mass.	
	Pawtucket, R. I.	Seymour, Conn.

Water barrels have been placed on all track bridges more than fifty feet long. All section houses and roadway buildings have also been equipped.

Commercial Sidetracks.

A large number of sidetracks to serve industries along the Company's lines have been installed during the year.

Creosoted Ties, Tie Plates and Screw Spikes.

Total number of ties (all kind) laid during the year	1,798,456
" " " " creosoted, provided with tie plates and screw spikes, laid during the year between New Haven and Woodlawn and on the Harlem River Branch	88,466

Rail.

There have been laid in main tracks during the year, in both maintenance and construction, 10,227 tons of 100 pound rail, and 18,628 tons of 80, 79, 78, 74, 68 pound and 90 pound rerolled rail.

With the completion of the improvement work now in progress it is expected that similar future expenditures will not be excessive unless the growth of business overtaxes the facilities.

New Equipment to the value of $5,987,555.82 has been purchased during the year, consisting of ten switch and two passenger locomotives, two freight and one switch electric locomotives, twenty-one sleeping cars, twenty-three parlor cars, thirteen baggage cars, 2,575 box cars, 1,497 coal cars, two derricks, two pile drivers and two steam shovels.

This amount also includes the cost of converting thirty-two passenger cars into cabooses and work equipment.

The above amount was disposed of as follows:

To Equipment	$5,600,360.68
To Replacement Fund	387,195.14

Your Company on account of its large financial interest in the securities of the Central New England Railway Company advanced to that company the necessary funds to enable it to call for redemption the 5 per cent. bonds secured by the First Mortgage upon its property dated January 23, 1899, and gave its assent to an application by the Central New England Company to the Public Service Commission of New York for the Second District for authority to make a new first mortgage bearing 4 per cent. interest to repay this advance, and to refund its floating debt and underlying mortgage and other bonds. The authority was granted and a new first mortgage was made dated January 1, 1911, and bonds thereunder to the amount of $11,967,000 issued of which $11,927,000 passed into the treasury of your Company in exchange for the various forms of indebtedness of the Central New England Railway Company held by your Company. The effect of this substitution of a single issue of new first mortgage bonds bearing 4 per cent. interest for various kinds of bonds bearing higher rates of interest was to save the Central New England Company a considerable yearly interest charge and to give your Company a bond more readily marketable than the forms of indebtedness previously held.

Your Company has endorsed its guaranty of principal and interest on these new first mortgage bonds and has sold the bonds at a satisfactory price.

The earnings of the Central New England Company will be sufficient to pay the interest on these bonds so that there need be no apprehension of a recourse to the guaranty of your Company.

The funded debt of the Central New England Railway Company now consists of:

First Mortgage 4 per cent. bonds of January 1, 1911 ... of which $20,000 are in the treasury of The N. Y., N. H. & H. R. R. Co., and $11,927,000 are in the hands of the public.	$11,947,000.00
Four Mortgage 4½ per cent bonds of Dutchess County Railroad Company ... of which $63,000 are in the treasury of The N. Y., N. H. & H. R. R. Co., and $287,000 are in the hands of the public.	350,000.00
General Mortgage Income Bonds ... of which $608.50 scrip is in the treasury of The N. Y., N. H. & H. R. R. Co. and $18,000 and $1,391.50 scrip are in the hands of the public. Funds for the payment of these bonds and interest thereon to their due date have been deposited with the Trustee in consideration of the release of the mortgage	20,000.00,
Total	$12,317,000.00

The capital stock of the Company consists of

Preferred ... of which The N. Y., N. H. & H. R. R. Co. owns 37,025 shares and $8.50 scrip and 424 shares and $17.11 scrip are in the hands of the public.	$3,750,000.00.
Common 48,000 shares ... of which The N. Y., N. H. and H. R. R. Co. owns 47,511 shares and $103.89 scrip and 487 shares and $96.11 scrip are in the hands of the public	4,800,000.00
Total	$8,550,000.00

The capital stock of the Company has been increased during the year by the addition of 1,598,404 shares ($56,940,400), 446,492 shares ($44,649,200) being new stock issued under authority of the special meeting of the Stockholders held October 27, 1909, referred to in the General Statement for 1910; and 122,712 shares ($12,271,200) issued in exchange for $18,406,800 face value of 3½% Convertible Debenture Certificates of the issue of January 1, 1906. There still remain in the treasuries of subordinate companies 214,713 shares.

The capital stock of the Old Colony Railroad Company has been increased during the year by the sale of eight thousand (8,000) shares, the proceeds of which have been applied toward the reimbursement of expenditures for betterments by your Company.

The outstanding indebtedness of the Company and its leased lines, in the hands of the public, has been decreased during the year by the amount of $3,[illegible] as follows:

DECREASES.

Woonsocket & Pascoag R. R. Co. 1st Mortgage 5% Bonds paid	$100,000.00
Farmington Street Railway Company 5% Debentures paid...	30,000.00
New Haven & Northampton Company 5% Northern Extension [illegible]	700,000.00
5% Three Year Debentures paid	10,000.00
5% Four Year Debentures paid	1,339,000.00
4½% Three Year Debentures paid	2,000,000.00
3½% Convertible Debenture Certificates exchanged for Capital Stock	18,406,800.00
Real Estate Mortgage paid	11,500.00
Boston & New York Air Line Scrip paid	8.73
4% [illegible]	3,760,401.50
4½% Notes paid	500,000.00
	$26,357,713.23

INCREASE.

[illegible]	$[illegible]
[illegible]	$[illegible]

There will mature between October 1, 1911, and October 1, 1912, the following obligations for which this Company is responsible:

October 1, 1911—Meriden Horse Railroad Company 5½ First [illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

Mr. Augustus S. May resigned as director on May 18th, 1911, and the vacancy was filled by the election of Mr. Francis T. Maxwell, of Rockville, Connecticut.

Mr. Arthur E. Clark resigned as director on May 18th, 1911, and the vacancy was filled by the election of Mr. Edward Milligan, of Hartford, Connecticut.

The faithful and efficient services of the officers and employes are hereby acknowledged.

By order of the Board of Directors,
CHARLES S. MELLEN,
President.

New Haven, Connecticut,
September 21, 1911.

STATISTICS.

Passenger Traffic.	
Number of passengers carried earning revenue	83,193,164
Number of passengers carried one mile	1,534,301,064
Average distance carried ....Miles	18.44
Total passenger revenue (excluding mails, express, etc.)	$26,212,670.51
Average amount received from each passenger	.31508
Average receipts per passenger per mile	.01708
Total passenger service train revenue	$30,154,915.98
Passenger service train revenue per mile of road	$15,045.56
Passenger service train revenue per train mile	1.86523
Freight Traffic.	
Number of tons carried of freight earning revenue	23,257,041
Number of tons carried one mile	2,181,557,124
Average distance haul of one ton....Miles	93.80
Total freight revenue (excluding miscellaneous)	$30,329,092.32
Average amount received for each ton of freight	1.30408
Average receipts per ton per mile	.01390
Freight revenue per mile of road	$15,130.7289
Freight revenue per train mile	4.02717
Total Traffic.	
Operating revenues	$62,153,434.80
Operating revenues per mile of road	$30,456.17
Operating revenues per train mile	2.63853
Operating expenses, including Taxes	$44,476,995.78
Operating expenses, including Taxes, per mile of road	$21,794.43
Operating expenses, including Taxes, per train mile	1.88813
Net operating revenue, less Taxes	$17,676,439.02
Net operating revenue, less Taxes, per mile of road	$8,661.74
Train Mileage.—Revenue Service.	
Miles run by passenger trains	15,986,627
Miles run by freight trains	7,350,883
Miles run by mixed trains	180,233
Miles run by special trains	38,312
Total revenue train mileage	23,556,055
Non-revenue service train miles	1,347,989
Grand total train mileage	24,904.044
Car Mileage, Etc.	
Mileage of passenger cars	76,584,719
Mileage of loaded freight cars—North or East	88,347,797
Mileage of loaded freight cars—South or West	58,067,277
Mileage of empty freight cars—North or East	17,345,183
Mileage of empty freight cars—South or West	47,295,718
Average number of passengers per car mile	25.55
Average number of passengers per train mile	99.00
Average number of passenger cars per train mile	4.72
Average number oftons of freight per loaded car mile	14.91
Average number of tons of freight per train mile	289.67
Average number of freight cars per train mile	28.41
Average number of loaded cars per train mile	19.43
Average number of empty cars per train mile	8.00
Average mileage operated during year	2,040.75
Average mileage operated during year in Passenger Service	2,004.24
Average mileage operated during year in Freight Service	2,004.47

STATEMENT OF COMBINED INCOME.

(All Inter-Company Transactions eliminated.)

The following named companies are included in the subjoined Combined Income Account for the year ending June 30th, 1911:

The New York, New Haven and Hartford Railroad Company, Central New England Railway Company, The Connecticut Company, New York and Stamford Railway Company, The Westchester Street Railroad Company, Berkshire Street Railway Company, The Vermont Company, Hoosick Falls Railroad Company, Housatonic Power Company, The Rhode Island Company, The New England Navigation Company, Hartford and New York Transportation Company, Maine Steamship Company and New Bedford, Martha's Vineyard and Nantucket Steamboat Company.

For the information of stockholders a description of these companies is here given.

The New York, New Haven and Hartford Railway Company.

Reference is made to Exhibits in this General Statement for description.

Central New England Railway Company.

Operates 276.78 miles of railway—Campbell Hall, N. Y., to Silvernails, N. Y. (including Poughkeepsie Bridge), Poughkeepsie to Hopewell, Dutchess Junc. to Conn. State Line, Poughkeepsie to Boston Corners, Hartford, Conn., to Rhinecliff, N. Y., Tariffville, Conn., to Springfield, Mass., Wicopee Junction, N. Y., to Fishkill Landing, N. Y., of which 147.67 miles are owned and 129.11 miles are leased.

The Connecticut Company.

Operates 782.944 miles of street railway lines, of which 479.969 miles are owned, and 303.025 miles are leased, serving the following cities and towns:

Cities of New Haven, Hartford, Bridgeport, Waterbury, New Britain, Meriden, New London, Norwich, Middletown, Stamford, South Norwalk, Rockville, Derby, Shelton, Ansonia, and the Town of East Haven, Hartford, North Haven, Wallingford, Hamden, Orange, Southington, Plainville, Farmington, Putnam, Thompson, Killingly, Plainfield, Waterford, Montville, Norwich, Lisbon, Windham, Sprague, Griswold, Portland, Middlefield, Cromwell, Rocky Hill, Wethersfield, West Hartford, Bloomfield, Windsor, Windsor Locks, Coventry, Stafford, East Hartford, East Windsor, South Windsor, Manchester, Vernon, Enfield, Glastonbury, Suffield, Greenwich, Strathford, Milford, Huntington, Fairfield, Westport, Norwalk, Darien, Naugutuck, Watertown, Middlebury, Thomaston, Torrington, Winchester, Beacon Falls, Seymour, Cheshire, Newington, and Berlin, Connecticut.

New York and Stamford Railway Company.

Operates 33.97 miles of street railway lines, of which 20.16 miles are owned, and 13.81 miles are leased, serving the following cities and towns:

Cities of Stamford, Conn., and New Rochelle, N. Y., and the Towns of Greenwich, Conn., and Rye, Port Chester, Harrison and Mamaronck, N. Y.

The Westchester Street Railway.

Operates 28.60 miles of street railway lines, of which 22.63 miles are owned and 5.97 miles are leased, serving the following city and towns:

City of Mount Vernon, N. Y., and the Towns of Tarrytown, Elmsford, Greenburg, White Plains, Harrison, Scarsdale, Eastchester and Mamaroneck, N. Y.

Berkshire Street Railway Company.

Operates 111,881 miles of street railway lines, all of which are owned, serving the following city and towns:

City of Pittsfield, Mass., and the Towns of Williamstown, North Adams, Clarksburg, Adams, Cheshire, Lanesboro, Dalton, Lenox, Hinsdale, Lee Stockbridge, Great Barrington, Egremont and Sheffield, Mass.

The Vermont Company.

Operates 20.849 miles of street railway lines, all of which are owned, serving the following towns: Bennington and Pownal, Vt.

Hoosick Falls Railroad Company.

Operates 7.105 miles of street railway lines, all of which are owned, serving the following towns: Walloomsac, North Hoosick and Hoosick Falls, N. Y.

Housatonic Power Company.

Operates gas, electric lighting, water and power plants:

At Branford .....Electric lighting.
At Waterbury .....Electric lighting and gas.
At New Britain.....Electric lighting.
At Greenwich .....Electric lighting and gas.
At Norwalk .....Electric lighting and gas.
At Naugatuck .....Gas.
At Suffield .....Electric lighting and power.
At New Milford.....Water for furnishing electric lighting and power.

The Rhode Island Company.

Operates 347.02 miles of street railway lines, of which 38.67 miles are owned and 308.35 miles are leased, serving the following cities and towns:

Cities of Providence, Pawtucket, Central Falls, Woonsocket and Cranston, R. I., and the Towns of Warwick, North Providence, East Providence, Johnston, Smithfield, North Smithfield, Burrillville, Cumberland, Lincoln, Barrington, Coventry, Scituate, Warren, Bristol, East Greenwich, Foster, North Kingston, South Kingston and Narragansett, R. I.

The New England Navigation Company.

Owns 25 steamers, 21 lighters and 2 transfer tugs, operating the following lines:

Between New York and Bridgeport; New York and New Haven; New York and New London; New York-Newport and Fall River; New York and New Bedford; New York and Providence; Norwich-New London; Watch Hill and Block Island; Wickford Landing and Newport; also operates steamer running between Providence-Newport and Block Island.

Hartford and New York Transportation Company.

Owns 6 steamers, 7 tugs and 31 barges, operating between New York and Bridgeport; New York and Hartford and intermediate points on the Connecticut River; and New York and Providence.

Main Steamship Company.

Owns 5 steamers, operating lines between New York and Boston; and New York and Portland, Maine.

New Bedford, Martha's Vineyard and Nantucket Steamboat Company.

Owns 5 steamers, operating lines between New Bedford and Woods Hole, Martha's Vineyard and Nantucket.

Combined Income Account.

Revenue:	
Freight	$[illegible]930,489.94
Passenger	[illegible]393,[illegible]
Mail	695,[illegible]
Express	[illegible]019,540.83
Other Transportation Revenue	[illegible]185.90
Revenue other than Transportation	1,781,[illegible]
Electric Light	605,684.99
Electric Power	501,293.06
Gas	481,537.59
Water	22,362.23
Total Revenue	[illegible]48
Less Operating Expenses	58,070,456.46
Net Operating Revenue	[illegible]
Net Revenue from Outside Operations	1,398,338.21
Total Net Revenue	[illegible]
Accrued Rents	[illegible]
Operating Income	[illegible]
Income from Other Sources	3,504,057.34
Total Income	[illegible]45
Deductions from Income:	
Rentals of Leased Roads	[illegible]
Interest on Bonds.	[illegible]
Interest on Convertible Debentures.	[illegible]
Interest on Debt	[illegible]
Other Interest	[illegible]
Rentals Leased Equipment	[illegible]05
Miscellaneous	[illegible]74
Total Deductions from Income	$18,807,116.05
Net Income	[illegible]
Dividends	[illegible]
Deficit	$313,288.60

COMBINED GENERAL BALANCE SHEET, JUNE 30, 1911.

The New York, New Haven and Hartford Railroad Company; The Harlem River and Portchester Railroad Company; Central New England Railway Company; The New England Navigation Company; Hartford and New York Transportation Company; Maine Steamship Company; New Bedford, Martha's Vineyard and Nantucket Steamboat Company; The Connecticut Company; The Rhode Island Company; New York and Stamford Railway Company; The Westchester Street Railroad Company; Berkshire Street Railway Company; The Vermont Company; The Hoosick Falls Railroad Company and Housatonic Power Company.

ASSETS.

Property Investment:		
Road and Equipment	$220,519,753.44	
Floating Equipment, Street Railways and other properties	108,942,472.68	
	$329,462,226.12	
Less, Reserve for Accrued Depreciation of Equipment	3,309,640.73	$326,152,585.39
Securities:		
Securities of Proprietary, Affiliated and Controlled Companies:		
Stocks (Exhibit I)	$43,057,051.28	
Miscellaneous (Exhibit I)	3,398,186.18	46,455,237.46
Other Investments:		
Advances to Proprietary, Affiliated and Controlled Companies for Construction, Equipment and Betterments	$1,678,313.53	
Miscellaneous Investments:		
Physical Property	8,004,353.62	
Securities Owned (Exhibit II)	3,506,310.62	13,188,977.77
Total Property Investment		$385,796,800.62
Working Assets:		
Cash		$30,644,356.15
Securities Owned Held in Treasury (Exhibit III)		201,700.00
Marketable Securities (Exhibit IV)		56,954,545.83
Agents' Balances		6,541,263.48
Net Balance due from Agents and Conductors		2,669,341.39
Miscellaneous Accounts Receivable		4,423,673.37
Materials and Supplies		5,807,788.63
Traffic and Car Service Balances due from other companies		375,454.47
Other Working Assets		69,414.47
Total Working Assets		$108,687,742.79
Accrued Income Not Due:		
Unmatured Interest, Dividends and Rents Receivable		$601,544.41
Deferred Debit Items:		
Temporary Advances to Proprietary, Affiliated and Controlled Companies	$1,568,928.33	
Working Fund Advance	264,316.42	
Special Deposits	238,029.45	$2,259,706.31
Cash and Securities in Sinking and Redemption Funds:		
Connecticut Railway and Lighting Co. Sinking Fund	$541,695.39	
Invested in Other Reserve Funds:		
Insurance Fund	58,000.00	
Accident and Casualty Fund	90,262.37	
Coal Insurance Fund	29,470.74	
Marine Insurance Fund, The New England Navigation Co.	161,195.72	699,852.77
Cash and Securities in Insurance and Other Funds:		
Connecticut Company Insurance Fund	$3,875,262.65	
Rhode Island Company Insurance Fund	28,752.73	
Other Insurance Funds	165,805.08	3,875,262.65
Total Insurance and Other Funds		2,860,722.47
Total Assets		$9,695,544.20

LIABILITIES.

Premium realized on Capital Stock Sold (Since July 1, 1909)	$32,393,789.00	
Less premium on shares held by Subsidiary Companies	12,954,376.75	19,439,412.25
Capital Stock of Subsidiary Companies in hands of Public.		109,413.22
Total Stock and Premium Realized Since July 1, 1909		$176,876,025.47
Mortgage, Bonded and Secured Debt:		
Mortgage Bonds, including Bonds of Merged Roads Assumed (Exhibit V)	$60,961,000.00	
Less held by Subsidiary Companies:		
The New England Navigation Co.	38,000.00	$60,923,000.00
Plain Bonds, Debentures and Notes, including Debentures of Merged Roads Assumed (Exhibit VI)		151,593,200.00
Funded Debt of Subsidiary Companies (Exhibit VII)		40,409,391.50
Total Mortgage, Bonded and Secured Debt		$252,925,591.50
Working Liabilities:		
Loans and Bills Payable		$22,600,000.00
Traffic and Car Service Balances due to other companies		2,166,759.50
Audited Vouchers and Wages Unpaid		6,123,119.68
Miscellaneous Accounts Payable		170,875.92
Matured Interest, Dividends and Rents Unpaid		5,282,732.36
Matured Mortgage, Bonded and Secured Debt Unpaid		25,612.68
Other Working Liabilities		99,998.02
Total Working Liabilities		$36,469,098.16
Accrued Liabilities Not Due:		
Unmatured Interest, Dividends and Rents Payable		$3,218,759.39
Taxes Accrued		33,359.08
Total Accrued Liabilities Not Due		$3,252,118.47
Deferred Credit Items:		
Operating Reserves		$1,049,988.00
Other Deferred Credit Items		2,324,445.09
Total Deferred Credit Items		$3,374,433.09
Appropriated Surplus:		
Reserves from Income or Surplus:		
Invested in Sinking and Redemption Funds:		
Connecticut Railway and Lighting Co. Sinking Fund		$362,695.39
Invested in Other Reserve Funds:		
Insurance Fund	$1,753,322.84	
Accident and Casualty Fund	957,757.62	
Coal Insurance Fund	29,470.74	
Marine Insurance Fund, The New England Navigation Co.	161,195.72	2,901,746.92
Total Appropriated Surplus		$3,264,442.31
Equipment and Personal Property Leased		8,304,671.06
Deferred Liability Account Net Assets, Connecticut Ry. and Lighting Co.		626,236.92
Profit and Loss Account		19,600,915.04
		$504,692,632.02

Contingent Liabilities:

The New York, New Haven and Hartford Railroad Company is liable jointly with other roads for any deficiency on foreclosure of bonds of The Boston Terminal Company.

The New York, New Haven and Hartford Railroad Company guarantees four per cent. dividends on preferred stock of the Springfield Railway Companies, $3,387,900., and payment of principal at one hundred five per cent. on liquidation.

The New York, New Haven and Hartford Railroad Company guarantees four per cent. dividends on preferred stock of the New England Investment and Security Company, $4,000,000., and payment of principal at one hundred five per cent. on liquidation, also guarantees the payment of the principal, $1,500,000., and interest of New England Investment and Security Company fifteen-year Funding Gold Notes, dated April 1st, 1909, also guarantees the payment of the principal, $1,500,000., and interest of New England Investment and Security Company fifteen-year Funding Gold Notes dated April 1st, 1909, when requested to do so by John L. Billard, as per contract.

Under the provisions of Section 4, Chapter 519, of the Acts of the General Court of the Commonwealth of Massachusetts, passed at its 1909 Session, The New York, New Haven and Hartford Railroad Company guarantees that it will duly pay the principal of, and the dividends, and interest upon the capital stock, bonds, notes, and other [illegible] Boston Terminal Company, imposed by Chapter 516, Acts of the General Court of the Commonwealth of Massachusetts, approved June 7th, 1911, authorizing the issue of preferred stock [illegible] Boston Terminal Company, in exchange for [illegible] Debentures dated November 1st, 1902, and [illegible] Debentures owned by The New York, New Haven and Hartford Railroad Company were exchanged for preferred stock. One Dollar ($1.00) par value was held by the public, [illegible] Boston Terminal Company, on [illegible] The New York, New Haven and Hartford Railroad Company hold the following stock:

[illegible] Common Stock at par value	$3,106,300.00
[illegible] Preferred Stock at par value	54,400.00

THE FIFTY-SECOND ANNUAL REPORT OF THE CHICAGO AND NORTH WESTERN RAILWAY COMPANY.

[illegible] fiscal year ending June 30, 1911.

[illegible] Revenue		$1,907,425.64
[illegible] Operating Income		13,676.96
[illegible] Net Profit		$11,851,299.68
[illegible] Interest [illegible] Net Operating Revenue		6,116,033.84
Operating Income		$18,235,764.80
Other Income:		
[illegible]	$1,[illegible]	
[illegible]	1,[illegible]	
[illegible]	1,[illegible]	
[illegible]	1,[illegible]	
Total Other Income		3,033,466.43

CHICAGO AND NORTH WESTERN RAILWAY COMPANY (Continued from preceding page).

Gross Income		$21,769,231.27
Deductions from Gross Income.		
Rents—Debits	$1,200,022.70	
Interest Accrued on Funded Debt	7,726,146.35	
Other Interest	1,360.97	
Sinking Funds	225,000.00	
Other Deductions	13,601.24	
Total Deductions from Gross Income		9,166,131.26
Net Income		$12,603,100.01
Dividends.		
8% on Preferred Stock	$1,791,600.00	
7% on Common Stock	9,108,015.00*	
Total Dividends on Stock		10,899,615.00
Balance Income for the year		$1,703,485.01

*This amount includes the full year's dividend on the increase in Common Stock of the Company issued during the latter half of the preceding fiscal year.

The results as compared with the preceding fiscal year were as follows:

Passenger Revenue increased	$687,866.20	
Other Transportation Revenue increased	543,030.29	
Nontransportation Revenue increased	23,485.84	
	$1,254,382.33	
Freight Revenue decreased	511,881.19	
Increase in Total Operating Revenues		$742,501.14
Operating Expenses increased	$859,090.98	
Taxes Accrued increased	136,521.32	
Increase in Operating Expenses and Taxes Accrued	$995,612.30	
Net Deficit from Outside Operations decreased	3,264.04	
		992,348.26
Decrease in Operating Income		$249,847.12

The Operating Expenses for the current fiscal year include $29,949,940.52 paid for Labor as compared with $30,150,911.21 paid during the preceding fiscal year, being a decrease of $200,970.69, accounted for as follows:

Decrease account less time worked by employes	$1,312,287.22
Increase account higher rates of compensation	1,111,316.53
	$200,970.69

MILES OF RAILROAD.

The total number of miles of railroad owned June 30, 1911, was		7,544.77 miles
In addition to which the company operated:		
Through Ownership of Entire Capital Stock—		
Princeton & Western Railway (Wyeville to Necedah, Wis.)	16.06 miles	
Wolf River Valley Railway (Junction east of Elton to Van Ostrand, Wis.)	1.98 "	
		18.04 "
Under Lease—		
St. Paul Eastern Grand Trunk Railway (Clintonville to Oconto, Wis., and branches)	60.02 "	
De Pue, Ladd & Eastern Railroad (Ladd to Seatonville, Ill.)	3.25 "	
Belle Fourche Valley Railway (Belle Fourche to Newell, S. D.)	23.52 "	
James River Valley and North Western Railway (Blunt to Gettysburg, S. D.)	39.55 "	
		126.34 "
Under Trackage Rights—		
Peoria & Pekin Union Railway (in the city of Peoria, Ill.)	2.02 "	
Chicago, Indiana & Southern Railroad (Churchill to Ladd, Ill.)	2.80 "	
Union Pacific Railroad (Broadway Station, Council Bluffs, Iowa, to South Omaha, Neb.)	8.73 "	
Chicago, St. Paul, Minneapolis & Omaha Railway (Blair to Omaha, Neb.)	24.70 "	
Chicago, St. Paul, Minneapolis & Omaha Railway (in Sioux City, Iowa)	2.62 "	
Illinois Central Railroad (Sioux City to Wren Junction, Iowa	10.10 "	
Missouri Valley & Blair Railway & Bridge Company's track	3.36 "	
		54.33 "
Total miles of railroad operated June 30, 1911		7,743.48 "
The above mileage is located as follows:		
In Illinois		685.02 miles
In Wisconsin		1,968.73 "
In Michigan		519.88 "
In Minnesota		650.30 "
In Iowa		1,620.60 "
In North Dakota		14.38 "
In South Dakota		1,052.16 "
In Nebraska		1,102.05 "
In Wyoming		130.36 "
Total		7,743.48 "

FREIGHT TRAFFIC.

The details of Freight Traffic for the year ending June 30, 1911, compared with the preceding year, were as follows:

	1910.	1911.	Increase Amount.	Increase Per Cent.
Freight Revenue	$49,536,839.18	$49,024.957.99	$511,881.19	1.03 Decrease

	1910.	1911.	Percentage of Increase or Decrease.
Tons of Freight Carried	39,339,739	36,733,526	6.63 Decrease
Tons of Freight Carried One Mile	5,567,587,719	5,433,696,684	2.33 Decrease
Average Revenue Received per Ton	$1.26	$1.33	5.56 Increase
Average Revenue Received per Ton per Mile	.89 of a cent	.90 of a cent	1.12 Increase
Average Distance Each Ton Was Hauled	141.40 miles	147.92 miles	4.61 Increase
Mileage of Revenue Freight and Mixed Trains	21,336,510	19,648,998	7.91 Decrease
Average Number of Tons of Revenue Freight Carried per Train Mile	260.71	276.54	6.07 Increase
Average Number of Tons of Revenue Freight Carried per Loaded Car Mile	15.51	15.65	.90 Increase
Average Freight Revenue per Train Mile	$2.32	$2.50	7.76 Increase

PASSENGER TRAFFIC.

The details of Passenger Traffic for the year ending June 30, 1911, compared with the preceding year, were as follows:

	1910.	1911.	Increase Amount.	Increase Per Cent.
Passenger Revenue	$18,431,017.47	$19,118,883.67	$687,866.20	3.73

	1910.	1911.	Percentage of Increase or Decrease.
Passengers Carried	28,697,470	30,330,900	5.69 Increase
Passengers Carried One Mile	1,012,742,855	1,054,572,455	4.13 Increase
Average Fare Paid per Passenger	64 cents	63 cents	1.56 Decrease
Average Rate Paid per Passenger per Mile	1.82 cents	1.81 cents	.55 Decrease
Average Distance Traveled per Passenger	35.29 miles	34.77 miles	1.47 Decrease
Mileage of Revenue Passenger and Mixed Trains	20,015,474	20,144,057	.64 Increase
Average Passenger-Train Revenue per Train Mile	$1.15	$1.20	4.35 Increase

MAINTENANCE OF WAY AND STRUCTURES.

The total Operating Expenses of the Company for the year ending June 30, 1911, were $53,012,710.19; of this amount $10,002,073.13 was for charges pertaining to the Maintenance of Way and Structures. Included in these charges is a large part of the cost of 58,956 tons of steel rails, the greater portion of which was laid in replacement of rails of lighter weight in 444.84 miles of track; also the cost of 2,493,501 new ties.

The charges for Maintenance of Way and Structures also include a large portion of the cost of ballasting 16.78 miles of track with crushed stone, 74.77 miles with gravel, and 22.87 miles with cinders and slag; the erection, in place of wooden structures, of 44 new steel bridges on masonry, and 7 on pile supports, aggregating 5,097 feet in length and containing 5,622 tons of bridge metal; and the replacement of other wooden structures with masonry arch and box culverts and cast-iron pipes, the openings being filled with earth. The wooden structures replaced by permanent work aggregate 12,596 feet in length.

The charges on account of Maintenance of Way and Structures for the year ending June 30, 1911, compared with the preceding year, were as follows:

Rails Laid in Renewals.	1910.	1911.	Increase or Decrease.
New steel rails laid	22,646 tons	40,210 tons	17,564 tons Inc.
Usable rails laid	18,336 "	18,746 "	410 " Inc.
Total tons laid	40,982 "	58,956 "	17,974 " Inc.
Ties Laid in Renewals. Number	2,418,782	2,493,501	74,719 Inc.
Cost of Rails.			
New steel rails	$654,641.58	$1,149,889.91	$495,248.33 Inc.
Usable rails	445,169.75	386,659.53	58,510.22 Dec.
	$1,099,811.33	$1,536,549.44	$436,738.11 Inc.
Less value of old rails and other items	822,109.52	1,093,061.45	270,951.93 Inc.
Net charge for rails	$277,701.81	$443,487.99	$165,786.18 Inc.
Cost of Ties	1,240,473.53	1,285,538.95	45,065.42 Inc.
Cost of Ballast	448,816.05	183,677.18	265,138.87 Dec.
Cost of Other Track Material	534,982.85	415,725.36	119,257.49 Dec.
Roadway and Track Labor and Other Expenses	5,035,626.69	4,169,703.72	865,922.97 Dec.
Total Charges for Roadway and Track	$7,537,600.93	$6,498,133.20	$1,039,467.73 Dec.
Other Charges Account Maintenance of Way and Structures were as follows:			
Bridges, Trestles and Culverts	1,096,140.27	1,284,681.52	188,541.25 Inc.
Road Crossings, Fences, etc.	244,272.71	268,962.82	24,690.11 Inc.
Signals and Interlocking Plants	250,727.87	246,663.31	4,064.56 Dec.
Buildings, Fixtures and Grounds	953,297.12	986,104.39	32,807.27 Inc.
Docks and Wharves	60,626.64	68,556.21	7,929.57 Inc.
Superintendence	396,458.59	400,294.69	3,836.10 Inc.
Roadway Tools and Supplies	96,263.32	75,157.02	21,106.30 Dec.
Sundry Miscellaneous Charges	138,950.44	173,519.97	34,569.53 Inc.
Total Charges Account Maintenance of Way and Structures	$10,774,337.89	$10,002,073.13	$772,264.76 Dec.

The above charges for Maintenance of Way and Structures for the current year amount to 18.87 per cent. of the total Operating Expenses, as compared with 20.66 per cent. for the preceding fiscal year.

MAINTENANCE OF EQUIPMENT.

The charges on account of Maintenance of Equipment for the year ending June 30, 1911, compared with the preceding year, were as follows:

	1910.	1911.	Increase or Decrease.
Locomotives	$3,842,292.79	$4,021,661.26	$179,368.47 Inc.
Passenger-Train Cars	926,679.91	980,437.97	53,758.06 Inc.
Freight-Train Cars	3,676,262.75	3,684,541.12	8,278.37 Inc.
Work Equipment	252,672.05	107,056.90	145,615.15 Dec.
Shop Machinery and Tools	123,216.89	201,214.78	78,004.89 Inc.
Superintendence	224,606.35	239,107.88	14,501.53 Inc.
Sundry Miscellaneous Charges	53,486.26	73,119.48	19,633.22 Inc.

Total Charges Account Maintenance of Equipment.....	$9,814,126.70	$9,307,196.09	$157,979.39 Inc.

The charges for Maintenance of Equipment for the current year amounted to 17.56 per cent. of the total Operating Expenses, as compared with 17.54 per cent. for the preceding fiscal year.

RESERVE FOR ACCRUED DEPRECIATION ON EQUIPMENT.

At the close of the preceding fiscal year there was a balance to the credit of the Equipment Reserve Accounts of.....		$1,398,702.01
During the year ending June 30, 1911, there was credited to the Equipment Reserve Accounts on account of charges to Operating Expenses and Profit and Loss, and for salvage....		2,781,321.55
		$4,180,023.56
And there has been charged during the year against the above amount the original cost of Equipment retired and other items, as follows:		
[illegible]	$364,562.00	
10 Passenger-Train Cars.....	35,611.72	
1,822 Freight-Train Cars.....	1,275,396.31	
130 Work Equipment Cars.....	25,800.00	
Other Items	92,288.04	
		1,793,658.07
Leaving a balance to the credit of the Equipment Reserve Accounts on June 30, 1911, of.....		$2,386,365.49

TRANSPORTATION EXPENSES.

The Transportation Expenses of the Company for the year ending June 30, 1911, were $30,836,560.68, or 58.17% of the total Operating Expenses. Of this amount $18,550,310.88, or 60.16%, was charged for labor; $7,863,922.11, or 25.50%, was charged for fuel for locomotives and $4,422,327.69, or 14.34%, was charged for supplies and miscellaneous items. The increase in the Transportation Expenses for the year ending June 30, 1911, as compared with the preceding fiscal year, was $1,159,206.43, or 3.91%, distributed as follows:

Increase in amount charged for labor.....	$287,679.08
Increase in amount charged for fuel for locomotives.....	164,169.30
Increase in amount charged for supplies and miscellaneous items	707,358.05
	$1,159,206.43

CAPITAL STOCK.

During the year ending June 30, 1911, there was a decrease of $4,275.00 in the amount of Common Stock and Scrip held by the Public, and a corresponding increase in the amount of such Stock and Scrip owned by the Company.

There was no change in the Preferred Stock or Scrip.

The Company's authorized Capital Stock is Two Hundred Million Dollars ($200,000,000.00), of which the following has been issued to June 30, 1911:

Common Stock and Scrip held by the Public	$130,117,213.82	
[illegible]	[illegible]	
Total Common Stock and Scrip.....		$132,455,530.97
[illegible]	[illegible]	
Preferred Stock and Scrip owned by the [illegible]	[illegible]	
Total Preferred Stock and Scrip.		22,398,954.56
Total Capital Stock and Scrip, June 30, 1911.....		$154,854,485.53

FUNDED DEBT.

At the close of the preceding fiscal year the amount of [illegible]		[illegible]
[illegible]		135,000.00
		$146,714,000.00
[illegible]		1,000,000.00
[illegible]		500,000.00

The Bonds on hand and due from Trustee have been decreased during the year as follows:

C. & N. W. Ry. General Mortgage Gold Bonds of 1987, 4%, sold to reimburse the Company for past expenditures made for Construction and in redeeming matured Bonds	22,500,000.00
Total Bonds in the Treasury and due from Trustee, June 30, 1911	$5,248,000.00
Net Decrease during the year in Bonds in the Treasury and due from Trustee.....	$15,015,000.00

CONSTRUCTION.

The construction charges for the year ending June 30, 1911, were as follows:

	Miles.		
On Account of Additional Main Tracks, viz.:			
Third Track, Mayfair Cut-Off, Ill....	2.52	$5,158.32	
Third and Fourth Tracks, Fulton Cut-Off, Ill.	4.69	8,580.04	
Second Track, Lake Shore Junction to south of Lindwerm, Wis.....	4.11	28,747.15	
Second Track near West Allis, Wis...	1.28	64,768.68	
			$102,254.19
On Account of Extension, viz.:			
Dallas to Winner, South Dakota.....	21.48		320,853.63
On Account of Elevating Tracks, viz.:			
In the City of Evanston, Ill.....		$279,933.55	
North 46th Avenue to Austin Avenue, Chicago, Ill.		9,095.64	
Austin Avenue to Harlem Avenue, Oak Park, Ill.		189,200.05	
Harlem Avenue, Oak Park, Ill., to Des Plaines River		139,797.59	
South Branch Track, from near Taylor Street to Canal St., Chicago, Ill.....		131,808.12	
In the City of Milwaukee, Wis. (Madison Division)		28,422.70	
			778,257.65
Sundry Construction:			
Right of Way and Additional Depot and Yard Grounds		$170,143.12	
Station Buildings and Fixtures.....		451,651.85	
Shops, Enginehouses and Turntables.....		793,760.60	
Water and Fuel Stations		149,624.05	
Shop Machinery and Tools.....		55,718.26	
Permanent Bridges (cost of new over old)..		928,752.18	
Interlocking and Signal Apparatus..... ..		33,421.74	
New Sidings, Yard Tracks and Spurs to Industries		435,121.48	
Betterment of Roadway and Track.....		339,326.78	
Fulton, Ill., Terminal Improvements.....		450,990.84	
Proviso, Ill., Terminal Improvements.....		255,428.55	
Boone, Iowa, Terminal Improvements		164,376.59	
New Chicago Passenger Terminal.....		4,188,061.99	
Miscellaneous Construction, including Road Crossings, Signs and other items.....		190,622.96	
			8,606,850.99
Additional Equipment:			
175 Locomotives, 274 Passenger-Train Cars, 225 Freight-Train Cars and 3 Work Equipment Cars		$4,944,789.96	
Less Equipment retired.....		1,793,658.07	
			3,151,131.89
			$12,959,348.35
Cost of Lee County Railway			808,111.89
Cost of Sioux City, Dakota and North Western Railway....			937,730.12
Total			$14,705,190.36

NEW PASSENGER TERMINAL IN THE CITY OF CHICAGO.

The Company's new Passenger Terminal in the city of Chicago was completed and opened to the public on June 4, 1911.

TRACK ELEVATION IN THE CITY OF CHICAGO AND VICINITY.

The elevation of the Company's roadway and main tracks in Chicago from a connection with its Rockwell Street line at Taylor Street to a connection with its Sixteenth Street line at Leavitt Street, a distance of [illegible] miles, has been practically completed.

The elevation of the main tracks of the Company on its Milwaukee line through the City of Evanston, Illinois, and the construction of five modern passenger stations in that City, have been completed.

Substantial progress has been made in the elevation of the two existing main tracks and the construction and elevation of four additional main tracks of the Green Harbor through the Village of Oak Park, which adjoins the City of Chicago at its western limits. The work now being executed and contracted for includes the extension of the construction and elevation of the present main tracks from Austin Avenue to Cicero Avenue, a distance of [illegible] miles; the elevation of the two existing main tracks and the construction of four additional main tracks from Cicero Avenue to Huron Avenue, a distance of [illegible] miles, the construction of a passenger station at the south end of the elevation from Humboldt Avenue to Harlem Avenue, a distance of 1.2 miles, and the construction of a double passenger station at Marion Street.

Proceedings are now being conducted by the Village of River Forest and Lower Lake Drainage, embracing the Village of Oak Park, to the western limit of the Company's property, for the elevation of the two existing main tracks and the construction of [illegible] additional main tracks [illegible] Austin Avenue, a distance of 3.11 miles.

LEASES, ADDITIONS AND BETTERMENTS.

[illegible] the most important [illegible] additions and betterments to the property of the Company during the fiscal year are the following:

The [illegible] road is being constructed from Lake Shore Junction, near Whitefish Bay, to Milwaukee, Wis., a distance of 4.11 miles, [illegible] and has been practically completed from West Allis, Wis., to a connection with the Milwaukee, Sparta and North Western Railway, a distance of [illegible] miles, including the erection and equipment of the necessary road. A line of [illegible] road [illegible] has been constructed from a point about two miles north of Lake Shore Junction, Wisconsin, on the Lake Shore Division, to near Lakeview, Wisconsin, on the Wisconsin Division, a distance of 1.00 mile, [illegible] of the City of Milwaukee, be-

tween the Lake Shore Division and the Milwaukee, Sparta and North Western Railway.

An aggregate of 136.00 miles of yard tracks, sidings and industrial spurs has been added.

At Madison, Wisconsin, a modern and commodious passenger station building has been completed, the main portion of which is constructed of gray stone, is two stories in height and has a frontage on Blair Street of 127 feet and a depth of 109 feet; the remainder of the building is of brick, is one story in height and occupies an area of substantially 38'x 140'. The general waiting room in the new building is 78 feet long, 50 feet wide and 32 feet high and has a floor of marble tile and walls faced with Tennessee marble. This room communicates with a sheltered concourse, 50'x75', from which gates lead to three track platforms, 20 feet in width and protected by iron and concrete shelter sheds 400 feet long. Directly adjoining and communicating with the general waiting room are the smaller waiting rooms, ticket and minor offices and a completely equipped dining and lunch room, 80 feet long and 35 feet wide. The second story of the new station is used for offices. In connection with this improvement an important enlargement and revision of track facilities has been made.

Modern brick passenger stations have also been completed at Wheaton, Harvard, Ravinia and Hubbard Woods, Illinois; Allis, Wisconsin; Negaunee, Michigan; O'Neill, Nebraska; and Aberdeen, South Dakota.

At Wheaton and Rockford, Illinois, brick freight stations, 20'x120' and 32'x152', respectively, have been constructed.

The shop plant of the Company at Chicago has been enlarged and improved by the construction of a 15-stall machine shop 189'x362', a wheel and stripping shop 150'x189' (equipped with the necessary tools), a transfer table and pit, and the installation of six electric traveling cranes.

The enlargement and improvement of the Company's terminal facilities at Proviso, Illinois, was inaugurated and a considerable expenditure made on that account during the year. The work now in progress consists of the construction of ample coal and water facilities and of 52.30 miles of yard tracks, which will increase the capacity of this yard to 4,967 cars.

At Nelson, Illinois, the construction of a 10-stall, 90-foot, brick engine house, clinker pit, turntable and a system of yard tracks with a capacity of 300 cars has been completed.

The improvements near Fulton, Illinois, consisting of a terminal yard, a 58-stall, 90-foot, engine house and other buildings, to which reference was made in the last annual report, have been completed.

At Boone, Iowa, the Company has undertaken the construction of a 36-stall, 90-foot, brick engine house, power house, electric light and transmission line, machine shop 164'x293', transfer table and fittings, and miscellaneous buildings and extensive facilities for supplying coal and water; also, the construction of 17 miles of yard tracks, which will make the total capacity of this yard 1,400 cars.

At Waseca, Minnesota, the existing yard tracks are being rearranged and four additional yard tracks are being constructed, increasing the capacity of this yard 209 cars.

At Tracy, Minnesota, a new freight yard containing 3.75 miles of track with a capacity of 400 cars has been completed.

At Chadron, Nebraska, a 20-stall, 84-foot, brick-lined engine house, and a brick shop building 100'x52', have been constructed to replace smaller buildings destroyed by fire, and the necessary new machinery and tools have been installed.

At Manitowoc, Wisconsin, a bituminous coal bridge 446 feet long and 60 feet high, and a bituminous coal screening plant, electrically operated, with suspended trolley runways and 5-ton bucket hoist for handling coal from boats to dock and from dock to cars, are being installed, together with a brick power house 44'x77', having modern boilers and electrical generating power and lighting plant. The coal dock area is 277'x855', and coal can be piled to a height of 40 feet. The capacity of the bituminous coal dock is 170,000 tons. Provision is also made for the future installation of a steel anthracite coal storage shed with complete handling plant having a capacity of 70,000 tons.

Additional plants have been installed at a number of stations to increase the facilities for supplying coal and water.

Telephone lines to be used in connection with the dispatching of trains are being constructed as follows:

From Milwaukee to Lindwerm, Wisconsin	8.00 miles
From Milwaukee to West Allis, Wisconsin	10.75 "
From East Clinton, Illinois, to Boone, Iowa	201.80 "
From Missouri Valley, Iowa, to Fremont, Nebraska, including Arlington to Irvington, Nebraska	55.97 "
From Omaha to South Omaha, Nebraska, via Irvington, Nebraska	136.30 "
From Tracy to Huron, South Dakota	126.50 "
From Huron to Oakes, South Dakota	118.80 "
From Sioux Valley Junction to Redfield, South Dakota	7.00 "

The following new equipment has been purchased during the year:

Locomotives		175
PASSENGER EQUIPMENT:		
Coaches (Steel)	50	
Chair Cars (Steel)	20	
Observation Smoking Cars (Steel)	6	
Parlor Cars (Steel)	4	
Observation Parlor Cars (Steel)	7	
Combination Passenger and Baggage Cars	7	
Baggage Cars (Steel)	10	
Postal Cars (Steel)	150	
Milk Express Cars	24	274
FREIGHT EQUIPMENT:		
Refrigerator Cars	50	
Ore Cars (Steel)	125	
Caboose Cars	50	225
WORK EQUIPMENT:		
Crane	1	
Ballast Unloader	1	
Ballast Spreader	1	3

NEW RAILWAYS AND EXTENSIONS.

The company has acquired by purchase, during the year, the following proprietary railways:

LEE COUNTY RAILWAY, a double track railway, extending from Nachusa to Nelson, Illinois, a distance of 17.76 miles.

SIOUX CITY, DAKOTA AND NORTH WESTERN RAILWAY extending from a connection with the Illinois Central Railroad near Hinton, Iowa, to a connection with the Chicago and North Western Railway near Hawarden, Iowa, a distance of 38.17 miles.

And has leased the following proprietary railways:

BELLE FOURCHE VALLEY RAILWAY, extending from a connection with the Chicago and North Western Railway at Belle Fourche, South Dakota, eastwardly to Newell, South Dakota, a distance of 23.52 miles.

JAMES RIVER VALLEY AND NORTH WESTERN RAILWAY, extending from a connection with the Chicago and North Western Railway near Blunt, South Dakota, to a connection with the Chicago and North Western Railway at Gettysburg, South Dakota, a distance of 39.55 miles.

Substantial progress has been made during the year toward the completion of the following railways under construction in the interest of this company:

DES PLAINES VALLEY RAILWAY, a double track railway, extending from near Blodgett, Illinois, on the western division of the four track system of the Chicago and North Western Railway between Chicago and Milwaukee, to a connection with the Wisconsin Division near Des Plaines, Illinois, and thence to a connection with the Galena Division at Proviso, Illinois, a distance of about 21 miles.

MILWAUKEE, SPARTA AND NORTH WESTERN RAILWAY, extending from a connection with the Chicago and North Western Railway near Lindwerm on the Wisconsin Division, about eight miles north of Milwaukee, to Sparta on the Madison Division, a distance of 169.03 miles, and from a connection with the above line at a point about six miles west of Lindwerm, to a connection with the Milwaukee and Madison line near West Allis, a distance of 8.16 miles, in all 177.19 miles. This mileage includes an existing branch railway between Necedah and Wyeville, a distance of 13.05 miles, which is being reconstructed and will be used as a part of the main line. At Butler, located near the connection between these two lines west of Lindwerm, a 58-stall, 90-foot, brick engine house, brick power house 100'x110', heating, water and fuel plants and miscellaneous terminal buildings are being constructed. There is also being constructed at this location a terminal yard containing 21.10 miles of track, with capacity for 1,525 cars.

THE ST. LOUIS, PEORIA AND NORTH WESTERN RAILWAY COMPANY was organized in the interest of this Company, in February, 1911, to construct a railway from a connection with the Chicago and North Western Railway near Peoria, to a connection with the Macoupin County Railway (a proprietary railway) near Girard, Illinois, a distance of about 90.4 miles. The right of way for this railway is being acquired. The new line will give the Company direct access to its extensive coal fields in Southern Illinois and insure to it an economical, adequate and reliable supply of fuel.

An extension of the Company's railway from Dallas, in Gregory County, South Dakota, to Winner, in Tripp County, South Dakota, a distance of 21.48 miles, has been completed.

INDIANA HARBOR BELT RAILROAD COMPANY.

In pursuance of the policy of the Company to make provision, as far as practicable, for the interchange of traffic with other railways outside of the limits of the City of Chicago, as well as to enable it to more directly participate in serving the large industrial territory under development in the vicinity of Indiana Harbor and Gary, Indiana, and tributary to the lines of the Indiana Harbor Belt Railroad Company, this Company has acquired by purchase during the year 20% of the outstanding capital stock and 20% of certain obligations of that Company. The Indiana Harbor Belt Railroad Company owns, or has trackage rights over, about 112 miles of railroad which connect with the lines of the Chicago and North Western Railway Company at its Proviso terminal yards.

LANDS.

During the year ending June 30, 1911, 27,098.55 acres and 37 town lots of the Company's Land Grand lands have been sold for the total consideration of $589,367.94. The total number of acres remaining in the several Grants June 30, 1911, amounted to 375,644.54 acres, of which 29,977.22 acres were under contract for sale, leaving unsold 345,667.32 acres.

Appended hereto may be found statements, accounts and statistics relating to the business of the fiscal year, and the condition of the Company's affairs on June 30, 1911.

By order of the Board of Directors.

WILLIAM A. GARDNER,
President.

GENERAL BALANCE SHEET, JUNE 30, 1911.

(7,544.77 Miles.)

ASSETS.

PROPERTY INVESTMENT.		
Road and Equipment:		
Balance to Debit of this Account, June 30, 1910	$291,597,611.02	
Add Sundry Construction and Equipment Expenditures for the year ending June 30, 1911 (as per statement elsewhere herein)	12,959,348.35	
" Cost of Lee County Railway	808,411.89	
" Cost of Sioux City, Dakota and North Western Railway	937,730.12	
		$306,303,101.38
Securities:		
Securities of Proprietary, Affiliated and Controlled Companies (Unpledged)		1,470,113.15
Other Investments:		
Advances to Proprietary, Affiliated and Controlled Companies for Construction, Equipment and Betterments	$21,801,800.18	
Miscellaneous Investments	1,001,597.47	
		22,803,897.65
		$330,577,112.18
WORKING ASSETS		
Cash	$12,964,392.90	
Common Stock and Scrip, C. & N. W. Ry. Co., in hands of Treasurer	2,338,317.15	
Preferred Stock and Scrip, C. & N. W. Ry. Co., in hands of Treasurer	3,834.56	
$40,000 M. L. S. & W. Ry. Lee & Dmp. Sinking Fund Bonds in hand	40,000.00	
4,777,000 C. & N. W. Ry. General Mortgage Gold Bonds of 1987, due from Trustee in exchange for Bonds retired	4,777,000.00	
431,000 Sioux City Iowa Ry. First Mortgage Bonds in hand	431,000.00	
149,700 Shares of Capital Stock of the Chicago St. Paul, Minneapolis & Omaha Ry. Co.	10,337,152.20	
41,715 Shares of Preferred Stock of the Union Pacific Railroad Co.	3,910,575.93	
Bills Receivable	449,224.00	

Traffic and Car-Service Balances Due from Other Companies	76,588.14	
Net Balance Due from Agents and Conductors	2,693,355.23	
Miscellaneous Accounts Receivable	2,122,222.16	
Materials and Supplies	4,669,456.33	
Other Working Assets	9,910.55	
		44,823,029.24
Deferred Debit Items.		
Advances	$347,428.26	
Insurance Paid in Advance	50,389.80	
Cash and Securities in Sinking and Redemption Funds	6,286,877.80	
Other Deferred Debit Items	941,475.46	
		7,626,171.32
		$383,026,312.74

LIABILITIES.

Capital Stock.		
Common Stock and Scrip, C. & N. W. Ry. Co., held by the Public	$130,117,213.82	
Preferred Stock and Scrip, C. & N. W. Ry. Co., held by the Public	22,395,120.00	
		$152,512,333.82
Common Stock and Scrip, C. & N. W. Ry. Co., owned by the Company	$2,338,317.15	
Preferred Stock and Scrip, C. & N. W. Ry. Co., owned by the Company	3,834.56	
		2,342,151.71
Premium Realized on Capital Stock		29,657.75
		$154,884,143.28
Mortgage, Bonded and Secured Debt.		
Bonds in hands of the Public	$154,852,500.00	
Add C. & N. W. Ry. Sinking Fund Debentures of 1933, in hands of Public, issued for purchase of Stock of C. St. P. M. & O. Ry. Co.	9,695,000.00	
	$164,547,500.00	
Less held in Trustee account Sinking [illegible]	4,666,500.00	
Amount owed by Company and due from Trustee	5,248,000.00	
		174,462,000.00
Working Liabilities.		
Traffic and Car-Service Balances Due to Other Companies	$1,476,041.90	
Audited Vouchers and Wages Unpaid	4,649,460.47	
Miscellaneous Accounts Payable	198,649.75	
Matured Interest, Dividends and Rents Unpaid	3,134,843.52	
Other Working Liabilities	8,921.96	
		9,427,917.60
Accrued [illegible] Not Due:		
Unmatured Interest Payable	$1,663,275.83	
Taxes Accrued	54,000.00	
		1,717,275.83
Deferred Credit Items.		
Insurance Department etc.		
Equipment	$2,386,365.49	
[illegible]		2,637,635.01
Appropriated Surplus.		
Sinking Fund on Madison Extension Gold [illegible]	$1,[illegible]	
[illegible]	1,[illegible]	
[illegible]	1,[illegible]	
[illegible]	1,[illegible]	
[illegible]	[illegible]	
		6,830,877.80
Profit and Loss		[illegible]
		$383,026,312.74

COMPARATIVE STATEMENT OF INCOME ACCOUNT.

	Year Ending June 30, 1910. Average Mileage Operated 7,629.45	Year Ending June 30, 1911. Average Mileage Operated 7,718.72	Increase or Decrease.
Operating Revenues.			
Freight Revenue	$49,536,839.18	$49,024,957.99	—$511,881.19
Passenger Revenue	18,431,017.47	19,118,883.67	687,866.20
Other Transportation Revenue	5,768,344.63	6,311,374.92	543,030.29
Nontransportation Revenue	439,483.41	462,969.25	23,485.84
Total Operating Revenues	$74,175,684.69	$74,918,185.83	$742,501.14
Operating Expenses	52,153,619.21	53,012,710.19	859,090.98
Net Operating Revenue	$22,022,065.48	$21,905,475.64	—$116,589.84
Outside Operations—Net			
Deficit	56,941.00	53,676.96	—3,264.04
Total Net Revenue	$21,965,124.48	$21,851,798.68	—$113,325.80
Taxes Accrued	2,979,512.52	3,116,033.84	136,521.32
Operating Income	$18,985,611.96	$18,735,764.84	—$249,847.12
Other Income.			
Rents—Credits	135,300.72	152,580.63	17,279.91
Dividends on Stocks Owned	1,594,249.50	1,711,222.00	116,972.50
Interest on Funded Debt Owned	1,900.00	4,087.50	2,187.50
Interest on Other Securities, Loans and Accounts	808,309.23	1,165,576.30	357,267.07
Total Other Income	$2,539,759.45	$3,033,466.43	$493,706.98
Gross Income	$21,525,371.41	$21,769,231.27	$243,859.86
Deductions from Gross Income.			
Rents—Debits	1,397,277.94	1,200,022.70	—197,255.24
Interest Accrued on Funded Debt	7,582,514.99	7,726,146.35	143,631.36
Other Interest	931.89	1,360.97	429.08
Sinking Funds	225,500.00	225,000.00	—500.00
Other Deductions	20,649.23	13,601.24	—7,047.99
Total Deductions from Gross Income	$9,226,874.05	$9,166,131.26	—$60,742.79
Net Income	$12,298,497.36	$12,603,100.01	$304,602.65
Dividends on Stock.			
8% on Preferred Stock	1,791,600.00	1,791,600.00	.....
7% on Common Stock	8,040,438.00	9,108,015.00	*1,067,577.00
Total Dividends on Stock	$9,832,038.00	$10,899,615.00	$1,067,577.00
Balance Income for the year, carried to Profit and Loss	$2,466,459.36	$1,703,485.01	—$762,974.35

*Note:—This increase is due to a full year's dividend on the increase in Common Stock of the Company issued during the latter half of the preceding fiscal year.

PROFIT AND LOSS ACCOUNT, JUNE 30, 1911.

DR.

Depreciation accrued prior to July 1, 1907, on equipment retired or changed from one class to another during the current fiscal year	$1,282,296.73
Discount on C. & N. W. Ry. 4% General Mortgage Gold Bonds of 1987 sold during the year	825,000.00
Net loss on property sold or abandoned and not replaced	53,854.24
Balance Credit, June 30, 1911, carried to Balance Sheet	33,066,463.22
	$35,227,614.19

CR.

Balance, June 30, 1910	$32,178,932.10
Balance Income for Year ending June 30, 1911, brought forward from Income Account	1,703,485.01
Balance from operations of Land Properties for year ending June 30, 1911	522,145.69
Amount transferred from "Appropriated Surplus" on account of [illegible] Madison Extension Gold Bonds	806,303.05
Balance of amounts written off the books, etc.	16,728.34
	$35,227,614.19

"COTTON BELT ROUTE" ST. LOUIS SOUTHWESTERN RAILWAY COMPANY.

[illegible]

CAPITAL STOCK

There has been no change in the capital stock of your company during the year.

FUNDED DEBT.

The amount of funded debt of $1,760,000.00, as shown by the general balance sheet, is held by the trustee as the amount of Equipment Trust Certificates issued and remaining paid is accounted for, as follows:

Equipment Trust Certificates issued:	
Deposited with Messrs. Kuhn, Loeb & Co., Kidder, Peabody & Co. and E. Barker Thomas & Co., covering deferred payments extending over a period of five years on 1,000 Box, 100 Automobile and 100 Refrigerator Cars	$1,760,000.00
Equipment Trust Obligations paid	183,922.20
Net Issues	$1,576,077.80

[illegible]

ST. LOUIS, BRYAN & EASTERN RAILROAD COMPANY—LEASE.

[illegible] on the line controlled which, as announced in the [illegible] report, has been acquired through this lease dated [illegible] during the current year. The original line [illegible] Bryan, Texas, to Groesbeck, Texas, a distance of [illegible] miles. Since the acquisition, extensions have been built from

ST. LOUIS SOUTHWESTERN RAILWAY COMPANY (Continued from preceding page.)

Gregor to Stuttgart, a distance of about 18 miles, and from Rice Junction to Hazen on the C. R. I. & P. Ry., a distance of about 17 miles. The entire line has been constructed in conformity with the latest standards and is now being ballasted with gravel. When the ballasting is completed, which it is expected will be during this Fall, the line will be turned over to your company for operation under the terms of the lease. First mortgage bonds of the Central Arkansas and Eastern R. R. Co., to the amount of $730,000.00, have been issued and sold to cover all expenditures for road and equipment to May 31, 1911.

STEPHENVILLE NORTH & SOUTH TEXAS RAILWAY COMPANY —PURCHASE.

As stated in the preceding annual report, your company has acquired ownership of the Stephenville North & South Texas Railway Co. by purchase of its capital stock and guaranteeing the payment, both as to principal and interest, of its First Mortgage, Five Per Cent., Thirty-Year, Gold Bonds. The original line acquired extended from Stephenville, Erath County, Texas, to Hamilton, Hamilton County, Texas, a distance of 42.6 miles. Extensions have since been built from Gatesville, the extreme southwestern terminus of the St. Louis Southwestern Railway Company of Texas, to Hamilton, a distance of 31.6 miles, and from Edson (near Hamilton) to Comanche, Comanche County, Texas, a distance of 31.5 miles. The entire new line, which opens up a resourceful territory heretofore lacking transportation facilities, is in operation at the date of this report. Application has been made to the Railroad Commission of the State of Texas for authority to issue bonds to cover the cost of construction of this new line, and it is expected that the desired authority will be granted at an early date.

DIVIDENDS ON PREFERRED STOCK.

Two semi-annual dividends, of 2% each, on the outstanding preferred capital stock, payable January 16 and July 15, 1911, were declared by the Board.

The crop and business conditions in the territory adjacent to your company's lines are good and the outlook for future traffic is therefore favorable.

The faithful and efficient services of your officers and employes, generally, during the past year, are acknowledged with pleasure.

For the Directors,

EDWIN GOULD, *President.*

"COTTON BELT ROUTE" ST. LOUIS SOUTHWESTERN RAILWAY CO.

OFFICE OF THE VICE-PRESIDENT AND GENERAL MANAGER.

ST. LOUIS, Mo., September 1, 1911.

MR. EDWIN GOULD, *President:*

DEAR SIR—Herewith I submit the Annual Report of the Company for the fiscal year ended June 30, 1911, showing the results from operation during the year and the financial and physical condition of the property at the close of the year.

The average main track mileage operated during the year was 1,487.0, an increase of 13.9 miles over the preceding fiscal year. The main track mileage operated at the close of the fiscal year, June 30, 1911, was 1,500.0 miles, an increase of 23.7 miles. This increase is explained as follows:

Trackage rights (freight trains only) over C. & E. I. R. R. from Thebes, Ill, to Olive Branch, Ill.		10.4
Trackage rights (freight trains only) over Illinois Central R. R., from Olive Branch, Ill., to Cairo, Ill.		18.0
Additional main track from Newro Junction, Ark., to Argenta, Ark.		3.2
		31.6
Less—Main track mileage Illmo, Mo., to Gray's Point, Mo., transferred to Illmo yard mileage	3.2	
St. L. I. M. & S. Ry. track mileage at Argenta and Little Rock, Ark., the use of which was discontinued upon completion of this company's facilities at Argenta	2.7	
Main track mileage Newro Junction, Ark., to St. L. I. M. & S. Ry. connection, transferred to side track mileage	2.0	7.9
Net Increase		23.7

A detailed exhibit of the mileage operated on June 30, 1911, showing the main line and branches separately, will be found in Table No. 1 of the appendix to this report.

In the condensed comparative statement, immediately following, will be found the financial results from operation for the year ended June 30, 1911, showing Operating Revenues, Operating Expenses, Net Operating Revenue, etc.

FINANCIAL RESULTS FROM OPERATION—ENTIRE SYSTEM.

INCOME ACCOUNT FOR FISCAL YEAR.

Item.	Year ended June 30, 1911.	Year ended June 30, 1910.	Increase or Decrease.
AVERAGE MILES OPERATED	1487.0	1473.1	13.9
OPERATING INCOME:			
RAIL OPERATIONS:			
Operating Revenues	$11,888,036.73	$10,986,515.96	$901,520.77
Operating Expenses	8,578,155.22	8,146,056.81	432,098.41
Net Operating Revenue	$3,309,881.51	$2,840,459.15	$469,422.36
OUTSIDE OPERATIONS:			
Revenues	$45,884.90	$46,641.60	—$757.40
Expenses	56,354.19	59,252.60	—2,898.41
Net Deficit	$10,469.29	$12,611.00	—$2,141.01
TOTAL NET REVENUE	$3,299,411.52	$2,827,848.15	$471,563.37
TAXES ACCRUED	369,291.55	369,704.36	—412.81
Total Operating Income	$2,930,119.97	$2,458,143.79	$471,976.18
OTHER INCOME	526,884.30	545,121.03	—18,236.64
GROSS CORPORATE INCOME	$3,457,004.30	$3,003,264.82	$453,739.54
DEDUCTIONS FROM GROSS CORPORATE INCOME	*2,242,181.28	*2,186,798.46	54,382.82
BALANCE, CREDIT, CARRIED FORWARD TO PROFIT AND LOSS ACCOUNT	$1,214,823.02	$816,466.36	$399,356.72

PROFIT AND LOSS ACCOUNT, JUNE 30, 1911.

Item.	Dr.	Cr.
Balance June 30, 1910		$4,826,255.63
Balance for Year brought forward from Income Account		1,214,823.02
Additions for Year		17,256.94
Extinguishment of Discount on Equipment Trust Obligations sold since July 1, 1907	$27,984.00	
Deductions for Year	124,887.18	
DIVIDENDS DECLARED:		
On Preferred Capital Stock—4% on $20,000,000.00, payable January 16 and July 15, 1911. $800,000.00		
Less amount on stock held in Company's treasury 4,254.00	795,746.00	
Balance, Credit, June 30, 1911	5,110,718.47	
Total	$6,059,335.65	$6,059,335.65

*Includes $121,700.00 dividends declared on Second Mortgage Income Bond Certificates—full interest (4%) on amount outstading in hands of public.

OPERATING REVENUES.

The steady development of the territory traversed by this line is reflected in the increase in total operating revenues of $901,520.77, or 8.21% over the last fiscal year. The increase in net operating revenue for the year was $469,422.36, or 16.53%.

Freight revenue increased $622,892.30, or 7.56%, due to improved business conditions and the continued development of the agricultural and industrial resources of the southwest country tributary to the line. The tonnage movement of cotton and cotton seed products, exceeded the previous year by 21%. The tonnage of rice, which is rapidly assuming importance as a product of the Arkansas section, increased 178%. There was a slight falling off in the tonnage of lumber and forest products (2.74%) while the tonnage of merchandise and miscellaneous manufactured articles increased 15.80%.

Passenger revenue increased $224,518.19 or 10.35%, which is attributable to the natural growth and the healthy business conditions prevailing.

The agricultural development of the country adjacent to this line, which has been commented upon in previous reports, continued with marked results during the past year. An increased interest in everything pertaining to better farming and larger yields is noticeable along the entire system. As a result of the organization of farmers' institutes, corn clubs, hog clubs, and of special demonstration events, the farmers are rapidly acquiring better cultural methods and greaetr ability to cope with climatic conditions.

For the season of 1910, Arkansas ranked second to all southern states in corn yield, producing 24 bushels to the acre and being exceeded only by Virginia, which produced 25.5 bushels to the acre.

The rice industry in Arkansas continued its remarkable development. The acreage devoted to this product in that state increased about 15% over the preceding year, Experience has demonstrated that the best quality of rice is grown at the point farthest north, where it can be cultivated, and the Arkansas rice ranks highest in this respect.

Great interest is being manifested in the reclamation, by means of levees and drainage ditches, of the alluvial overflow lands in Southeast Missouri, Northeast, Central and Southern Arkansas. Several millions of acres of fertile land will be reclaimed by properly draining the sections referred to.

The extensive industrial development of the section served by this company is evidenced by the establishment during the past year of many new industrial concerns, diversified in character, amongst which are the following: twelve hardwood lumber plants, eight stave mills, six ice factories, four grist mills, three peanut cleaning plants, two mattress factories, three brick plants, five handle factories, two glass factories, three cement tile works, and numerous factories manufacturing furniture, veneer, jugs, concrete blocks, cans, hoops, beehives, pottery, coffins, etc., etc.

The rate litigation with the States of Missouri and Arkansas, referred to in previous reports, is still pending. Permanent injunctions, in favor of the carriers, were granted by the United States Circuit Courts, but each of the States named has carried its case to the United States Supreme Court for final adjudication.

OPERATING EXPENSES.

The total operating expenses for the fiscal year ended June 30, 1911, shows an increase over the preceding fiscal year of $432,098.41, or 5.30%. The ratio of total Operating Expenses to total Operating Revenues this year was [illegible] last year 74.15.

The following changes occurred in the general operating expense accounts:

Maintenance of Way and Structures....decreased, $350,810.68, or 16.31%
Maintenance of Equipment.....increased, 206,518.13, or 11.12%
[illegible] increased, [illegible]
Transportation Expenses .....increased, 521,624.99, or 15.92%
General Expenses [illegible]

The decrease in Maintenance of Way and Structures is explained by the heavy maintenance work of an extraordinary character, done during the preceding year, notably the reconstruction of the steel bridges over the Arkansas and Saline rivers, the maintenance proportion of which amounted to about $164,000.00, and to extensive tie renewals, exceeding those of the present year by $157,970.44.

The policy of maintaining the company's equipment to a standard of high efficiency was carried on during the current year, and resulted in an increase in equipment [illegible]

The increase in Transportation Expenses was due principally to the increased cost of fuel, occasioned by miners' strikes in the coal producing districts contiguous to the line, and to advances in wages of employes. The increase in cost of coal used in all branches of the service, due to increase in price, aggregated for the current year $188,630.33, and the increase due to increased consumption on account of increased locomotive mileage was $76,750.66. The advances in wages [illegible] amounted 10%, and materially increased the operating expenses of the company.

Exhibit "A" on page [illegible] shows the [illegible] expenses for the current and preceding years, and shows the ratios of operating expenses, by classes, to operating revenues and to total operating expenses, average per mile of road operated, etc. Exhibit "B" on pages [illegible] shows a comparison of operating expenses in detail, by primary, as well as by general, accounts.

TRAIN AND CAR LOADING.

The following tables show the average load per freight train and per loaded freight car for the past five years.

Average number of tons per loaded car (excluding company material).

Year ended June 30	St. L. S.-W. Ry. Co.	St. L. S.-W. Ry. Coast Lines.	Entire System.
[illegible]	17.8	18.8	17.[illegible]
1903	18.00	18.40	17.[illegible]
1904	18.19	18.67	17.35
1905	18.19	18.84	17.43
1906	18.59	16.63	18.53
1907	19.01	17.06	18.40
1908	19.25	17.35	18.69
1909	17.84	16.67	17.49
1910	18.58	16.89	18.14
1911	18.78	17.30	18.32

[illegible] for train (including company material).

Year ended June 30.	St. L. S.-W. Ry. Co.	St. L. S.-W. Ry. Co. of Tex.	Entire System.
1902	344.14	160.23	255.80
1903	383.70	167.09	281.63
[illegible]	[illegible]	172.20	[illegible]
[illegible]	[illegible]	177.33	[illegible]
[illegible]	[illegible]	192.49	31[illegible]06
[illegible]	[illegible]	202.81	3[illegible]35
[illegible]	[illegible]	189.55	311.19
[illegible]	[illegible]	1[illegible]84	3[illegible]61
1910	434.16	196.27	326.11
1911	423.70	200.04	320.16

EQUIPMENT.

The following equipment, contracted for under trust agreements during the preceding year, was all received during the current fiscal year, viz: 16 freight locomotives, 14 passenger coaches, 6 chair cars, and 3 parlor-[illegible] cars.

There was contracted for, under trust agreements executed during the current fiscal year, 1500 box, 500 automobile and 500 refrigerator cars—of [illegible] there were received up to June 30, 1911, 1509 box, 21 automobile, and 437 refrigerator cars, the balance having been received since the close of the fiscal year.

In addition to the foregoing there was purchased for cash, 2 official cars.

As a matter of information, of special interest, in connection with trust equipment, it is pertinent to state that, at this writing, there is not a vacant number in any series of passenger and freight cars or locomotives covered by the company's outstanding equipment trust obligations.

ADDITIONS AND BETTERMENTS.

The exhibit styled "Property Investment—Road and Equipment" on page 31, shows, in detail, the expenditures for additions and betterments during the year. There has been expended for Additions and Betterments—Road, to June 30, 1911, out of current funds, and for which no securities have been issued, the sum of $2,679,863.71; of this amount $1,411,759.40 was expended during the current year.

FREIGHT HOUSE, TEAM TRACKS, ETC., AT ST. LOUIS, MO.

Since the last annual report of the company, a desirable site in St. Louis has been selected and the property acquired, on which to construct a freight house, team tracks, etc. At the date of this report the old buildings on the property acquired have been razed, plans have been prepared for the new facilities and work on same is under way by the contractors.

TRACKAGE RIGHTS, WACO, TEXAS, TO McGREGOR, TEXAS, AND USE OF FACILITIES AT WACO, GRANTED TO THE GULF, COLORADO AND SANTA FE RAILWAY.

Effective April 10, 1911, a contract was entered into with the Gulf, Colorado and Santa Fe Ry., under the terms of which that company is granted the right to operate its freight and passenger trains over the rails of this company between McGregor, Texas, and Waco, Texas, a distance of eighteen miles, and the joint use of this company's terminal facilities at Waco, Texas.

USE OF TERMINAL FACILITIES AT SHERMAN, TEXAS, GRANTED TO THE MISSOURI, OKLAHOMA AND GULF RY. CO. OF TEXAS.

A contract was entered into with the Missouri, Oklahoma and Gulf Ry. Co. of Texas, effective November 1, 1910, granting that company the joint use of the terminal facilities of this company at Sherman, Texas.

In the succeeding chapters, headed respectively, "Financial Exhibits," "Traffic," "Transportation," "Maintenance of Way and Structures," "Maintenance of Equipment," etc., will be found a complete analysis of the financial condition, results from operation, and the maintenance and improvement of the property.

CONDENSED GENERAL BALANCE SHEET—

ENTIRE SYSTEM, JUNE 30, 1911.

[illegible] PRESCRIBED BY THE INTERSTATE COMMERCE COMMISSION, EFFECTIVE JUNE 15, 1910.)

ASSETS.	TOTAL.	+Increase. —Decrease. This Year.
PROPERTY INVESTMENT:		
ROAD AND EQUIPMENT—(See exhibit H).		
[illegible]	$78,8[illegible]36.53	—
Investment since June 30, 1907	5,563,721.66	+$2,716,897.66
	$84,430,258.19	+$2,716,897.66
Reserve for Accrued Depreciation on [illegible]	1,377,[illegible].20	+ 370,018.42
[illegible]	$83,05[illegible].99	+$2,346,879.24
SECURITIES—(See exhibit I).		
Securities of Proprietary, Affiliated and [illegible] Pledged	$1,679,166.67	—
Securities Issued or Assumed—Pledged	12,504,333.20	
Securities of Proprietary, Affiliated and Controlled Companies—Unpledged	22,379.00	+ $1.00
Total	$14,197,178.87	+ $1.00
[illegible] page 32.)		
Miscellaneous Investments	$10,130.32	—
[illegible]	$[illegible]	+$2,346,880.24
WORKING ASSETS. (See exhibit N).		
[illegible]	$[illegible]	— $[illegible].50
[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
ductors	63,851.22	— 4,575.57
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

THIRTIETH ANNUAL REPORT OF THE CHICAGO, SAINT PAUL, MINNEAPOLIS AND OMAHA RAILWAY COMPANY.

REPORT OF THE BOARD OF DIRECTORS.

To the Stockholders of the Chicago, Saint Paul, Minneapolis and Omaha Railway Company:

The board of Directors submit herewith their report of the operations and affairs of the Chicago, Saint Paul, Minneapolis and Omaha Railway Company for the fiscal year ending June 30, 1911.

The results of the operation for the year were as follows:

OPERATING REVENUES:		
Freight revenue	$10,563,204.36	
Passenger revenue	4,475,419.11	
Other revenue from transportation	951,030.26	
Non-transportation revenue	103,197.63	
Total operating revenue		$16,092,851.36
OPERATING EXPENSES:		
Maintenance of way and structures	$1,965,393.52	
Maintenance of equipment	1,863,983.78	
Traffic expenses	285,536.56	
Transportation expenses	6,155,616.44	
General expenses	385,523.46	
Total operating expenses (66.22 per cent. of operating revenue)		10,656,053.76
Net operating revenue		$5,436,797.60
Outside operations (net deficit)		12,538.06
Total net revenue		$5,424,259.54
Taxes accrued (4.54 per cent. of operating revenue)		730,807.55
Operating income		$4,693,451.99
OTHER INCOME:		
Joint facilities, rents	$59,636.31	
Dividends declared on stock owned	41,976.00	
Interest accrued on funded debt owned	11,725.68	
Miscellaneous	26,429.91	
		139,767.90
Gross corporate income		$4,833,219.89
DEDUCTIONS:		
Hire of equipment—balance	$80,770.91	
Joint facilities, rents	288,100.77	
Interest accrued on funded debt	1,631,590.16	
Miscellaneous	16,372.73	
		2,016,834.57
Net corporate income		$2,816,385.32
Dividends on stock (7% on both common and preferred)		2,086,910.00
Net surplus for the year		$729,475.32

COMPARATIVE INCOME.

As compared with the previous year, the results were as follows:

Operating revenues, increased		$997,828.55
Operating expenses, increased		767,574.65
Net operating revenue, increased		$230,253.90
Net deficit from outside operations, increased		11,890.61
Total net revenue, increased		$218,363.29
Taxes accrued, increased		47,975.91
Operating income, increased		$170,387.38
Other income, decreased		2,671.79
Gross corporate income, increased		$167,715.59
Interest on funded debt, increased	$20,023.49	
All other deductions, decreased	53,407.75	
		33,384.26
Net corporate income, increased		$201,099.85

The operating expenses for the current fiscal year include $5,950,393.38 paid for labor, as compared with $5,489,847.36 paid during the preceding fiscal year, being an increase of $460,546.02 paid on account of labor. Of this increase $198,463.06 was due to the increase in rates of compensation, and $262,082.96 to the increase in the number of men employed.

MILES OF ROAD.

The mileage operated on June 30, 1911, was 1,743.82, as follows:

	Owned.	Leased.	Total.
In Wisconsin	770.87	1.28	772.15
In Minnesota	434.33	38.71	473.04
In Iowa	74.54	27.50	102.04
In South Dakota	88.20	....	88.20
In Nebraska	306.29	2.10	308.39
Total	1,674.23	69.59	1,743.82

The average mileage operated was 1,742.55.

In addition to the above, the company owned and operated 85.29 miles of second track, located as follows:

In Wisconsin	59.35
In Minnesota	24.23
In Nebraska	1.71
Total	85.29

FREIGHT TRAFFIC.

The details of freight traffic for the year ending June 30, 1911, compared with the preceding year, were as follows:

	1910.	1911.	Increase—Amount.	Increase—Per cent.
Freight revenue	$9,720,911.60	$10,563,204.36	$842,292.76	8.66

	1910.	1911.	Percentage of Increase or Decrease.
Tons of freight carried	7,231,446	7,422,937	2.64 Increase
Tons of freight carried one mile	1,070,987,529	1,171,703,024	9.40 Increase
Average revenue received per ton	$1.34	$1.42	5.97 Increase
Average revenue received per ton per mile	.908 of a cent	.902 of a cent	.66 Decrease
Average distance each ton was hauled	148.10 miles	157.87 miles	6.60 Increase
Mileage of revenue freight and mixed trains	4,269,380	4,272,392	.07 Increase
Average number of tons of revenue freight carried per train mile	250.85	274.25	9.33 Increase
Average number of tons of revenue freight carried per loaded car mile	15.92	17.33	8.86 Increase
Average freight revenue per train mile	$2.28	$2.47	8.33 Increase

PASSENGER TRAFFIC.

The details of passenger traffic for the year ending June 30, 1911, compared with the preceding year, were as follows:

	1910.	1911.	Increase—Amount.	Increase—Per cent.
Passenger revenue	$4,309,072.83	$4,475,419.11	$166,346.28	3.86

	1910.	1911.	Percentage of Increase or Decrease.
Passengers carried	4,345,696	4,419,017	1.69 Increase
Passengers carried one mile	224,461,301	233,136,695	3.86 Increase
Average fare paid per passenger	99.16 cents	101.28 cents	2.14 Increase
Average rate paid per passenger per mile	1.920 cents	1.920 cents	....
Average distance traveled per passenger	51.65 miles	52.76 miles	2.15 Increase
Mileage of revenue passenger and mixed trains	4,208,240	4,343,215	3.21 Increase
Average passenger train revenue per train mile	$1.22	$1.21	.82 Decrease

OPERATING EXPENSES.

Maintenance of Way and Structures:

The total operating expenses of the company for the year ending June 30, 1911, were $10,656,053.76; of this amount $1,965,393.52 was for charges pertaining to maintenance of way and structures. Included in these charges are $78,731.93 for rail, $286,115.35 for ties, and the cost of re-ballasting 130.75 miles with gravel, cinders or slag, also part cost of replacing 2,893 feet of wooden bridging with permanent work.

During the year 11,440 tons of new steel rails and 5,828 tons of usable and re-rolled steel rails were laid in track, a greater portion of which replaced rails of lighter weight, and 584,542 ties of all descriptions were laid in renewals.

The details of the charges to maintenance of way and structures for the year, compared with the previous year, were as follows:

Rails laid in renewals—	1910.	1911.	Inc. or Dec.
New steel rails laid	7,395 tons	11,440 tons	4,045 tons
Usable and re-rolled rails laid	6,895 "	5,828 "	*1,067 "
Total laid	14,290 "	17,268 "	2,978 "
Ties laid in renewals—			
Number	429,246	584,542	155,296
Cost of rails—			
New steel rails	$265,853.01	$333,321.74	$67,468.73
Usable and re-rolled rails	111,935.54	114,971.82	3,036.28
	$377,788.55	$448,293.56	$70,505.01
Less value of old rails and other items	292,971.43	269,561.63	76,590.20
Net charge for rails	$84,817.12	$78,731.93	*$6,085.19
Cost of ties	231,291.37	286,115.35	54,823.98
Cost of ballast	104,543.23	73,202.80	*31,340.43
Cost of other track material	96,445.23	82,322.00	*14,123.23
Roadway and track labor and expenses	773,990.54	772,645.68	*1,334.86
Total charges for roadway and track	$1,291,087.49	$1,293,017.76	$1,930.27

*Decrease.

Other expenses account of maintenance of way and structures were as follows:			
Superintendence	80,691.12	80,618.38	*72.74
Bridges, trestles and culverts	221,182.49	228,284.24	7,101.75
Road crossings, fences, etc.	53,964.62	52,031.43	*1,933.19
Signals and interlocking plants	6,195.31	8,216.70	2,021.39
Buildings, fixtures and grounds	152,898.49	194,355.48	41,456.99
Docks and wharves	7,304.29	6,126.95	*1,177.34
Roadway tools and supplies	14,000.68	15,381.92	1,381.24
Miscellaneous charges	129,130.88	87,360.66	*41,770.22
Total charges account of maintenance of way and structures	$1,956,455.37	$1,965,393.52	$8,938.15

The foregoing expenditures for maintenance of way and structures for the current year amount to 18.44 per cent. of the total operating expenses, as compared with 19.79 per cent. for the preceding fiscal year.

Maintenance of Equipment:

The charges on account of maintenance of equipment for the year ending June 30, 1911, compared with the preceding year, were as follows:

	1910.	1911.	Inc. or Dec.
Locomotives	$731,805.13	$782,338.45	$50,533.32
Passenger train cars	172,479.96	208,431.11	35,951.15
Freight train cars	725,754.33	742,637.83	16,883.50
Work equipment	29,856.53	24,364.98	*5,491.55
Shop machinery and tools	29,164.62	28,260.06	*904.56
Superintendence	50,380.33	54,346.40	3,966.07
Sundry miscellaneous accts.	18,702.19	23,604.95	4,902.76
Total charges account of maintenance of equipment	$1,758,143.09	$1,863,983.78	$105,840.69

*Decrease.

The above charges for maintenance of equipment for the current year amount to 17.49 per cent. of the total operating expenses, as compared with 17.78 per cent. for the preceding fiscal year.

Transportation Expenses.

The transportation expenses for the year were $6,155,616.44, or 57.77% of the total operating expenses. Of this amount $3,479,678.47, or 56.53%, was for labor; $1,862,081.04, or 30.25%, was for fuel; and $813,856.93, or 13.22%, was for supplies and other items.

The total increase in the charges as compared with the previous year was $602,426.86, distributed as follows:

Increase in amount charged for labor	$383,382.21
Increase in amount charged for fuel for locomotives	217,440.28
Increase in amount charged or supplies and other items	61,614.37
Total increase	$602,426.86

EXTENSIONS OF LINE.

The extension of the line from Kennedy to Kaiser, Wis., a distance

[illegible] was completed, and the line opened for traffic October 3, 1910.

Work has been commenced on the construction of a line from Black River Falls to a connection with the main line at Vaudreuil, Wis., a distance of 2.23 miles. The line will be completed and opened for traffic [illegible].

SECOND MAIN TRACK.

Contracts have been let and work is in progress on a new double track line from Eau Claire, Wis., west, for a distance of 3.18 miles, with a double track bridge over the Chippewa river, connecting with the old line at a point one and one-fourth miles east of Truax. It is expected [illegible] let in the course of the next fiscal year.

A second main track is being constructed, for a distance of 40.23 miles, between Merrillan and Wyville, Wis. In connection with this work a change will be made in the line and grade for a distance of 3.80 miles, between Millston and Warren, shortening the distance 144 feet, eliminating two curves, reducing the curvature 38 degress and changing the controlling grade from .8 per cent. to .5 per cent. It is expected that the work will be finished and the track opened for traffic during the fall of 1911.

BUILDINGS.

Depots were erected to replace similar structures destroyed by fire, as [illegible]:

Ashland Junction, Wis.

[illegible], Minn.

Fordyce and South Sioux City, Neb.

Work was begun on a new depot at Craig, Neb. A new brick passenger depot, 140 feet long, 31 feet wide except baggage end 22 feet wide, with steam heat, electric light and brick platform, was constructed at Sioux Falls, So. Dak., to replace the old depot which was moved to new location and remodeled for use as a freight depot. A brick freight house, 30 by 512 feet, with a second story at one end, 30 by 32 feet, for office use, was constructed at Minneapolis, Minn.; this building is provided with steam heat, plumbing and electric light. There was also constructed at Minneapolis an automobile platform, 30 by 325 feet, of concrete wall filled with earth, to take the place of old platform removed to make room for the new freight house. The passenger depot at New Richmond, Wis., and the freight-passenger depot at Bayfield, Wis., were remodeled and enlarged.

A five stall addition was made to the engine house at Altoona, Wis., and four stalls of the engine house at St. James, Minn., were extended 17 feet. Work is now in progress on the construction of a fifteen stall engine house, machine shop and oil house at Omaha, Neb., to replace buildings destroyed by fire. A brick addition was made to the engine room and work begun on a 20-foot addition to the passenger car shop at Hudson, Wis. Work is in progress on an addition, 120 by 221 feet, to the [illegible].

Water tanks were rebuilt at Osseo, Chetek and Hudson, Wis.

The elevator belonging to this company at Washburn, Wis., was dismantled and taken down.

SIDE TRACKS AND YARDS.

[illegible] miles, which includes 2.33 miles of track laid in the new yard north of Plymouth Avenue, Minneapolis, Minn.

BRIDGES.

By construction of permanent bridges	1,503 feet.	
[illegible]	[illegible]	"
[illegible]	[illegible]	"
[illegible]	[illegible]	"

[illegible]

[illegible] EXPENDITURES ON EQUIPMENT.

[illegible]

the equipment reserve accounts on account of charges to [illegible]

$1,341,591.82

[illegible]

[illegible]

[illegible]

SEVENTEENTH ANNUAL REPORT—SOUTHERN RAILWAY COMPANY.

WASHINGTON, D. C., September 29, 1911.

To the Stockholders of the Southern Railway Company:

The Board of Directors submits the following report of the affairs of the Company for the year ended June 30, 1911:

INCOME STATEMENT.

	1911.	1910.	Increase or Decrease.
Miles of Road Operated—Average	7,041.95	7,050.17	Dec. 8.22
Gross Operating Revenues	$60,345,062.64	$57,294,508.34	Inc. $3,050,554.30
Total Operating Expenses	40,926,790.08	38,635,745.94	Inc. 2,291,044.14
Net Operating Revenue	$19,418,272.56	$18,658,762.40	Inc. $759,510.16
Outside Operations — Net Deficit	42,027.75	(*Cr*) 18,980.36	Inc. 61,008.11
Net Revenue	$19,376,244.81	$18,677,742.76	Inc. $698,502.05
Taxes	2,212,967.87	2,027,104.35	Inc. 185,863.52
Operating Income	$17,163,276.94	$16,650,638.41	Inc. $512,638.53
Other Income	3,292,529.36	3,227,927.98	Inc. 64,601.38
Total Gross Income	$20,455,806.30	$19,878,566.39	Inc. $577,239.91
Deductions from Income	2,660,946.05	2,759,069.41	Dec. 98,123.36
Total Available Income	$17,794,860.25	$17,119,496.98	Inc. $675,363.27
Interest on Mortgage, Bonded and Secured Debt	11,124,856.76	11,362,478.37	Dec. 237,621.61
Balance of Income over Charges	$6,670,003.49	$5,757,018.61	Inc. $912,984.88
Dividends on Preferred Stock: No. 21, One Per Cent., paid in April, 1911	$600,000.00	.....	Inc. $600,000.00
Reserve for Dividend No. 22, One Per Cent., payable in October, 1911	600,000.00	.....	Inc. 600,000.00
Total Dividends	$1,200,000.00	.....	Inc. $1,200,000.00
Balance over Dividends on Preferred Stock	$5,470,003.49	$5,757,018.61	Dec. $287,015.12
Additions and Betterments	66,045.71	52,372.91	Inc. 13,672.80
Balance carried to Credit of Profit and Loss	$5,403,957.78	$5,704,645.70	Dec. $300,687.92

DISCOUNT ON SECURITIES.

As of June 30, 1910, there remained a balance of discount on securities sold amounting to $4,853,144.57. There accrued during the year $35,700 as discount on Equipment Trust Obligations issued, and $75,000 as premium on First Consolidated Mortgage Bonds sold, leaving a net balance of $4,813,844.57. Following the general practice of the Company, there was charged during the year to Income $125,814.78, and to Profit and Loss $3,000,000, leaving a balance on June 30, 1911, of $1,688,029.79 to be charged to Income in subsequent years during the life of the securities, or, at the option of the Company, to Profit and Loss.

INTEREST.

The accrued Interest on the Funded Debt of the Company for the year was $302,504.19 less than for the previous year, while the accrued interest on Equipment Trust Obligations was $64,882.58 greater, thus making the total interest on Fund Debt and Equipment Trust Obligations $237,621.61 less than for the previous year (See Table 2, page 22).

DIVIDENDS.

The financial condition of the Company having so improved as to make such action entirely consistent with a sound and conservative policy, a Dividend of One Per Cent. on the Preferred Stock of the Company was declared and paid in April, 1911, and provision has been made for the payment in October of a similar Dividend out of Net Income earned during the year. It was considered that, as a fair recognition, under all the circumstances, of the just expectations of the holders of its Preferred Stock who had received dividends for a series of years until the conditions which culminated in the financial panic in the fall of 1907 and the subsequent business depressions necessitated their suspension, a reasonable proportion of the Company's cash resources could properly be devoted to the payment of dividends. It is the expectation of the Board of Directors that, with a continuance of favorable conditions, the rate of dividend may gradually be increased until the full dividend can again be properly paid.

PROFIT AND LOSS.

The surplus as shown by the Profit and Loss statement as of June 30, 1910, was $8,685,959.91, while the surplus as of June 30, 1911, after, as hereinbefore stated, charging to the account $3,000,000 for Discount on Securities, amounted to $11,445,965.08, a gain of $2,760,005.17 over the previous year. (See Table 3, page 23).

PROPERTY INVESTMENT AND MORTGAGE DEBT.

The investment in physical property, exclusive of depreciation, has been increased $7,574,876.55, of which $2,554,042.66 was in Road and $5,020,833.89 in Equipment. This increase represent net additions made during the year. (See pages 26 and 27).

The Mortgage, Bonded and Secured Debt increased during the year $5,369,300, consisting of increases in Mortgage and Collateral Trust Bonds $6,153,300, and a decrease in Equipment Trust Obligations amounting to $784,000. (See pages 28, 29 and 30).

There were retired during the year at maturity $500,000 Charlotte, Columbia and Augusta Railroad Company Second Mortgage Seven Per Cent. Bonds and $500,000 Richmond, York River and Chesapeake Railroad Company Second Mortgage Four and One-Half Per Cent. Bonds, and through the provisions of Sinking Funds $27,700 Charlottesville and Rapidan Railroad Company First Mortgage Six Per Cent. Bonds and $5,500 Franklin and Pittsylvania Railroad Company First Mortgage Six Per Cent. Bonds. All of these bonds were redeemed by the Company with Treasury Funds, and there were issued and placed in the Treasury to represent such disbursements an equal amount of First Consolidated Mortgage Five Per Cent. Bonds.

There were also retired at maturity during the year $1,580,000 Virginia Midland Railway Company Second Mortgage Six Per Cent. Bonds, Series B, to retire which $1,500,000 First Consolidated Mortgage Five Per Cent. Bonds free in the Treasury were sold. Subsequently, as provided for in the First Consolidated Mortgage, $1,580,000 First Consolidated Mortgage Five Per Cent. Bonds were issued and placed in the Treasury.

By reason of these drawings the total amount of First Consolidated Mortgage Five Per Cent. Bonds free in the Treasury as of June 30, 1911, amounted to $2,392,800.

On February 21, 1911, there were drawn and taken into the Treasury $5,000,000 Development and General Mortgage Four Per Cent. Bonds, which, under the terms of that mortgage, could be so drawn during the calendar year 1911 to reimburse the Treasury for its advances made for additions and betterments. In like manner there were drawn and taken into the Treasury during the fiscal year $1,131,000 Development and General Mortgage Four Per Cent. Bonds to reimburse the Treasury for the proportion of equipment obligations paid during the year which was charged to capital account.

By reason of these drawings the total amount of Development and General Mortgage Bonds free in the Treasury as of June 30, 1911, was $13,667,000.

The Company has thus been able to conserve its Working Assets through the conservative, but progressive, employment of its Treasury funds.

ADDITIONS AND BETTERMENTS.

During the year the Company's new double-track line through Lynchburg, Va., was completed and put into service, giving a shorter line, without grade crossings and with substantial reduction in grades and curvature, thus avoiding congestion, promoting regularity and safety of train movement and effecting economies in operation. The completion of this work through Lynchburg, together with the construction of a mile and a half of double-track south from Franklin Junction, Va., to connect with about five miles of double-track already constructed from Whittle, Va., north—a gap of five miles between Sycamore and Franklin Junction, Va., being operated as a single-track gauntlet—gives the Company practically the equivalent of fifty miles of double-track between Monroe and Whittle, Va.

The new double-track line through the traffic tunnel between Citico and Ooltewah Junction, Tenn., referred to in previous annual reports, has been completed and placed in service since the close of the fiscal year, resulting in substantial gains in efficiency and economy of operation.

During the year the Company has pursued the policy of constructing lap-sidings to facilitate train movement at points where traffic is heavy but does not yet require double-tracking, these sidings being so arranged that they can be used as parts of a double-track line if the business shall require its construction. Thirteen of these lap-sidings are being constructed at points between Atlanta and Macon, Ga., eight between Knoxville and Chattanooga, Tenn., and three between Morristown, Tenn., and Asheville, N. C.; the aggregate length of which will be 28.4 miles.

Since the close of the year work has been commenced on thirty-eight miles of double-track north of Atlanta, between Crosskeys and Gainesville, Ga., which, in connection with six miles of existing double-track from Atlanta to Armour, Ga., and by the operation of two five-mile gaps as single-track gauntlets in a double-track system, will give practically the equivalent of fifty-four miles of double-track north from Atlanta to Gainesville, greatly facilitating the movement of traffic on that important part of the Company's lines.

The Company has also undertaken the completion of its Knoxville, Tenn., Belt Line River Front Extension by the construction of about seven miles of track, which will provide transportation facilities to the marble quarries along and adjacent to the Tennessee River, and will also provide track facilities for further industrial development in that vicinity.

The construction of a new inbound freight station of modern type at Atlanta, Ga., has been undertaken and is expected to be completed early in 1912. The upper floors of this building will provide office accommodations for the Company's forces at that point.

The Company is constructing additional yard facilities at Macon, Ga.; and, in connection with the Georgia Southern & Florida Railway Company, additional freight station and platform facilities are being provided at that point.

In connection with the Mobile & Ohio Railroad Company, the Company is constructing additional wharf facilities at Mobile, Ala., upon adjoining river frontage owned by the two companies. This improvement, consisting of a wharf and two-story warehouse, is necessary for the proper handling and storage of existing Cuban traffic and traffic to and from South America which it is expected will follow the establishment of regular steamship service to and from South American ports.

During the two years ended June 30, 1911, the Company has acquired and contracted for 198 locomotives, 203 passenger-train cars, 5,207 freight-train cars and 11 pieces of road service equipment, all of modern type and standard capacity. In addition 1,000 gondola cars, which had passed the stage of economical operation, were converted into 800 steel underframe ventilated box cars and 200 refrigerator cars at the Company's car works at Lenoir City, Tenn.

TERMINALS AT LOUISVILLE, KY.

During the year the Kentucky and Indiana Terminal Railroad Company, the entire capital stock of which is owned in equal parts by this Company, The Baltimore & Ohio Railroad Company and the Chicago, Indianapolis & Louisville Railway Company, made provision for the refunding of its entire outstanding funded debt and for the construction of a new double-track bridge across the Ohio River between Louisville, Ky., and New Albany, Ind., the double-tracking of its Belt Line, and the improvement and enlargement of its terminal facilities in Louisville, Ky.

For these purposes, it issued £1,231,000 (approximately $5,990,784.60) First Mortgage Four and One-Half Per Cent. Fifty-Year Gold Bonds, due January 1, 1961. These bonds are guaranteed, jointly and severally, as to principal and interest, by this Company, The Baltimore & Ohio Railroad Company and the Chicago, Indianapolis & Louisville Railway Company, which companies have, by contract, agreed to use during the life of the bonds, the bridge and terminal facilities of the Kentucky & Indiana Terminal Railroad Company for all their traffic in Louisville and crossing the Ohio River at Louisville.

LABOR CONDITIONS.

All questions as to wages and conditions of employment which have arisen during the year between the Company and its employees have been amicably adjusted. In some cases settlements were reached through mediation under the National Law commonly known as the Erdman Act. It is proper, in this connection, that recognition should be expressed of the conservative value of the Erdman Act as affording a means for the settle-

It is noteworthy that, in the settlement of the recent railway strike in England, through the medium of a special governmental commission, the government gave an assurance to the railway companies that it would propose legislation in the next session of Parliament providing that an

Another illustration of this same tendency was a statement of the Judge

remedy was to apply to the Federal Parliament for protective duties that would allow it to comply with the award.

PROGRESS OF THE SOUTH IN ITS RELATION TO THE COMPANY.

One of the most important factors in the strength of the Company's position is the progressive industrial and agricultural development of the territory traversed by its lines.

The growth of communities served by the Company's lines may be measured by the United States Census reports of population of all Southern Railway Stations of sufficient importance to be returned separately in 1890, 1900 and 1910. The figures for 1910 show a growth in the aggregate population of these places of 34.2 per cent. in the ten years since 1900, and of 75.3 per cent. in the twenty years since 1890.

The percentages of increase for Southern Railway stations, so far as reported separately by the Census Bureau, compare with the percentages of increase for the Southeastern States named as follows:

	1910-1900.	1910-1890.
Virginia.		
Southern Railway stations	42.2	62.8
Entire State	11.2	24.4
South Carolina.		
Southern Railway stations	60.5	185.7
Entire State	16.5	36.3
North Carolina.		
Southern Railway stations	25.4	72.5
Entire State	13.1	31.6
Georgia.		
Southern Railway stations	43.3	82.3
Entire State	17.7	42.0
Alabama.		
Southern Railway stations	83.2	144.3
Entire State	16.9	41.2
Mississippi.		
Southern Railway stations	47.9	127.6
Entire State	15.8	39.3
Tennessee.		
Southern Railway stations	34.7	90.1
Entire State	8.1	23.6
Kentucky.		
Southern Railway stations	13.6	46.2
Entire State	6.6	23.2

A diversified industrial development, based on the foundation of the manufacture of Southern raw materials, is in progress. This development is passing beyond the stage of advancing raw materials through the primary processes of manufacture, and is characterized, to an increasing degree, by the establishment of industries devoted to the conversion of the products of primary manufacturing into articles ready for the final consumers. A notable illustration of this is the multiplication of furniture factories and other woodworking establishments which use as their raw materials the products of the lumber mills of the South. The same tendency is seen in the establishment of plants which draw their raw materials from Southern iron and steel mills, cotton mills and other primary manufacturing industries. The United States Census reports on manufactures in 1909, as compared with 1904, show an increase of 40 per cent. in the annual value of manufactures in the Southeastern States traversed by the Company's lines. A large proportion of this industrial development has been contiguous to the lines of the Company.

This development during the year ended June 30, 1911, included the completion of 379 industrial plants and additions to 141 existing plants. At the close of the year there were 62 plants under construction. The plants completed during the year included 34 textile mills, 70 lumber mills, [illegible] 12 cotton-seed oil mills, 13 fertilizer works, 29 flour and feed mills, 29 stone quarries, coal and other mines, 19 brick works and 118 miscellaneous plants.

With climatic and soil advantages unsurpassed by those of any other part of the United States, the farmers of the Southeastern States are taking up the most approved methods of agriculture with intelligence and zeal. The success with which they are doing this is attested by the statistics of the United States Department of Agriculture, which show increasing yields per acre in each State traversed by the Company's lines.

A table published by the United States Department of Agriculture giving the total value for each State of the farm crops reported on by the Department in comparison with the census figures for 1899, shows that in the Southeastern States traversed by the Company's lines there was an in[illegible] in $485,481,000 to $1,042,614,000 or 115 per cent. For all of the other States, including the newer Western States where the growth has been rapid, the increase in the same period amounted to 73 per cent., and for the States north of the Ohio and Potomac Rivers and east of the Mississippi to 60 per cent.

The agricultural development in the territory contiguous to the Company's lines is due in part to increased average yields per acre, and partly to the more general practice of diversified farming. One-crop farming, even in the region most favorable to cotton production, is becoming much less common. Southeastern farmers are making record yields of corn and other grains, they are devoting more attention to live stock and dairying, [illegible] apples. Orchards produce abundantly, the flavor of the fruit is particularly [illegible] proved cultural methods they can grow as much cotton per acre as before [illegible] of whom has had practical experience in the growing of cotton under boll [illegible] fact that the cultural methods being taught and which must be adopted when the weevil appears, are identically those by which the yield of cotton per acre may be increased where the weevil is not present. It is believed that as a result of the work of this Department, in co-operation with the United States Department of Agriculture and State authorities, the weevil will do relatively little damage if it shall spread to territory along the Company's lines. The results attained by the Company's Cotton Culture Department have been sufficiently satisfactory to warrant an increase in the force of field agents, and the work of the Department will be extended farther to the eastward so as to cover all of the territory along the Company's lines to which there is even a remote danger that the weevil may spread within the next several years.

It is interesting to note that, with governmental encouragement and the active support of European spinners, efforts are being made to increase cotton production in other parts of the world. A recent illustration of this was the publication of a letter from the British Foreign Office to the British Cotton-Growing Association, stating that the first step for encouraging the further cultivation of cotton in the Anglo-Egyptian Sudan had been taken "by putting down a plantation of several thousand acres, to test all conditions of which full knowledge is necessary before any scheme for a larger development can be undertaken." It is also reported that the possibilities of increasing cotton production in British East Africa are being looked into, and that improved transportation in Uganda is expected to be followed by increased production in that region. The French Government, for five years past, has annually placed a sum of money at the disposal of the Ministry of the Colonies for the purpose of promoting cotton-growing in the French Colonies.

The cotton-producing states of the United States now possess a substantial monopoly in the production of cotton, giving them an advantage such as is enjoyed by no other region in the world. It is gratifying to be able to state that the statistics of the United States Department of Agriculture, covering the period from 1866 to 1910, show that the average yield of cotton per acre in each of the cotton-producing states traversed by the lines of this Company has been greater in the last ten years than in any preceding ten-year period. In view of this increase under normal conditions, and as the boll weevil is not a menace to the supremacy of the southern part of the United States in cotton production, for the reason that successful and profitable growing of cotton under boll weevil conditions is a matter of the adoption of improved cultural methods, we may expect still larger yields per acre; and, notwithstanding the efforts being made to expand the industry in other countries, there should be no difficulty in the American planter keeping pace with the growing demand of the world and maintaining the great advantage which he now possesses.

The management of the Company, recognizing that the cutting up of the great cattle ranges of the West into farms will make the consumers of meat products in the United States dependent upon farm-grown meats for a larger proportion of their supply, and having in view the constant increase in the demand for meats and dairy products in the South and in the densely populated area along the North Atlantic seaboard, is making special efforts to encourage the development of live stock raising and dairying in its territory.

It is proper that recognition should be made of the valuable assistance rendered by the newspapers published in the cities and towns along the Company's lines and by commercial organizations, banks and individuals who have aided the Company in all its efforts to advance the agricultural prosperity of the Southeast. Highly effective work is being done along this line by the United States Department of Agriculture, the Agricultural Commissioners of the several States and the State Agricultural Colleges. The Company is working in harmony with all of these agencies, and special acknowledgment should be made of the cordial spirit with which they have welcomed its assistance and of their uniformly helpful co-operation.

THE SERVICE OF EMPLOYEES.

It is gratifying to the Board of Directors to be able to report that the service of officers and employees in all departments has been characterized during the year by loyalty to the interests of the Company. The standard of efficiency throughout the service is sufficiently high to justify the management in pursuing a consistent policy of filling, by promotion, vacancies that may occur, thus preserving a wide field of opportunity for advancement for all loyal and efficient employees.

Statements of the accounts and statistics of the Company in the usual detail will be found in the tables hereto annexed.

The accounts have been examined, as usual, by Certified Public Accountants, Messrs. Patterson, Teele & Dennis, and their certificate is made a part of this report.

Respectfully submitted, by order of the Board,

W. W. FINLEY, President.

Cable Address
"Dyer"

Arthur W. Teele, C. P. A.
John Whitmore.
Hamilton S. Corwin, C. P. A.
Harold F. Leeming, C. A.

F. R. C. Steele, C. A.,
Boston

PATTERSON, TEELE AND DENNIS
[illegible]
NEW YORK AND BOSTON

[illegible]
New York, September 1, 1911.

[illegible] the Balance Sheet and Income and Profit and Loss Accounts published herewith.

The amount charged to Capital Accounts for expenditures during the [illegible] fours.

Respectfully submitted,
PATTERSON, TEELE & DENNIS
Certified Public Accountants.

TABLE 1.

INCOME STATEMENT FOR YEAR ENDED JUNE 30, 1911, COMPARED WITH YEAR ENDED JUNE 30, 1910.

1910.		1911.
	Operating Revenues:	
$38,161,391.93	Freight Revenue	$39,498,963.61
14,639,160.76	Passenger Revenue	16,056,303.76
279,092.78	Miscellaneous Passenger-Train Revenue	292,100.46
1,375,081.64	Mail Revenue	1,370,741.78
1,620,028.34	Express Revenue	1,816,970.04
845,782.71	Other Transportation Revenue	891,164.43
373,370.18	Revenue from Operations other than Transportation	418,818.56
$57,294,508.34	Total Operating Revenues	$60,345,062.64
	Operating Expenses:	
$6,635,724.58	Maintenance of Way and Structures	$7,464,916.42
9,876,728.58	Maintenance of Equipment	9,460,756.74
1,436,776.24	Traffic Expenses	1,549,403.98
18,934,426.56	Transportation Expenses	20,662,085.84
1,752,089.98	General Expenses	1,789,627.10
$38,635,745.94	Total Operating Expenses	$40,926,790.08
$18,658,762.40	Net Operating Revenue	$19,418,272.56
18,980.36	Outside Operations—Net Revenue	
	Outside Operations—Net Deficit	42,027.75
$18,677,742.76	Net Revenue	$19,376,244.81
2,027,104.35	Taxes	2,212,967.87
$16,650,638.41	Operating Income	$17,163,276.94
	Other Income:	
$15,499.98	Rents Accrued from Lease of Road	$17,499.96
149,345.71	Hire of Equipment—Balance	137,342.87
195,510.13	Rents Accrued from Joint Tracks, Yards and Terminals	200,131.10
135,016.29	Miscellaneous Rents	148,970.63
141,218.53	Miscellaneous Income	194,268.92
1,999,138.71	Income from Investments	2,153,005.36
592,198.63	Miscellaneous Interest and Commissions	441,310.52
$3,227,927.98	Total Other Income	$3,292,529.36
$19,878,566.39	Total Gross Income	$20,455,806.30
	Deductions from Total Gross Income:	
$31,958.56	Income from Operation, Southern Railway Company in Mississippi, Alabama State Line to Columbus, Miss.	$34,440.49
1,381,504.00	Rents Accrued for Lease of Other Roads (See Table 2)	1,381,505.00
808,656.56	Rents Accrued for Joint Tracks, Yards and Terminals	799,061.91
60,993.80	Miscellaneous Rents	60,017.72
116,462.04	Separately Operated Properties	176,396.39
266,806.19	Discount on Securities Sold Purchased charged to Income	125,814.78
92,688.26	Miscellaneous Deductions	83,709.76
$2,759,069.41	Total Deductions	$2,660,946.05
$17,119,496.98	Total Available Income	$17,794,860.25
$10,533,324.19	Interest on Funded Debt (See Table 2)	$10,230,820.00
602,346.18	Interest on Equipment Trust Obligations (See Table 2)	667,228.76
226,808.00	Dividends Accrued on Southern Railway—Mobile & Ohio Stock Trust Certificates	226,808.00
$11,362,478.37		$11,124,856.76
$5,757,018.61	Balance of Income over Charges	$6,670,003.49
	From which Deduct:	
	Dividend No. 21 (1%) on Preferred Stock, paid in April, 1911	$600,000.00
	Reserve for Dividend No. 22 (1%) on Preferred Stock, payable in October, 1911	600,000.00
	Total Dividends	$1,200,000.00
$5,757,018.61	Balance over Dividends on Preferred Stock	$5,470,003.49
52,372.91	Additions and Betterments	66,045.71
$5,704,645.70	Balance Carried to Credit of Profit and Loss for the Year	$5,403,957.78

TABLE 3.

PROFIT AND LOSS FOR YEAR ENDED JUNE 30, 1911.

Balance at Credit of this Account June 30, 1910	$8,685,959.91
Add:	
Credit Balance of Income for the Year	5,403,957.78
Net Miscellaneous Credits	356,047.39
	$14,445,965.08
Deduct:	
Discount on Securities charged off during the year	3,000,000.00
Credit Balance June 30, 1911	$11,445,965.08

TABLE 20.

OPERATING STATISTICS FOR YEARS ENDED JUNE 30, 1911 AND 1910.

	1911.	1910.	Increase or Decrease.	Per Cent. of Increase or Dec.
Mileage:				
Miles of Main Line of Railroad Operated at End of Year	7,085.63	7,093.39	—7.76	.11
Average Miles of Line Operated during Year	7,041.95	7,050.17	—8.22	.12
Average Miles of Line Maintained during Year	6,572.91	6,580.44	—7.53	.11
Maintenance of Way and Structures:				
Total Charges	$7,464,916.42	$6,635,724.58	$829,191.84	12.50
Ratio to Operating Revenues	12.37	11.58	.79	
Ratio to Operating Expenses	18.24	17.18	1.06	
Cross-ties Renewed:				
In Main Line	2,922,239	2,617,049	305,190	11.66
In Side Tracks	409,447	324,131	85,316	26.32
Total	3,331,686	2,941,180	390,506	13.28
Cross-tie Renewals per Mile of Main Line Maintained	445	398	47	11.81
New Steel Rail Laid in Track—Tons:				
75-lb. Section	50	4,570	—4,520	98.90
80-lb. Section	45	5,347	—5,302	99.16
85-lb. Section	43,340	36,570	6,770	18.51
86-lb. Section Girder	4		4	
Total	43,439	46,487	—3,048	6.56
Miles of Track Laid with New Rail during Year	325.30	355.13	—29.83	8.40
New Ballast Placed in Track—Cubic Yards	327,104	584,066	—256,962	44.00
Total Miles of Ballasted Track, June 30th	4,402.92	4,350.59	52.33	1.20
Maintenance of Equipment:				
Total Charges	$9,460,756.74	$9,876,728.58	—$415,971.84	4.21
Ratio to Operating Revenues	15.68	17.24	—1.56	
Ratio to Operating Expenses	23.12	25.56	—2.44	
Average Number of Locomotives on Hand during Year	1,566	1,485	81	5.45
Cost of Repairs per Locomotive, excluding Renewals and Depreciation	$2,292.26	$2,288.98	$3.28	.14
Cost of Repairs per Locomotive, including Renewals and Depreciation	$2,540.44	$2,529.69	$10.75	.43
Average Cost of Repairs of Locomotives per Mile Run, excluding Renewals and Depreciation (Cents)	8.52	8.36	0.16	1.91
Average Cost of Repairs of Locomotives per Mile Run, including Renewals and Depreciation (Cents)	9.44	9.24	[illegible]	2.16
Average Number of Passenger-Train Cars on Hand during Year	1,076	1,030	46	4.47
Cost of Repairs per Passenger-Train Car, excluding Renewals and Depreciation	$648.43	[illegible]	[illegible]	[illegible]
Cost of Repairs per Passenger-Train Car, including Renewals and Depreciation	$756.68	$7[illegible].92	$16.76	2.27
Average Number of Freight-Train Cars on Hand during Year	51,188	51,065	123	.24
Cost of Repairs per System Freight-Train Car, excluding Renewals and Depreciation	$49.06	$57.83	—$8.77	15.17
Cost of Repairs per System Freight-Train Car, including Renewals and Depreciation	$76.49	$88.73	—$12.24	13.79
Traffic Expenses:				
Total Charges	$1,549,403.98	$1,436,776.24	$112,627.74	7.84
Ratio to Operating Revenues	2.57	2.51	.06	
Ratio to Operating Expenses	3.79	3.72	.07	
Transportation Expenses:				
Total Charges	$20,662,085.84	$18,934,426.56	$1,727,659.28	9.12
Ratio to Operating Revenues	34.24	33.05	1.19	
Ratio to Operating Expenses	50.49	49.01	1.48	
Transportation Expenses per Revenue Train Mile (Cents)	63.42	60.48	2.94	4.86
Locomotive Costs per Mile Run:				
Enginemen (Cents)	7.85	7.46	0.39	5.23
Enginehouse Expenses (Cents)	1.94	1.87	0.07	[illegible]
Fuel (Cents)	9.25	9.06	[illegible]	2.10
Water (Cents)	0.63	0.66	—0.03	4.55
Lubricants (Cents)	0.17	0.17		
Other Supplies (Cents)	0.19	0.21	[illegible]	9.52
Total (Cents)	20.03	19.43	0.60	3.09
Average Number of Miles Run per Locomotive	[illegible]	40,791	[illegible]	.18
Average Number of Miles Run per Ton of Coal	12.77	12.74	0.03	.02
Coal Consumed—Tons	3,300,774	3,193,262	107,512	3.37
Fuel Consumption per Mile Run:				
Passenger (Cents)	6.53	4.97	1.56	31.39
Freight (Cents)	11.47	9.33	2.14	22.94
Train Supplies (Cents)				
Expenses (Cents)	1.96	1.93	0.03	1.55
Total Train Operating Expenses per Mile Run (Cents)	11.[illegible]	9.40	1.86	19.79

TABLE 16.

TRAFFIC STATISTICS FOR YEARS ENDED JUNE 30, 1911 AND 1910.

	1911.	1910.	Per Cent. of Increase or Decrease.
Average Miles of Road Operated.	7,041.95	7,050.17	Dec. .12
Passenger Traffic:			
Number of Passengers Carried..	17,137,450	15,694,486	Inc. 9.19
Number of Passengers Carried One Mile	740,411,290	671,732,143	Inc. 10.22
Average Distance Hauled per Passenger .....(Miles)	43.20	42.80	Inc. .93
Total Revenue from Passengers.	$16,056,303.76	$14,639,160.76	Inc. 9.68
Average Receipts per Passenger per Mile .....(Cents)	2.169	2.179	Dec. .46
Total Passenger-Train Revenue..	$19,536,116.04	$17,913,963.52	Inc. 9.06
Passenger-Train Revenue per Mile of Road.....	$2,774.25	$2,540.93	Inc. 9.18
Passenger-Train Revenue per Train Mile	$1.18146	$1.14843	Inc. 2.88
Average Number of Passengers in Each Train	44.78	43.06	Inc. 3.99
*Average Number of Passengers in Each Car.....	13.57	13.42	Inc. 1.12
Freight Traffic:			
Revenue Freight:			
Number of Tons Carried.....	26,091,061	25,204,297	Inc. 3.52
Number of Tons Carried One Mile	4,088,496,793	3,985,563,001	Inc. 2.58
Average Distance Hauled Per Ton .....(Miles)	156.70	158.13	Dec. .90
Total Freight-Train Revenue..	$39,498,963.61	$38,161,391.93	Inc. 3.51
Average Receipts per Ton per Mile .....(Cents)	0.966	0.957	Inc. .94
Freight-Train Revenue per Mile of Road	$5,609.09	$5,412.83	Inc. 3.63
Freight-Train Revenue per Train Mile	$2.32352	$2.27368	Inc. 2.19
Average Number of Tons of Freight in Each Train.....	240.51	237.46	Inc. 1.28
Average Number of Tons of Freight in Each Loaded Car	14.54	14.53	Inc. .07
All Freight (Including Company's Material Hauled Free):			
Number of Tons Carried.....	31,088,281	30,183,606	Inc. 3.00
Number of Tons Carried One Mile	5,111,331,177	4,969,652,728	Inc. 2.85
Average Number of Tons of Freight in Each Train.....	300.67	296.10	Inc. 1.54
Average Number of Tons of Freight in Each Loaded Car	18.17	18.12	Inc. .28
Revenues and Operating Expenses:			
Passenger and Freight-Train Revenue $59,035,079.65	$56,075,355.45	Inc. 5.28	
Passenger and Freight-Train Revenue per Mile of Road.....	$8,383.34	$7,953.76	Inc. 5.40
†Operating Revenues $60,345,062.64	$57,294,508.34	Inc. 5.32	
Operating Revenues per Mile of Road	$8,569.37	$8,126.68	Inc. 5.45
Operating Revenues per Revenue Train Mile	$1.85206	$1.82991	Inc. 1.21
†Operating Expenses (Taxes Excluded) $40,926,790.08	$38,635,745.94	Inc. 5.93	
Operating Expenses per Mile of Road	$5,811.85	$5,480.11	Inc. 6.05
Operating Expenses per Revenue Train Mile	$1.25608	$1.23397	Inc. 1.79
†Net Operating Revenue $19,418,272.56	$18,658,762.40	Inc. 4.07	
Net Operating Revenue per Mile of Road	$2,757.52	$2,646.57	Inc. 4.19
Net Operating Revenue per Revenue Train Mile	$0.59598	$0.59594	Inc. .01

*Includes Sleeping, Parlor and Observation Cars. †Excludes Outside Operations.

GENERAL BALANCE SHEET, JUNE 30, 1911, AND JUNE 30, 1910.

ASSETS.

June 30, 1910.		June 30, 1911.
	Property Investment:	
	Road and Equipment:	
	Investment to June 30, 1907:	
$318,243,507.64	Road	$318,243,507.64
47,796,465.54	Equipment (Including Trust Equipment)	47,796,465.54
$366,039,973.18		$366,039,973.18
$366,039,973.18	Total investment to June 30, 1907	$366,039,973.18
	Investment since June 30, 1907:	
$13,093,[illegible]	Road	$15,647,735.43
10,212,667.94	Equipment (Including Trust Equipment)	15,233,501.83
$23,306,360.71	Total Investment since June 30, 1907	$30,881,237.26
$389,346,[illegible]	Total Road and Equipment....	$396,921,210.44
12,050,[illegible]	*Less:* Reserve for Accrued Depreciation on Equipment.....	12,912,296.92
$377,296,201.06	Total Net Road and Equipment.	$384,008,913.52
	Securities:	
	Securities of Proprietary, Affiliated and [illegible]	
$2,495,351.93	Stocks	$2,487,686.26
21,797,[illegible]	Bonds	21,502,921.74
$24,292,[illegible]		$23,990,608.00
2,000,000.00	[illegible]	2,000,000.00
	Controlled Companies—Unpledged:	
[illegible]	[illegible]	$125,886.21
[illegible]	[illegible]	673,419.75
$896,615.88		$799,305.96
[illegible]	Total	$26,789,913.96
	[illegible]	
$335,656.89	tion, Equipment and Betterments...	$589,749.37
1,001,513.51	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]

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WE have pointed out heretofore how the failure of the Canadian reciprocity agreement, while undoubtedly affecting the future volume of railway business between the two countries, will still leave large opportunity for railway extension and connection between them. But there is one aspect of the regrettable defeat of reciprocity which must not be overlooked. It segregates Canada to her own railway policy and in the broadest, and at the same time most emphatic, sense confirms it. "Canada for the Canadians" will be a principle which the new Borden administration will apply first of all to the railways; and by the rule of contraries, if by nothing else, the divergency between Canadian encouragement of railways and our own discouragement of them seems sure to persist. This is especially true in the matter of building new lines; but it is almost equally true of the Canadian policy of non-interference with existing corporate railway administration in contrast with our own federal and state railway regulation. In Canada there is to be a policy of railway sustenance and support, probably intensified by the failure of reciprocity; here there is just the reverse policy. But the flow of capital ignores tariffs. So does the flow of emigration. He must be a blind economist who has not seen how of late our railway capital—and other capital, too—has begun to shift into Canada, how our western emigration is flowing to the Canadian West, and how our great still undeveloped Northwest must be retarded in railway development so long as railway baiting prevails. Yet in all this, after all, there is an optimistic thought. We have recently seen how the driving out of capital has forced the state of New York to modify materially her taxation of personal securities. The expulsion of capital from New York supplied precisely the vivid and concrete object lesson needed to drive the tax error home and rectify it. Canada refused us reciprocity; but if her proximity and her protective railway policy combined continue to result in transfers of our capital northward, the remedy on this side of the border line will only be a question of time, defeated reciprocity have its partial offset, and the single objective example be more forceful than the thousand previous appeals to reason.

IN the review of the annual report of the New York, New Haven & Hartford, published last week, brief reference was made to its policy somewhat unique among American railways, of extensive financing on a basis of debentures rather than mortgage bonds. The corporation has, in fact, out of $213,029,003, "mortgage bonded and secured debt," $151,593,200, or about 70 per cent., in "plain bonds, debentures and notes," as shown by its general balance sheet. Nor is this all, for the company has in the past converted large amounts of debentures into stock, and did so last year to the amount of $18,406,800. Debentures, indeed, appear to be a part of the traditional policy of the company, following the English precedent, though not to the extent of second and third debentures. The plan has certain advantages for railways. It leaves an unmortgaged or slightly mortgaged railway property as a kind of ultimate security, or to be mortgaged in case of an emergency. A long time debenture has some of the merits of a long time mortgage bond; and it lends itself readily to the theory of a subsequent general or blanket mortgage, and without injustice to the debenture holder if his security is given the right to share in any subsequent mortgage lien. Nor, in the case of a strong dividend paying road, is the real security much inferior to the mortgage bond itself. On the other hand, the debenture means a higher rate for the railway and—as distinguished from the short note—that rate often reaches over a long series of years. It cannot supply conservative "institutional" demand like that of the savings banks, held by their legal restrictions on investment; and, unless issued under the mortgage sharing proviso, the debenture is subject to the danger of senior issues that may impair the security. Finally, there is the American investment sentiment,

rooted deep in custom, that looks to the positive lien on a railway property. In spite, therefore, of the recent short note policy of solvent American railways—the short note being really but a short time debenture—there appears to be little likelihood of any expansive debenture custom; or, if it does come, it will be, as in the case of many of the debentures of the New Haven, a system with the contingent mortgage security annexed.

AFFABILITY AS AN ASSET.

THE railway superintendent who has a large division with many hundreds of employees to supervise and aggressive grievance committees to deal with needs to be strong in two opposite directions: he must have first-class executive ability, which often includes a considerable percentage of those forceful qualities sometimes summarized as "ugliness," and he must also be a skillful conciliator. The trainmaster, as the superintendent's understudy and performing many of the same duties, should be the same kind of a man. In other words, it needs an uncommon man to run the operating department of even a part of a big railway. The difficulty of finding uncommon men results in the grievance voiced by a trainmaster in a southern state, signing himself Fx, in a letter printed in another column. He finds two kinds of trainmasters, those noted for doing good work, and those noted for their suavity, and it is the last named who get the promotions. The only consolation that we can offer Fx is to try himself to add affability to his other good qualities. Moreover, it must be expected that the suave man will have the advantage at the beginning of the race, whatever may be the situation later. That his qualities have a real value is attested by the fact that such large salaries are frequently paid to salesmen who are deficient both in executive ability and in elementary education. Righteousness and truth may even at times seem to lose their primacy, because of the importance of maintaining or promoting amicable relations. A noted clergyman once, when asked by a young man as to the qualities to be looked for in choosing a wife, whether piety or amiability should be the first desideratum, promptly replied: "Amiability."

Cultivating suavity after one has arrived at the age of trainmastership is not likely to be easy, but that does not remove the necessity. Mr. Park, vice-president of the Illinois Central, has recently issued a pamphlet on the subject, in which he gives many good points. This essay is intended, no doubt, for station agents, conductors and brakemen, but there is nothing to hinder a trainmaster, or even a superintendent from acting on its precepts. For example, on page 2 we read:

"[illegible]; he must be thoroughly conversant with those who are naturally affable; those who practice successful methods of salesmanship; and those whose actions, in both official and social relations, are governed by ordinary etiquette. A study of government methods, as applied in the army and navy, as well as in diplomatic relations with other countries, is well worth the effort. There are books treating of courtesy, that will be recommended by the Educational Bureau of the company upon request. . . . The things which seem to irritate the patrons of a railway are, at times, incomprehensible. They are, apparently, passing emotions brought about by the temporary excitement of a mental condition which is abnormal. Patrons ask questions which seem irrelevant; they make unreasonable demands, or demands that cannot be complied with. 'Patience is a most necessary qualification for business; many a man would rather you heard his story than granted his request. One must seem to hear the unreasonable demands of the petulant, unmoved, and the tedious details of the dull, untired.' (Chesterfield.)"

The first two lines of that paragraph will in many cases be sufficient [illegible] the [illegible] who *naturally* possess the qualities desired. If you have a naturally [illegible] in the best manner [illegible] to any train you [illegible], who, perhaps, are [illegible] more property than get some one [illegible] at all [illegible] [illegible] courtesy.

[illegible] and [illegible] must be a main element in the ambitious railway man's effort in this matter, for he is not going to [illegible] least persistency, to let the subject absorb his mind for considerable periods of time, and frequently. This is necessary to avoid being superficial. A trainman or baggage agent may be the pink of politeness, yet so poorly qualified to answer passengers' questions that his pleasant manners are almost a mockery. A trainmaster may be affable, and free with cigars, yet so poorly qualified to really meet a patron's complaint that his affability is only a disappointment to the complainer. A really earnest study of this matter of pleasing people—passengers, freight-house patrons and everybody—will lead a man to improve the matter as well as the manner of his service to the public; and then he will improve so fast that he will surprise himself. Full and accurate information is the thing that the patron wants, and fullness, or even elegance of language is no substitute for it.

Our correspondent says that the "boss-grievers" get the ear of the higher officer and secure the suspension of punishments which the fair minded employees, and perhaps even the men punished, have acknowledged to be just. Here again the importance of tact comes in. Cases of this kind may often be considered simply as examples of superior suavity on the part of the grievers. Their ability to palaver is, indeed, one reason why they have been put on the committee. The trainmaster must qualify himself in the same direction—with the objectionable or insincere elements left out. He must at least study the art of cajolery; having studied the art and thus got at the viewpoint of those who practice it, as well as of those on whom it is practiced, he can himself adopt more dignified measures.

Any railway man who feels himself at all deficient in the art of courtesy will do well to get a copy of Mr. Park's pamphlet. As before observed, it appears to be written mainly for station men and trainmen, but in speaking to trainmasters we need offer no apologies for enlarging on the duties of agents and conductors, for the trainmaster needs to be as well informed concerning the nature of the agent's or conductor's duties as does the agent or conductor himself. It is true that this is a hackneyed subject and the pamphlet is a short one; nevertheless, it contains a number of suggestions of a kind not usual in railway documents. One of its most significant lessons—partly to be found, however, between the lines—is that the station agent or conductor must be well informed. Mr. Park says:

"A kind word to those in the waiting rooms, who may be too timid to ask questions, shows thoughtfulness, and is received with appreciation. Courtesy of this kind is seldom vouchsafed, and when such interest is not manifested, the impression may be given that the company's representative is taciturn and sour, although the contrary may be the case. The agent is looked upon as the company itself. He has the right to know that patrons are satisfied, and no offense can be given or taken through a polite inquiry as to whether anything can be done to assist the traveler. With the waiting room full of people, a few minutes spent among its occupants in this way may bring many dollars to the company in return. On the train, the conductor has many opportunities to increase the value of his services with a little personal effort that costs him nothing and wins smiles of approval. Many prominent and learned men have been flattered by a word of recognition from the conductor; in what esteem, then, must his affability be held by those of less importance?"

Surely an agent or conductor must be well informed if he is to satisfactorily carry out the ideas here suggested. If you offer to a passenger mere pleasantries or remarks about the weather—which may be entirely proper as ice-breakers—and if then the passenger turns around and starts to discuss the relation of the directors of the road to the state legislature or to a city grade crossing commission, you must be prepared to quickly shift from mere words to actual matters of business. Again, not the least important qualification of an affable railway man is to be able to cease anything like puffing his employer when the passenger emphasizes some really important point against the road. If an intelligent and courteous citizen enlarges on the fact that he was six months in collecting a simple claim for lost freight, and if you know that the practice of your road in settling claims is open to criticism, it is no answer to him to point to your fine parlor-car accommodations, or to the fact that station windows are now kept clean. Rather, there is need for a discreet word of regret.

The final lesson is in one word: "patience." As most railway men have to meet the attacks of the inquisitive or dull or exasperating patron when they are overworked and tired, they will agree with us that here is the rub. Some of us who think that we have already made some progress in the attainments that Mr. Park calls for are obliged to admit that this part of our theoretical good service sometimes gets neglected in practice—in *our* practice. The best watchword is that first quoted from the pamphlet: watch the men who are naturally affable. A newspaper reporter who visited the Grand Central station in New York City at a busy time the other day found the station master answering, at the average rate of six times a minute, a question which each questioner could have answered himself by turning his eyes very slightly upward and reading a dozen words printed in letters a foot high. It requires natural affability, or a very good quality of the cultivated kind, to deal with that kind of situation.

CHICAGO, INDIANAPOLIS, & LOUISVILLE.

THE Chicago, Indianapolis & Louisville has two main lines, one running from Chicago south via Indianapolis to Cincinnati, and the other from Michigan City south to Louisville. At Cincinnati the road connects with the Louisville & Nashville, and with the Cincinnati, New Orleans & Texas Pacific, and at Louisville with the Southern Railway, and with the Louisville & Nashville. The Monon is controlled jointly by the Southern Railway and the Louisville & Nashville, the two together owning 87 per cent. of the stock. Since the C. N. O. & T. P. forms the northern part of the Southern Railway's Queen & Crescent route, the Monon gives the Southern Railway and the Louisville & Nashville their line to Chicago. It enables the Southern Railway to route freight from all southern territory to Chicago. Of course, the Southern cannot successfully compete for freight, say, as far north as Washington, D. C., to be routed by way of Cincinnati, and over the Monon to Chicago, and the amount of traffic that it can get from southeastern territory is problematical, but it can compete for freight on all of its southwestern lines, and the Louisville & Nashville can solicit freight for Chicago from all of the territory that it serves.

The Monon runs through a highly competitive territory, both for freight and passenger business. In the last two years it has earned enough to comfortably pay 4 per cent. dividends on the preferred and 3¼ per cent. dividends on the common stock, and have some surplus to credit to profit and loss. Both last year and this year the two principal stockholders of the Monon could have had larger income from their investment if they had wanted it. There was, however, a change of policy in the management of the road when Ira G. Rawn became its president in 1908. Before that the road had been allowed to pursue the even tenor of its way without any attempt at all on a large scale to improve the property. Its physical condition was, therefore not very good. Since 1907, $1,150,000 has been charged for additions and betterments, which, as President Harrison points out in his annual report, is equivalent to more than 2½ per cent. per year on the common stock during the past four years. In 1911, $664,000 was spent for additions and betterments, of which $274,000 was charged to income and the remainder paid for through the sale of equipment trust certificates. The company let a contract for the installation of automatic block signals on its line between Chicago and Indianapolis, possibly influenced in part by the agitation in Indiana for block signals.

The company has adopted 90-lb. rail as its standard, and the new equipment that was ordered during the past year is much heavier than the equipment ordered heretofore. Last year the company placed 47,436 cu. yds. of ballast in track, as against 34,560 cu. yds. the year before; of the total main track, 98.87 per cent. is now ballasted. The road renewed 566 ties per mile last year, as against 363 the year before.

Considerably more was spent for maintenance of equipment last year than it has been the practice in the past to allow for this account; $879,000 being charged for maintenance of equipment in 1911, as compared with $823,000 in 1910. Twelve new consolidation engines, three Pacific type engines, 100 steel underframe automobile box cars and 200 steel underframe flat cars were added to the equipment during the year.

In the fiscal year ended June 30, 1911, the company operated 617 miles, or almost exactly the same as the year before, and earned gross $6,187,000, an increase of $167,000 over the year before; but higher operating expenses consumed more than this increase, and the company earned $713,000 available for dividends, as against $862,000 in 1910. President Harrison says: " . . . It is a fair illustration of the change in operating conditions of an American railway that six years ago, when the operating revenues for the year ended June 30, 1905, were 9.33 per cent. less than they are this year, the operating income was 19.17 per cent. greater than it is this year. . . . As the property has been well maintained, and much study has been given to operating efficiency, these increases in expenses can be traced largely to increased wages and compliance with the requirements of governmental regulating authority; though it is fair to point out that the increased terminal expenses at Louisville, incident to the congestion and construction of the property of the Kentucky & Indiana Terminal, which is used by this company were substantial, but fortunately believed to be an extraordinary factor in increasing the operating expenses of this company." We have quoted the last sentence because it shows a candor that is not by any means always displayed when railway officers publicly discuss the increased cost of operation.

Earnings from passengers amounted to $1,577,000 last year, as against $1,449,000 the year before. This is an increase of 8.80 per cent. The increase in passenger business was handled by an increase of only 1.15 per cent. in the mileage passenger trains, the total passenger train mileage last year being 1,642,000.

Of the total 3,656,000 tons carried in 1911, 1,113,000 tons, or 30.44 per cent., was manufactures and miscellaneous. This is a very high proportion of what on most railways is high class traffic taking a high ton mileage rate. In 1910 the total tonnage of all commodities was 3,520,000 tons, and of manufactures, 1,028,000 tons, or 29.15 per cent. of the total tonnage. The average receipts per ton per mile were 0.836 cents last year, as against 0.775 cents the year before. This is an increase of 7.87 per cent. in the average rate per ton mile. The tonnage of both products of mines and products of forests was proportionately less last year than the year before. The Monon has on its lines large coal fields, and during the year a traffic agreement was made with the Monon Coal Company, which agreement it is expected will result in a substantial increase in the coal traffic of the company. Last year the company carried 493,000 tons of bituminous coal, as against 486,000 tons carried the year before.

The following table compares the operations of the road in 1911 with 1910:

	1911.	1910.
Average mileage operated	617	616
Freight revenue	$4,054,115	$4,063,422
Passenger revenue	1,576,660	1,449,074
Total operating revenue	6,186,879	6,020,242
Maint. of way and structures	799,008	794,968
Maint. of equipment	878,722	852,785
Traffic	201,556	175,641
Transportation	2,193,184	1,973,814
Total operating expenses	4,257,163	3,948,135
Taxes	268,445	268,654
Operating income	1,661,271	1,803,453
Gross corporate income	1,865,579	2,041,408
Net corporate income	712,587	861,580
Dividends	541,250	541,250
*Surplus	171,337	320,330

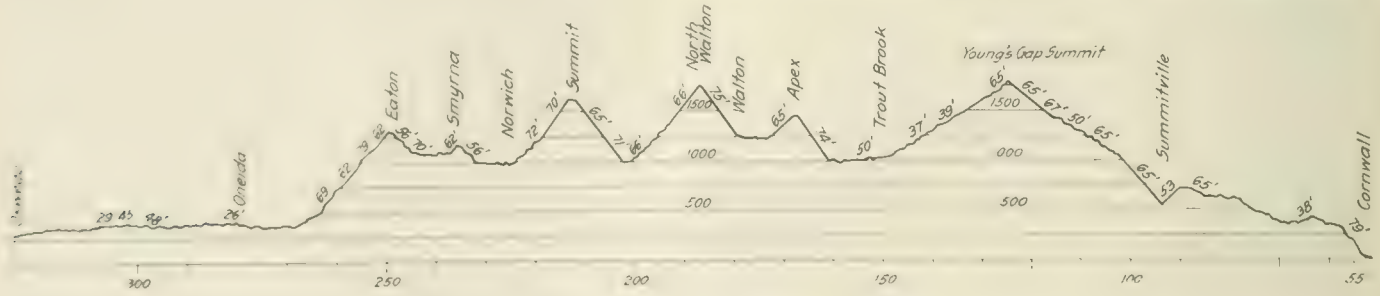
*In 1911 the company charged against profit and loss the total cost of additions and betterments since 1907, namely, $1,152,123.

NEW YORK, ONTARIO & WESTERN.

ANY review of the New York, Ontario & Western must consider the property in two aspects—first its character as an independent and self-supporting property; and, second, its nature as a subsidiary of the New York, New Haven & Hartford. Its latter character is, in some respects, the more important, especially as bearing on the future of the property. At present, and for the immediate future, the controlling corporation is not seeking very high development and expansion, content in the main to draw a fair dividend on the investment. But beyond are much larger potentialities.

Taking up, however, first the Ontario & Western as a separate property, the prime feature to attract attention in its annual report is its character as a coal carrying line. Out of total operating income of $9,295,702 during the last fiscal year, $4,597,202, or somewhat more than 48 per cent. was derived from the transportation of coal. Even more significant is the increase shown in this branch of the business. The $4,597,202 in 1911 compared with $3,903,739 the previous year, shows an increase of $693,463, or almost 18 per cent.; and the gross coal tonnage from the Scranton division, exclusive of coal used by the company, was 3,520,862 tons, an increase over 1910 of 652,993 tons, or almost 23 per cent. This was somewhat more than 5.4 per cent. of the output of the entire anthracite field in the calendar year 1910. Future increase of the business is forecast by the continued work of second-tracking the Scranton division, of which 43 out of 54 miles is now double-tracked, many other general improvements of coal-handling facilities and, much more well taken care of. That of way and structures rises from $1,034,454 to $1,087,791; of equipment from $1,316,045 to $1,494,634—in these, obviously some allowance being necessary for the increase of wages, which appears on a much larger scale as an indefinite factor in the transportation expenses which rise from $3,191,408 to $3,613,220. But, besides the sums spent for maintenance is the large entry for additions and betterments, amounting to $1,420,848 for the plant and $1,703,159 for rolling stock over and above equipment retired, and reaching together $3,124,007. These have been financed chiefly by new general mortgage bonds and notes. The company is evidently preparing for a much larger increase in traffic which, with more efficient operation, ought to show next year a good increase in surplus over the normal 2 per cent. dividend. Noteworthy details of the report are an increase of 3.91 per cent. in local passenger earnings and decrease of 8.40 per cent. in through passenger earnings; an increase of 2.42 per cent. in local freight earnings and decrease of 3.77 per cent. in through freight earnings; a decrease of the large milk traffic of the country from $758,755 to $742,104, owing to adverse market conditions in New York City; an increase of the amount paid for use of foreign engines and cars from $121,302 to $273,252—an expense which the new equipment ought to reduce; a decrease of the investment in coal properties from $11,001,778 to $10,415,000; and a decrease in profit and loss surplus from $5,893,138 to $5,646,141.

Turning finally to the secondary aspect of the property involving its relations to and with the New Haven—which holds 291,622 shares of the O. & W. stock with a book value of



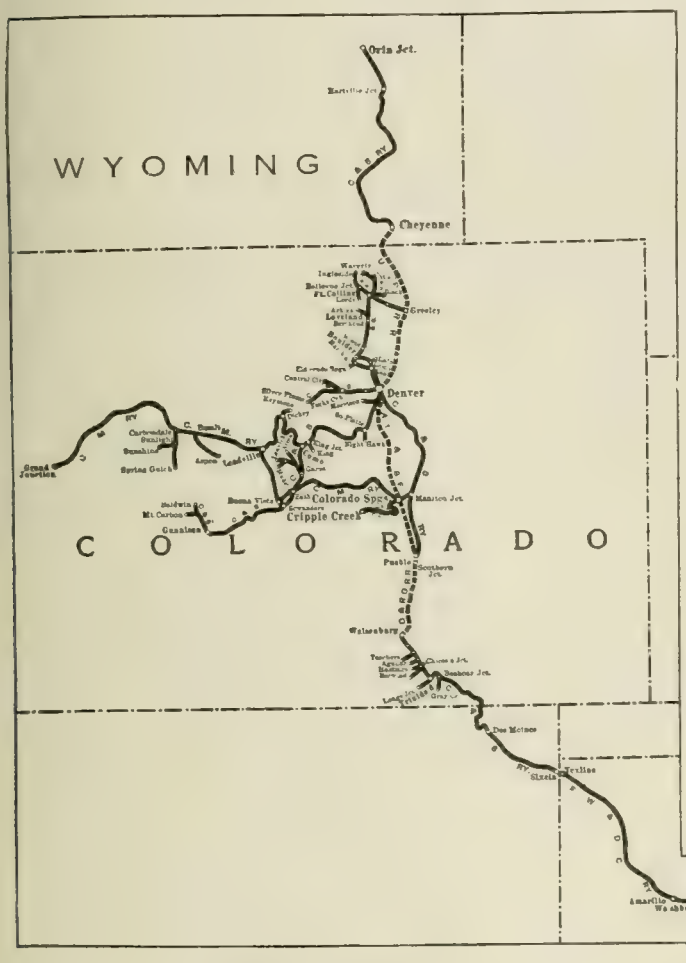
Profile of the New York, Ontario & Western.

telling the addition of 1,340 coal cars, in the list of additions and betterments. Of the coal tonnage 2,060,136 tons, or almost 59 per cent. went to tidewater at Weehawken and Cornwall, and 183,991 tons to the lakes via Oswego. Of the remainder, 1,276,735 tons, or somewhat more than 36 per cent., presumptively it went very largely to New England.

The gross operating revenue of the line shows the handsome increase from $8,578,782 to $9,295,702, almost entirely due to [illegible] and in spite of a loss of 65 per cent on [illegible] through freight earnings due to the withdrawal [illegible] per cent of the differential rate allowed the company. But [illegible] operating expenses which rose from $8,382,146 to $8,811,619, left net operating revenue only $67,447 above that of last year. Deductions of other income and slight increase of taxes and [illegible] left the balance from current income still [illegible] gross income to [illegible] from $2,844,417 to $2,880,636. [illegible] the surplus from dividends [illegible] the preferred year, to [illegible] from $1,312,797 to $1,144,709, a [illegible] $168,088 less than the dividends paid on the $22,114,800 of [illegible] stock and the $4,000 of preferred stock. Like to [illegible] the Ontario & Western was hit by the increase in [illegible] amounting to about $700,000. That wages have the power to [illegible] was [illegible] would have been [illegible] $500,000 [illegible] was in 1910. The [illegible] by [illegible] Our [illegible] for the purpose of [illegible] [illegible] [illegible]

COLORADO & SOUTHERN.

THE Colorado & Southern has now decided to build a line of its own between Wellington, Col., the northernmost point on the Fort Collins district, to Cheyenne, Wyo., connecting there with the Chicago, Burlington & Quincy. Heretofore the company has used the Union Pacific between Denver and Cheyenne. This change is due to the increased business on the



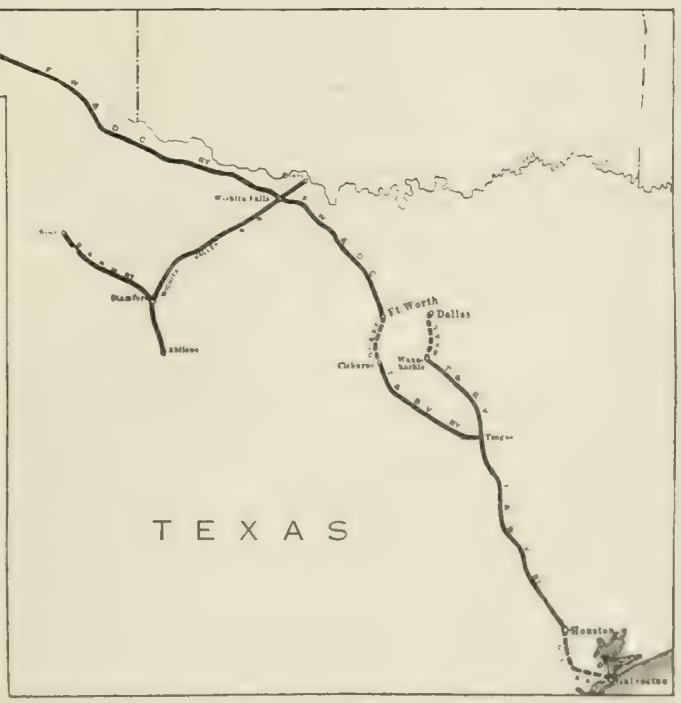
Colorado & Southern Lines.

Union Pacific line between Cheyenne and Denver, and possibly to a keener competition between the Hill and Harriman lines for Gulf business. The Colorado & Southern was composed originally of a branch lopped off the Union Pacific, and the Denver, Leadville & Gunnison, and to these Colorado lines was added the Fort Worth & Denver City, and a half interest in the Trinity & Brazos Valley. The other half interest in the Trinity & Brazos Valley is owned by the Chicago, Rock Island & Pacific. The independent C. & S. property, then, as it stood in 1908 consisted of lines in Colorado tapping the rich mineral resources of that state, with a good and short line giving Colorado products an outlet to the Gulf at Galveston, Tex. Control of this property was bought by the Chicago, Burlington & Quincy, giving the Hill lines an outlet to the Gulf, with the obvious possibility of competing with the Southern Pacific on business from the Pacific coast to Galveston. The Wyoming division of the Colorado & Southern, which runs from Cheyenne north to Orin Junction on the C. B. & Q., and which has heretofore been isolated, will, on the completion of the line from Wellington to Cheyenne, form part of a through line which can be traced from the Pacific coast terminals of the Great Northern through Billings, Mont., to Galveston, the C. B. & Q., having plans for a line from Orin, Wyo., to Thermopolis.

In 1908 the Colorado & Southern carried a total tonnage of freight amounting to 6,680,000 tons, of this total, 75.03 per cent. originated on C. & S. lines and 24.97 per cent. on foreign lines. In the fiscal year ended June 30, 1911, the C. & S. carried 7,770,000 tons of freight, of which 67.93 per cent. originated on C. & S. lines, and 32.07 per cent. on foreign lines; or, put in a different way, in 1908 there was 5,100,000 tons of freight originating on the company lines and yielding $7,070,000 revenue, while in 1911 there was 5,270,000 tons originating on company lines and yielding $6,950,000 revenue. On the other hand, in 1908 there was 1,670,000 tons of freight delivered to the C. & S. by connecting lines and yielding the C. & S. $2,940,000 revenue, while in 1911 there was 2,490,000 tons of freight delivered by other lines and yielding the Colorado & Southern $4,170,000 revenue. These figures tell the most interesting part of the Colorado & Southern's story, since the Burlington acquired control.

In 1911 the Colorado & Southern earned gross $15,820,000, as against $16,780,000 gross in 1910. Operating expenses amounted to $10,330,000 last year, and to $10,860,000 the year before. After payment of 2 per cent. dividends on the stock and paying half of the deficit on the Trinity & Brazos Valley, which payment last year amounted to $483,000, the C. & S. had a surplus of $516,000, as against $1,180,000 the year before. Both freight and passenger revenue were less last year than they were the year before, as shown in the figures at the end of these comments, and this decrease in revenue was due to a smaller amount of traffic moved. The average haul per ton per mile, 151 miles, was very slightly longer than the average in 1910, and the average revenue per ton per mile, 9.49 mills, was very slightly less than in 1910.

The total ton mileage last year was 1,171,000,000, a decrease of 78,000,000 ton miles from the year before; and the passenger mileage was 153,000,000, a decrease of 7,000,000 from the year before. With this smaller freight traffic, the Colorado & Southern was not able to maintain its train load at quite as high a figure in 1911 as in 1910, the average train load on standard gage being 317 tons in 1911 and 325 tons in 1910. On narrow gage, however, the average train load was 95 tons last year, as against 93 tons the year before; and while on all lines



there was almost exactly the same number of loaded cars per train mile in 1911 as in 1910, there was on an average 7.31 empty cars last year, as against 7.10 in the year before.

Operating expenses as a whole last year actually showed a small decrease, as shown in the comparative figures herewith;

but only a part of the total decrease came in transportation expenses. Maintenance of way and structures cost $1,690,000 in 1911, as against $2,190,000 in 1910, but maintenance of equipment, on the other hand, cost $2,780,000 last year, as against $2,520,000 the year before. Less was spent last year for ties; rails; bridges, trestles and culverts; buildings, fixtures and grounds; and roadway tools and supplies than in 1911, and only $348, under the head of maintenance expenses, was spent for ballast.

In 1911 the C. & S. spent a total of $4,770,000 for improvement and extension of the property not chargeable to maintenance expenses. Of this amount, $2,270,000 was for new lines and extensions and $2,500,000 for additions and betterments. The largest items under additions and betterments are $1,570,000 spent for freight train cars, $325,000 spent for locomotives, $122,000 spent for bridges, trestles and culverts, and $89,000 for crossings and signs. In 1911 $3,407,000 refunding and extension mortgage bonds was sold to reimburse the treasury for capital expenditures. At the end of 1911 the company had $1,480,000 cash and total working liabilities of $2,670,000. The profit and loss surplus on June 30, 1911, was $10,340,000, as against $9,270,000 at the end of 1910.

The following table shows the principal figures for operation of the Colorado & Southern in 1911, as compared with the previous year, 1910:

	1911.	1910.
Average mileage operated	2,015	2,042
Freight revenue	$11,120,361	$12,040,8[illegible]
Passenger revenue	3,870,672	3,918,093
[illegible]	15,824,065	16,777,981
Maint. of way and structures	1,688,223	2,188,645
Maint. of equipment	2,779,143	2,521,273
[illegible]	239,692	274,271
Transportation	5,112,952	5,378,794
Total operating expenses	10,334,111	10,863,455
[illegible]	478,323	477,870
Operating income	4,978,345	5,414,333
Gross corporate income	5,623,566	6,041,959
Net corporate income	2,298,592	2,951,633
Dividends	1,300,000	1,300,000
Half of def. of Trinity & Brazos Val.	482,598	466,718
Surplus	515,994	1,184,915

NEW BOOKS.

[illegible]—[illegible] By Henry Greenleaf Pearson. Boston: Houghton, Mifflin Co. Cloth; 5 in. x 7½ in.; 196 pages. Price, $1.25 net.

This is a biographical sketch of one of the most gifted men in American railway history. Col. Forbes, who died in 1898 at the age of 86, was an important figure in the Michigan Central and the Chicago, Burlington & Quincy for many years, and this book is an entertaining sketch of his activities in those fields. Extracts from advance sheets of the book were published in the *Railway Age Gazette*, December 2, December 23, and March 31 last. Mr. Pearson's work is made up in part of extracts from letters and other data written by Col. Forbes himself. The reader will find that Forbes was a vivid writer, and that Mr. Pearson has edited his material with excellent judgment. As is observed by the publishers in their circular, stories of the wise, honest and public-spirited work done by men like Forbes in the railway field deserves attention, not only because of their own intrinsic worth, but also as an offset to those narratives which have perhaps been given undue prominence in the literary world, which have told of the evil deeds done in connection with roads of unfortunate memory. The subject of this sketch [illegible] ing and governmental activities were with us, his career will [illegible] an interest in "human documents," and in the formative period of the railway era.

Letters to the Editor.

WEAKNESSES IN TRAIN OPERATION.

August 27, 1911.

To the Editor of the Railway Age Gazette:

Your editorials of August 11, 18 and 25, and the letter signed "L. N. S.," concerning discipline of enginemen, bring up a subject in which all right thinking American citizens should be interested. No one can deny that railway officers are vitally interested in the correct solution of this important problem. They are giving it their best thought. That it has not been solved proves that it is a problem not easy to solve.

Have not the men who direct the destinies of the trainmen and station men gone too far with the "get along with the men" idea? The trainmasters, and other minor officers, who know how trains ought to be operated, and insist on the men who operate them doing it strictly in accordance with the rules and safe practice; who administer the necessary discipline to insure it being done when the occasion demands, are not the ones who are promoted, as a rule. And the men in similar positions who wink at gross violations and unsafe practices; who O. K. time slips as turned in without inquiring whether the overtime which is claimed was actually earned, are the ones who usually "get along with the men." And, however, much we may regret to have to say it, they are also usually the ones who are promoted. There are some shining exceptions.

It requires no difficult process of reasoning to get the result of this practice; and the railways are suffering from it.

The bugaboo about this officer or that offiecr not getting along with the men, usually originates in the brains of the grievance committee, and is directed against some honest officer who knows what is right and has the moral courage to stand up for it. But the grievance committees are "the men," and they are the men who reach the general officers' ears. We all have known of cases where division officers administered discipline that was just and for the good of the service, and that met with the approval of a majority of the men on the division; yet which the grievance committee has had reversed on the plea "that it would have a good effect on the men." Instead of "seeing that the offence does not occur again," the committee usually succeeds in bringing about a condition where the men who make trouble report to, and receive their instructions from the chairman of the grievance committee instead of the officer designated in the rules.

Fx.

FOREIGN RAILWAY NOTES.

Locomotive and car building in Austria seem to be in a bad way. Three locomotive works report their output in 1910 as 45½ per cent. less than in 1909, and the number of their employees was reduced from 4,796 to 3,056. The association of car builders reports that it had orders for 10,500 cars in 1908, 6,400 in 1909, and 4,700 in 1910; while the prospect is for only 1,700 this year. These works are able to build 16,000 cars yearly.

Nearly one-fourth, by weight, of the locomotive fuel used in Russia in 1908 was petroleum or petroleum residuum. A ton of petroleum costs as much as 2.55 tons of coal, and in Asia it serves for a little less than twice as many miles, but in Europe for only 64 per cent. more—perhaps due to a greater use of residuum in Europe. A table giving the relative heating value of different fuels gives 69 units of petroleum as equivalent to 110 of English coal, and to 273 of a coal produced in eastern Siberia. The cost of locomotive fuel in 1908 was 14.78 per cent. of the total working expenses of the Russian railways. It has to be hauled long distances for some of the lines.

INTERLOCKING AT THE NORTH WESTERN STATION, CHICAGO.*

BY J. A. PEABODY,
Signal Engineer, Chicago & North Western.

In the new passenger station of the Chicago & North Western in Chicago there are 16 tracks. These merge at the north end of the station into a six-track throat, which divideds into two four-track approaches, one from the north and one from the west as shown in Fig. 1. On the line to the north the signaling extends to the junction of the Wisconsin and Milwaukee divisions, near Division street. On the west approach it extends to the junction with the four tracks of the Galena division near Noble street.

INTERLOCKING PLANTS.

There are five interlocking plants in the terminal:

1. Lake street, at the entrance to the station yard.
2. Clinton street, at the junction of the north and west approaches.
3. Noble street, at the junction of the west approach with the Galena division.
4. Division street, at the junction of the north approach with the Wisconsin and Milwaukee division; and
5. Carpenter street, at the junction of the north approach and the old Milwaukee and Wisconsin division tracks.

The interlocking machines are all of the standard unit-lever type, made by the General Railway Signal Company.

There is an apparent duplication of derails on some tracks within the Clinton street plant. The derails farthest from the fouling point were installed to comply with the Illinois rules requiring 500 ft. of protection on main tracks for facing moves, while those near the fouling point protect against trailing moves; and since they are located at clearance points allow conflicting routes to be set up as soon as the train passes them, instead of holding these routes until a train passes the derail farthest away.

SIGNALING.

In developing the signaling to be used, the then standard practice of the road, which combined the use of the two-position lower quadrant semaphore signal for interlocking with the disk signal for automatic blocking was compared with the three-position upper quadrant semaphore signal for all purposes. The latter was adopted, with the result that but 90 signals were required instead of 150 under the old standard; and the number of signal aspects was reduced and the method of giving information to the engineman simplified. The aspects of the signals are in the upper quadrant and are arranged according to the latest recommendations of the Railway Signal Association. A green light means proceed; red, stop; and the combination of the red and green, caution. The lamp which is used in the combination has but one burner and a reflector furnishes the second light. This lamp was designed in 1889 by E. C. Carter, chief engineer, and has been standard of the Northwestern since that time.

At the Lake street plant, information as to the position of the signal ahead as well as the proceed and stop signals, is given by one dwarf signal using three positions. This secures the safe handling of trains at reasonable speed and the absolute safety and reliability of the practice has already been satisfactorily shown. Also at this plant, the third position of the last signal governing trains inbound into the station is used to indicate that the track under the train shed is clear. The dwarf signals are all motor driven and, except at the Lake street plant, are used in the horizontal and diagonal positions only.

For tracks which are signaled so that trains may be run in either direction at any time, traffic levers are installed in each of the interlocking machines in order to prevent trains being started in the opposite direction on one of these tracks at the same time as, or against, an approaching train, and to provide protection in case of emergency when it is necessary to reverse traffic on any of the other tracks. These levers are controlled in the same manner as the signal levers in manual blocking machines so that signals cannot be given for a movement on to a track until the traffic levers controlling the movements to that track are in the proper position in the towers at both ends of the track.

COMMUNICATION AND INFORMATION.

The means of intercommunication between the various points of the terminal comprise (1) conductors', towermen's and gatemen's annunciator system; (2) telautograph; (3) various automatic train annunciators and indicators; (4) illuminated track diagrams; (5) lights over levers; (6) the intercommunicating system, and (7) the telephone system.

The system of annunciators generally known as the "C. T. G." system is used for the starting of trains from the station. Each of the station tracks holds two trains and the "C. T. G." equipment for each track is, therefore, in duplicate. Four boxes containing conductors' lights and push buttons are mounted on posts on the platform, the equipment including two telephones on each platform. The director's table in the Lake street tower has three lights and a push button for each of the two possible trains on each of the 16 tracks in the train shed. The gatemen's lights are on the concourse and the push buttons are on the track side of the gate posts of the partition dividing the main concourse from the train shed. For through trains the conductor pushes his button one minute before leaving time. This lights the top light on the director's table in the Lake street tower and the first light on the gateman's indicators reminding them that it is about leaving time. If the director can handle the train on time he replies by pushing a button, which puts out the top light and leaves the second light on his table, and also puts out the first and lights the second light at the gate, and also lights the top light of the conductor's indicator.

When it is time for the train to leave, the gateman closes his gate and after giving the last passenger who went through sufficient time to get on the train he pushes his button. This extinguishes the second light at the gate, puts out the conductor's top light, and lights the lower one, and puts out the second and lights the third of the tower director's light, thus advising both the conductor and director that the train may leave. The conductor then signals the engineman to proceed, which he does if the signal indicates that he may. The restoring of the first interlocking signal to the stop position automatically restores the annunciator system. For suburban trains the conductor pushes his button ten seconds before leaving time and receives no answer, as to avoid congestion these trains must leave on time. Before a train which has discharged its passengers can back out of the station a signal must be received from the director.

This system gives the tower director absolute control of all trains in the station, so that he can make the utmost use of track room, and in actual practice is simple, rapid, and easily understood.

The Gray telautograph system has three transmitters and 19 receiving stations. The transmitters are in the two division despatchers' offices and in the Lake street tower. Receiving stations are so distributed that every employee about the station who should know about incoming trains is kept informed.

The telephone system includes a line for direct communication between adjacent interlocking towers, and a local system at each plant. There is a permanent telephone on each home signal bridge. Annunciators controlled automatically by the track circuit relays announce to the towerman the approach of trains. When a detector circuit is occupied, the small light mounted under ground glass over each switch lever is extinguished, and when the track is free the light burns. The Lake and Clinton street towers have illuminated track diagrams. The necessary information is so clearly and completely shown in the illuminated

*From a paper presented at a special meeting of the Western Society of Engineers, September 20.

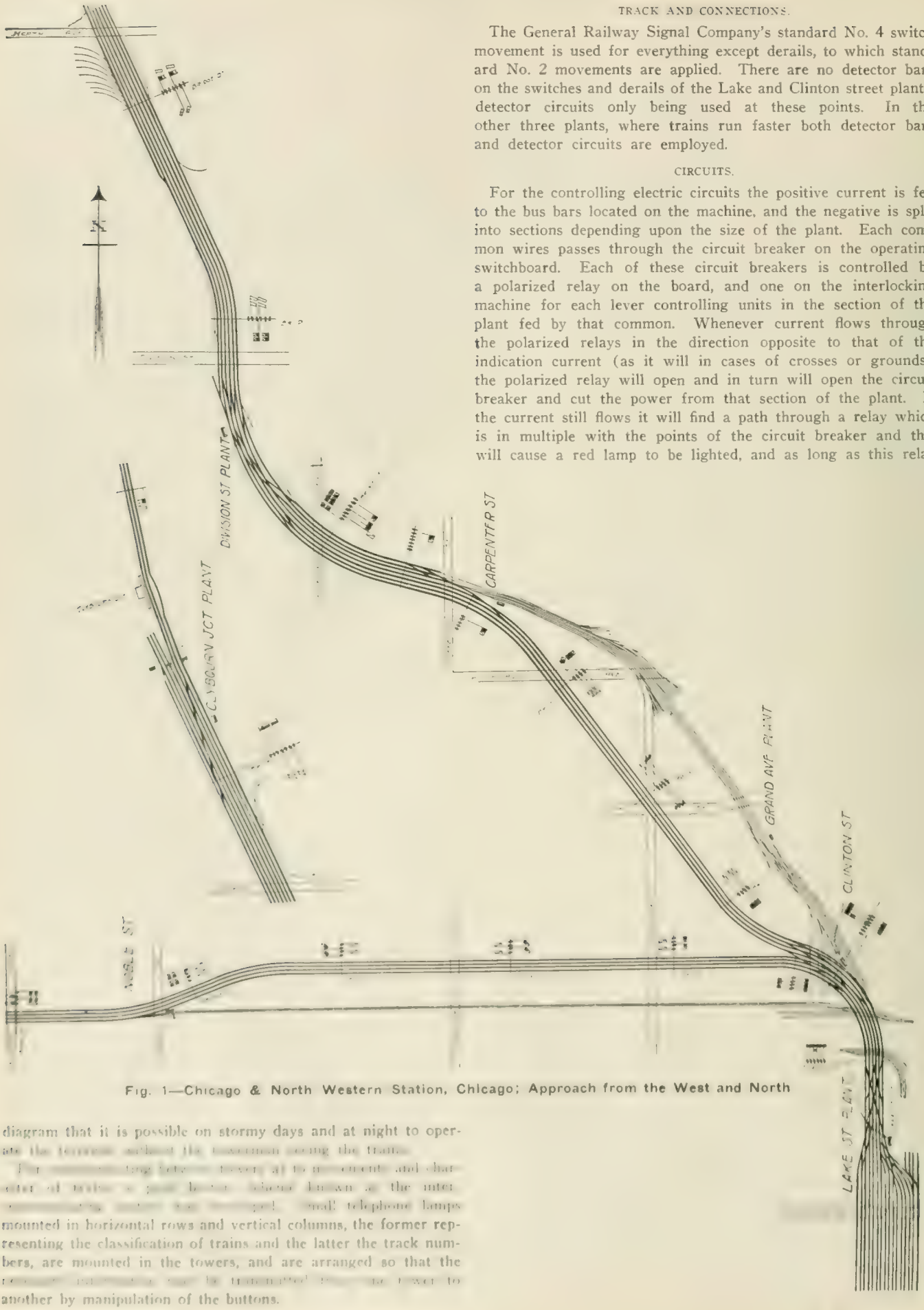


Fig. 1—Chicago & North Western Station, Chicago; Approach from the West and North

diagram that it is possible on stormy days and at night to operate the terminal without the assistance of the trainmen.

For communicating between towers as to movements and character of trains a push button system known as the inter-communicating system has been provided. Small telephone lamps mounted in horizontal rows and vertical columns, the former representing the classification of trains and the latter the track numbers, are mounted in the towers, and are arranged so that the [illegible] may be transmitted from one tower to another by manipulation of the buttons.

TRACK AND CONNECTIONS.

The General Railway Signal Company's standard No. 4 switch movement is used for everything except derails, to which standard No. 2 movements are applied. There are no detector bars on the switches and derails of the Lake and Clinton street plants, detector circuits only being used at these points. In the other three plants, where trains run faster both detector bars and detector circuits are employed.

CIRCUITS.

For the controlling electric circuits the positive current is fed to the bus bars located on the machine, and the negative is split into sections depending upon the size of the plant. Each common wires passes through the circuit breaker on the operating switchboard. Each of these circuit breakers is controlled by a polarized relay on the board, and one on the interlocking machine for each lever controlling units in the section of the plant fed by that common. Whenever current flows through the polarized relays in the direction opposite to that of the indication current (as it will in cases of crosses or grounds) the polarized relay will open and in turn will open the circuit breaker and cut the power from that section of the plant. If the current still flows it will find a path through a relay which is in multiple with the points of the circuit breaker and this will cause a red lamp to be lighted, and as long as this relay

is energized the main circuit will be held open, so that closing the circuit breaker will not restore the current as long as the trouble exists. Clearing the trouble, however, automatically puts out the red light and closes the circuit. A 2-c. p. 110-volt lamp with a suitable switch is used as a ground detector.

The dwarf signals are of the Model 2-A type, made by the General Railway Signal Company. The motor is geared directly to the spindle on which the blade is mounted and to which are also connected springs to force it back to its normal position when released. The motor while running backward generates current, which energizes the indication magnet and releases the lever. The load imposed on the generator brings the mechanism to an easy stop, accomplishing the purpose of a dash pot. The common wires for the dwarf signals pass through switch boxes on all facing derails to insure that the derails are off the track before the signal can be cleared. The high signal mechanism is of the same type as the dwarf; the interlocking signals being operated at 110 volts. All high signals are slotted. The approach signals are similar to the interlocking signals, but operate on 16 volts instead of 110.

The lights on the signal levers are selected through switch levers and relay points to indicate as follows: No light, when there is no route prepared; green light, when there is a route lined up and unoccupied; red light, when there is a route lined up and occupied.

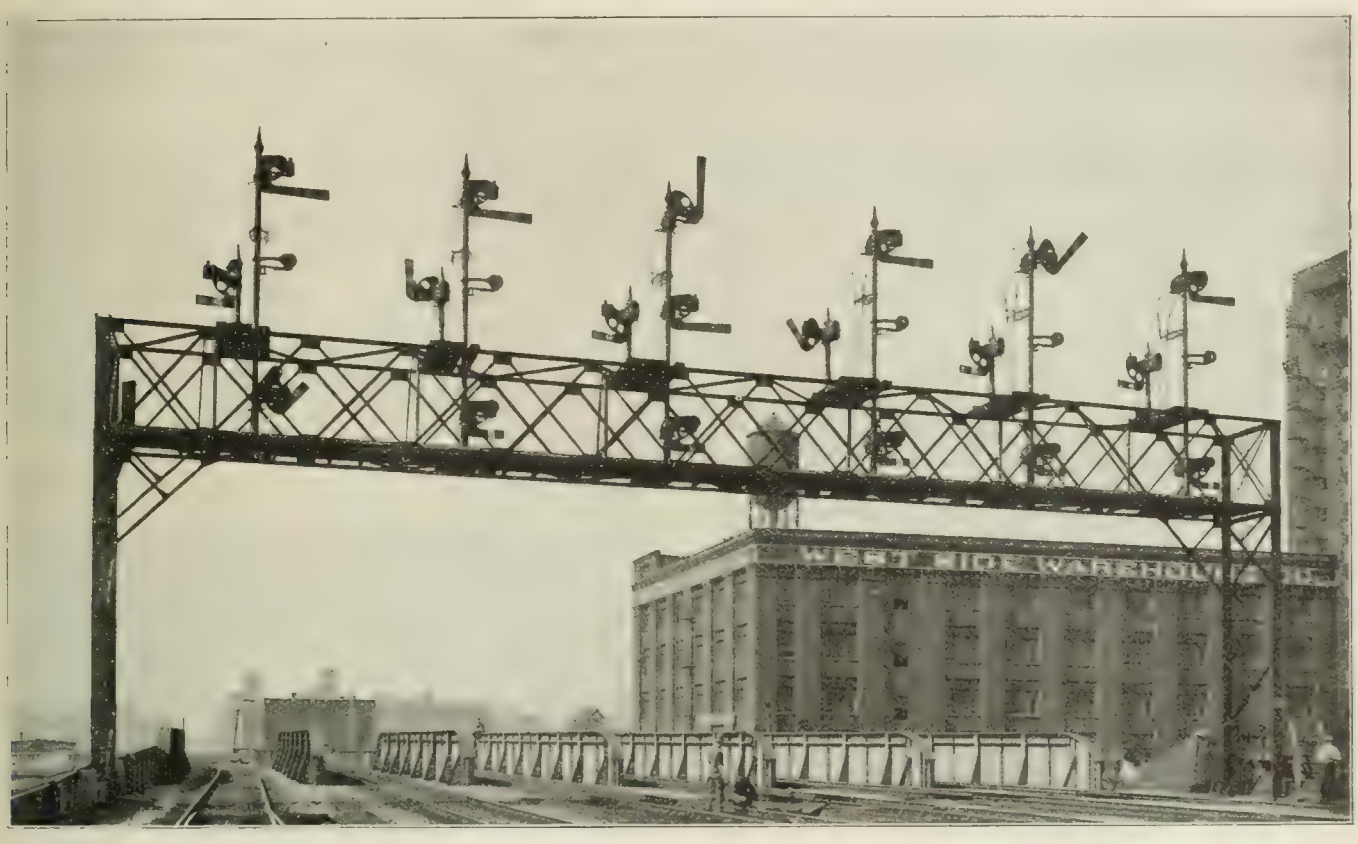


Fig. 2—Bridge A, Between Lake Street and Clinton Street Towers. Signals on High Masts Are Controlled from Clinton Street Tower, and Signals on Low Masts from Lake Street Tower.

TRACK CIRCUIT FEED.

The track circuits for the interlocking plants are fed by loops, as shown in Fig. 3, from the 20-volt storage batteries in the towers. The wires of the same polarity are joined at the end, forming the loops and giving the current from the switchboard two paths to any point on the loop. Thus the wires may be broken at any place and other points will still receive current. Two positive and two negative wires are run through a low-voltage distributing board to junction boxes in the plant to

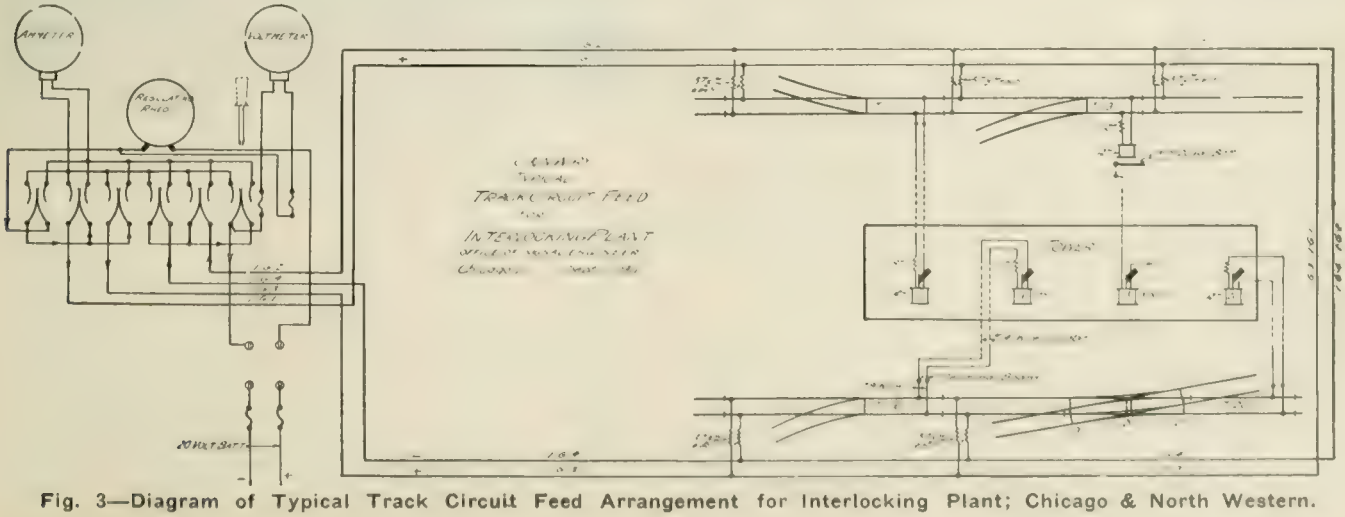


Fig. 3—Diagram of Typical Track Circuit Feed Arrangement for Interlocking Plant; Chicago & North Western.

be fed. Ammeter jacks for each wire and for the main feed wires after the loop wires are joined are placed on the switchboard, and a regulating rheostat is inserted in the positive lead for cutting the battery down to 12 volts, at which it is generally maintained. The track sections are fed through the various points on the loop through resistance units of the enclosed fuse type and averaging 37½ ohms. The limit to the number of circuits that could be fed from the lead was found to be 20. Relays of 12-ohm resistance are used on all of these circuits and a 12-ohm resistance unit is placed in series with the relay

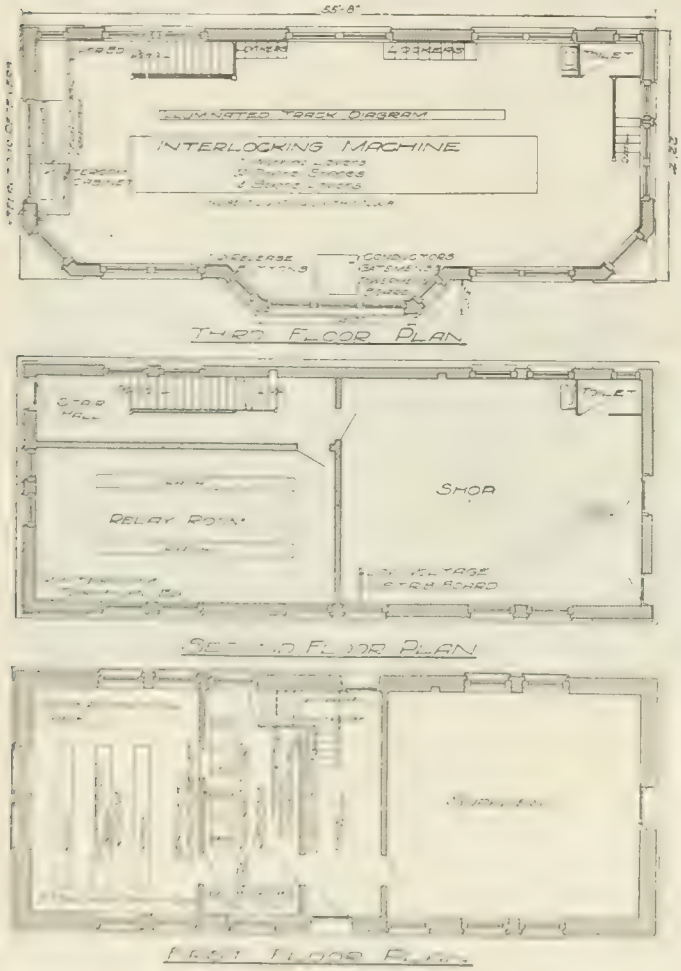


Fig. 4—Floor Plans of Lake Street Tower.

to detect a partial drop away of the armature on account of the extra contact.

Where the track sections are adjacent to the towers track relays are placed in the towers. Repeater relays in the tower are controlled by those track relays which are set adjacent to their sections. Motor generator sets run from the station depot [illegible] at all times [illegible] fed direct to the train shed track circuits.

At the signal bridges at which power houses are located the track circuits are fed through a single cell of 120 ampere-hour capacity storage battery with an 8-ohm resistance in series. Four-ohm relays are used where the track circuit is fed from these individual cells.

[illegible] LOCKING

Release route locking circuits are employed at Lake, Clinton and Division streets only. In operation a train entering a route locks up all switches, derails and movable point frogs in the route, and as the wheels leave each track section the switches, derails and movable point frogs in that section are released so they may be moved for the setting up of a new route. The levers are controlled by electric locks located on top of the lever, the circuit being held normally open by a contact operated by the lever latch. A white light in multiple with the lock and latch contact shows whether or not the lock can be energized. Each lock is controlled directly by the track relay of the section in which the switch is located, providing absolute detector locking and making it impossible to throw a switch when the section in which that switch is located is occupied.

In the Lake street plant signal locking only is employed, by means of which signal levers lock their routes and switch levers do no locking except in a few special cases. In the Division and Clinton street plants the derail levers lock the routes, and the system of locking allows very nearly the complete release effected by the electric locking and still retains the derail protection. All facing derails lock the trailing derails and facing point switches in their routes. At Clinton street, where two derails are used in some spaces, the slow speed derails do all the mechanical locking, and the circuits of conflicting high signals are controlled by the derails. At the Carpenter and Noble street plants the route ahead of the high speed train is locked, and on all slow speed movements detector locking only is installed. In these plants the mechanical locking is as follows: Derails lock all switches in the route; high speed derails lock back-up derails; lower number locks the higher number in derails of the same class; mechanical locking is transferred from

Fig. 5—Wiring on the Backs of the Relay Racks in Lake Street Tower; Chicago & North Western.

derails [illegible] to allow necessary freedom when the special release feature is required.

INSTALLATION OF WIRING

On account of the great mass of wires required it was necessary to furnish detailed plans showing exactly how each piece was to be accomplished, and the workmen were required to follow this plan without any knowledge of the complete circuits involved. Plans for junction boxes, terminal boards and manholes on the ground and on signal bridges and also for the terminal boards in the tower were made to show which wires were to be spliced through, wires to be connected to terminals

and the location of terminals and resistance units. Plans of the conduits were made to show the location and size of each, and tables were furnished giving the number and size of the wires in each duct, the total length of each wire, its number, destination and the number of feet to be left out at each end. In addition, plans were furnished of the backs of relay, combination boards, interlocking machine, releases, etc., showing the details for connecting the wires, using the tag numbers to identify them. The circuit sheets were written instead of drawn. This work of the drafting room saved an immense amount of labor in the field.

POWER DISTRIBUTION SYSTEM.

Power for all uses except the operation of the Lake street plant is taken from the power house at 6,600 volts, three-phase, and distributed through a conduit system. The current is transformed to 220 volts, three-phase, for power purposes and for 220 volts-110 volts, single phase, for lighting purposes. Transformers located near each tower supply current for purposes in the tower and also for the nearby signal bridges. The remaining transformers are so located as to supply two or more outlying signal bridges. The lighting transformers are arranged in boards, with secondaries in multiple, so that there are two sources of power for each circuit, either transformer being able to carry the total load. Induction motor generator sets are provided in duplicate for each battery located in the towers. The generators are shunt wound, with wide variation of voltage. A motor generator is running continuously in multiple with each battery, taking most of the load, the battery helping out on the peaks. Automatic underload circuit breakers are provided for opening the generator circuits in case of failure of the alternating current supply. At the power houses located at signal bridges the motor generators are of the same type as those in the towers, the volt range being from 4 to 40. The generators are capable of charging from 1 to 16 cells of battery.

Where storage batteries are located at the signal bridges they are provided in duplicate with a motor generator set for charging. A three-phase, 220-volt relay operated in parallel with the motor controlling the charging circuits provides for the possibility of the alternating current failing or a fuse opening in the motor end. Whenever either of these happens this relay opens

STATISTICS OF MATERIALS AND UNITS ON THE NORTH-WESTERN TERMINAL.

	Lake Street Interlocking.	Clinton Street Interlocking.	Carpenter Street Interlocking.	Division Street Interlocking.	Noble Street Interlocking.	Wisconsin Division Automatic.	Galena Division Automatic.	Station.	Totals.
Signal motors, 1-6 h.p.	67	62	23	31	21	16	15	....	235
Switch motors, 1 h.p.	98	77	32	51	30	....	....	....	288
Motor generators, 110 v. d.c.	2-12.5 h.p.	2-12.5 h.p.	2-5 h.p.	2-7.5 h.p.	2-5 h.p.	....	....	2-½ h.p.	10
Motor generators, 20 v. d.c.	2-12.5 h.p.	2-2.5 h.p.	2-1 h.p.	2-1.5 h.p.	2-1 h.p.	4-2 h.p.	....	2-½ h.p.	12
Motor generators, 4 v. 40 v. d.c.	....	....	....	....	....	4-2 h.p.	4-2 h.p.	....	8
									553 motors 30 generators
Storage battery, 110 v.	57 cells 400 a.h.	57-400	57-160	57-240	57-160	....	....	....	285
Storage battery, 20 v.	10 cells 400 a.h.	10-400	10-160	10-240	10-160	....	....	....	50
Storage battery, 16 v.	....	....	....	....	....	8 sets-8 cells 120 a.h.	8 sets-8 cells 120 a.h.	....	128
Storage battery, 2 v.	....	....	....	....	....	38-120 a.h.	30-128 a.h.	....	68
									531 cells storage battery
Lamps—									
On signals, 2 c.p. 110 v.	134	68	30	46	27	32	30	....	367
On levers, 1 c.p. 55 v.	196	183	72	114	70	....	....	....	635
On illuminated track diagram, 4 watt, 14 v.	924	419	..		....				1,343
On intercommunicating diagram, 20 v. tel.	22	168	54	47	71				290
On telephone switch board, 20 v. tel.	51		....						51
On conductor, towerman, gateman, 20 v.	96		....						96
On conductor, towerman, gateman, 2 c.p. 20 v.	....		....					274	274
On tower lighting	....		....					....	
									3,056 lamps
Relays and indicators	255	160	46	71	8	81	29	87	677
Relays, intercommunicating	22	168	54	48	11	..		..	290
Relays, telephone	57	....	....	....	....				57
									1,024 relays
Transformers—									
Power, single phase, 220 v.	3-10 k.w.								3
Power, three phase, 220 v.		1-20 k.w.	1-7.5 k.w.	1-7.5 k.w.	1-7.5 k.w.	1-2 k.w.	1-2 k.w.	..	
Light, single phase, 220 v.	1-2.5 k.w. auto.	2-3 k.w.	1-3 k.w.	1-3 k.w.	1-3 k.w.	2-3 k.w.	2-3 k.w.		10
Lever light, 55 v.	1-1 k.w.	11-1 k.w.	1-½ k.w.	1-½ k.w.	1-½ k.w.				
Illuminated track diagram, 14 v.	1-5 k.w.	-5 k.w.	....						

48,710 feet rubber lead cable 1,214,500 feet of wire.
13,890 feet paper lead cable 910,650 feet of wire.
90,500 feet linen lead cable 122,500 feet of wire.
578,835 feet loose wire rubber covered.

153,100 feet lead covered cable 2,826,485 feet of wire.

Levers—									
High signals	....	29	8	12	10			....	59
Dwarf signals	67	33	15	21	11				147
Switches	29	26	7	25	7				94
Double slip switches (ends)	46	12	8	6	8				80
Movable point frogs	23	6	4	3	4	....			40
Derails	....	33	13	17	11	....			74
Traffic locks	6	14	6	6	4				36
Total working levers	171	153	61	90	55				530
Spare high signal levers	....	6	....	2	8				16
Spare dwarf signal levers	2	....	....						
Spare switch levers	2	2	....		1				5
Spare traffic levers	....	....	....	4	4				8
Spare spaces	37	7	15	4	12				
Lever frames	12	7	5	12	8				44
Automatic signals	....	....	....			16	15		31
Track circuits	79	58	1	41	6	12	16	3	255

the charging circuit, preventing discharging of the battery. If the power returns after failing the relay restores the charging circuit.

Current for the lever locks of the interlocking machines is supplied from a 220 to 55-volt transformer, and the illuminated track diagram is fed from a 220 to 14, 12 and 10-volt transformer. If the alternating current fails an emergency switch will connect up the locks and the plants are then operated without the diagrams.

The Lake street plant receives power from three single-phase transformers, delta connected, located in the power house and furnishing 320 volts.

The range of voltages used in the complete installation is shown in the following list:

1. 6,600 volts alternating current, three-phase, power transmission.
2. 220 volts alternating current, three-phase, power secondaries.
3. 220-110 volts alternating current, three-wire tower lighting.
4. 110 volts alternating current, signal lighting.
5. 55 volts alternating current, locks and lights on levers.
6. 14-12-10 volts alternating current, lights on illuminated diagram.
7. 220-110 volts direct current, three-wire tower lighting.
8. 110 volts direct current, interlocking machine and telautographs.
9. 20 volts direct current, auxiliary circuit, emergency lever, locks and telephones and intercommunication systems.
10. 16 volts direct current, automatic signal operation.
11. 12 volts direct current, track circuit lights.
12. 1 volt direct current, individual track circuits.

INSTALLATION

For the present needs and future requirements of the power distribution for signal, telephone and telegraph apparatus a system of ducts was installed. This starts at the power house with 32 and extends to a point near the junction of the north and west approaches, where a separation is made and each approach fitted with two lines of eight ducts each, one line on each side of the right-of-way as far as practicable. One line on each approach is for power and the other for signal, telephone and telegraph purposes. Separate manholes were built for each [illegible] the telephone and telegraph ducts open into the same manhole. Where the ducts had to run together three separate manholes were built, and the ducts for one apparatus run through the manhole assigned to the other two. Three-inch bituminized fiber conduit, laid in concrete, was used throughout. Across the subway approaches and extending 10 ft. on either [illegible] pipe was run for each duct and the fiber put through it. The manholes are built of brick, with iron covers. Branch systems of conduits were installed for interlocking wires, [illegible] the same general type of construction as for the main [illegible] concrete [illegible] were built instead of manholes. Two-inch iron conduit is used for short runs. As a great many of the switches are on structural steelwork, the [illegible] the electric protection of the [illegible] part of the [illegible] and the [illegible] continued in [illegible] and [illegible] [illegible] pass and [illegible] [illegible] and [illegible] in the [illegible] and [illegible] were enclosed in [illegible] and 4-in. [illegible] [illegible] and were [illegible] are made [illegible] between [illegible] and [illegible] and [illegible] and [illegible] [illegible] [illegible]

fore in use were carefully considered, and revisions and additions suggested at the New York and Chicago meetings have been incorporated. The committee also recommended the adoption as standard, the specifications for 1-inch wrought iron signal pipe, published last year (drawing No. 1015).

The symbols were adopted as recommended, except that it was voted that a track battery should be designated by the letter *B* between the rails. The conclusion as to wrought iron signal pipe was adopted.

Committee No. 2 (C. J. Kelloway, chairman), mechanical interlocking, reported on four subjects, namely: bolt-lock for power operated home signals; concrete foundations; specifications for interlocking for drawbridges; and floor plans for mechanical interlocking cabins. The committee could not recommend a satisfactory device to take the place of a bolt-lock for power operated signals, but offered some suggestions on the subject. A code of specifications for Portland cement concrete was presented, the same having been approved by the harmonizing committee. Complete specifications for interlocking at drawbridges were deemed by the committee unnecessary, the general specifications for mechanical interlocking being adequate except for the special needs of drawbridges. These special needs vary with the types of bridge, and therefore it is not practicable to prepare satisfactory specifications; but the committee presented a list of requisites for the protection of drawbridges, including a statement of the sequence in which operations should be performed. It was recommended that the association take action with a view to having bridges so designed that rail locks may be easily applied near the ends of the rails, and rail attachments so arranged that rails may be readily insulated for track circuits.

Charles C. Anthony.

Plans of a cabin floor and of a lead-out floor were presented by this committee last June and are now in the hands of committee No. 1. The committee presented seven pages of proposed changes in detailed specifications for mechanical interlocking, the same having been approved by the harmonizing committee (the chairmen of committees 2, 3 and 4).

Discussion.—The discussion on the question of a substitute for the bolt lock resulted in referring it back to the committee. The specifications for concrete were approved, except that for foundations which are not made in place, such as those for pipe carriers, the mixture should be stronger; and this change was incorporated in the report as adopted. The recommendations as to drawbridges were adopted and sent to letter ballot, as were the recommendations of the harmonizing committee.

Committee No. 3 (B. H. Mann, chairman), power interlocking, submitted typical plans for electric interlocking; a report on a bolt lock, or its equivalent, and specifications and typical plans for electro-pneumatic interlocking. Much of the matter in this committee's report consists of things presented at the June meeting, but now in more complete shape. Figs. 10 and 11, of plans presented last June, have been withdrawn. The plans presented now are Figs. 8, 9, 12, 13 and 14; approach and route locking with and without slotted signals; simple route locking; track indicating circuit; and simple approach locking. The committee proposes definitions of "detector locking," "route locking" and "approach locking." Taking up the question of specifications for motors to be used for the operation of switches and signals, the committee consulted F. W. Ells, of Milwaukee, and presents a code of specifications prepared by him.

The foregoing matter was prepared by a sub-committee, W. H. Arkenburgh, chairman. Another sub-committee, F. B. Weigand, chairman, prepared diagrams of typical plans for electric interlocking, including circuits for one-arm signals and circuits for selecting signals. These diagrams number 39; 7 based on the practice of the American Railway Signal Company; 9 the Federal Signal Company; 12 the General Railway Signal Company; 9 the Union Switch & Signal Company, and 2 the electro-pneumatic system of the Union Company. This list includes the single switch circuits presented last year, but with new numbers.

Committee No. 3, like committee No. 2, was directed to report on a bolt lock for electric signals. The sub-committee presented a brief report describing such an apparatus which is in experimental use on the Pennsylvania Lines west of Pittsburgh, at SQ tower, Pittsburgh. This lock is solenoid, which when de-energized allows a plunger to drop into a hole drilled through the slide plate and base of the switch movement. The committee describes the operation of the lock; but, after consulting 24 signal engineers by letter, and after careful study, concludes that such an additional safeguard is not needed on the standard types of electric interlocking. The safeguards now in use afford as much security as is afforded by the bolt lock in mechanical apparatus; and where additional protection is desired for high speed routes, the sub-committee recommends the installation of route locking. The proposed bolt lock would of course be useful if by its introduction expense could be saved by the elimination of safeguards against crosses in the circuits.

Discussion.—The five diagrams, Figs. 8, 9, 12, 13 and 14, were accepted and sent to letter ballot, as were the 39 plans submitted by Mr. Wiegand. The matter prepared by Mr. Ells was accepted as information.

That part of the report of committee No. 3, dealing with the question of bolt locks, was accepted as a progress report.

Sub-committee C (I. S. Raymer, chairman), of committee No. 3, submitted a code of specifications for petroleum asphaltum suitable for insulating electric conductors in trunking. This committee also submitted plans for terminal boxes, junction boxes and trunking; and also plans of circuits for single switches, cross-overs and signals interlocked by the electro-pneumatic system.

The specifications for asphaltum were approved by the con-

vention. The plans for terminal boxes, etc., and for electric circuits, etc., were accepted and ordered sent to letter ballot.

Sub-committee E (W. F. Follett, chairman), submitted a code of specifications for electro-pneumatic interlocking, filling 40 pages. This code includes specifications for gas engines, for electric generators, for switchboards, for bonding pins, zincs, coppers and copper-sulphate; and supplementary specifications for drawbridges.

Committee No. 3 reported the conclusions of the harmonizing committee on eight pages of additions and changes in the specifications for power interlocking.

Discussion.—The specifications submitted by sub-committee E were adopted, except that the length of detector bars was left blank and the specifications for drawbridges were not acted on. The recommendations of the harmonizing committee were adopted.

Committee No. 4 (A. G. Shaver, chairman), automatic block signals, reported a complete code of specifications for direct current neutral relays; specifications for impregnation treatment of magnet coils; specifications for hard fiber and for tinned channel pins. Former specifications have been clarified. The committee has under consideration a specification for coppered pins and a design for a channel pin gage. The battery specifications include drawings of a cell, a zinc and a copper; also of cross arms for four, six, eight and ten pins.

The committee was unable, for lack of time, to present typical circuit plans.

Discussion.—The specifications for impregnation treatment of coils, etc., for hard fiber and for channel pins were approved, as was the plan for a caustic soda cell; but the specifications for the cell were referred back. The plans and specifications for zincs and for cross-arms were approved.

The committee on automatic stops and cab signals (No. 6, Robert C. Johnson, chairman), reported that it had examined the plans and specifications of a number of systems during the past year and had witnessed some tests; but it makes no recommendations. Some railways have started investigations, by their own officers, of the subject of automatic stops and cab signals, but the names of these railways are not given. Reference is made to the last annual report of the Block Signal & Train Control Board and its essays on train brakes and track circuits. Brief mention is made of three systems by name, the Collard-Rohe, the Unverricht and the system which has been tried on the Interborough Rapid Transit and which was described by Mr. Waldron at the last meeting of the association.

This was received by the association as a progress report.

The committee on subjects and definitions (C. C. Anthony, chairman), made a number of recommendations looking to the adoption of definitions for certain kinds of electric locking and for a number of electrical terms.

The meeting approved the proposal of the committee that [illegible] shall be asked to say whether he objects to the term itself or to the committee's way of defining it.

The committee on wires and cables (No. 9, W. H. Elliott, chairman), reported codes of specifications for lead covered cable, for underground braided cable, for underground lead-covered cable for current at 2,300 volts, for copper-clad steel bond wire and for hard-drawn copper steel line wire of 30 per cent. conductivity.

The committee accordingly recommends that the resistance [illegible] which was presented last year, but withdrawn at the request of the manufacturers, be now adopted, the manufacturers having failed to substantiate the objections which they then made. Practically all of the wire which has been bought by railways during the past year has been of higher resistance than is now recommended by the committee, and several of the largest manufacturers have given assurance that they do not object to the newer specifications now proposed. The table of resistances as proposed is to apply to rubber insulated signal wire, aerial braided cable and rubber insulated lead-covered submarine cable.

Discussion.—The first three codes of specifications above mentioned were adopted, but those for copper-clad bond and line wires were not adopted. The recommendation as to the table of resistances was adopted.

Committee No. 10, on electric signaling for electric railways (H. S. Balliet, chairman), made a report filling sixty pages, made up mainly of descriptions of the latest installations of automatic signals on railways, standard or interurban, on which electric traction is to be used. The work was divided among eight sub-committees, composed of ten or more men each. The following are the plants described: Philadelphia, Baltimore & Washington at Washington, D. C. (described in the *Railway Age Gazette* of June 30, last); Atchison, Topeka & Santa Fe, Holliday, Kans. (12 miles) and Daggett, Cal. (21 miles); Cumberland Valley, 56 miles; Auburn & Northern and Syracuse, Lake Shore & Northern (these last two installations, aggregating about ten miles, were put in by the Union Switch & Signal Company in 1908 and 1909); Southern Pacific at Oakland, Cal., 18 miles of road and 17 interlocking plants; Washington Water Power Company, 20 miles (described in the *Railway Age Gazette* of December 16, 1910); Boston & Maine (Hoosac Tunnel), 10 miles completed this year; and Illinois Traction System, 100 miles, completed this year. Description of the signaling of the New York Terminal of the Pennsylvania Railroad was considered, but the report on it is deferred until next year. Mr. Morrison, of the New Haven road, was requested to describe a system of alternating current automatic block signals for a railway using alternating current for propulsion. He made a drawing of such an arrangement, and it is presented by the committee as a "suggestion," but because the art is not sufficiently advanced no list of requisites for apparatus or material is presented.

Another sub-committee presents a description of the General Railway Signal Company's universal polyphase relay.

Sub-committee B (E. B. Smith, chairman), presents a list of requisites of apparatus and material for automatic block signals worked by alternating current on a line where direct current is used for propulsion. The full membership of committee No. 10 endorses Mr. Smith's report, this after having made a searching and rigid examination of a large amount of data.

Discussion.—The bulk of the matter in the report of committee No. 10 was received as information, but the diagram of circuits for an alternating current block signal system on a railway using A C propulsion, as presented by Mr. Morrison, was adopted, the same having been approved by the whole committee. The same was true of the matter presented by sub-committee B.

The committee on the manual of standard practice (No. 11, F. P. Patenall, chairman), made a report setting forth the standards of practice which it was believed should be printed in the Manual of the association. Most of these standards have been printed in past volumes of proceedings, principally since January, 1909, but the voluminous codes of specifications for mechanical interlocking, for electric interlocking and for automatic block signaling will require some slight revisions. These revisions the committee proposes to make. The committee says that the following items should *not* be printed in the Manual, being now out of date: (1) all special papers; (2) former reports on symbols and nomenclature; (3) rules for operation and maintenance of interlocking, and (4) signal department organization.

Discussion.—The meeting voted not to include in the manual the third principle under the head of signal indications, namely: "Two lights of full intensity shall be displayed on every high speed signal." The recommendations of the committee as to omissions were accepted.

The committee on contracts (No. 12, L. R. Clausen, chairman), presented a long discussion of the considerations to be taken into account in the preparation of a contract for the joint construction, operation and maintenance of an interlocking plant (as at the crossing of two roads), but it was found impracticable

ticable to submit a form of contract or agreement suitable for adoption as a standard, owing to the great variety of circumstances which it is necessary to consider. The discussion presented by the committee includes three distinct lists of items of expenses and responsibility: (a) where there is no existing crossing; (b) where there is a crossing but no plant; and (c) where there is a crossing with a plant.

This report was received as information and ordered printed in the proceedings.

The committee on the promotion of signaling education (W. J. Eck, chairman), reported that the index to signal literature had been under consideration during the past year, but that there is no occasion for the revision of that index at the present time. None of the colleges or universities have made material changes in their courses of study during the past year. The committee has made a careful investigation of The School of Railway Signaling at Utica, N. Y., which now has about 900 students receiving instruction by correspondence. The school has established a free employment bureau. The courses of study have been re-arranged so as better to meet the needs and wishes of students who are already engaged in signal work and who desire to take up some of the features of signal engineering while still they are engaged in elementary studies. The committee believes that the school is doing the greatest work for the signal world that was ever undertaken.

Eighteen pages of this report are taken up with notes on what a number of the principal railways are doing in the matter of educating their signal department employees. The note on the Delaware, Lackawanna & Western includes seven pages, containing extracts from the rules prescribed by that company for maintainers. The educational department of the Union Pacific now prescribes 33 lessons on signaling. Two-thirds of the maintainers on that road are studying these lessons.

This report was accepted substantially as presented.

The committee on storage battery (A. H. Yocum, chairman), reported a code of specifications for portable cells for all-lead storage batteries, with drawings. The committee finds that a jelly electrolyte is in use by some of the members of the association, but the committee has not been able to get satisfactory data for a specification.

These specifications were a revision of those heretofore in effect, and were adopted by the association as reported.

The committee on methods of recording signal failures (J. C. Young, chairman), reported seven proposed standard forms for reports and records. The forms considered by the association last year have not been used by any railway; but the committee has made a careful study of the whole subject and has unanimously agreed on the forms now presented. The first one is a card to be filled out by an engineman when delayed by a signal; the next is a train despatcher's record, to be kept in a book 7½ in. x 12 in.; the third is a form of telegram to be sent by the despatcher to the maintainer; the fourth is the maintainer's failure report; the fifth is a record of the performance of each signal, to be kept up throughout the life of the signal; and the sixth and seventh are monthly summaries. Form six shows the comparative efficiency of the different maintainers and is designed to stimulate competition between them. This form includes not only automatic signal failures, but every kind of signal failure with which the maintainer has to do. The committee find that the methods of compiling and classifying monthly statements are exceedingly diverse, hardly any two railways in the country making reports exactly alike.

The meeting would not take the time to discuss this report and referred the subject back to the committee for further investigation.

According to the statement of the director general of railways of Argentina the narrow-gage lines produced $18,669,890 and spent $13,647,995 during 1910. The medium-gage lines produced $4,356,975 and expended $2,541,810. The wide-gage railways produced $80,049,545 and expended $45,326,050.

PUBLIC REGULATION AND RAILWAY SAFETY.*

BY SAMUEL O. DUNN,

Editor, *Railway Age Gazette.*

No railway men are engaged in more useful work than the members of this association. Operating officers in general are striving to increase the economy and efficiency of transportation in this country. You are doing that, and in addition you are devoting yourselves especially to increasing the safety of transportation. There is no more acute need on our railways than work along that line. Their accident record often is exaggerated. The causes of it often are misrepresented. But after all proper allowance has been made for exaggeration and misrepresentation, the dispiriting fact remains that the record is bad. Some people think the primary duty of a railway is to furnish cheap transportation. I think its primary duty is to provide good and safe transportation. The public has no right to criticize the very great majority of the rates of our railways. On the average they are low—too low. The public has a right to criticize their accident record. Not only does it possess that right, but it is using it. The public opinion on this subject which is developing demands the earnest attention of all who wish our railways well. We have but to glance over the history of the last few years to be instructed that when the public begins to turn its attention to any abuse or evil condition in the transportation business it behooves railway men to begin at once to study the situation, to undertake to remedy it, and, if it is not completely remediable, to lay the facts before the public so that it may not act unwisely.

Until a few years ago the traffic men of our railways enjoyed much freedom of action. If you and I had been in their places probably we, being weak and erring human beings like them, would have done as they did—that is, abused this freedom. Ever since 1887 it has been illegal to discriminate unfairly between persons or communities. Nevertheless, long after that secret rebating and other forms of unfair discrimination continued. The railway traffic men were not alone at fault. The shippers who persisted in contempt of the law to solicit and demand illegal favors, the lawmakers who made the law inconsistent, the public officials who did not enforce it, were also much to blame. But the public held the railway traffic men entirely responsible, and when it got through with them they had been lassoed, thrown, tied and branded. The brand they bear is I. C. C., meaning they are now owned by the Interstate Commerce Commission. Nominally, the railway traffic managers can still make rates. Actually, almost all power to make them has been parceled out between the state and interstate commissions.

Having finished the job of taking control of the rates and earnings of the railways, those who regulate you recently have been turning their attention to the operating department. They are prohibiting public drinking cups on trains, fixing the number of men who shall compose a train crew, prescribing safety appliances and the kind of headlights that shall be used, and so on. It is proposed in Congress to require the railways to widen their clearances, to within a few years substitute steel for wooden passenger train equipment, and to install block signals on all their lines—changes Mr. Melcher estimates would involve an expenditure of $1,361,000,000. If there could be any assurance that legislation and the orders of the commissions dealing with these subjects would be wise, railway men could regard them with complacency; they could continue to draw their salaries and let the regulating authorities assume the responsibility and do the work of seeing that the railways are well operated. Unfortunately, experience does not encourage this view.

I have already said that inconsistency in the laws for the regulation of rates was largely responsible for the long continuance of unfair discrimination. This inconsistency existed in the original Interstate Commerce act itself. It said in one

*An address delivered at the dinner of the Railway Signal Association, Colorado Springs, Colo., October 11, 1911.

breath that the railways should not unfairly discriminate; it said in the next that they must quit pooling. On top of that the Supreme Court of the United States held that the Sherman anti-trust law prohibited even reasonable agreements between competing railways regarding rates. Now, the chief purpose for which pools had been formed and agreements made was to enable the railways to keep competition within reasonable bounds, so as not only to protect their own earnings, but to eliminate the unfair discrimination prohibited by the Interstate Commerce act. Where railway competition goes on without restraint, unfair discrimination is inevitable, for the railways will naturally compete harder for the business of the big shipper and the big community than for the business of the little shipper and the little community, which results in their extending to the big shipper and big community favors they do not give to the little shipper and the little community. In spite of the fact that this inconsistency in the provisions regulating railway traffic has existed for twenty-four years, in spite of the fact that lawyers and courts repeatedly have pointed it out, that railway men have complained of it, that every economist of note in this country has condemned it, Congress has refused to take any action to release the railway traffic man from an intolerable position where he must either violate the provisions that prohibit agreements and pools, or violate the provisions that prohibit discrimination.

Railway managers cannot, however, escape all responsibility for unwise legislation regarding traffic. If, when President Roosevelt asked for legislation empowering the Interstate Commerce Commission to fix reasonable rates when it found rates made by the railways unreasonable, railway managers had consented not to oppose it, very probably they could have written the measure themselves. The commission ought to have been given this power, but most railway executives opposed it. The consequence was the raising of a great storm of public agitation which not only carried through the proposed legislation, but so aroused public opinion as to cause the enactment of a great mass of federal and state laws which ought not to have been passed.

The application of all this to the situation that confronts railway operating officers is plain. First, the conditions that may suggest the need for regulation of operation should be remedied by railway men themselves as far as may be practicable. The best way to prevent regulation is to remove all reason or pretext for it. Then no effort should be spared by railway men to so educate the public and so advise the regulating authorities as to prevent unnecessary regulation and to see that such regulation as may be adopted shall be wise. The most important legislation regulating the operating department that may be passed is that aiming to promote safety. Because the accident records of our railways is open to criticism, there are many persons, having boundless confidence not only in the power, but in the wisdom of government, and having no great confidence in railway officers, who seem to think that the government should prescribe the safety devices and measures to be adopted without any particular reference to the views or wishes of railways. But it is questionable if the respective records of our governments and our railway managements warrant such complete confidence in the government or such complete want of it in the railway managements. The total number of people killed in railway accidents in the United States in the year ended June 30, 1907 (the last year for which we have complete statistics at the Interstate Commerce Commission), was 6,712. Of these 4,944, or 57 per cent., were persons who met death while trespassing on railway property. Their deaths were due, not to shortcomings of railway management but to shortcomings of passengers. The states have constantly refused to pass and enforce laws to prevent such trespassing although repeatedly urged to do so. The total number of deaths aside from those of trespassers, was 3,778. This is the maximum number that may properly be charged against shortcomings of railway managements, railway plants and railway employees. The primary, fundamental duty of every civilized government is to protect men from acts of violence by other men. Yet, according to statistics compiled by the Chicago *Tribune*, the number of persons who have died by homicide in the United States in a single year have exceeded 10,000, and were no less than 8,975 in 1910. The railways have over a million and a half employees, most of whom are constantly engaged in work which must be extra hazardous under the most favorable conditions. They haul each year over 900,000,000 passengers an average of 33 miles each, which is the equivalent of hauling each of our population about three hundred miles. And yet the railways kill but 2,358 employees and 249 passengers, a total of 2,607 persons, or but 29 per cent. as many as meet death by violence at the hands of their fellows. Those who work for railways and those who travel are very much more likely to be killed by their neighbors than to be killed while about their ordinary work or while traveling. Even the total number of persons killed in all railway accidents, including trespassers on railway property, was less than the number who died by homicide. These figures do not indicate that the efficiency of government in the United States is so much greater than the efficiency of railway management as to justify public officials, and the public who are responsible for the character of our governments, in pointing the finger of scorn at railway managers, and stepping in to tell them how to make railway transportation safer. The streets of Jerusalem, we are told, were kept clean by every man sweeping before his own door. Perhaps if our governments would perform better such fundamental duties as that of protecting men in their right to security of person and property from the violence of their fellows and devote less energy to regulating railways there would be fewer homicides and no more railway accidents. One trouble with government in the United States is that we have so many public officials who devote time to instructing and guiding other persons in the performance of their duties which would be better spent in performing their own. There is a popular impression, for example, that our governors are elected to enforce state laws, whereas recent developments indicate that they conceive it to be their job to act as the guides, counselors and friends of the Supreme Court of the United States in deciding railway rate cases. I have heard the accident record of our railways used as an argument for government ownership of railways. The same sort of boneheaded logic would lead to the conclusion that our homicide record is a conclusive argument in favor of railway ownership of government.

What I have said is not intended as an argument against all regulation of railway operation. It is meant only to call attention to the fact that our governments perform even those duties which are primary and fundamental, and which civilized governments have had thousands of years of experience in performing, with much less than 100 per cent. efficiency. If they do not perform these duties nearly so well as could be wished, it seems a just conclusion that their officers should be very moderate in their criticisms of railway management, and that they are not apt to perform well other duties that are new and strange unless they hear and heed the counsel of those most familiar with the subjects to be dealt with. Not only should railway operating men place the results of their experience at the disposal of public authorities, but they are willing and anxious to do so. The special committee on the Relations of Railway Operation to Legislation, of which Mr. Melcher, vice-president of the Rock Island Lines, is chairman, has been doing excellent work along this line, and is prepared to do more. At the meeting of this convention a committee of signal officers has been appointed to act as expert advisers on signal matters to Mr. Melcher's committee. I believe that when lawmakers and public officers understand the motives that prompt the special committee and its auxiliary committees, and the methods according to which they work—methods that have not a single characteristic of those of the old time railway lobby—they will

be welcomed as invaluable counselors in determining what laws ought and what laws ought not to be passed, and how those that are passed ought to be framed.

The need for such co-operation between railway men and public authorities has been strikingly illustrated by many incidents that have occurred in connection with the regulation of operation. For example, the management of a large road whose financial resources are limited some time ago made a careful study of how to so spend the money it had available for block signals as to get the maximum results. It decided that, as most accidents take place at and near stations, it would first protect the stations on its lines. It had just got well started on this work when the state of Indiana required railways having certain earnings per mile to equip all their lines in that state with block signals. The consequence is that this road is spending all of the money it has available for signals in Indiana, and instead of getting and giving to the public the maximum protection for its expenditure it is getting and giving to the public the minimum protection. Such incidents are bound to happen if regulating authorities act without the advice of those experienced in railway operation or in disregard of their recommendations.

This incident also directs attention to another and most important point. There is no doubt of the right and power of the public to regulate railway operation in the interest of public safety. But it has no right to regulate it regardless of the effect on railway earnings. Indeed, it may be questioned whether, if public authorities would let the roads enjoy ample earnings, much regulation specifically to promote safety would be necessary. Railway managers are as anxious to make railway operation safe as the public is to have them do so. When they have the needful funds they commonly use them to further the public's welfare as well as that of the roads. If you will cast your mind's eye over the railways of this country you will find that generally the roads that have the most complete and the best block signal systems, which have the safest equipment and the safest roadway, are the most prosperous roads, and that it is the least prosperous that are the most unsafe. A public policy of dealing penuriously with the carriers tends much more strongly to prevent the promotion of safety than the most unjustly criticized efforts of railway officers to pay substantial dividends—dividends which must be paid if they are to raise capital on reasonable terms. This penurious policy is doing far more to prevent the general installation of block signals and other safety devices than regulation is doing, or perhaps can do, to promote it. When people compare the accidents on our railways with those on the railways of the principal countries of Europe they should bear in mind that the railways of those countries have been made safer than ours by the enforcement of sterner discipline of employees—discipline which is backed up by the administration of stringent laws penalizing the violation of rules of the railway companies—and also by a capital investment per mile exceeding that of our railways by from 100 to 400 per cent. Our railways are capitalized at less than $60,000 per mile. Those of Europe are capitalized at an average of twice this much, and those of the United Kingdom, where accidents are fewest, are capitalized at about $275,000 a mile. In those parts of our country where the investment in railways is as great as the average in Europe, travel is much safer than elsewhere. And when the earnings of the rest of our railways are large enough to enable them to raise the capital to develop their facilities as their managers would like to do, you will, I believe, see them made equally safe, whether there is any government regulation of operation or not.

In this respect, as in all others, the duties of the public and the railways are reciprocal. It is the duty of the railways to make their service good and safe; and assuming that they have the means to do so the government has a right to require them to do so. On the other hand, the government has no right to act in ignorance or disregard of the conditions to be dealt with, as they are known only to those who are dealing with them. It has no right to regulate the earnings of railways without any regard to the effect that must be produced on the quality and safety of their service, and, equally, it has no right to regulate their service without due regard to the effects on their revenues. No class of men, whether inside or outside of railway service, is better situated or better equipped to give the public and the regulating authorities the kind of knowledge and counsel that they need, if there is to be further regulation regarding safety, than the members of the Railway Signal Association; and in proportion as you do diffuse correct knowledge and give wise counsel on this subject you will earn the gratitude of both the railways and the people.

NATIONAL ASSOCIATION OF RAILWAY COMMISSIONERS.

This association held its twenty-third annual convention in Washington, D. C., October 10-13. The opening addresses of President Burr, and of Chairman Clements of the Interstate Commerce Commission, were noticed in these columns last week.

The following states were represented by one or more persons, in most cases a commissioner, and generally two, but in some cases a secretary or counsel: Arizona, Arkansas, Florida, Georgia, Illinois, Iowa, Kansas, Kentucky, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New York (First and Second districts), North Dakota, Ohio, Oklahoma, Oregon, South Carolina, South Dakota, Virginia and Wisconsin. Mr. Cartwright, secretary of the Railway Commission of Canada, was present.

The whole of the time of the convention during the first day was practically taken up by a discussion of the report of the committee on express service and express rates, presented by Chairman Staples of Minnesota. The president of the association, Mr. Burr, in his address, advocated a law requiring the railways to attend to the parcels traffic themselves instead of having it done by the express companies. The discussion brought out a great variety of expressions of opinion, and it was carried over to the second day. The committee, indeed, offered no final conclusions, declaring that the subject should be studied another year. Mr. Decker of New York and Chairman Clements of the Interstate Commerce Commission, members of this committee, had not agreed to all the radical propositions of the majority, and each presented to the association a memorandum setting forth their views.

On Tuesday the association adopted a modified resolution approving the action of the House of Governors in the appointment of a committee of five to file with the Supreme Court of the United States a brief in the Minnesota rate case, "to the end that these cases, so far as the same affect the several states, may be fully presented to the Supreme Court."

The committee on legislation made a report calling upon Congress to give to the Interstate Commerce Commission additional powers. This committee believes that railway rates and the issue of railway securities can be regulated with such a high degree of scientific accuracy that railway securities generally will some time become as safe as government bonds.

A resolution was adopted declaring that no injunction ought to be granted by a United States court to stay the enforcement of any order "made by a commission authorized by state laws to regulate or control common carriers or other public service corporations."

The association selected Washington for its next annual convention. The bid of Detroit, Mich., for the convention was defeated, 19 to 28. The date of the next meeting is November 19, 1912.

The election of officers for the ensuing year resulted in the choice of the following: President, Charles F. Staples of Minnesota; first vice-president, O. P. Gothlin of Ohio; second vice president, H. W. Hill of Georgia, and secretary, William H. Connolly (Interstate Commerce Commission, Washington, D. C.

LETTERS FROM AN OLD RAILWAY OFFICIAL TO HIS SON, A GENERAL MANAGER.*

XXI.

Tucson, Ariz., August 26, 1911.

My Dear Boy:—If people's eyes were never too large for their stomachs there would be less overeating. If human concepts were never too vast for practical performance there would be fewer disappointments in administration. Because the railways have grown so fast and have become so large, our imagination has sometimes run too far ahead of our judgment. This is a big world full of big things and big men. The biggest men are learning that big things can be handled and big men developed only by complete treatment of little things and of the so-called little men. This growing conviction is manifesting itself in various ways. Railways, thank God, are building more division shops and relatively fewer general shops. Division stores are becoming more and more complete. Division accounting is gaining ground and is paving the way for local disbursement.

The station agent, bless him, is being emancipated by the telephone from specialized selection, and is gradually being accorded that recognition which is his due as an all 'round man. In short, our big corporate units are growing in strength only as the smaller units become complete and self-contained. Official solicitude should be for ton-miles, as well as for train-miles, for car-loads as well as for train-loads. Take care of the mills and the millions will take care of themselves. Above all, study an often neglected unit, the man-day. How much work can each man reasonably be expected to perform in one day? How many days in each year can a man reasonably expect to be employed? Labor conditions on railways will never be satisfactory until employment can be reasonably constant and continuous. This is a difficult problem, but when enough big men give it attention it will be solved. It probably means more elasticity, more interchangeability between train service and the various kinds of maintenance, between the locomotive and the shop, between the railway and allied or contiguous industries. The individual is the indivisible unit of society. We must build from him as a unit. Since he is of such infinite variety it follows that our sociological architecture must be varied accordingly. Design is staff work. Execution is line work. I do not doubt the ability of one man to direct the carrying out of a scheme practically designed. When one man tells me that unassisted he can furnish a design to meet all requirements I am from beyond Missouri and have to be shown several times.

I have been writing you all these things because of interest in you and pride in our profession. With four or five other professions and occupations at command, I stick to the railway game because it is the greatest of ancient or modern times. If these letters, written hurriedly in the midst of a strenuous life, with little opportunity for revision and verification, have hurt anyone's feelings, I am sorry. Many things in this world are taken too personally and too seriously when intended as only Pickwickian.

If these letters have helped you or any friend of yours, by shattering any false idol or otherwise, they have more than fulfilled their purpose. Those to whom fortune has been kind in affording extended opportunities owe to society the duty of imparting their conclusions to their fellows. The recipients alone are qualified to judge as to how well such duty is performed and as to how far such conclusions are worth while. In this case the duty has been a pleasure as well.

To avoid the switch shanty garrulousness of an old brakeman I now give up this preferred run and turn in at the office my lantern and keys.

With a father's blessing,

Affectionately, your own

DAD.

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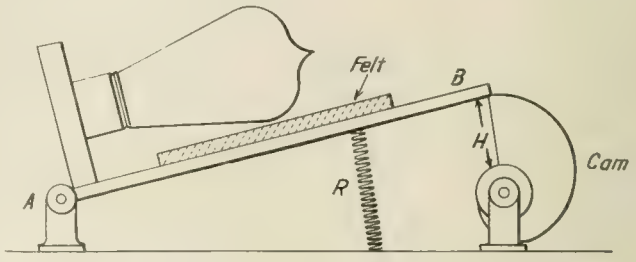
ELECTRIC LAMP TESTING DEVICE.

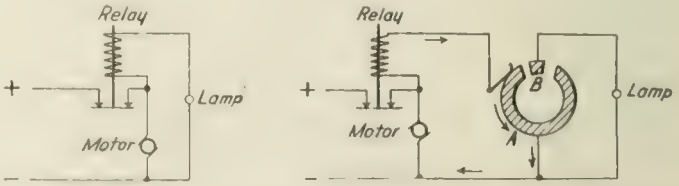
A method for testing the metallic filament lamps, which was devised by Mr. Vinson, an engineer of the Western Railway of France, is shown in the accompanying illustrations. The device is used to give the lamps repeated shocks, so as to test the strength of the metallic filament. As shown in the illustration, the lamp is placed on a pivoted board *A B*, which is raised by a cam and allowed to fall through the distance *H*. A spring *R*, whose tension may be regulated, is used to increase the force of the fall; a felt strip is placed on the board directly to deaden the shock. The cam is driven by an electric motor which operates at 60 r. p. m., and the number of revolutions or shocks are



Device for Testing Electric Lamp Filaments.

registered on a revolution counter. The motor connections are arranged so that when the filament breaks the motor will stop, the counter showing the number of revolutions which it took to break it.

The lamps are tested both cold and hot; the wiring diagrams show the way in which the motor is connected. When testing the lighted lamp the connections are quite simple, the lamp being placed in shunt across the motor. In this shunt is a relay, which controls the master switch to the motor. When the filament of the lamp breaks, the relay circuit or the shunt will be broken, allowing the master switch to drop, thus stopping the motor. To test the lamp cold, the connections are a little more complicated. A rotary switch is provided in the shunt circuit, as shown, the



Wiring Diagrams for Testing the Lamp Filament Hot and Cold.

lamp being conected to the small segment *B*. As the switch revolves, in the direction shown, the brush remains for the most part on the section *A*, which provides a direct connection through the shunt. During the revolution, the brush will come in contact with the segment *B*, which passes the shunt current through the lamp. If the lamp is not broken it will be momentarily lighted by the current passing through it, but this does not raise the temperature of the lamp to any appreciable extent. When the lamp breaks and the brush comes in contact with the segment *B* the relay circuit is open and the master switch falls, thus stopping the motor.

FOREIGN RAILWAY NOTES.

Crop prospects reported from all parts of Argentine are excellent. The railways have in consequence made appropriations and are in a state of efficiency for meeting the coming harvest.

The Danish State Railways raised their passenger fares October 1. The advance is greater in proportion for the longer journeys than for the short ones, in a few cases as much as 40 per cent.

NEW RAILWAY LAWS IN CALIFORNIA.

At a special election, October 10, called by the governor for the purpose the citizens of California voted on 23 proposed amendments to the state constitution. These were passed by the last legislature, as reported in the *Railway Age Gazette*, April 7, last. The following sections affecting the railways were adopted by the people:

1. (Senate No. 17).—Adding to Section 14, of Article 1, the rights of private property, and to the law of eminent domain. The taking of private property for a railway, either steam or electric, for logging or lumbering purposes shall be deemed a taking for public use. Any person, firm, company or corporation, taking private property under the law of eminent domain for such purposes, shall thereupon become a common carrier.

2. (Senate No. 32).—Adding to Article 20, a new section to be numbered Section 21, relating to compensation for industrial accidents. The legislature is empowered to enforce a liability on the part of all employers to compensate their employees for any injury incurred in the course of their employment, irrespective of the fault of either party. The legislature may provide for the settlement of any disputes arising from such proposed legislation by arbitration, or by an industrial accident board, by the courts, or by any or all of these agencies, anything in the state constitution to the contrary notwithstanding.

3. (Senate No. 47).—Amending Section 23, of Article 12, to confer upon the railway commission power and jurisdiction to regulate and control the business of all public utilities.

4. (Assembly No. 6).—Amending Section 22, of Article 12, to create a railway commission, and define its powers and duties. There will be five commissioners instead of three. The legislature may district the state and the commission receives plenary powers.

The three commissioners in office at the time this section takes effect are to serve out the term for which they were elected, and two additional commissioners are to be appointed by the governor. The commissioners first appointed hereunder shall serve; one, until January 1, 1917; two, until January 1, 1919, and two until January 1, 1921. The legislature shall have the power, by a two-thirds vote of each house, to remove any one or more commissioners from office for dereliction of duty or corruption or incompetency.

5. (Assembly No. 28).—Amending Section 19, of Article 12, relating to the issuing of passes to public officials. No transportation company shall grant free passes, or passes or tickets at a discount, to any person holding any office of honor, trust or profit in the state, except to members of the railway commission and officers and employees of the commission and to peace officers. The acceptance of any such by other than those named shall work a forfeiture of office. [This appears to be the only action taken concerning passes.]

6. (Assembly No. 50).—Amending Sections 20 and 21, of Article 12. Advances in rates cannot be made without permission of commission; discrimination is prohibited, and except by commission's permission the charge for a long haul shall not exceed the charge for the aggregate short hauls over the same distance; and the commission may authorize a lesser charge for a long than for a shorter haul. This power to fix absolute rates is not to be subject to review by the courts, except on a question of confiscation. The commisison is to have the power to require one railway company to switch to private tracks of shippers upon its own line, the cars of a connecting railway, and to regulate compensation for such service.

SELF-PROPELLED GANTRY CRANE.

The gantry crane shown in the accompanying illustration has recently been installed in the Cleveland yards of the Lake Shore & Michigan Southern by the Cleveland Crane & Engineering Company, Wickliffe, Ohio. It has two hoists, the auxiliary hoist being rated at five tons and the main hoist at thirty tons capacity. Each one of these hoists is capable of 50 per cent. overload. The span of the crane is 64 ft. and the height 30 ft. It covers two sidings, which accommodate six freight cars each. There is also wide space for teaming trucks to drive under the crane near the sidings.

The crane is operated by electricity and a 25 h. p. motor

64-ft. Gantry Crane; Lake Shore & Michigan Southern.

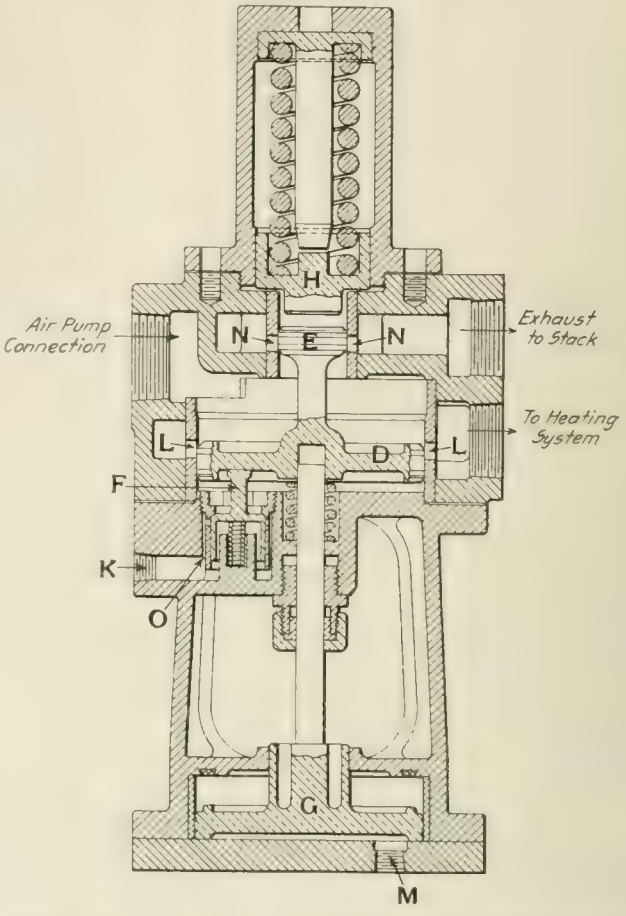
is located at the middle of the bridge. The motor shaft is geared to the axles of the two front trucks, there being in all four trucks of two wheels each. By this means the crane is propelled along the track. On the bridge is an enclosed four-wheeled trolley which accommodates three motors of different sizes—one for each hoist and the third for the rack which drives the trolley along the bridge. The operator's cab is heavily enclosed, and contains the controllers for all the motors and the brake.

This crane replaces a stiff leg hand crane of 15-tons capacity. The radius of the boom permitted its operation over four cars. To unload more than this number the assistance of a switch engine was necessary. One operator was employed for the crane and a foreman with five assistants for moving loads weighing over 15 tons, as they required the use of rollers and crowbars. This required considerable extra time and additional labor, especially during the rush periods. With the new method one operator is required, but no assistants, since but one man is needed to attach the hoist to the load, and this is done by the one who comes for the load. The new crane operates over twelve cars, which saves much time and the services of a switch engine and a yard crew. The handling of the load by the new method also requires only about one-third the time.

This gantry crane has handled thirteen heavy loads in twenty minutes, whereas the old stiff leg crane, with a crew of six men, could hardly have accomplished the same job in less than two hours and a half. It has been estimated that in the handling of 17,000 tons during a year, the crane will save approximately $2,500 as compared to the old method.

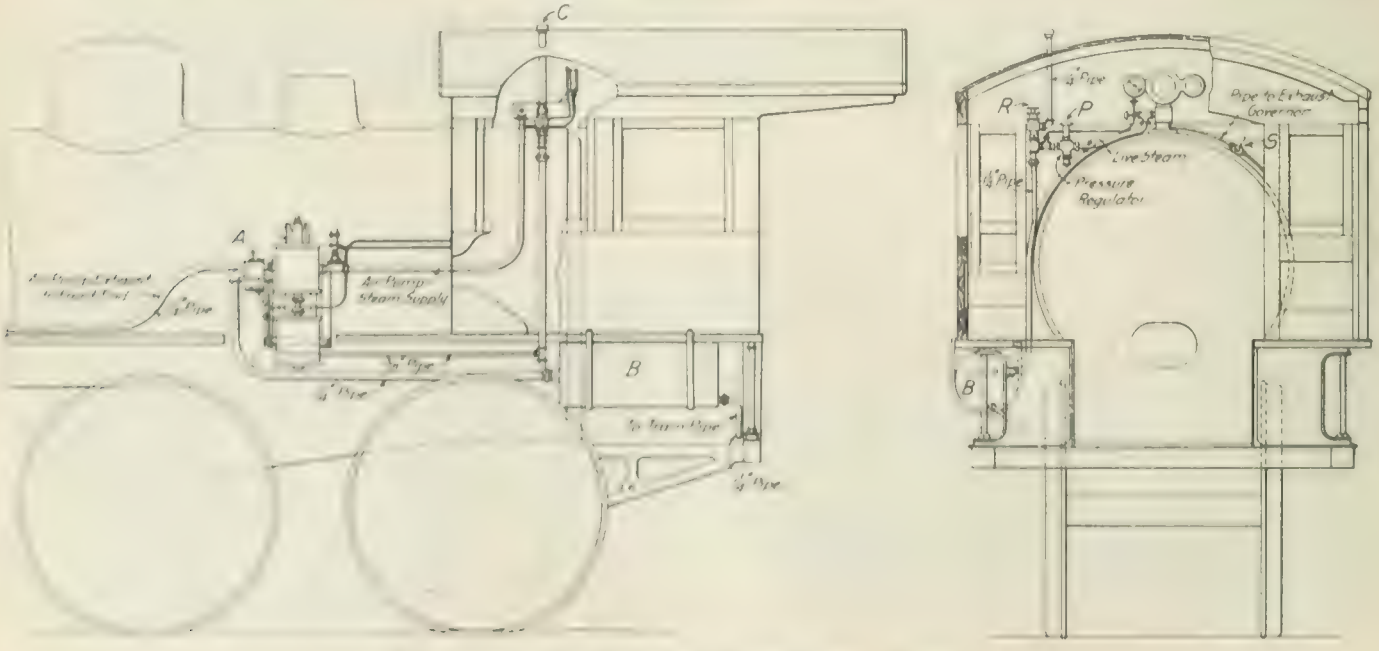
CAR HEATING BY AIR PUMP EXHAUST STEAM.

Heretofore the heating of trains with the exhaust steam from the air pump has been objectionable in that it increased the back pressure on the pump. To overcome this objection the Economy Car Heating Company have brought out a by-pass valve which automatically prevents the back pressure in the pump from becoming excessive. This is accomplished by allowing the exhaust steam to expand into the receiving tank *B* of the steam heating system until its pressure has reached a certain point, after which the by-pass valve will automatically close the connection to the receiving tank and allow the pump to exhaust to the atmosphere. [illegible] pistons *D* and *E* a check valve *F*, a cut-out piston *G* and a dash pot *H*. The pistons *D* and *E* are 5 in. and 1½ in. in diameter, respectively, and both are provided with two packing rings each to eliminate leakage. They



By-Pass Valve for Air Pump Exhaust Steam Heating System.

are placed on the same stem and act against each other. The larger one controls the flow of the exhaust steam through the ports *L* to the heating reservoir *B* and the smaller controls the exhaust through the ports *N* to the atmosphere. The check valve *I* is located in the body of the valve and controls the con-



Piping Arrangement for Air Pump Exhaust Steam Heating System.

nection between the heating reservoir and the underside of piston *D*. When free, it is held closed by the spring shown, and is so arranged that its stem comes in contact with the underside of piston *D* when it is at one half stroke. Thus it will be seen that when the piston *D* is below half stroke the check valve *F* opens the connection between the under side of the piston and the heating reservoir. The cut-out valve *G* is located at the bottom of the by-pass valve and is operated by the main reservoir pressure, which is controlled by the three-way cock *S* on the engineer's side of the cab. When *S* is open the cut-out piston is raised and with it the two pistons *D* and *E*. This cuts out the connection between the air pump exhaust and the heating reservoir and opens the connection to the atmosphere. The dash pot *H* is provided with a heavy spring to prevent the severe hammering of the piston *D* and *E* when the exhaust is released to the atmosphere.

It will thus be seen that the arrangement is both automatic and under the control of the engineer. When operating automatically the exhaust steam enters the by-pass valve as shown and forces piston *D* down, allowing the steam to expand into the heating reservoir *B*, which supplies the heating system. As previously stated, the reservoir is connected to the underside of piston *D* when it is in its lower position. As the pressure above and below the piston *D* becomes equalized near the end of the pump stroke the upward force will be greater on *D*, on account of the lifting pressure on *E*, and will cause *D* to be raised, thus closing the ports *L* to the heating reservoir and opening the ports *N* to the atmosphere. As these ports open and suddenly relieve the pressure above *D* the check valve *F* closes and the piston is raised only by the expansion of the steam remaining under *D*. This tends to reduce the force of the blow on the dash pot *H* which, with the springs prevents any disastrous hammer blows.

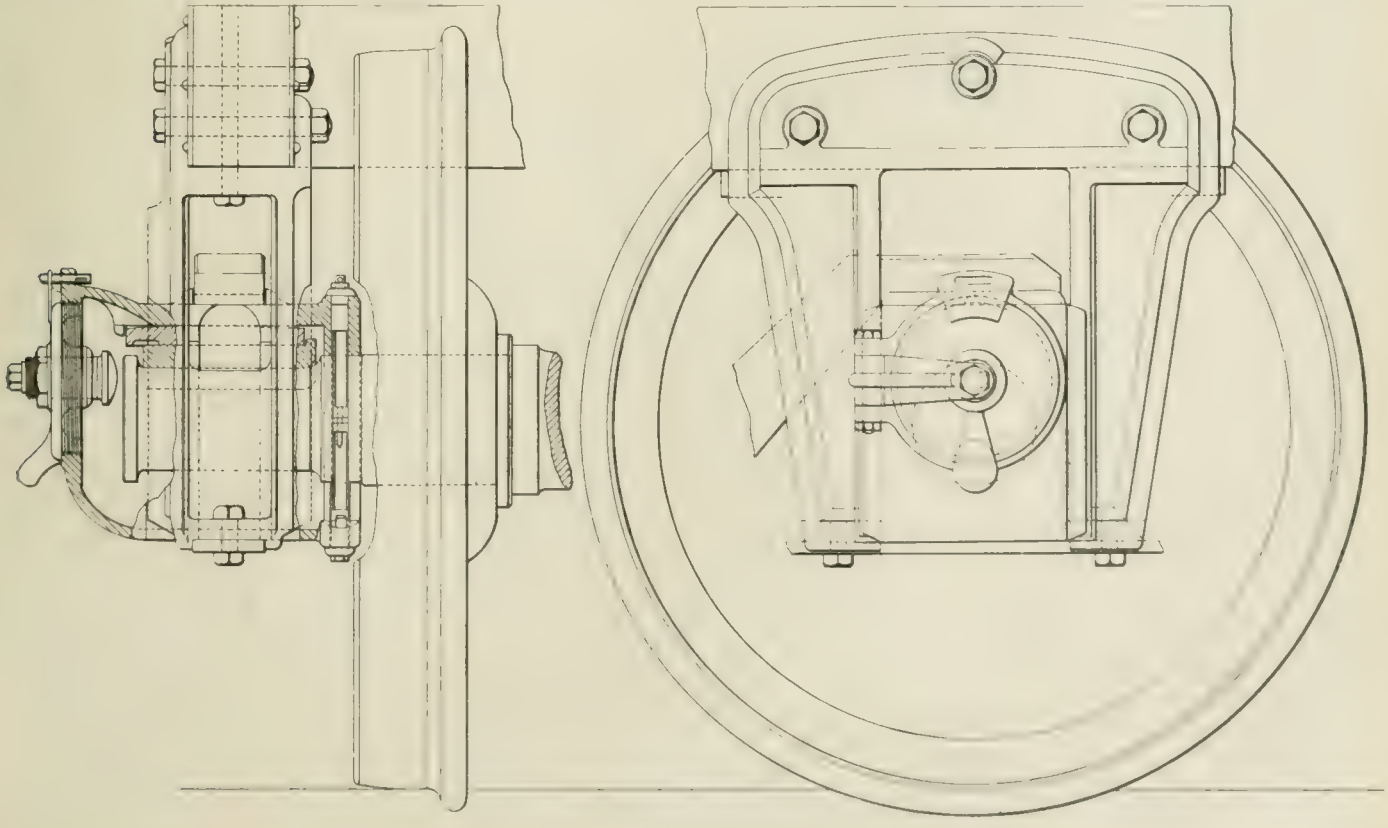
Live steam is fed to the reservoir *B* through the reducing valve *P* to insure a supply of steam in case the pump is cut-out or does not supply sufficient steam for the heating system. This valve may be set to any desired pressure. To prevent the exhaust from the air pump raising the pressure in the reservoir *B* to a point higher than the steam line will stand, the relief valve *R*, set for a pressure approximately 10 lbs. higher than the reducing valve *P*, is provided.

Service tests have been made on this system which have demonstrated that while from 70 to 75 per cent. of the steam used in operating the air pump is utilized, there is no appreciable difference in the speed of the air pump or the amount of steam used. The new equipment is in successful use on a number of roads, and is claimed to make car heating by the use of the air pump exhaust steam practical. The sale of this equipment is handled by the Ward Equipment Company, New York.

NEWCOMB JOURNAL BOX.

The journal box shown in the accompanying illustration is made by the Newcomb Journal Box Manufacturing Company, Carthage, N. Y. It is practically dust proof, and is designed to fit the M. C. B. standard pedestal and to be used with the standard bearings and wedges. It differs from the ordinary box in the design of the cover and the dust guard, and the manner of controlling the lateral motion. The cover is round and is screwed into the box, making a substantial support for the side thrust bearing, which is screwed through the cover. It has a disc of phosphor bronze which bears on the end of the axle about 1¾ inches above the center and is adjusted by screwing in or out; it is held in position by a lock nut on the outside of the cover. In this way the lateral motion is easily controlled. The spring which extends over the cover is used to support it when it is unscrewed from the box.

The dust guard is made of malleable iron, and is split in the middle, one part being above the journal and the other below. Each carries a part of a packing ring which may be made of wood, paper, fiber, babbitt, brass, or any other suitable material. This ring is the only part of the dust guard that needs renewal, and it may be renewed without removing the truck from under the car or without the use of a jack. The malleable iron parts of the dust guard are provided with lugs and dowels



Newcomb Journal Box.

for properly fitting them together. The rings are held in place against the journal by springs which bear against the caps at the top and bottom. When renewing the packing rings the caps are removed and the parts of the guard may readily be taken out. Since the phosphor bronze disc takes up the lateral play of the axle, the end collar of the journal is unnecessary and the ends of the axles are made to a smooth finish so as not to cut the disc. The journal brasses should be made ⅛ in. shorter at each end in order to reduce the possibility of friction. Boxes of this type have run 107 days without oiling or repacking on a locomotive tender truck on the Chicago, Burlington & Quincy. The makers claim that the number of hot boxes will be reduced, that the brasses will wear longer, that the oil and waste will be used more efficiently, and that the journals will not become cut where this box is used.

STATE RAILWAYS TO THE RESCUE.

The great drought in Europe so reduced the crops that the railways, at least in Germany and Austria, have felt constrained to come to the help of consumers by great reductions of rates, especially on forage. The Prussian State Railways have announced such reductions, effective until next July. Some examples will show how great they are. Forage barley from Thorn, on the border of Russian Poland, to Berlin, in carloads of 22,040 lbs. is carried for $22.85, instead of the regular rate of $37.60. The distance is 238 miles by one line and 246 by another, and the reduced rate is 10 1-3 cents per 100 lbs. To Magdeburg, 88 miles further, the carload rate is reduced from $55.45 to $32.50—from 25.2 to 14.8 cents per 100 lbs., the distance being a little more than one-third of that from Chicago to New York. For Indian corn, which comes chiefly from this country, but to some extent also from Hungary and Argentina, the rate, which was $32.84 per carload from Hamburg to Berlin, 178 miles, is reduced to $17.61, or from 14.9 to 8 cents per 100 lbs. From Oderburg, on the Austrian frontier, through which imports from Hungary come, to Magdeburg, a long haul (for Germany) of 571 miles, the rate on corn is reduced from $68.78 to $35.46 per carload, the reduced rate being 16 cents per 100 lbs.

Other forage is carried at one-half the regular rates, as, for instance: Bran, from Thorn to Berlin, pays $10 per carload instead of $20, bringing the rate down to 4.5 cents per 100 lbs., reminding one of rates made in competition with the Erie canal, the distance from Buffalo to New York, however, being nearly twice as great as that from Thorn to Berlin.

Heretofore when reductions in rates on forage have been made in Prussia because of scarcity, they have applied only to shipments to farmers and stock growers. This time they are general. It is hoped that the low rate on Indian corn will cause it to be used in distilleries instead of potatoes, which are very largely used for making spirits, the sandy lands of North Germany being better for potatoes than for grain. This year the potato crop has suffered, especially from the drought, and it is desirable that it shall be saved for food so far as possible, it [illegible] part in the diet of the working population. The rates on potatoes are reduced 50 per cent. This [illegible] length of the kingdom, from Eylau to Dortmund, 579 miles. A [illegible] Sea ports inland, to take the place, so far as may be, of the most which cannot be fattened this fall.

[illegible] officers, charitable organizations, clubs, etc., which sell at cost price.

[illegible] drought has prevented the growth of the green manures which are usually plowed in, and it is argued that a much greater [illegible]

These reductions will doubtless reduce the gross earnings by some millions for some nine months, but will perhaps prevent a more serious loss later on. The Prussian railways have had a considerable increase in gross earnings so far this year, and, it is said (expenses are not reported till the close of the year), for some months no considerable increase in expenses. They are thus in condition to sacrifice a part of their profits for a time. Baden and Bavaria, and by this time probably other German states, have followed Prussia in these measures, and Austria has engaged to do something, although it is badly in need of all that its state railways can bring in.

One result of the drought has been noticeable. With so great a reduction of production we might expect also a reduction in traffic. But the drought has made the water so low in the rivers which empty in the North Sea that their navigation has been interrupted, and millions of tons usually floated down have been diverted to the railways, which have had a shortage of cars when normally, after the acquisitions of late years, they should have had a surplus. The beet harvest, which presses them greatly in October usually, is now on, and is so light that they will probably be relieved earlier than usual. The effect of this light crop has already been felt in the price of sugar in America.

FOREIGN RAILWAY NOTES.

Gabriel C. Valverde has applied to the Bolivian government for permission to build a branch line from a convenient point on the Arica-Viacha Railway to Oruro. Mr. Valverde plans to carry out the work at his own expense, without guaranty from the government.

The Swiss State Railways are earning a little more this year than last, but substantially the whole increase is absorbed by larger expenses, the gain in net for seven months is little more than ½ per cent. Most requests for additional passenger trains, etc., have been refused, as the authorities see the need of great economy for some time to come.

Russia was fairly beginning to equip itself with railways down to the time of the Japanese war; but since that time it has added comparatively little to its mileage. In 1885 it had 15,911 miles in its immense territory, the part of which in Europe alone has two-thirds the area of the United States. It added 2,792 miles to this in the next five years, 3,789 miles from 1890 to 1895, and then no less than 11,204 miles from 1895 to 1900, when it bid fair to be the great field for railway building for at least a decade or two. But with the war came a setback, as may be seen by the following statement of the mileage opened in each of the last four years reported: In 1906, 1,561 miles; in 1907, 1,053 miles; in 1908, 280 miles, and in 1909, 262 miles; or 3,156 miles in four years, and nearly half of that in the first of them. There has been, however, a considerable amount of second-track added and other improvements, more needed, probably, than new road. This gives Russia 41,681 miles in all.

There appears to be a boom in Japan in respect to light railways, since the passing of the light railway subsidy law in August last year. Applications filed for charters number 136, with a total mileage of 1,952 and a capital of over $50,000,000. Up to the present time charters have been granted to 66 companies, with an aggregate capital of about $21,450,000. New applications continue to reach the railway board at a rapid pace and it is expected that by next April double the number now registered will have been received. It may interest manufacturers having dealings with Japanese railways to know that the railway board has recently been reorganized and is now under direct control of the minister-president. The business connected with the South Manchuria Railway has been separated from the board and transferred to the jurisdiction of the Colonial bureau. The railway board controls all business relating to the state railways of the country, as well as business relating to private railways, light railways and tramways.

Maintenance of Way Section.

WE have been obliged to postpone the publication of the papers submitted in the contest on "Methods of Keeping Cost Data for Maintenance of Way Work" until next month, because of lack of space, resulting from the publication of the report of the Bridge and Building Association convention at St. Louis. This action will allow the judges more time to carefully consider the various papers, as the subject treated in this contest is one of the most important we have covered up to this time. Nine papers were submitted in the contest, and the best papers will be published in the November Maintenance of Way section, together with the names of the successful contestants. Because of the postponement of this contest, the competition on Construction Kinks, which it was originally announced would close on November 1, will not close until November 25. A large number of kinks arising from a wide variety of conditions should be received in this contest. The field embraces all devices or methods resulting in a saving of time or labor, or a gain in efficiency and adapted to handling any feature of construction or reconstruction work, from the clearing of the right-of-way to the ballasting of the completed track, except those relating to bridge and concrete work, which will come within the limits of another competition. Prizes of $25 and $15 will be awarded for the best two contributions, and all other contributions submitted which are accepted and printed will be paid for at our regular space rates. Kinks should be sent to the Civil Engineering Editor of the *Railway Age Gazette,* 417 South Dearborn street, Chicago, not later than November 25.

THE difficulty met by the Bridge and Building Association in getting out the committee reports in time for publication before the convention has in a measure been common to other associations. Coupled with the honor and the opportunity for investigation accompanying the assignment of a member to a place on a committee, there is a distinct duty to be performed, and an incomplete or delayed report is but a partial fulfillment of the obligation. For the association to secure full benefit from a report it should be in the hands of the secretary in time for him to have it printed and mailed so as to reach the members several days in advance of the convention. The members then have an opportunity to study the report and are prepared to discuss it intelligently at the convention. On the other hand, if the members secure their first knowledge of a report when it is read at the convention, and have no copies before them, the discussion is very likely to be incomplete, and vital points will be overlooked. The more valuable a report is, the greater is the necessity that the members have it in hand a sufficient time in advance of the convention for them to absorb its contents. Again, the forwarding of reports to the secretary at the last minute complicates matters for him, as he is burdened at that time with the many other details incident to preparation for the convention and cannot give the time to the final arrangement of the reports which he would be able to give if they were sent in earlier. It is important that the individual committee chairman co-operate with him in this regard. The delay of sending in reports is largely due to lack of committee organization early in the year. In many cases little work is done until late in the season and the convention is at hand before the members realize it. A study of the methods followed by those committees whose reports were completed in proper time will generally show that these were organized and began the collection of their material soon after their appointment. In this way they are able to compile the report gradually without undue exertion on the part of any member and complete their work in proper season. These associations are built up and maintained because of the benefits received by the individual members from the investigation of subjects and the exchange of ideas along the lines of their work. Every effort should be made to secure the greatest benefits for the membership at large, and one of the most effective means of accomplishing this is the thorough preparation of all committee reports in advance.

THERE are many conditions under which it is either necessary or more advantageous to handle work by force account, because of the difficulty of measuring the amount of work done on other than the day basis. As an instance of this, the three following conditions arose in connection with the rebuilding of a large yard recently. It was necessary to do a small amount of grading along a busy ladder where the interference due to switching was heavy and so irregular that the contractor could not estimate closely on it. In another place it was advisable to start a portion of the work before all plans were definitely decided on and the amount to be done was not definitely known. In the third case the work consisted of light and uneven grading, which it was impossible to measure accurately on a yardage basis. Under such conditions, where payment is made for the actual force employed, it is necessary that accurate records be kept by both the contractor and the engineer or other railway representative in charge. Usually each keeps a separate record and little or no attempt is made to see that they agree, with the result that when the conractor receives his estimate he frequently finds discrepancies and complains of under payment. To avoid this constant trouble, work is often let by contract at an increased cost. Any method which will eliminate such disputes is of distinct advantage to both parties, and it is surprising that some plan such as that described elsewhere in this issue by Mr. Woollner is not in more general use. The engineer, or inspector, and the contractor each makes his daily record of the force employed; by checking these reports against each other daily, discrepancies can be eliminated while the details are fresh in their minds. By attaching the signatures of both to the report it is made final for that day, and neither can go back of it. This system has been given a thorough test in the construction of the Northwestern Pacific, where a large amount of force account was necessary, such as building roads into the line and hauling in company material, and has been found to work out very satisfactorily.

IT is a common tendency of the section foremen to gather up all the material they can lay their hands on for some possible emergency; and it requires careful supervision on the part of the roadmaster or supervisor to keep down the amount thus accumulated. Small quantities of material left over from relaying rail or from construction jobs seldom find their way back to the storehouse, but are put away by the nearest section foreman against the day when he will need them, which perhaps may not come for a year. These quantities may be small individually, but in the aggregate they become a large amount on an entire system. It is safe to say that an investigation on almost any road will show many ways in which money is tied up in reserve stock which could be released without any detriment whatever to the service. One large western road a year ago changed from the practice of placing an emergency rail at every mile-post to the practice of placing one every two miles, and in this way released over $30,000 worth of rail. Many roads keep at each tool house a frog and a set of switchpoints, together with other material to provide for emergencies; others simply keep one complete set of the materials used on the division at some central point ready for shipment wherever needed. This material should be placed on some platform where it can be readily loaded on cars, or, better still, it may be kept loaded on a car ready for quick movement, and without the necessity of waiting for men to load it. Practically every road has cars which are not fit for commercial service, but which could be used in

this way. By such methods much of the emergency material ordinarily kept along the line can be returned to the storekeeper.

SECTION FOREMEN'S MEETINGS.

THE practice of calling together the section and extra gang foremen at regular intervals for instruction and the discussion of topics directly connected with their work is of such value to both the men and the company that it is surprising that it is not more generally adopted. The only reason why it is not appears to be that many roadmasters and other officers in charge of track work do not know the possibilities of such meetings. Other departments have had staff meetings and discussions for years, but they have not been common in the maintenance department. On most divisions the train service is such that it is possible for the foremen to assemble at a central point in the morning and return home in the evening. In some cases these meetings are held on Sundays when they can gather without leaving their work. At other places they come together during the week, leaving their gangs in charge of assistant foremen for the day. It is considered that the gain in knowledge and in interest in their work by the foremen more than compensate for the time spent.

Such meetings are of value in several ways. A general discussion of any track topic by 20 or 30 foremen is certain to bring out many ideas new to the majority of them. Such discussions are of special value to the younger foremen, who pick up many points by listening to the older men. The meetings also afford an opportunity to those in charge of track work to instruct the men regarding new devices and to talk with them concerning general track standards, which tend to promote uniformity of work. An opportunity is also afforded for men in the other branches of the operating department to meet with the foremen and talk with them about matters of mutual interest, the result being better co-operation. Last spring on a road on which a reduction of force was ordered the roadmaster took advantage of such a meeting to explain the situation fully and to ask the foremen how many men they could let go and still maintain the track safely. After studying the matter carefully the foremen figured out where they could reduce their forces the required amount without impairment of the service. In this way the foremen shared the responsibility with those above them and did not lose interest in their work, as so often happens when they suddenly receive arbitrary orders to reduce forces.

On the Erie, foremen's meetings were begun last winter, and held regularly until summer work was begun. These were attended by the engineer of maintenance of way, division superintendent, division engineer, supervisor of track, supervisor of [illegible] and [illegible], supervisor of signals, and all of the foremen on [illegible] different [illegible]. In the morning the officials talked to the men on the problems of handling labor and material, and regarding efficient methods of work. In the afternoon each foreman was required to tell of the most serious conditions existing on his section or territory, of which he felt he had reason to complain. In some instances their complaints were found to be groundless. In other cases there were found to be good reasons for them, and the conditions were accordingly remedied. Such good results were secured that it is planned to resume the meetings this fall.

One advantage of them from the standpoint of the men is that [illegible] a little recreation and an opportunity to [illegible] The section foreman's outlook [illegible] but he has opportunity to know how other track men are doing their work. The Union Pacific [illegible] all section foremen [illegible] general point where it came on that district and go over it with the train. In this way each foreman was enabled to see the condition of every other foreman's track, and also to hear the comments and criticisms of inspecting officials, thereby securing much valuable information. While for some reason these trips were discontinued sometime ago, the old foremen still talk about them and about what they learned on "the special."

MAINTENANCE WORK BY CONTRACT.

THE tendency to contract certain portions of maintenance of way work is gaining ground today, and a number of roads are using this method experimentally on work which has heretofore been done exclusively by company employees. The declining efficiency of the foreman as well as of the laborer indicates forcibly the need of some change in the way of doing this work. The average laborer takes little interest in what he is doing, and does no more than the foreman requires of him. Any method which will awaken the interest of the average trackman and foreman results in more and better work. It is in arousing this interest that the letting out of work by contract attains its principal advantage. In the instance of putting in rock ballast on the Michigan Central, referred to elsewhere in this issue, the road is getting more work done per man than formerly and at a considerably decreased cost, while, at the same time, the contractor is making a reasonable profit. He is spurred on by the knowledge that his profits depend directly on the amount of track ballasted, and he secures more work from his men than he would if acting as a foreman for the railway. By employing men of his own nationality, as in this case, he also understands them better and is able to handle his force more successfully than if handicapped by having an interpreter. At the same time, the proper standard of work is maintained by placing a company inspector on the ground. The greatest advantages of a method of this kind are secured by letting the work out in contracts of such small size that the contractor is able to devote his attention to the immediate work. The letting of a large contract to one company would result in the foreman bearing the same relation to the contractor that he now bears to the railway. The personal interest he has in the profits bears a very important relation to the efficiency he secures. On several other roads ballasting work has been done by contract for a number of years under similar arrangements and with good results. There are several other classes of maintenance work to which the same principles will apply. One eastern road let a contract last spring for the renewal of ties on a certain district, and, while the contract had to be canceled early in the season because of labor troubles with the contractor, it is planned to try the same arrangement next year. Another detail which can frequently be contracted is mowing weeds along the right-of-way. There are large areas on which the weeds are cut by hand where they could be cut by a farmer with a team and mower at but a small proportion of the expense of hand work. Other large areas can be leveled off so that they can be mowed in this way at a greatly reduced cost.

One of the largest fields for economy is in contracting minor repairs to depots and other buildings to local workmen, instead of sending company employees from division headquarters probably 100 miles away. It is manifestly cheaper to hire a local carpenter to repair a leak in a roof or to put a new lock in a door than to have a man spend a day on the road each way to do a couple of hours' work. In such a case the expense of doing the actual work is but a small proportion of the total cost. Again, in handling such work much time is often lost either in waiting for small amounts of supplies or in sending men to unload small amounts of material before the work can be started. The Erie has given the subject of contracting maintenance work careful attention, and has adopted it in several instances. In handling repairs to buildings a local contractor submits his bid, and after it is approved by the division engineer he is allowed to proceed with the work. For all amounts under $25 he is paid at once by the station agent from the funds on hand.

ENGINEERING ARTICLES SINCE SEPTEMBER 15.

THE following articles of special interest to engineers and maintenance of way men and to which readers of the maintenance of way section may wish to refer have appeared in the issues of the *Railway Age Gazette* since September 15:

Farm Communities and Permanent Railway Labor.—The relation of economic conditions in the foreign settlements in our cities and the colonization movements in our rural communities to the supply of track laborers is touched on in an article by Alice Bennett on page 560 of the issue of September 22. Editorial comment on this subject appears on page 547 of the same issue.

The building of the Alaska Northern Railway is a good example of the possibilities of railway construction in a country which it is usually thought presents insurmountable difficulties to railway construction and operation. The territory traversed by this line, some of the difficulties in its construction and operation, and its possibilities for future traffic are described in an illustrated article in the issue of September 22, page 561.

Trackmen's Strikes.—A news note concerning a strike of maintenance of way employees on the Delaware, Lackawanna & Western and other track labor news appears on page 566 of the issue of September 22, and page 603 of the issue of September 29.

Tonnage Rating of Locomotives on the Burlington.—An abstract of Bulletin No. 138 of the American Railway Engineering Association, by M. H. Wickhorst, was printed in the issue of September 29, page 592. The article outlines in detail the method of equating tonnage rates on the Burlington.

The construction details of a concrete engine house built for the Elgin, Joliet & Eastern at Joliet, Ill., are given in an illustrated article on page 597 of the issue of September 29.

The structural details and a general description of the steel barge Mastodon built for Morgan's Louisiana & Texas Railroad & Steamship Company for service in transferring passenger and freight trains across the Mississippi at New Orleans are given in an illustrated article in the issue of September 29, page 600.

The Rail Situation.—An editorial comment on the immediate need of improvement in rail specifications to guard against the numerous accidents caused by rail failures appeared in the issue of October 6, page 627.

Addresses to Engineering Students.—A review of a book just published by Waddell & Harrington, including a number of addresses to engineering students by prominent educators, was published on page 628 of the issue of October 6.

New York Central's West Side Improvements in New York City.—Many plans have been suggested for improving the west water front of the city of New York, which is occupied by the freight tracks of the New York Central. The New York legislature has passed bills prescribing the general plan for this improvement, which must be finished within six years. The detailed plan submitted by the railway company for meeting the requirements of the legislature was described in an illustrated article in the issue of October 6, page 636.

The installment of the series of Letters from an Old Railway Official to His Son, a General Manager, which appeared on page 638 of the issue of October 6, contained some very interesting comments on railway construction work and the handling of contracts.

Rapid Bridge Work on the Boston & Albany.—The Boston & Albany has developed some advanced methods of replacing bridges, one of which was described in the issue of May 5, 1911. The latest example of this class of work was the replacing of a bridge at West Springfield, Mass., which is described in an illustrated article on page 639 of the issue of October 6.

Construction Work on the Cleveland Short Line.—The building of the Cleveland Short Line around the city of Cleveland, Ohio, has involved widely different and extremely difficult problems in engineering, including all the common problems of tunneling, bridging and track elevation and many new ones arising from the location of the line through the city. The interesting features of this work are described in an illustrated article on page 705 of the issue of October 13.

Letters to the Editor.

RENEWING TIES TO FACE.

CHICAGO, October 10, 1911.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

The method of renewing ties to face advocated by R. P. Trabue in the issue of the *Railway Age Gazette* of August 18 is of direct interest to all track men, and is a subject worthy of careful consideration. The practicability of this method depends largely on other track conditions, such as the kind of ballast used, the average life of the rail and the life of the tie. Mr. Trabue's experience has evidently been with rock ballasted track, and the advantage of a complete renewal to face is greater on such track than when gravel or other more easily worked ballast is used. There is no question but that the annual disturbance of rock ballast is disastrous to good riding track unless a large amount of labor is expended.

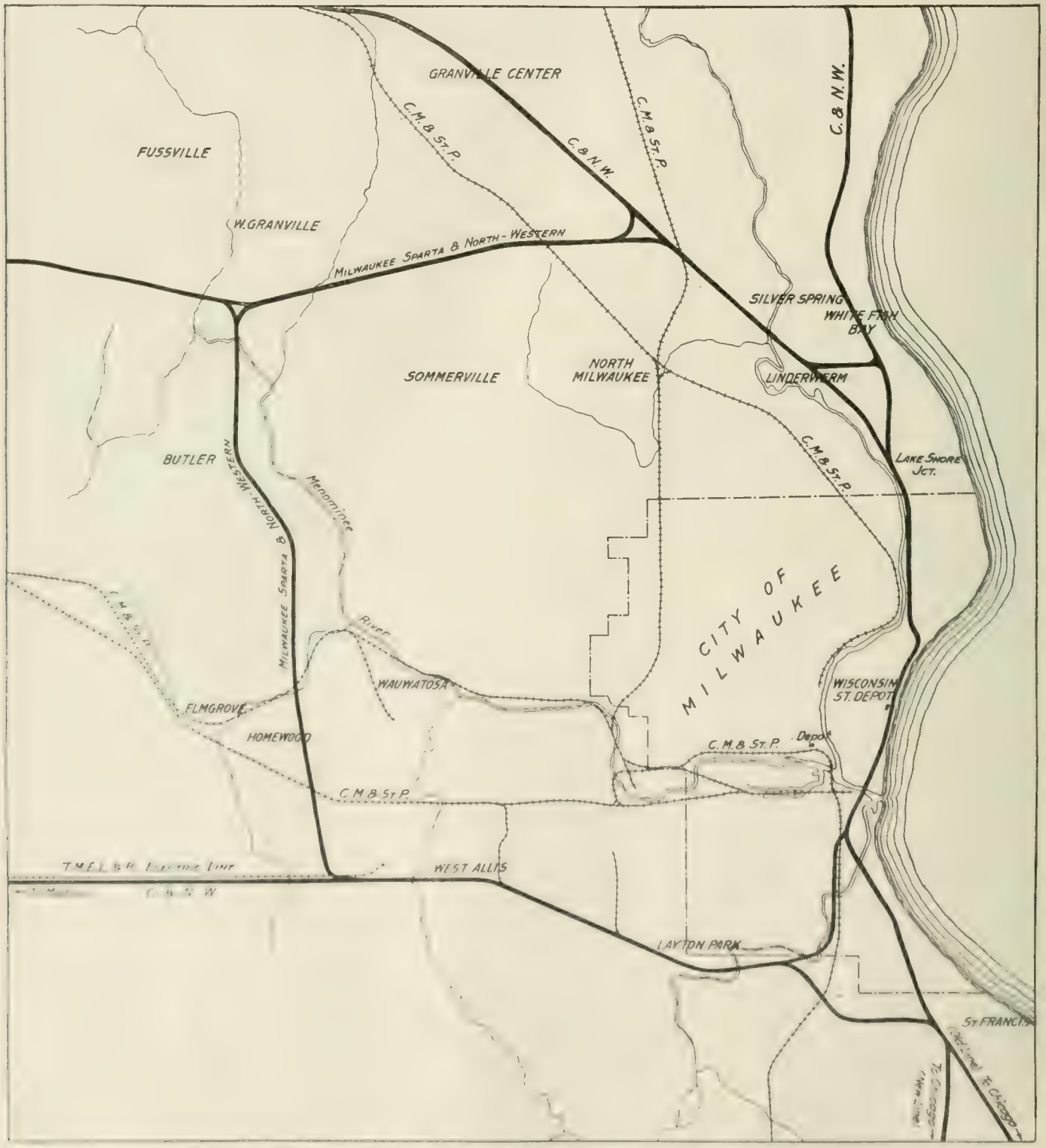
On account of the size of the equipment used today it is found that even when the quality of the steel is good the life of the rail very frequently is about equal to the life of the ties. For this reason many roads are in a way following the same plan as Mr. Trabue in taking special pains to see that the track is put in first-class shape at the time the rail is renewed. All ties that will not last three or four years are removed, the track is surfaced so that all ties have an even bearing, and it is put up to good gage on tie plates. In this way a permanent structure is approached, and but little work in the way of tie renewals and gaging is left for the section men to do during the life of the rail, while the amount of extras to be done, most of which ordinarily remain undone because of the press of other duties, is reduced to a minimum. This is especially true of the proper gaging of the new rail. If it is laid to accurate gage the section foreman will make a special effort to keep it so. On the other hand, if the gage is left bad the section foreman with his small gang is not apt to regage it, and even if he does the rail is frequently worn out before he gets over the entire section. Under this method of permanent construction in relaying steel it is possible to use crushed stone ballast with but little additional cost for future maintenance, as there is no question but that crushed stone holds the track in shape longer than other ballast; and with the track properly put up on a solid sub-grade when the steel is laid, it should need no further general surfacing during the life of the rail. The amount of picking up of low spots is also reduced to a minimum. Ordinarily about three months of the best part of the year is spent on tie renewal work alone, leaving little time for the numerous other important details necessary for proper maintenance. With such a method of construction section forces are able to devote more time to tightening bolts and keeping crossings, station grounds and right of way in good condition.

On the other hand, the advantage of a complete renewal of ties is not so great on a light traffic line, where the life of the rail exceeds the life of the tie, which is the case on a large proportion of the mileage of this country. It will probably frequently happen, in the case of the complete renewal system, that, when ties have about reached their limit, business will suddenly fall off, and the management will suggest "getting along another year." This would certainly not be a safe thing to do, but, nevertheless, as long as records of expenditures are maintained at the expense of the track, this state of affairs is sure to arise if the complete renewal system is tried. H. K. R.

CONSTRUCTION WORK ON MILWAUKEE BELT SECTION OF THE MILWAUKEE, SPARTA & NORTHWESTERN.

In connection with the building of the Milwaukee, Sparta & Northwestern, a low-grade line from Lindwerm, Wis., to Sparta, the Chicago & North Western has added a belt connection around the city of Milwaukee, to eliminate the congestion of traffic in that city and to open a strip of territory desirable for industrial development. The relation of this belt line to the North Western's operation in the vicinity of Milwaukee was shown in an illustrated article in the *Railway Age Gazette* of February 24, 1911, page 354. This section of the new road is now about finished, and it is expected to be turned over for operation in a short time.

The belt line leaves the Madison division of the Chicago & North Western about one mile west of West Allis, running northerly for about eight miles to a connection with the main line of the new Milwaukee, Sparta & Northwestern. The line is double track with a maximum grade of 0.5 per cent., compensated, and is laid with 90-lb. rail and gravel ballast. The principal construction features are the Butler yard and engine terminal and the structures over the Menominee river, the two divisions of the Chicago, Milwaukee & St. Paul Railway and the electric line of the Milwaukee Electric Railway & Light Company.

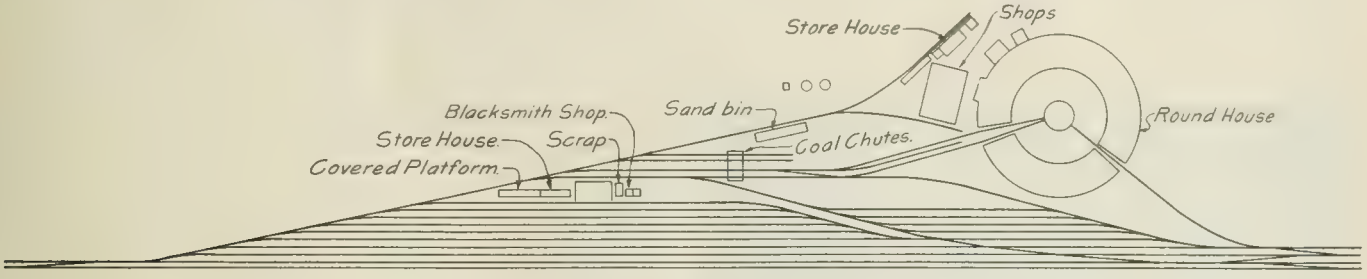


Chicago & North Western Lines Around Milwaukee.

BUTLER YARD.

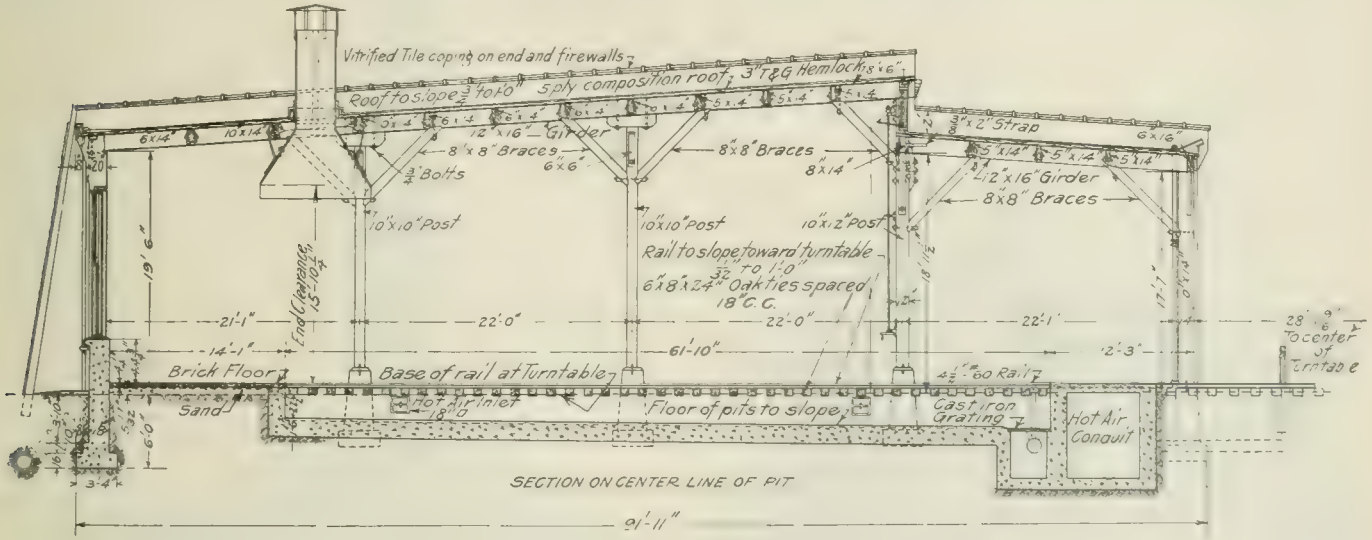
The terminal lay-out is divided into two parts by a highway crossing at the new town site of Butler. Although the grades have not yet been separated at this crossing, it is probable that the road will be carried overhead on a steel viaduct. The classification yard is south of this point and the repair yard and shop building group are north. The classification yard is on a level grade and contains 21 tracks with a capacity of 1,525 cars. It is laid with 72-lb. rail on soft ties and gravel ballast. The tracks are laid 13 ft. center to center, with No. 7 turn-outs from ladders. The yard is on a very light fill, the material for which came from a cut about three miles south. This cut furnished about 42,000 cubic yards, which made all fills on the 8-mile section.

The repair yard has eight tracks spaced 20 ft. center to center, and is served by a ladder at each end. The group of buildings includes, in addition to the roundhouse, a power house and machine shop, storehouse, sand bin, coal chute, blacksmith shop and air brake room, paint shop, office building and club house. The engine house is the company's standard 90-ft. brick house having a 60-stall circle. The two openings, a single track from the classification yard and a double track from the engine leads, occupy the space of three stalls, leaving 57 stalls for service.



Repair Yard and Engine Terminal.

There is a standard 80-ft. turntable on a concrete foundation. The foundation and side walls up to 4 ft. 5 in. above the base of rail are of concrete, and the brick wall above the concrete is 16 in. thick. The roof is 3 in. x 8 in. D. & M. planking covered with 5-ply composite tar and gravel roofing. The running rails in the engine house are 60-lb. laid on 6 in. x 8 in. x 24 in. ties on 18 centers set flush with the surface of the concrete. The house is heated by blowing hot air through concrete ducts below the track level from a heating and fan room adjoining the house. The main duct is laid just within the inner circle of the engine house, and connects with laterals between each pair



Section of Roundhouse.

Roundhouse; Milwaukee, Sparta & Northwestern.

of stalls. Two openings from each lateral admit air to the track pits, the openings being controlled by dampers. The smoke jacks are of a patented composition sold under the trade name Transite. The concrete in the foundations was placed from three mixers inside the circle located approximately at the third

Repair Yard and Coaling Chute During Erection.

points. The material was brought in in standard cars and wheeled to the mixers and the concrete was wheeled away to the forms.

The power house is 100 ft. x 109 ft. 10 in., divided into a boiler room, generator room and machine shop. There will be a

Club House.

[illegible] and a generator supplying electric power for [illegible] in the [illegible] and lighting all buildings and for operating the fan for the heating system. The power house chimney is [illegible] ft. high and 7 ft. inside diameter at the bottom.

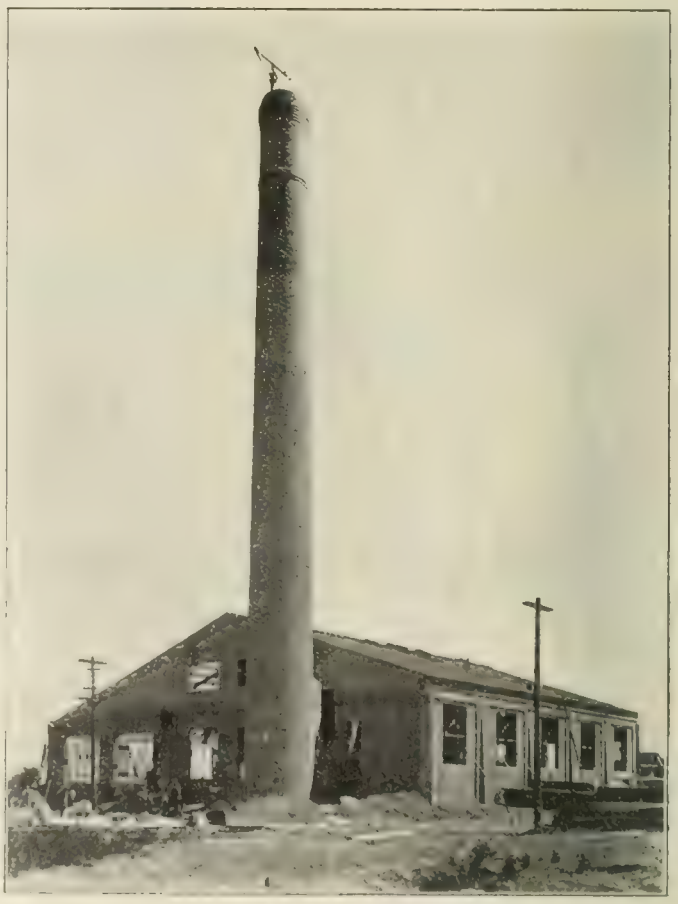
Menominee River Arch.

The coal chute is a frame structure on concrete foundation of the standard automatic hoist type, built by Fairbanks, Morse & Company, Chicago. It has a capacity of 600 tons and provides for coaling engines on two tracks.

The club house, which provides living accommodations for trainmen, is a 3-story frame building on concrete foundation, with slate roof. It contains 18 double rooms, in addition to the living room, dining room, kitchen, halls, baths and living quarters for the family conducting the house. The building is equipped with electric light, steam heat and running water.

MENOMINEE RIVER ARCH.

The Menominee river is crossed just south of the junction of the belt line and the main line of the Milwaukee, Sparta & Northwestern, and is carried under the tracks in one 40-ft. and two 32-ft. concrete arches. The footings are on rock and gravel, the maximum pressure allowed being 6,500 lbs. per sq. ft. The arch barrels are reinforced in both directions by ½-in. corrugated bars spaced 1 ft. center to center at a uniform distance of



Power House; Milwaukee, Sparta & Northwestern.

3 in. from the intrados of the arch. The parapet walls are reinforced by ¼-in. corrugated bars set vertically in the back of the wall, and by similar bars placed horizontally in the face of the wall. The up-stream piers are provided with 60-lb. rails set in the surface of the concrete as ice breakers, the method of anchoring these rails by ¾-in. rods being shown in the accompanying drawing. The backs of the arch barrels and bench and parapet walls have a smooth mortar finish and were waterproofed in the following manner. The concrete, when clean and dry, was painted with a coat of asphalt cut with naphtha or gasolene. This surface was covered by [illegible] in. of asphalt mastic, made of one part asphalt to four parts of clean sand, spread in place and well smoothed with smoothing irons. The entire surface was then mopped with hot asphalt and sprinkled with sand. The concrete mixtures used in this structure were as follows: Arch rings, copings and parapet walls, 1:2:4, stone to pass a 1½-in. ring; bench walls and wing walls, 1:3:5, stone to pass a

2¼-in. ring; footings, 1:3:6, stone to pass a 2¼-in. ring. The yardage in the complete structure was approximately 6,000 yards.

CHICAGO, MILWAUKEE & ST. PAUL CROSSINGS.

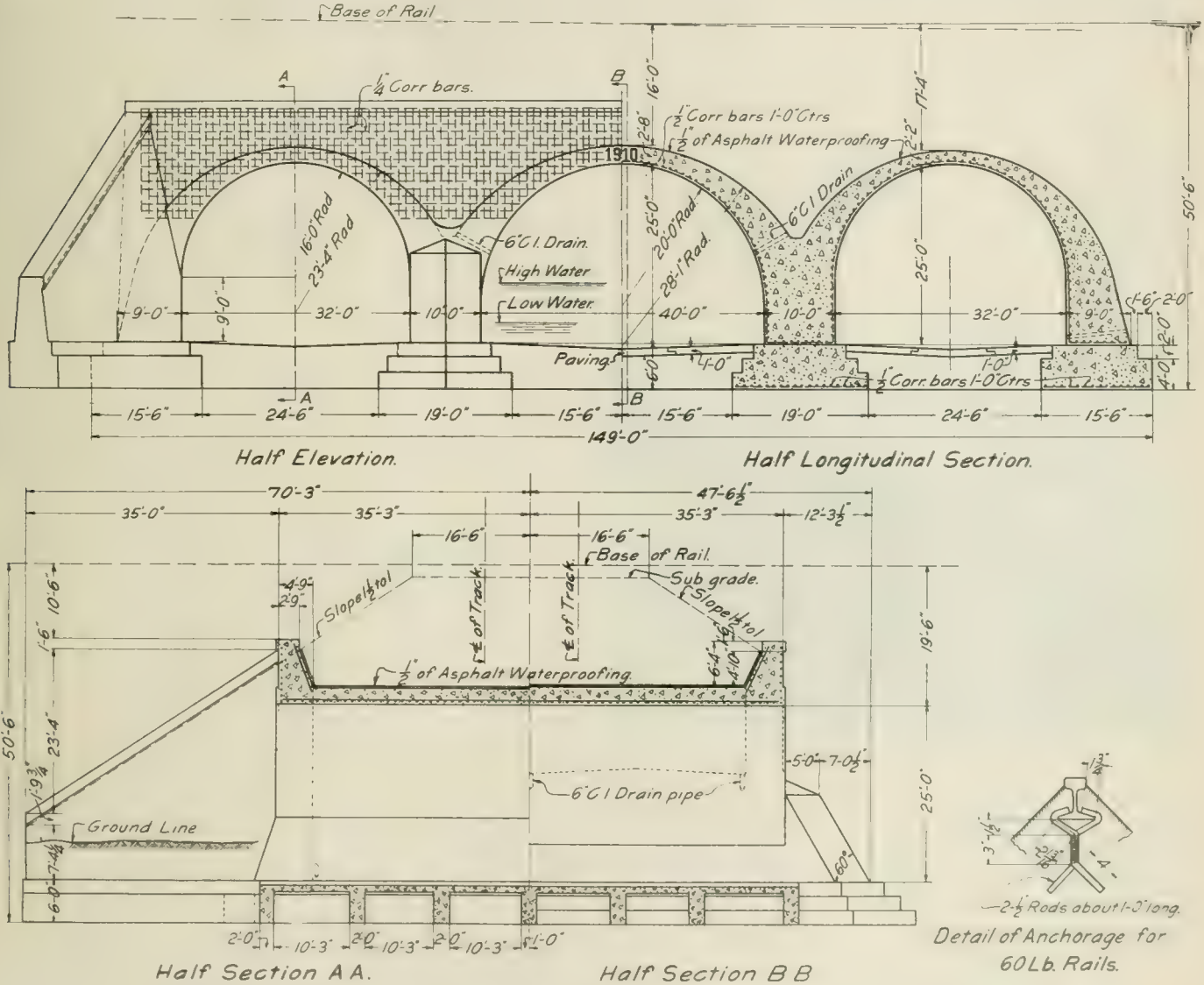
The La Crosse division and the Prairie du Chien division of the Chicago, Milwaukee & St. Paul are crossed by the belt line on riveted through truss structures with open trough floors. The Prairie du Chien division crossing is near a highway crossing, the latter being spanned by the deck plate girder approach shown in the accompanying photograph. The La Crosse division is crossed on a double-track through riveted lattice truss having a span of 170 ft. ½ in. Cooper's E50 loading with the impact formula $I = \frac{3/4 L}{L+D}$ was used to determine live loads for the trusses, longitudinal girders and floor troughs at panel points. For intermediate troughs, 30,000 lbs. on each rail was assumed to be distributed on two ties. The unit stresses used were

Tension on steel, 15,000 lbs. per square inch.

Compression on structural steel, $\frac{15{,}000}{1 + \frac{L}{13{,}500 r}}$ lbs. per square inch.

Bending for pins, 22,500 lbs. per square inch.
Bearing for pins and shop rivets, 22,500 lbs. per square inch.
Shearing for pins and rivets, 11,000 lbs. per square inch.
Shearing for web plates (gross section), 9,000 lbs. per square inch.

The open trough floor in this bridge, which requires only 1 ft. 10⅞ in. between low steel and base of rail, is typical of the construction which the Chicago & North Western is using in cases where the requirements of clearance demand a thinner floor than can be secured with the common floor beam construction. Longitudinal plate girders, 4 ft. ¼ in. back to back of angles, are placed 2 ft. 1 in. inside of the trusses, and the floor troughs, which are built up of plates and angles, are connected to the web and stiffener angles of these girders. Shelf angles reinforced by vertical angles and connected by cover plates are riveted to the web plates of the troughs at three points under each track, as shown in the accompanying drawing, and the ties laid directly on these cover plates. Every fourth tie is held in position by a bolt and the guard rails are bolted through the ties to the supporting plates. The intermediate troughs are 11⅜ in. wide, center to center of web plates, and the troughs under panel points are 1 ft. 2 7⁄8 in. wide. All troughs are 1 ft. 6¾ in. high, back to back of angles. Drainage is provided by setting sections of 1-in. gas pipe, 1 ft. 3 in. long, vertically in the bottom cover plate at each end of the troughs just inside the girders. These pipes are threaded on the lower end for a length of 4 in. and are held in place by a hexagonal nut above the plate. The troughs are filled with asphalt mastic sloped to drain to these openings at the ends of the troughs. Details of this design are shown in the accompanying figures.

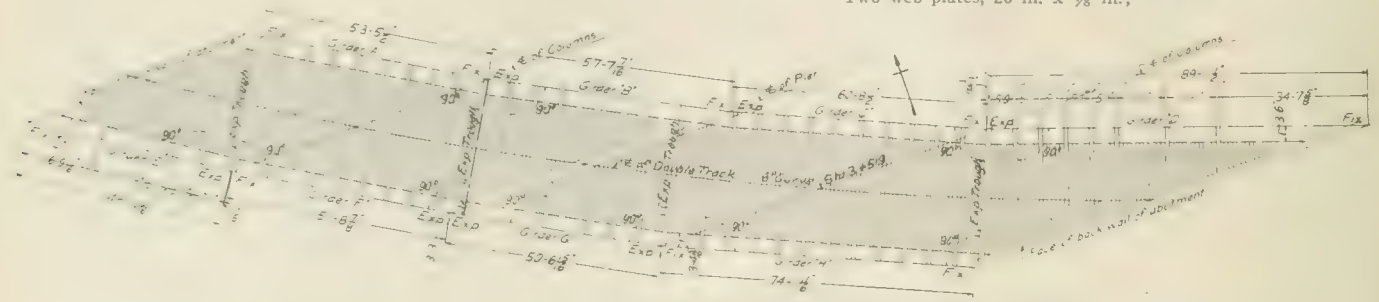


Sections of Arch.

MILWAUKEE ELECTRIC CROSSING.

At the point where the belt line leaves the Chicago & North Western, the latter line is paralleled by a double track electric railway of the Milwaukee Electric Railway & Light Company.

These tracks are crossed overhead by the belt line on a through plate girder structure with trough floor. The alinement is a 6 deg. curve cutting the center line of the electric road at an angle sharper than 30 deg. The girders are carried on concrete abutments, a concrete center pier and intermediate steel columns. The total length of inside girders is 262 ft. 5-16 in., and of outside girders, 225 ft. 7 11-16 in. A clearance of 20 ft. above the top of rail of the electric line is provided, and by using the trough floor construction the distance from low steel to base of rail is reduced to 2 ft. 7¼ in. The curved alinement and sharp angle of intersection made necessary special designs at the ends of the girders. As shown in the accompanying drawing, girders D and E support one end of each of the floor troughs in the end section, the other ends resting on the abutments; girders H and C, and F and A, respectively, support opposite ends of floor troughs, and girders B and G support the outer ends of troughs whose inner ends rest on the center pier. As far as possible the troughs are perpendicular to the supporting girders. The conditions of loading and the unit stresses allowed in the design are the same as for the truss bridge described above. Girder H, the heaviest in the structure, is made up of the following sections:



Layout of Plate Girder Bridge; Milwaukee, Sparta & Northwestern.

Crossing of Prairie du Chien Division.

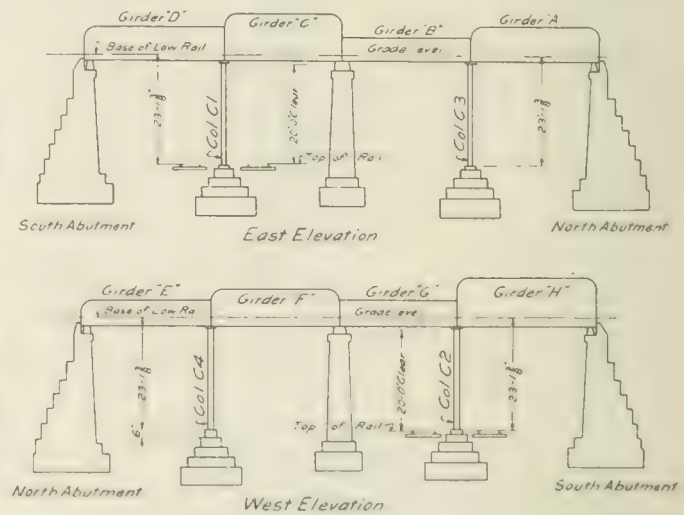
The floor troughs in the section between girders H and C, which are illustrated herewith, are typical of the design used. Gusset plates from girder stiffener angles and auxiliary vertical angles, which are riveted to the girder web, support floor beam troughs. The floor beam troughs have the following section:

Two top cover plates, 10½ in. x 9 16 in.;
Two top angles, 6 in. x 3½ in. x ⅝ in.;
Two web plates, 26 in. x ⅜ in.;
Two bottom angles, 6 in. x 4 in. x ⅜ in.;
Two bottom cover plates, 12½ in. x 9/16 in.

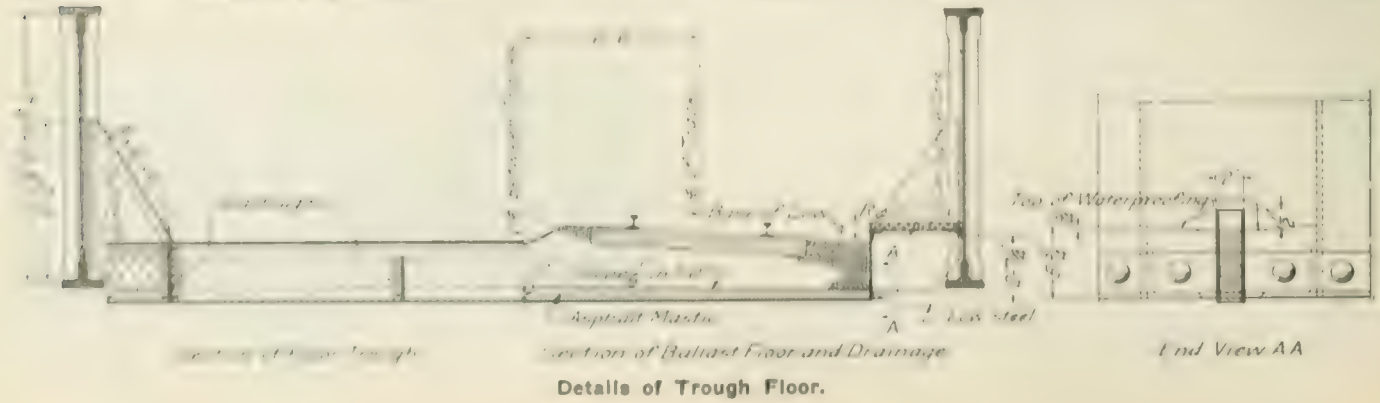
Ballast girders, built up of a web plate 35 in. x 7-16 in. and a top and bottom angle 5 in. x 3½ in. x 7-16 in., are set between these floor beam troughs parallel to and 3 ft. 4 5-16 in. inside of the center line of the main girders. To these ballast girders are riveted the secondary troughs, 4 in. x 4 in. x 7-16 in. angles being used for the connection. These troughs have the following section:

One top cover plate, 10½ in. x 11 16 in.;
Two top angles, 5 in. x 3½ in. x ⅝ in.;
Two web plates, 18 in. x 7/16 in.;
Two bottom angles, 4 in. x 4 in. x 11 16 in.;
One bottom cover plate, 12½ in. x 11/16 in.

All up troughs are filled with asphalt mastic to a depth of 7 in. and the surface sloped ⅛ in. to 1 ft. to drains at both ends of the troughs. Stone ballast is laid over this mastic and dressed

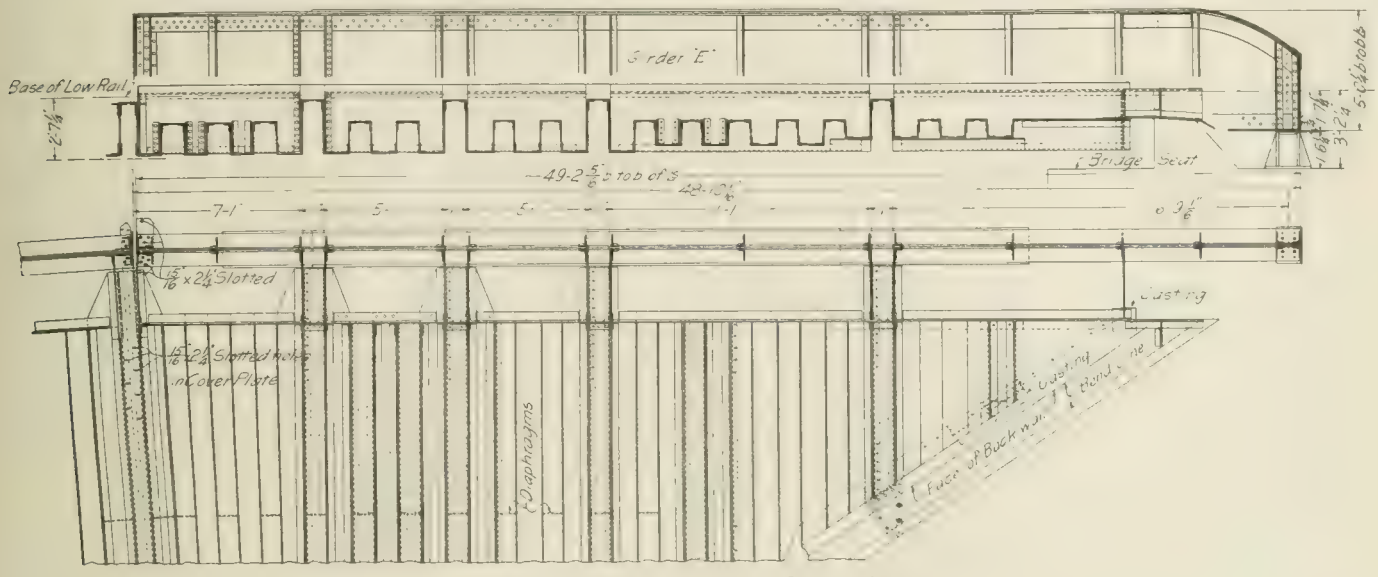


Elevations of Girders.



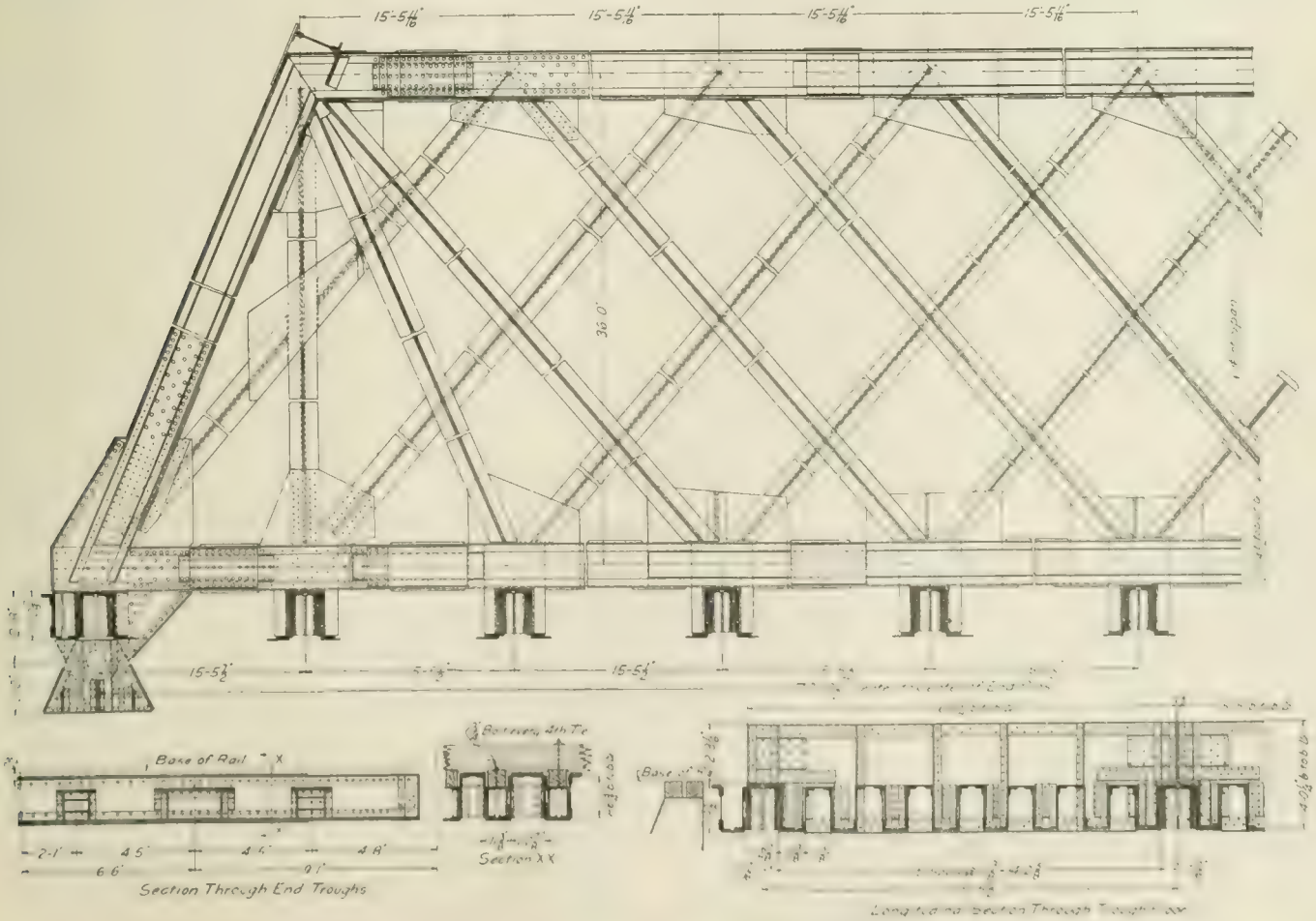
Details of Trough Floor.

to the section shown. The trough spacing is 13 in. and 11 in., center to center of web plates for up and down troughs, respectively, and ties are spaced 2 ft. center to center, being arranged to come directly over the up troughs. Concrete slabs 4 in. thick reinforced with ½-in. corrugated bars placed transversely on 6-in. centers are provided to cover the open spaces between the main girders and the ballast girders. These slabs rest on the upper angle of the ballast girder and shelf angles riveted to the web of the main girder.



Details of Girder and Floor Connections.

The sections of girders and troughs in other parts of the structure vary from that given above, due to differences in loading and span lengths, but the essential features in all cases are the same. The troughs that are supported on an abutment or pier are carried on castings similar to base castings, which are planed top and bottom. At expansion joints, troughs are provided which have the connection of top cover plate to top angles made by ⅞ in. round bolts in holes slotted to 2¼ in. The holes are covered under the nuts by 2½ in. x ¼ in. washers. On the pier the space between the castings supporting the troughs was filled with concrete level with the top of the castings before the steel was erected. The intermediate columns are braced by top and bottom struts and diagonal bracing, one column of each pair



Elevation of Truss and Detail of Trough Floor.

being arranged to slide on a phosphor bronze plate to care for expansion.

The John Marsh Construction Company had the contract for all excavation and masonry work on this section; Gindele & Company built all buildings in the shop group except the coal chute, which was erected by Fairbanks, Morse & Company, and the Alphonse Custodis Chimney Company had the contract for the stack. All this work was planned and carried out under the immediate supervision of E. C. Carter, chief engineer of the Chicago & North Western, with the following organization: W. H. Finley, assistant chief engineer; J. F. Stern, engineer of bridges; D. Rounseville, resident engineer; and W. A. Brewer, assistant engineer in direct charge of the work in the field.

REBALLASTING BY CONTRACT.

The Michigan Central has for the past three years been doing stone ballasting by contract, which has proven entirely satisfactory as to the amount and quality of work done, and a considerable saving has been effected over the cost of similar work done by company forces. Since the only available labor is Italian, the contract was let to an Italian who had been in the service of the company for a number of years, supplying labor for track work. This man had always dealt honestly with both the railway company and the men, and, although he knew nothing of stone ballasting, it was found that he could secure from his own countrymen more and better work at a less cost than could the company by employing white foremen with the usual interpreters. There has been no labor trouble whatever since adopting this method, the contractor being able to handle all the stone furnished by the quarry with a much smaller force than was required by the company when doing the work themselves.

Under the terms of the contract the company prepares the track to receive the stone, by skeletoning out the old ballast, spacing and replacing the old ties, applying anti-creepers and distributing the stone. After the stone has been distributed the contractor is responsible for the condition of the track until accepted by the inspector. In connection with the stone ballast considerable work has also been done in raising small sags to improve the grade line before making the lift on stone.

The company's forces consist of two gangs of between 20 and 30 men, one gang being used for skeletoning out and the other for spacing and renewing ties. Both gangs are combined into one when any considerable length of track is to be lifted on gravel or cinders. Where track is lifted before receiving the stone it is necessary to do but very little skeletoning, and the two gangs work together lifting and renewing and spacing ties. At the time the track is skeletoned out, all swings in the alinement are taken out.

The contractor's force consists of from 35 to 50 laborers, divided into two gangs, with two foremen and an assistant foreman, [illegible] and twelve men being used almost continually picking up rough spots and lining behind the lifting gang.

The specifications under which the work is done require that the track be lifted in such a manner that after a lapse of three [illegible] will require [illegible] not more than 2 in. [illegible] in lifting the track to the grade of the stone. On the sag [illegible] tamped with spades, which are found to be more [illegible] than the ordinary tamp. After the [illegible] has been under traffic for at least three days it is given a [illegible] lift of from 1 in. to 2 in., lined to stakes, and tamped to its [illegible] ballast section.

The contractor at present is receiving [illegible] cents per ft. for lifting and [illegible] for spacing, surfacing and trimming, under a two-year contract, and the company has [illegible] to [illegible] the contractor. The present [illegible] per ft. for lifting and [illegible] is [illegible] and it is good [illegible] to [illegible] It is interesting to note the track at least a 6-in. lift and [illegible] of [illegible] the contractor's [illegible]

The company's laborers are paid $1.60 per day, foremen $75 per month, and the inspector $85 per month.

Both the contractor's and the company's foremen are subject to instructions from the inspector, who is selected from the regular foremen and is generally one who is very familiar with stone ballasting work. When the contractor finishes a mile of track it is carefully looked over by the inspector and if, after riding over it, he finds it up to specifications, it is accepted and the contractor is relieved of further responsibility.

WORK TRAIN FOR HANDLING TRACK MATERIAL.

A special work train with a small extra gang has been employed for several years on the Aurora division of the Burlington for loading and unloading all track material for construction work, as well as relaying rail. This division is a very busy one, and each year there is a great deal of miscellaneous construction work of various kinds which requires the handling of a large amount of track material. The old way was to have the way-freight load or unload it with the aid of several section gangs, to avoid calling out extra power. After the recent federal legislation, especially, it was found that this work could not be handled economically in this way, so a special work train was put on at the beginning of the season. All material for construction or renewal work on various parts of the division is handled by this train and gang, and their use has been found to result in greatly decreased interference to tracklaying and section gangs. Rails, ties, splices and bolts, etc., are unloaded systematically and promptly, and it is possible to complete arrangements for track work far enough in advance to eliminate the frequent waiting for material. This advantage was also found in picking up second-hand rail, in supplying mills for sawing, and in redistributing this rail for use on the line. In addition to the service for construction gangs, the outfit is useful in filling bridges, unloading odd lots of ballast, and cleaning up scrap on the main line where traffic is dense.

The main result of the use of this train is the saving of time lost in collecting large forces of track laborers, and the more rapid performance of track work on account of material being on hand ready for use. There is a further economy in the use of such a train on a large division where small roundhouses are maintained at junction points, as the outfit can be laid up at the most convenient point and avoid the time of running into headquarters, as was necessary where the train was called out for but one day at a time.

The outfit used on this division consists of an engine, way car, tool car and bunk car, with a gang of 12 men in charge of the work train conductor. The conductor selected for this work is a man experienced in accounting and rendering reports for all material loaded and unloaded. Being on this train from season to season he becomes familiar with the requirements of maintenance work and in this way simplifies the distribution of material.

We are indebted for this information to W. S. Kirby, superintendent of the Aurora division, under whose supervision this train has been in operation.

The track elevation department of the city of Chicago has issued a report covering the period since January, 1909, which shows that the total mileage of track elevation work covered by ordinance to June, 1911, has been 140 miles of roadbed and 843 miles of track. It is also estimated that 192 miles of roadbed and 1,265 miles of track remain to be elevated which are not yet covered by city ordinances. The principal work under way at the present time is that extending from Grand Crossing southeast through South Chicago, eliminating the complicated crossing at Ninety-fifth street, South Chicago. The plans for this work were described in the *Railway Age Gazette* of March 24, 1911, page 758. The report is signed by Francis J. Owens, commissioner of track elevation.

BRIDGE AND BUILDING CONVENTION.

The twenty-first annual convention of the American Railway Bridge and Building Association was called to order at the Planters' Hotel, St. Louis, Mo., October 17, by President Rettinghouse. J. N. Penwell (L. E. & W.) offered prayer. John H. Guldlach, president of the St. Louis City Council, welcomed the convention to the city in the absence of the mayor. George Andrews (B. & O.) replied for the association.

In his address President Rettinghouse paid a tribute to the early founders of the association in St. Louis twenty years ago and pointed with pride to the record of work done and to the standing of publications. He urged new members to take part in the discussion and also pointed out that it was necessary for members to limit their remarks strictly to the subject under discussion. He called attention to the increase in membership from 60 charter members to 143 members in 1900 and 475 today.

The membership committee reported 90 new members. The treasurer's report showed a balance of $1,311.

The following are abstracts of the committee reports and the discussions on them:

FIREPROOFING FOR TIMBER TRESTLES.

The types of fireproofing used mostly at the present time are as follows: (a) Ballasted floor pile bridges, about the same amount of ballast being placed under the tie on the bridge as on an embankment; (b) metal covering on ties; (c) ballast covering from 2 to 4 in. thick on the ties, a wood filler being placed between the ties to support the ballast; (d) metal covering on the caps and stringers; (e) metal covering on the ties, with 2 in. of ballast thereon; (f) ordinary pile bridges built with certain kinds of treated timber; (g) fire-resisting paints; (h) pile bridges having I-beam stringers.

The fireproof feature of ballasted floor timber trestles is not the most important reason for adopting this type of construction, so it is not gone into in any detail in this report. Such bridges with treated timber cost about 75 per cent. more than the ordinary pile bridges.

The method of entirely covering the ties with metal is favored by many roads. It affords very good protection when the sheets are firmly attached and in good condition. If the metal used is of a poor quality and light weight, holes will soon develop, and if not properly fastened it will work loose and the ends will curl up, assisting ignition, rather than preventing it, by affording opportunity for the lodgement of sparks.

Ballast covering over the entire deck affords a good protection. A very serious objection is that the ballast holds the moisture and causes decay of the timber. The position of the filler blocks between the ties is important. The two extremes are placing them flush with the top of the ties and placing them directly on the stringers. In the first case the gravel will readily move about, due to the vibration of the trains, while in the latter case a large surface of the timber is exposed to the action of moisture. Probably the best way is to place the fillers so that the tops will come about 1 in. below the top of the tie.

Galvanized iron is placed on the top of caps and stringers by a number of roads, the object being to protect the timber from weather as well as from fire. Fire-resisting paints are used to a considerable extent in the New England States and in Canada with good results in most cases.

Summary of 44 Railways, Showing Number on Which Each Type of Fire-Proofing Is Used.

Types Used.	Number of Roads Using.
A	24
B	8
C	15
D	18
E	1
F	1
G	6
H	1

Summary Showing the Types of Fireproofing Used on 44 Railways.

Types Used.	Number of Roads Using.
A	6
B	2
C	3
D	5
G	4
A and D	6
A and H	1
A and C	6
A, B and D	2
A, B and C	1
A, G and F	1
A, C and D	1
B and C	1
B, C and E	1
B and D	1
C and D	2
D and G	1

The conclusions were as follows:

Most railways favor the ballasted floor pile bridge because it has many desirable qualities as well as being fireproof.

The protection of the timber from the weather is probably as much the reason for using type D as the fireproof feature.

Types F and H are used because with them a bridge is more permanent than the ordinary timber trestle, hence does not need so many repairs.

Types B, C, E and G are used solely to protect bridges from fire, and since type E is merely a slight modification of type B, there remain only three types used exclusively for fireproofing.

With the use of types B and C, inspection and repairs are more difficult to make than ordinarily, and this is quite important on timber structures; also when type C is used a more rigid inspection is necessary and more repairs will be needed than otherwise.

Type G is very simple and does not change the general construction of the bridge in any way. Another thing in its favor is the comparatively low cost. There is, however, some doubt as to its effectiveness, but a thorough test made under actual working conditions ought to determine whether a fire-resisting paint is practicable to use for fireproofing timber trestles.

Committee: Lee Jutton (C. & N. W.), W. H. Moore (N. Y. N. H. & H.), J. C. Nelson (S. A. L.), R. J. Arey (A., T. & S. F.).

Discussion.—A. E. Killam (Intercolonial).—Twenty per cent. of fires are caused by dropping sparks in rotten sap wood at the corners of timbers. In many cases we have cleaned off the sapwood, resulting in a structure lasting three or four years longer. Trackmen do not realize the danger of this unless they are specially instructed.

J. S. Robinson (C. & N. W.).—Our superintendent of motive power says that the trouble is due to the type of firebox approved by the government. We are now placing fence boards on ties inside and outside the rail on some bridges, and covering with 3 in. of clay near the rail and with 4 in. at the center of track. We find it makes the floor practically waterproof as well as fireproof. It costs not over 37½ cents per lineal foot.

Mr. Penwell.—Protection should begin at the ground, with the clearing away of brush by section forces. Rotten timber in a structure is a firetrap and should be removed. Placing clay or gravel on a bridge shortens its life. Using paint lengthens the life of a trestle, and the only objection is the whitewashed appearance it is given.

C. Smith (M. P.).—Ninety-five per cent. of fires start from the top. Protection insures a 50 per cent. increase in the life of timber and nets 15 per cent. on the investment.

G. Aldrich (N. Y. N. H. & H.).—Galvanized iron does not last over two years near salt water, so we use zinc. We have used whitewash as a fire preventative; it increases the life of timber 20 per cent.

B. Pickering (B. & M.).—Painting is the only satisfactory method. A Boston & Maine bridge, painted one year ago, caught fire where it was not painted and it burned so slowly that little damage was done. The bridge was double track, 175 ft. long. I

would recommend covering caps and stringers with sheet iron and painting ties.

Mr. Jutton.—Tests made by the engineer of tests of the New Haven show that creosote burns fiercely and greatly aids fire.

J. H. Markley (Tol., P. & W.).—It is old bridges which catch fire. We never cover the bridges where there are stringers only until they are one year old.

Further discussion was postponed, as a test of fire resisting paint was planned at the Missouri Pacific trestle at Crewe Coeur lake, 22 miles west of St. Louis. This test was made the next day, 150 members attending in a special train. The bridge is 138 ft. long and 8 ft. high. It was painted with one coat of Clapp fire resisting paint, applied by company forces on the tops of ties, stringers and caps, and on the sides of ties. An engine was run twice over the bridge, dropping live coals, and coals were also placed on the stringers. No damage was done. A pile of ties previously painted with the Clapp paint was covered with straw and fired without damage.

At a later session of the convention, discussion on this subject was resumed, as follows:

Mr. Jutton suggested that the association decide what kinds of fire proofing it favored and that the committee continue this subject for another year, perhaps preparing specifications for different types.

Mr. Fake. I would like to see various trestles painted with paint and other protection and compared with unprotected structures.

Mr. Penwell.—I would like also to see tried a structure treated with whitewash.

Mr. Jutton.—Type G in the report refers to any liquid coating or whitewash.

Mr. Fake.—I believe that paint should not be applied with a brush. Timbers should be painted before framing, as fire originates in joints.

J. Thorne (C. B. & Q.).—In the spring of 1889 we built a trestle across the Rock river, near Rock Island. Partly as an experiment, we applied salt on all ties. Many fires started, but they never crossed the salt. The last piles were removed in 1910, being in good condition. Another pile trestle, now eleven years old, is in good condition, as shown by a recent examination. German experiments rate salt as second among preservatives, as well as being a good fire protection.

The committee was continued for another year and instructed to conduct necessary tests to enable conclusions to be reached.

DERRICKS IN MATERIAL YARDS.

Chairman Penwell asked that the subject be continued for another year. Only a progress report was submitted. The committee was unable to secure sufficient data as to derricks used in yards only. Many sent in data covering derricks used in both yard and field work. The report was referred back to the committee.

BEST METHOD OF NUMBERING BRIDGES.

In preparing this report a letter was sent to a large number of officers [illegible] of the bridge departments of the various railways, asking what method they considered best for numbering bridges and what was the practice in use on their lines. A study of the information received in reply to this letter showed that:

First—At the present time the number of roads using the mileage system is somewhat, but not greatly, in excess of the number using the consecutive numbering system.

Second—Where changes are being made they are made from the consecutive numbering system to the mileage numbering system.

Third—The consensus of opinion seems to be that with a new line where a scientific system can be put in at the start the mileage system is preferable.

Fourth—The mileage system seems to present some difficulties if applied to a large road with many main lines and branches.

Fifth—Where the consecutive numbering system is in use on an old-established line of considerable mileage and many branches, it seems advisable to keep this system. The cost of the change is almost prohibitive. All officers of the road know the important bridges by their numbers, so that changes would cause endless confusion, and for a considerable time bridges would be known by either one of two widely varying numbers.

Sixth.—It has been urged against the consecutive numbering system that it gives no indication as to the location of the structures. This is largely overcome by having a proper record of bridges in the office of record, showing the stations and the mileage and indicating the numbers of the bridges in their proper relative position to these stations and mile number-posts. The consecutive numbering system is in use on the Chicago & North Western and on practically all other roads of any size. When a report comes in from the field with regard to a bridge, stating the number, the report is immediately sent to the bridge department, where the bridge record books are kept, and advice can be instantly given to the general officers, stating just where the bridge is, with reference to the stations, on that particular line. This does not locate the bridge closer than between two mile-posts and between two stations, but this is as close as can be asked from any system.

The committee did not believe it advisable to recommend any particular system of bridge numbering at this time. The matter has been discussed to a very considerable extent, and there are today advocates of the consecutive system as well as of the mileage system of bridge numbering, although the former are in the minority. It is not believed that the association should introduce any particular system or go on record as advocating one particular system and that only.

Committee: I. F. Stern (C. & N. W.), E. B. Ashby (Lehigh Valley), W. H. Wilkinson (Erie), C. N. Monsarrat, William Graham, R. H. Reid (L. S. & M. S.).

Discussion.—W. H. Moore (N. Y. N. H. & H.).—Within the past few years we have changed from consecutive to mileage numbering We believe there are great advantages in the latter method. Much objection was made to the change before it was made, but no confusion arose. We would not think of going back to any other system. We always made the number zero at the connection with the main line and defined the bridge by naming the branch.

J. T. Andrews (B. & O.).—Until last year we favored the mileage system. Within the past few years we have made much realinement, causing confusion. Now the most favored plan is the consecutive numbering by hundreds, starting No. 1 at each division terminal and numbering consecutively, each division having different hundreds. The plan on one division is to number bridges by miles and tenths; any new bridge inserted can then be numbered by the mile and hundredth.

G. Aldrich (N. Y. N. H. & H.).—When we first started mileage numbering I was opposed to it, but now I like it. Any timecard identifies the bridge when the mileage number is shown. It is very easy to number additional bridges.

BUILDINGS AND PLATFORMS FOR A SMALL TOWN.

At the meeting last year this subject was referred back to the committee for further consideration, there having been some criticism of that part of the report in regard to the tracks back of the depot and the elevated plaform. The report last year said that "for stations where but a small amount of freight is handled a house track back of the staion is not desirable. Where, however, a large amount of freight is received, as is occasionally the case in small towns and on busy roads, and where considerable time would be lost by local freight trains getting out of the way of other trains, a track back of the station is desirable."

It was not intended to make this a general standard, but to be used in cases where considerable quantities of freight being received could be unloaded while waiting for other trains to pass. If such conditions do not exist the committee does not recommend the layout.

Concerning the platforms, general conditions must govern. If heavy freight is received a high platform of proper size is usually desirable. At some small stations large quantities of cotton, broom corn, oil in barrels, ore, etc., are received for local shipment. In such cases an elevated platform would seem a necessity. They should be placed as conditions would seem best for transferring from wagons to cars, or vice versa, and far enough from other buildings so as not to endanger them in case of fire.

For the above reasons the committee did not see its way clear to change its last year's recommendations and submitted the following conclusions:

(1) Passenger stations and combination passenger and freight stations with their platforms should be contiguous to and face the main track.

(2) Where but a small amount of freight is handled, platforms level with the car floor are not generally desirable. Where a considerable quantity of heavy freight is handled, platforms at or nearly the height of the car floor are desirable. Such platforms may be adjoining the station building or at a distance from it contiguous to a team or unloading track, as conditions require. When they constitute a part of the depot platform they should not in general extend nearer the main track than the front line of the station building and in no case nearer than 8 ft. of the main track rail.

(3) Grain elevators, oil houses, cotton, broom corn or other platforms or buildings storing inflammable or semi-inflammable merchandise should be located, as far as practicable, so as not to endanger railway or other property.

(4) Section tool houses should, where practicable, be located adjacent to the main track and preferably outside of side track limits.

Committee: C. H. Fake (M., R. & B. T.), N. H. LaFountain (C., M. & St. P.), H. M. Jack (I. & G. N.), B. F. Beckman (F., S. & W.), O. H. Andrews (St. J. & G. I.), R. J. Bruce (M. P.).

Discussion.—Mr. Penwell.—If this track can be put in without placing additional switches in main track I favor it.

Mr. Fake.—It may happen that it becomes advisable to place another switch in the main line to save the time of trains.

BRICK VENEER FOR STATION BUILDINGS.

The committee sent out a letter to members of the association and others, asking what results they had secured from using brick veneer for station buildings. It seems from the replies received that very few roads use brick veneer to any extent for this purpose, and a large number advise that they have not had any experience with this type of structure. Three members of the committee have had no experience with brick veneer, and one who had some experience has had considerable trouble with the veneering jarring loose from the wood sheeting and around the window and door frames, on account of the vibration and general severe service a station building has to stand.

Taking into consideration the cost of lumber and the additional expense for a suitable foundation which would stand the vibration caused by the passing of high-speed trains, the saving in the cost of brick veneer over a solid brick structure would not justify veneering.

A number of men questioned if such a structure would be suitable for station buildings at outlying stations where there is much vibration from trains passing at high speeds, and believed that the only way this trouble could be overcome would be to build permanent and expensive foundations. This brings up the question of the advisability of placing a brick veneer building on an expensive foundation.

Concerning fire protection, it is not considered that brick veneer is of great benefit, as but a small proportion of the fires damaging or destroying buildings start from sparks lodging in the outside walls.

The consensus of opinion in these letters is that with the present high price of lumber, a brick veneer building on solid foundation will cost very nearly if not equally as much as a structure built entirely of brick.

Brick veneer buildings have been built by the Toledo, Peoria & Western at Sheldon, Watseka and Washington, Ill.; by the St. Louis, Iron Mountain & Southern at Beebe, Ark., and by the Chicago, Milwaukee & St. Paul at Edgerton, Wis. The Chicago, Burlington & Quincy, after watching the endurance of one built at Plattsmouth, Neb., is now building brick veneer depots at Walthill, Alma and Harvard, Neb.

Committee: M. E. Gumphrey (C. R. I. & P.), J. D. Moen (C. & N. W.,), W. Beahan (L. S. & M. S.), R. O. Elliott (L. & N.), W. A. Conkling (U. P.).

Discussion.—Mr. Killam.—We have twenty or thirty veneer building, but they are not satisfactory. We now use timber or solid timber. We often have to tear part of a wall out to repair timber near the wall. The present cost of brick is but little more than veneer. We have not built of veneer for the last twenty years.

Mr. Markley (T. P. & W.).—Our buildings are on concrete and rock foundation.

P. J. O'Neill (L. S. & M. S.).—We can build brick wall plastered on the brick inside cheaper than a veneer building lathed and plastered.

Mr. Markley (T. P. & W.).—We are now building a station of veneer with beaver board inside instead of plastering.

Mr. Markley (C. &. E. I.).—One should have solid wall up at least five feet to withstand the knocks received in unloading freight.

Mr. Rettinghouse.—Any wall should have protection guards. I do not believe that the difference in cost warrants the adoption of veneer.

Mr. Markley (C. & E. I.)—My objection to a veneer building is that it means too much combustible material.

The committee's report was received as information, and the subject was continued for further report next year.

ROOFS AND COVERINGS.

As a general proposition, roofings suitable for use on railway structures may be divided into five classes. First, built-up roofs surfaced with gravel, slag or similar material; second, built-up roofs surfaced with tile or brick, set in plastic material or cement mortar; third, built-up roofs without gravel, slag or tile surface; fourth, prepared roofings, either smooth or with a sanded or pebbled surface; fifth, overlapping tile, slate or cement shingles, and galvanized iron. Galvanized iron should not be used on a roof incline of less than six inches to the foot. Built-up roofs give the best value on flatter inclines, but should not be specified where the incline exceeds two inches to the foot unless the contractor is thoroughly familiar with them. The use of tarred felt and coal tar pitch in built-up roofs has proven its value by long service. Poor roofs of this type are due to the material not being coal tar pitch or being improperly applied or used in too small quantities. Tile or brick roof increases the cost four to six times, and the life is practically the life of the structure. Prepared roofings have the defect that because of being in only one layer a single defect causes a leak. Overlapping tile, slate and shingle roofs are advisable for inclines in excess of six inches to the foot.

It is practicable to apply any fairly smooth wooden deck, except as the roof incline has a bearing on a built-up deck. With decks of concrete or tile, there must be some provision for nailing. This is usually provided by wooden nailing strips when the deck itself cannot be nailed into. The smaller the building, and the greater the distance from the base of operation, the greater is the advantage of prepared roofing. Grit or pebble surface on prepared roofing permits the use of more waterproofing material on the surface and protects it from erosion.

Discussion.—Maurice Coburn (Vandalia; chairman Roofing committee of the American Railway Engineering Association)—The manufacturers formerly kept all information regarding roofings to themselves, and the railways knew very little. In built-

up roofs, it is necessary to select between coal tar and asphalt. Coal tar is cheaper than asphalt in first cost and in application. Asphalt is an uncertain proposition and requires more skill in application. Coal tar is not good for ready roofings, for coal tar felt gets brittle more quickly than others. It is necessary to have a mixture of several different asphalts and flux with oil to get results. No one asphalt is good of itself, for the oil separates and goes back into the felt. It must be mixed by experienced men.

H. A. Horning (Mich. Cent.)—The particular design of the building usually governs the kind of roof to apply. I favor tile over slate for ornamental purposes, although it is slightly more expensive. We use prepared roofing on small buildings in inaccessible locations. We have never used it in a passenger station, where appearance is essential. The question is not solved with them.

The president invited roofing salesmen to speak, and Mr. Waddell (Johns-Manville), and Mr. Sibley (Barrett Manufacturing) gave short instructive talks.

Mr. Markley (C. & E. I.)—In our practice we resurface gravel roof by applying more pitch and gravel. We never place new felt over old felt.

Mr. Robinson (C. & N. W.)—We placed prepared roofing on the Wells street station fourteen years ago. It gave a very hard surface. We removed the roof recently and found it in very good condition. We have difficulty with coal tar, the pitch dripping at suburban stations and at shop buildings. We have used tar mixed with pitch, probably causing dripping. However, we used coal tar pitch in 1894 on sheds and got very good service; they have been coated once. We use slate roofs on the Chicago shops, built in 1871. Where copper nails were used, results were good. Repairs were necessary where galvanized iron nails were used. Tile roofs have been successful.

Mr. O'Neill.—There can be considerable dripping with coal tar. We have had difficulty with a roof over a boiler room, which dripped for nearly a year.

The report of the committee was received as information and the subject was continued for another year.

REINFORCED CONCRETE TANKS, STAND PIPES AND RESERVOIRS.

The average life of a wooden tank may be taken as about 18 to 20 years, depending upon the kind of lumber used, care used in construction and the attention given to it, such as keeping it filled with water, not allowing the water to freeze, keeping the outside of the tank painted, etc. The hoops also need constant attention, and in many cases have to be changed once or twice during the life of the wood. On account of these difficulties other materials have been given consideration. Many steel tanks have been built and are the standard of some railways, such as the Lehigh Valley. This style of construction is most frequently used for the larger size tanks of, say, 100,000 gallons and over.

The principal arguments to be made in favor of reinforced concrete water tanks are: (A) the required materials can easily be obtained in almost any locality and the experience gained with each tank built gradually decreases the construction cost; (B) the concrete tank need not necessarily be kept filled with water in order to preserve it; wooden and steel tanks rapidly go to pieces by being alternately wet and dry; (C) it is easily kept clean regardless of the kind of water it holds because nothing is absorbed by the concrete; (D) there are no maintenance charges; wooden and steel tanks require painting, calking, renewal of hoops, etc.

The foundations must be carefully planned, but the same is equally true of wooden and steel tanks. The details will depend entirely on the location and must be redetermined for each individual case. The argument has been advanced that uneven settlement will do less harm to the superstructure of a properly designed reinforced concrete tank than to a wooden tank, but this is of course for getting in a poor and insufficient foundation.

The design of the superstructure varies considerably and to some extent is governed by the use to which the tank is to be put. In general way there are three designs: (A) a cylinder or prism resting on concrete footings and used for its entire height as a water reservoir; such a tank is used where the quantity of water is the main consideration or where the tank is located on an elevation. (B) a cylinder or prism resting on concrete footings having a diaphragm or partition a considerable distance above the footings that form the bottom of the water reservoir. This design is used where elevation is needed to obtain sufficient pressure for hydrants or water columns and where the hydrostatic pressure if brought to the base of the tower would be likely to cause seepage through the concrete. The lower portion of the tower can be provided with suitable openings and utilized for pumping machinery and the storage of tools. In case of trouble during severe winter weather a tank of this design can be thawed out without risk. (C) a tank of concrete resting on reinforced concrete posts similiar to a wooden or steel tank on the tower. Design C is used the same as B without the frost-proof feature.

A railway tank should be provided with a roof which may be of concrete, wodo, tile, slate or prepared roofing, as desired.

The railways of the country are giving more attention to the appearance of their buildings and grounds. Reinforced concrete lends itself very readily to artistic design and this will be no small argument in favor of the concrete tank.

There are several reasons why railways have not taken up the construction of reinforced concrete tanks more generally. In the first place, because of the comparatively few structures of this kind that have been built, the work up to the present time has been largely experimental. Railways that have to contend with severe cold weather do not care to try such tanks until they are sure they will stand freezing weather without injury. Because of constantly changing operating conditions and requirements the permanent location of many tanks must necessarily be more or less uncertain. Lack of experience in this form of construction makes the labor charge run high.

The report describes in some detail a number of stand pipes and tanks recently erected in this country, and concludes with a bibliography of literature on this subject. Among the railway tanks described are: One on the Pennsylvania at Austinburg, Ohio; two on the Southern Railway on Ooltewah and Bull's Gap, Tenn.; one at Empalme, Sonora, Mexico, on the Cananea, Yaqui River & Pacific and one at Savannah, Ga., on the Central of Georgia Railway.

Committee: F. E. Weise (C. M. & St. P.), G. H. Soles (P. & L. E.), C. W. Richey (Penna. R. R.), W. H. Vance (La. & Ark.), D. G. Musser (Penna. Lines).

Discussion.—Mr. Weise.—The concrete tank costs more than the wood or steel tank, but the maintenance charges are reduced to a minimum. However, it was not advisable to include cost figures in the report, as they vary with individual cases.

Mr. Strauss (B. & O.).—The tank on the road, described in the report, has not leaked, but it has sweated considerably, discoloring the outer surface. In construction, the only effort to bond one section to another was to clean the surface with hydrated lime. The water was not turned in for 30 days. Several small leaks developed, but it soon became substantially watertight. Moisture did not appear at the joints more than elsewhere.

J. B. Sheldon (N. Y. N. H. & H.).—Very fine sand sometimes has voids of 50 per cent., while a coarse sand may have voids as low as 10 per cent. One should know the class of sand used.

Mr. Strauss.—We used No. 3 sand, secured locally. It was really glass sand. It was crushed and washed, with a large percentage of fine particles.

Mr. Weise.—The proportions vary because local material is used. The thickness of the walls in the designs submitted vary greatly.

Mr. Markley (C. & E. I.).—I would make the concreting continuous until the tank is complete, without joints.

Mr. Strauss.—Continuous poring might apply to shallow tanks, but I doubt its advisability for high tanks. I am satisfied that we would secure poor results in a big tank poured from the top continuously. Experience in concreting girders has showed that

material segregates in dropping 10 ft. This tank construction is cheapened by the use of steel forms.

Mr. Markley (C. & E. I.).—I meant to pour three or four sections vertically until completed.

Mr. Strauss.—The subject of small cracks and the effect on reinforcement was not studied. Cracks were so small they were hardly found. It was not thought that enough water reaches the steel to do harm. There is a chance of small pockets forming along the steel, resulting from poor workmanship.

Mr. Rettinghouse.—We designed a tank for an industrial concern 24 ft. in diameter, 30 ft. in the ground and 30 ft. high. It was reinforced above ground only.

The subject was continued for investigation next year.

BEST AND MOST ECONOMICAL PUMPING ENGINES.

The committee gave this subject a considerable amount of study and conducted a number of tests and investigations, but it did not feel that it was in the position to recommend the best and most economical pumping engines for general use for the reason that a proper and complete report in this connection would mean a recommendation for each and every condition encountered in railway water service, and the number of such conditions are very numerous. Instead of making a report strictly in accordance with the subject in hand, the committee considered that the report would be of greater value if it included a number of tests with different types of pumping units. Such tests were made and reports presented by the committee. Data was submitted which had been gathered from water stations where reliable figures could be obtained as to the amount of fuel consumed and water pumped resulting from actual weight and measurements of fuels, reading of meters, etc. The points selected where the tests were conducted were such as are commonly found in railway service, and the same results may be secured at any station where similar conditions exist. All of these tests were reduced to cost per water horse power per hour, and in each instance the cost of fuel was given, which can be used as a basis for fuel at any other figures.

The committee submitted this report as a progress report and suggested that such tests and investigations be continued.

Committee: C. E. Thomas (I. C.), J. Dupree (S. I.), G. H. Jennings (E. J. & E.), R. A. Luker (G. C. & S. F.), J. B. White (C. & N. W.).

Discussion.—Chairman Thomas urged that the report be continued for another year, and said that two roads were changing from gasolene to power distillate, the cost being three cents a gallon as against twelve cents for gasolene, with the same power.

The subject was continued for another year.

EMBANKMENT PROTECTION.

The committee on embankment protection submitted as a report a number of letters by members of the association and United States government officials, describing methods of protecting embankments used under their supervision.

The Lake Shore & Michigan Southern uses heavy breakwater stone where they have heavy washing and pounding of the waves, such as along Sandusky bay. This protection is sometimes supplemented by filling in between the breakwater stone with smaller stone which can be handled by hand or plowed off the cars. Another kind of protection used is barbed wire or woven wire fence, which is spread along the embankment and filled in with underbrush or other material so as to form a mat. In other cases heavy underbrush is placed on the embankment and covered over with lighter material which will interweave with it and form a solid mat. Piling has also been driven at dangerous places.

A method used on the Southern Pacific was described by C. F. Green in the issue of the *Railway Age Gazette* of July 21.

On the Fort Worth & Denver City rubble stone is placed in shingle fashion for about 30 cents per square yard, and is forming an efficient bank protection. Along river banks cribs about 10 ft. wide are built extending out into the stream at an angle of about 30 deg., and pointing down stream. These cribs have sand bars back of them to prevent future trouble. Barbed wire fences have also been placed along the bank at several points but without entire success. It is expected that concrete slab protection will be placed at several points along the line in the near future.

Information was included from a report of the chief engineer of the Mississippi river commission regarding the weaving and sinking of a fascine mattress at Delta Point, La., opposite Vicksburg, where the river bank is caving in and endangering the tracks of the V. S. & P. R. R. Figures are given which show that the mat was costing $27.78 per lineal foot, or about $25,000 for 900 ft. of revetment.

A report, together with plans and photographs, of the Keer Gabin system for protecting embankments and controlling channels at a nominal cost was also attached. This method is attracting considerable attention today.

Committee.—E. L. Loftin (Q. & C.), P. W. Cahell (S. A. L.), C. H. Eggers (C. R. I. & P.), J. M. Mann (Ft. W. & D. C.), W. G. Massenburg (G. C. & S. F.), C. F. Green (S. P.), C. S. Thompson (D. & R. G.).

Discussion.—A. M. Van Auken (M. D. & Gulf).—There seems to be no one method that is best for all cases. Where there is rock bottom, or the soil does not wash, riprap is best. In alluvial streams, mattress revetment is best, although expensive. It must be carried from low water out to the center current, in order that the current will not work under. It must be extended above and below the danger zone to avoid cutting behind. With these provisions, the mattress will be a permanent protection. The mattress is only serviceable under water, where it is not subject to decay. Rivers are continually changing, and a plan good this year may not apply next year. Dikes must be close enough together to break up eddies or they will form below.

J. M. Staten (C. & O.).—Broken-up slate is good to stop wash. There are many slate quarries on our line where this is secured. It forms mats with the sediment and is never carried away. If the current cuts under the slate it slides down but does not wash away.

Mr. Rettinghouse.—The North Western is spending $30,000 to $50,000 annually at Blair to protect the bank. Much work has also been done at Pierre to protect the new bridge.

Mr. Loftin.—The Queen & Crescent has no stone in the South to protect washouts. We have to haul slag from Birmingham; this does good work. Burmuda grass takes hold quickly in slag and holds well.

Mr. Van Auken.—On the Mississippi river we are using cypress boards for mats where brush is scarce. Ordinarily, prices for mats are per lineal foot, but the width varies greatly, so that is no definite guide.

RECORDS OF BRIDGE BUILDING.

The committee made no report.

SUBJECTS FOR NEXT YEAR.

The committee on Subjects submitted the following:

1. Derricks and Other Appliances for Handling Material in Supply Yards.
2. Sash Size and Kind of Glass for Roundhouses and Shops.
3. Concrete Tank Construction.
4. Brick Veneer Station Buildings.
5. Roofs and Roof Coverings.
6. Reinforced Concrete Culvert Pipe.
7. Construction and Maintenance of Long Pipe Lines for Locomotive Water Supply, Intakes, Pipe Lines, Pump Pits, Reservoirs, etc.
8. Development of Turntables to Meet Operating Conditions for Modern Locomotives, Showing the Most Improved Practice.
9. Track Scales, Construction and Maintenance.
10. Painting Structural Iron or Steel for Both Bridges and Buildings.
11. Relative Merits of Brick and Concrete in Railway Buildings and Platforms.

ELECTION OF OFFICERS.

The following officers were elected for the ensuing year: President, F. E. Schall (L. V.); first vice-president, A. E. Killam (Intercolonial); second vice-president, J. N. Penwell (L. E. & W.); third vice-president, L. D. Hadwen (C. M. & St. P.); fourth vice-president, T. J. Fullem (Ill. Cent.); secretary, C. A. Lichty (C. & N. W.); treasurer, J. P. Canty (B. & M.). Executive committee: G. Aldrich (N. Y. N. H. & H.); P. Swenson (M. S. P. & S. S. M.); G. W. Rear (Sou. Pac.); W. O. Eggleston (Erie); W. F. Steffens (B. & A.); and E. B. Ashby (L. V.).

The next convention will be held at Baltimore, Md., during the third week of October, 1912.

EXHIBITS.

At the annual meeting of the Bridge and Building Supply Men's Association, held at the Planters' Hotel, October 17, the following officers were elected: President, L. E. Wolcott, U. S. Wind Engine & Pump Company, Batavia, Ill.; vice-president, H. Henning, Eastern Granite Roofing Company, New York; treasurer. J. A. Meadew, Paul Dickinson, Inc., Chicago; and secretary, D. A. Bonitz, National Roofing Co., Chicago. P. C. Jacobs, H. W. Johns-Manville Company, New York, was made a member of the executive committee.

The following firms made exhibits:

Allith-Prouty Company, Chicago.—Floor hinges, passenger station doors, and other door specialties. Represented by W. D. Jamison.

American Hoist & Derrick Company, St. Paul, Minn.—Literature and photographs describing hoisting engines, derricks, etc. Represented by F. J. Johnson.

American Valve & Meter Company, Cincinnati, Ohio.—Poage style H valve chamber, its latest improvement in stand pipes. Represented by J. T. McGarry and F. C. Anderson.

Asphalt Ready Roofing Company, New York.—Protection and Arrow brand roofing, No. 5 sand surface, No. 6 gravel surface, made with 6-in. lap, all nailing concealed. Represented by W. A. Hemenway and H. H. Hestead.

Barrett Manufacturing Company, New York.—Literature, Barrett's specification roofs, waterproofing and tar. Rok sub-floors. Represented by L. C. Sibley, W. S. Babcock, E. J. Caldwell and H. B. Nichols.

Carey, Philip, Company, Cincinnati, Ohio.—Carey's flexible cement roofing. Represented by P. Stagg, D. R. Warfield and G. W. Lincoln.

Chicago Pneumatic Tool Company, Chicago.—Railway section and inspection gasolene motor cars, Boyer hammers and Little Giant drills; also [illegible] Represented by C. F. Walker.

Detroit Graphite Company, Detroit, Mich.—Literature describing paints used on railway structures. Represented by T. R. Wyles, B. Ofallon Randolph, L. D. Mitchell and J. J. Hogan.

Paul Dickinson, Inc., Chicago.—Smoke jacks, chimneys and ventilators. Represented by A. Meaden, A. J. Filkins and W. H. Dayton.

Dixon Crucible Company, Jersey City, N. J.—Samples of crucibles, literature describing products, photographs of bridges and other structures [illegible] Represented by H. V. Neale.

Eastern Granite Roofing Company, New York.—Safeguard granite roofing, Evertite roofing and roof paints. Represented by H. Henning and C. F. Barstow.

Fairbanks, Morse & Company, Chicago.—Literature describing its several devices. Represented by C. W. Kelley, F. N. Roy, A. F. Young and [illegible] H. W. [illegible] Company of asbestos shingles, sheet and granulated cork, Key-Transite smoke jack, pipe covering and asbestos [illegible] Represented by J. C. Young, H. R. Wardell, J. H. Trent, C. E. [illegible] H. W. [illegible] K. T. H[illegible] Miller.

HOW THE ROADMASTER CAN PROMOTE EFFICIENCY.*

BY F. M. PATTERSON,

Assistant Engineer, Chicago, Burlington & Quincy, Chicago.

On any roadmaster's division the roadmaster usually can know within reasonable limits the amount and character of the traffic that his track will be called on to sustain and the expenditure that he will be allowed to make for labor and material. Clearly, then, the problem is to get the best results with the labor and material at hand. The problem of handling men is the most important one that the roadmaster has to face, and if he can handle his superiors, who supply the material, and his subordinates, who use it, the way is open for him to secure effective results.

The matter of handling one's superior officers is a serious one, and the only way to succeed in any eminent degree lies in knowing absolutely the conditions affecting all parts of one's territory and having a systematic plan for its maintenance and improvement; also to have the courage to defend and adhere to that plan until definitely overruled, and then to endeavor faithfully to follow out the line of action laid down in its place.

It is in the management of his subordinates that the roadmaster must look for the best results. He should be an instructor to his men. While the section foreman is seldom a man of more than elementary education and usually has acquired the knowledge of his work by hard labor rather than by deductive reasoning, he also is usually an observer, and his interest can be stimulated by telling him why a thing should be done when he is given the order to do it. The plan of having meetings of section foremen for the discussion of their work and the interchange of ideas is one that has given such good results that it is to be regretted the scheme has not been more generally adopted.

If he is to maintain his track efficiently, the roadmaster must not only be secure in knowing his work, and able to plan his campaign, but must have under him a corps of foremen who will follow his orders, and at the same time have enough initiative to be able to act on their own judgment in cases of emergency. Such men are still to be found on railways today, but it must be admitted that young men with the proper qualifications to take their places are not plentiful. This is a vital problem, and the roadmaster who can evolve a successful plan for securing the necessary supply of foremen for the future will accomplish something of no mean value.

Discipline must be maintained firmly but in a way that will work no injustice; the men must be made to feel that in all cases an impartial investigation is made before judgment is passed. A spirit of loyalty should be fostered and suitable recognition given for meritorious actions lying outside the sphere of regular work. It is too much to expect that the foreman will be an expert bridgeman or car repairer, but he will often discover conditions whereby prompt action on his part may avert serious trouble.

The drudgery of track work deters many from entering the service, therefore labor-saving devices should be investigated fully, but with an open mind and no device should be approved until it has had a thorough trial and has been studied from all angles.

It is essential that the roadmaster know promptly the amount of work his men accomplish every day, and to do this he should study the reports from his foremen. In view of the many reports now required from the foreman and his limited capacity for clerical work, one hesitates to add to the burden, but often it will be found that a simple report form can be devised that will give the roadmaster the desired information better than the forms in use. In any event, the roadmaster's clerk should keep cost data up to date from the best available sources, and tabulate it in convenient form for the roadmaster's inspection, so that he may keep in constant touch with the cost of work on his different sections and apply himself to remedying conditions where they are

*[illegible] presented in connection on How the Roadmaster Can Promote [illegible] dated July 1, 1911.

not satisfactory. Especial attention should be paid to the performance of work trains and every effort should be made to pick the best men for the crews. Intelligent planning and execution of the movements of the train must be made, and co-operation with the chief despatcher should be had at all times. On work involving the use of several trains for an extended period it will be found economical to have an assistant or supervisor in charge, thus relieving the roadmaster of much of the detail and allowing him to devote himself to the work on his entire division.

Waste, either of labor or of material, must be guarded against with the utmost vigilance, for by reason of it injustice is done both to the railway and to the roadmaster himself. The railway is defrauded because it has paid out money for which it received no return, and the roadmaster is injured because his division is deprived of money that otherwise could have been spent in needed improvements. While it is true that all roads do not make monthly or yearly appropriations for maintenance work, the maximum amount that can be spent for each division is usually pretty well fixed, and for every dollar wasted there must be a dollar's worth of needed work left undone.

USING SECTION MOTOR CARS TO PROMOTE EFFICIENCY.*

BY W. H. KOFMEHL,

Roadmaster, Chicago, Milwaukee & St. Paul, Elgin, Ill.

About two or three years ago several large railways began to investigate the use of motor cars for section forces. The Chicago, Milwaukee & St. Paul was very anxious to give these cars a thorough, practical test, and in order to carry out this test a plan was figured out for replacing hand cars with motor cars on the C. & C. B. division in Illinois. This division consists of 130 miles of double track, and carries a very heavy traffic out of Chicago. In rearranging sections they were lengthened from 4 to 5 and 5½ miles double track, reducing the expense of foremen one-third without losing any supervision or efficiency. In fact, so far as supervision and efficiency are concerned it is believed that the sections are better off than they were with the hand cars. About one hour per day is saved in going to and from work, while at times of derailments, washouts and fires, and for patroling track, their value cannot be over-estimated. In order to make quick storm patrols a system was worked out whereby all cars go in one direction regardless of section limits and report at the next telephone station to the train despatcher.

Some considered motor cars dangerous on account of the liability of meeting trains, but our experience has been that there is not as much danger with motor cars as with hand cars, as the cars are on the road only about half as long. It only requires a few minutes to get to work, and if the track is clear the men will get to their destination before any train comes in sight.

Both the Rockford and the Fairbanks, Morse & Co. cars are used, and the cost to operate them, including gasolene, valve oil, and repairs, averages about $4 per month per car. When one considers that some of these cars are among the first air-cooled motor section cars used, this expense is very light, and in time, with improved cars, it should be reduced at least one-half. It is figured that on this division from $8,000 to $10,000 a year is being saved by the use of these cars in addition to the salvage recovered in the way of tools, section houses, hand and push cars, etc. Seven sections were done away with, while among the equipment recovered when the change was made to motor cars were seven tool houses, seven hand cars, seven push cars, 526 tools of different kinds, including 33 shovels, 20 picks, 24 tamping bars, etc., in addition to a hand car released for every motor car supplied.

In discussing the unfavorable features of the motor car, it must be remembered that the car must be limited to not over 800 lbs. in weight, therefore the best kind of material and workmanship must be employed to put out a strong and durable car that should last four or five years before going to the shop. About the only serious objection we have found to the motor cars is that we expect too much from them. Instead of lengthening the sections from 8 to 12 or 14 miles on single track, and from 3½ to 6 miles on double track, the section should be kept to a reasonable length.

*Entered in the contest on How the Roadmaster Can Promote Efficiency, which closed July 1, 1911.

PUBLICITY AND ENCOURAGEMENT IN TRACK WORK.*

BY J. A. M'RAE,

Refrigerator Inspector, Union Pacific, Grand Island, Neb.

Before we can discuss this problem intelligently we must know just what "efficiency" means. The author of a recent magazine article on "Scientific Management" had the laborer with the strongest back and the weakest mind obeying the foreman as a machine responds to the hand on the throttle, stopping and starting at the word of command, regulating every movement by the watch, toting pig iron from pile to car at the rate of forty-eight tons per day; he called the resulting pile "efficiency."

Such may be pig-iron "efficiency," but assuredly it is not railway "efficiency," for the dominant railway note is "safety," and the production of "safety" requires intelligence not only at the head of the organization, but in every working unit. Intelligence cannot be found in a mere machine, nor in a man willing to become an automaton. Safety, then, with greatest track improvement at lowest cost, should be considered track "efficiency."

To promote efficiency the roadmaster must be efficient himself, knowing thoroughly and being able to teach every detail of his work. He should cultivate in his men to the highest degree the qualities of loyalty, honesty, industry, alertness, carefulness and mental independence

To secure the greatest improvement with the least cost, a generous emulation must be stimulated among the foremen. For this purpose proper publicity is effective. Some personal experience will illustrate its application.

Some years ago, when the writer was assisting a roadmaster having charge of twenty-two sections embracing 180 miles of track, as the time approached for the commencement of an important division of track labor, say, tie renewals, a circular about as follows would be issued to section foremen. "The roadbed will soon be free from frost. Foremen will watch carefully for heaving and soft spots in track, taking all necessary precautions to keep track safe. As soon as the frost is out we will start renewing ties and push this work vigorously so that it may be completed before the arrival of hot weather. Foremen will have everything ready, tools put in good condition, and promptly request anything necessary to fill up standard allowance."

At the end of each month, specially good work would be commended in such a circular as: "I am much pleased with the report of J. Jones, section 7, who shows 700 ties put in this month. I shall call the superintendent's attention to this excellent showing. William Smith, section 17, had no stock killed this month. This shows careful attention to fences. Stock on track not only entails heavy money loss when killed, but is a source of danger to trains. Carefulness is always highly comendable."

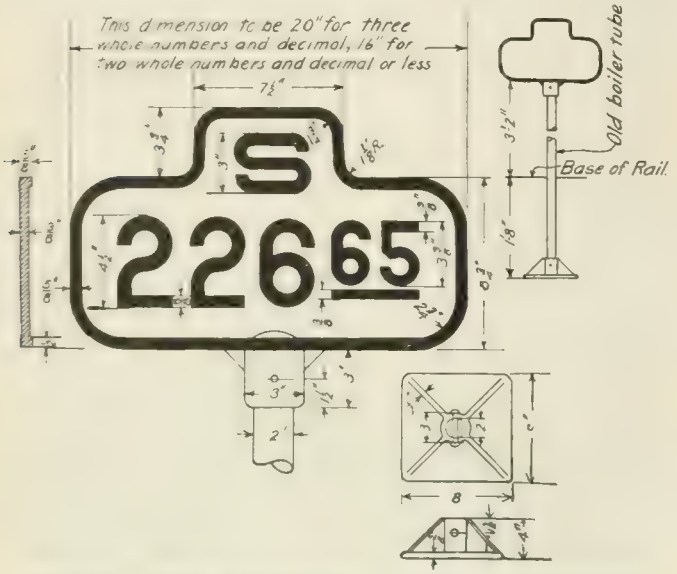
It soon became an easy matter to pass the praise around, each foreman receiving a portion two or three times yearly, and the necessity for criticism almost entirely disappeared, while that roadmaster's district held for several years the system record for low maintenance cost per mile, with never an accident due to track defects. It will be noted that every circular issued in some way emphasized "safety" as a vital consideration.

With such a system the main thing left for the roadmaster to do to promote efficiency is to watch for "track kinks" in the *Railway Age Gazette* and elsewhere, and where one is found good and available bring it to the attention of his men as he meets them at their work in his trips over the road on his motor car.

*Entered in the contest on How the Roadmaster Can Promote Efficiency, which closed July 1, 1911.

RIGHT OF WAY SIGNS ON CHICAGO GREAT WESTERN.

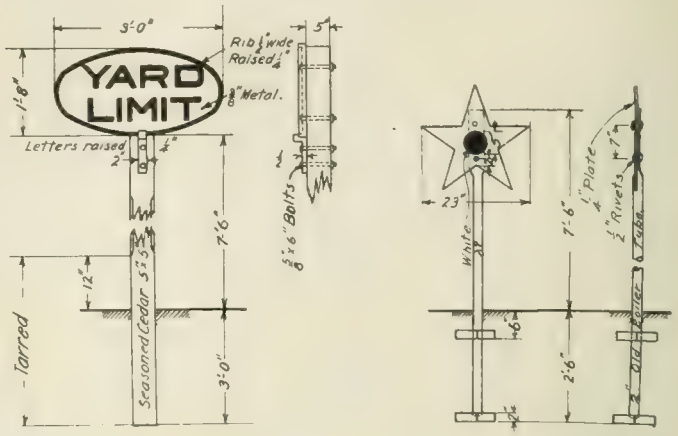
The Chicago Great Western has adopted standard designs for caution signs, bridge number signs and flanger signs, which consist of a cast iron sign supported by an old boiler tube. This type has the double advantage that it is permanent and


This dimension to be 20" for three whole numbers and decimal, 16" for two whole numbers and decimal or less
Old boiler tube
Base of Rail
S
22665

Standard Bridge Number Sign; Chicago Great Western.

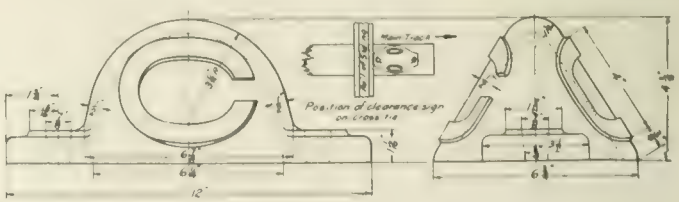
that it utilizes old boiler tubes which would otherwise be scrapped. The work of cutting the tubes, casting the signs and assembling the completed sign is done in the company shops at Oelwein, Iowa, and they are shipped out from there as required. The patterns for the cast signs, which are of wood, are made by a private company to specifications furnished by the railway company. From these wooden patterns are made numerous cast iron patterns which are used in casting the signs. In the case of the bridge number signs the letters and numbers have to be changed for each casting.

The lower ends of the boiler tubes are set in cast iron anchors 8 in. square with a socket 4 in. deep. The cost of these signs, not including the original cost of pattern, nor the cost of shipping and erecting, is approximately as follows: Caution sign, $2.50 each; bridge number sign, $2 each; flanger sign, $2.25 each. The company's standard clearance sign, as shown, is a solid casting painted white with black letters. As in the case of the cast iron signs mentioned above, these castings are made in the company shops and shipped out over the system. The approximate cost of these signs is $2 each.

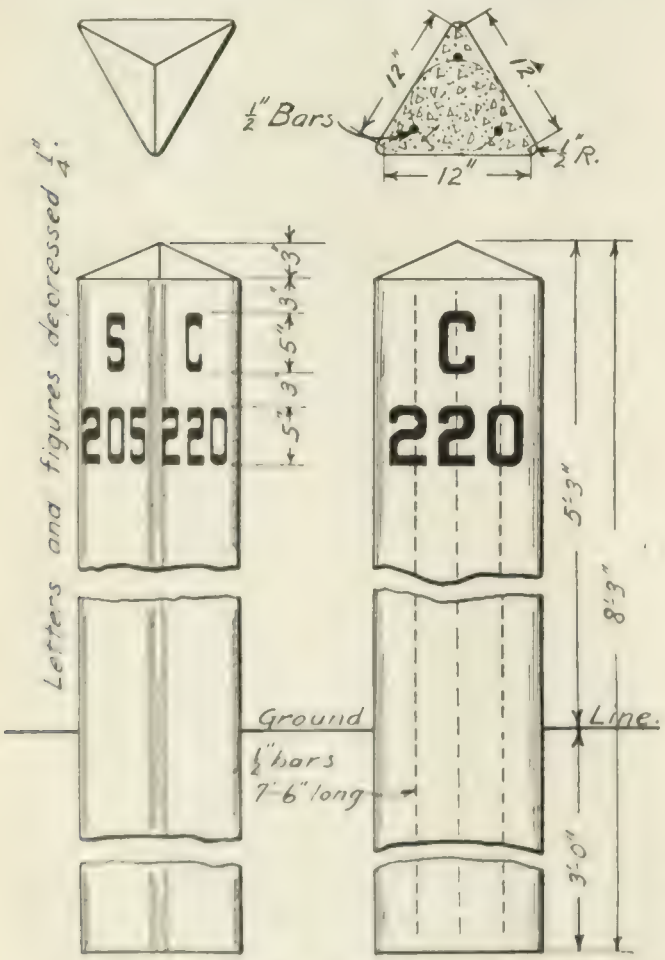


Standard Yard Limit and Flanger Signs; Chicago Great Western.

The concrete mile-posts which are now being placed on this road are shown herewith. The concrete is one part cement, two of sand and four of broken stone or gravel. Letters and figures are sunk ¼ in. and painted black. The reinforcement consists of three ½-in. bars. These posts are purchased from the maker, as the company has not thought it expedient to go into the manufacture of this class of posts.



Standard Clearance Sign; Chicago Great Western.



Concrete Mile Post; Chicago Great Western.

PRAISING AND REWARDING THE FOREMAN.*

BY S. B. PETER,
Roadmaster, St. Louis & San Francisco, Pittsburg, Kan.

Use care in the selection of foremen, and, having placed a man in charge of a section, do not be too ready to find fault with his work. Take advantage of every opportunity to come in closer touch with the work, offering suggestions as to methods rather than issuing peremptory orders as to how the work should be done. When a foreman is doing good work, a word of commendation does not increase the payroll, but does increase the incentive to try to excel in amount and quality of work accomplished. After a reasonable length of time, if a man wants leave of absence with transportation to some point ask for it

*Entered in the contest on How the Roadmaster Can Promote Efficiency, which closed July 1, 1911.

for him, and show him that faithful service is rewarded. If these methods fail to accomplish the desired result, and a foreman seems to think that the company owes him a living, the sooner he is dismissed from the service the better for all concerned.

REVETMENT WORK ON THE MISSOURI PACIFIC.

The Missouri Pacific recently completed bank protection work at several points along the Missouri river between Kansas City, Kan., and Leavenworth, on which a somewhat different method was employed than is commonly used on this river. What is termed a loose fascine mattress was built, which is somewhat in contrast with the basket woven type of mattress generally used on the Missouri by the United States government engineers. This lose woven type is a modification of the tight fascine mattress which is used by the government engineers on the lower Mississippi river work. It requires less material and labor than the tight fascine mattress and the conditions on the Missouri river do not absolutely require the latter type.

In building this loose fascine mattress, no specially constructed barges are required. This is a distinct advantage, as mattress protection work is not going on at all times, and it very often happens that every available barge is in use for rip rap paving

Weaving Barges, Showing Bottom Poles and Loose Fascine Just Completed.

construction at the time it is desired to do revetment work. To provide special mattress barges would mean an idle plant to maintain often for long periods.

In constructing the loose fascine mattress, poles termed "bottom poles" are placed about 8 ft. apart on the barges and are allowed to remain under the mattress and form a part of it. On top of these poles and along one end of the barges the mattress head, 18 to 24 in. in diameter and of a length equal to the width of the proposed mattress, is built up with other poles. The whole is carefully bound together with wire strands to which are fastened the cables that are to act as head lines during the sinking of the mattress, as well as the wire strands that will act as the sewing cables for binding the loose fascines together. These sewing cables are usually composed of ordinary commercial galvanized wire strands from ¼ to ⅜ in. in diameter, and one pair is placed at each bottom pole.

With one sewing cable of each pair lying on the barge and the other one thrown back up stream and over the mattress head, a layer or bed of brush about 1 ft. thick and 4 ft. wide is placed along and next to the mattress head, and on top of the bottom poles and the one sewing cable. This bottom sewing cable is then brought up over the bed of brush and drawn back reasonably tight either by hand or with block and tackle, depending on whether or not the mattress is to be comparatively tight. The cable is then temporarily fastened down by means of a staple driven into the mattress head or into the preceding fascine. The other sewing cable is then brought forward, thrown across the barge, and acts as the bottom cable for the following bed of brush. This process is repeated until the mattress is of the desired length. The bottom poles are made continuous by splicing others to them as needed, while the sewing cables are looped around them at short intervals. Transverse cables securely fas-

Loose Fascine Mattress, Showing Two Lines of Sewing Cables.

tened to the bottom poles and to the sewing cables are placed at intervals and lead up the bank to dead-men or anchors.

On comparatively steep banks, top poles called "binders" are placed on top of the loose fascines and directly above the bottom poles, being securely fastened thereto as well as to the sewing cables. These are placed on the mattress after the latter is lying flat on the river, and their purpose is to prevent the rip rap ballast from rolling off the mattress after it reaches the bottom.

The "basket woven" type of mattress can best be understood by observing the photographs. No poles are used underneath, although if deemed necessary some can be placed on top to pre-

Loose Fascine Mattress, in Foreground, with Weaving Barges and Partly Loaded Brush Barge.

vent the rip rap from rolling off, as with the other style of mattress. Galvanized wire strand is threaded through the mattress at regular intervals and in both directions. The brush work is from 12 in. to 18 in. thick. Only selected brush (bar growth willow ½ in. to 2 in. in diameter at the butt end and 10 to 25 ft. long) can be used for this class of work, and expert labor is required to weave it together. By more carefully observing the views, it will be noted that the brush is stranght and of comparatively uniform size.

When publishing the cost of river protection work, the figures usually show the expense per linear foot of bank protected, which includes the top bank rip rap paving; however, from a few figures at hand it is found that the basket woven type of mattress costs from 6 cents to 8 cents per sq. ft. in place; while the loose fascine type costs from 4 cents to 6 cents per sq. ft. Under favorable conditions, on one recent job this cost went down to 3.6 cents per sq. ft.

The difference in cost may be ascribed to the following: (a)

Near View of Basket Woven Mattress.

No special weaving barges are required for the fascine type. (b) The fascine mattress can be constructed more rapidly with common labor than the basket mattress can be with experienced weavers who command much better pay. (c) Any kind of brush near at hand can be used to build the fascines, while the bar growth willows for the basket mattress are becoming more scarce every year, and at times must be brought from quite a distance.

In favor of the basket woven mattress, the following claims are usually brought forward: (a) It provides a tighter covering for the bank protected. In answer to this it may be said that a tight fascine mattress can be obtained at small additional expense by the use of block and tackle to tighten up each bundle of

Completed Basket Woven Mattress.

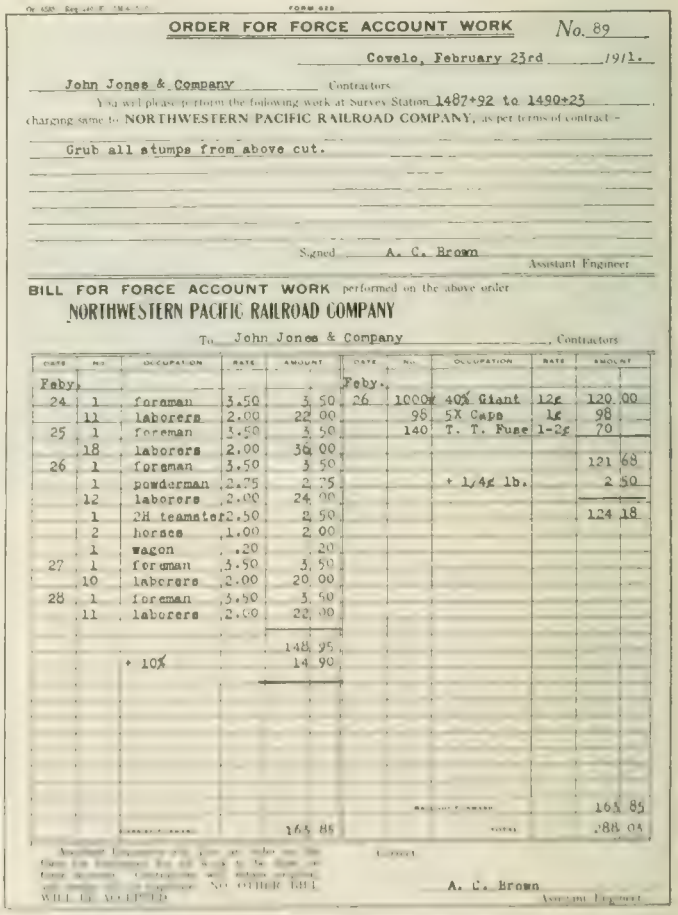
brush. Also, the writer's [Mr. Miller's] experience on the Missouri River during the past six years seems to indicate that the fascine mattress is sufficient for the purpose used. (b) That the brush in the mattress and embedded together that after it sinks to place at the bottom of the river it will hold together even after the wire fastenings have rusted out. This is a [illegible] which the United States engineers' standard on the Arkansas river. It brings about to a large extent the interlocking, while at the same time permitting the use of comparatively rough brush. However, from some carefully conducted experiments made years ago by the writer, it is unquestionably a fact that the galvanized wire strand and other iron fastenings are of longer life than the brush itself, particularly so in cases where the action of the river brings about scour along the outer edge of the mattress after it has been in place for several years, thus bringing a bending strain upon the brush. The experiments referred to developed the fact that willow brush, that had been in the river for from seven to ten years has assumed a condition of wet rot, such as to render it practically devoid of strength to resist bending; due in large measure no doubt to the fact that it was almost wholly sap wood. It may be mentioned here that the fascine type of mattress permits the use of hard wood brush.

We are indebted to C. H. Miller, engineer of river protection of the Missouri Pacific, for the information given above.

FORCE ACCOUNT SYSTEM FOR CONSTRUCTION WORK.

BY WILLIAM S. WOOLLNER.

Friction between engineers and contractors, caused by controversies as to what constitutes force account work, or work paid for at cost plus a percentage, and the adjustment of force account bills, occurs on almost every large piece of construction work,



ORDER FOR FORCE ACCOUNT WORK No. 89

Cowelo, February 23rd 1911.

John Jones & Company Contractors

You will please perform the following work at Survey Station 1487+92 to 1490+23, charging same to NORTHWESTERN PACIFIC RAILROAD COMPANY, as per terms of contract —

Grub all stumps from above cut.

Signed A. C. Brown Assistant Engineer

BILL FOR FORCE ACCOUNT WORK performed on the above order

NORTHWESTERN PACIFIC RAILROAD COMPANY

To John Jones & Company, Contractors

DATE	NO.	OCCUPATION	RATE	AMOUNT	DATE	NO.	OCCUPATION	RATE	AMOUNT
Feby.					Feby.				
24	1	foreman	3.50	3 50	26	1000#	40% Giant	12¢	120 00
	11	laborers	2.00	22 00		98	5X Caps	1¢	98
25	1	foreman	3.50	3 50		140	T. T. Fuse	1-2¢	70
	18	laborers	2.00	36 00					
26	1	foreman	3.50	3 50					121 68
	1	powderman	2.75	2 75			+ 1/4¢ lb.		2 50
	12	laborers	2.00	24 00					
	1	2H teamster	2.50	2 50					124 18
	2	horses	1.00	2 00					
	1	wagon	.20	.20					
27	1	foreman	3.50	3 50					
	10	laborers	2.00	20 00					
28	1	foreman	3.50	3 50					
	11	laborers	2.00	22 00					
				148 95					
		+ 10%		14 90					
									165 85
				165 85					288 03

A. C. Brown

Form 628—Order to Contractor for Work and for Making Up His Bill.

and as lack of harmony between road and contractors tends to add to the cost, as well as to detract from the efficiency of the work, anything that will tend to eliminate such differences will be well paid for by the results obtained. Questions arise as to whether certain work should be paid for as force account work, and there also often is controversy between engineers and contractors about the amount of labor and materials used on force account work, the reports of the timekeepers differing.

To avoid all controversy in regard to force account work, first, it should be decided in advance what work is to be done on a force account basis; and, second, reports of the engineer and contractor covering men and material used on force account work should agree. The following system for handling force account work has been devised with these principles in view, and experience has shown that if it is strictly followed, most of the friction between the contracting parties will be eliminated.

Form 628 is used for giving an order on the contractor to perform force account work and for making up his bill for work performed. Form 622 is used as a daily report of labor, equipment and material used on force account work. The rates of pay for labor, rental rates for stock and equipment, prices of material, and percentage to be paid in addition to cost should, of course, be stated in the contract, as should the class of work to be done on force account basis as nearly as it can be stated at the time the contract is drawn.

When an engineer wishes to have a certain piece of work done on a force account basis he issues an order in duplicate, on form 628, giving a description of the job, as well as its location and hands the same to the contractor's representative. It is understood between the contracting parties that no force account work is to be undertaken without a written order from the engineer, and that no bill for force account will be given consideration unless it is accompanied by the engineer's order. All engineers are provided with duplicating pocket books (No. 0—McDonald Stylograph) and if they find it necessary to issue orders for force account work while away from their headquarters, they do so by handing the contractor's representative a memorandum order, a carbon copy of which remains in the pocket book. Upon returning to headquarters the engineer immediately issues an order on regular form (628) to replace the memorandum order. The orders are numbered consecutively as issued.

The engineer's timekeepers keep a record of the labor, equipment and material used on force account work, compiling the same from data collected by themselves. Each evening they record this data on form 622, showing the number of force account order on same. This report is made in triplicate, one copy being retained by the engineer, one copy handed to the contractor, and one copy forwarded to the chief engineer or other officer in charge of final approval of bills. When daily reports have been completely filled in they are handed to the contractor's timekeeper to be checked, and if he finds that they agree with his records he signs them in the space provided, retaining one copy for his record for making a bill at the end of the month, and returning the other two copies to the engineer's timekeeper, who retains one copy for his record for checking the bill at the end of the month and forwards the remaining copy to the chief engineer or other official.

After daily reports (form 622) have been signed by both timekeepers they are final and the contractor will be paid only for the items shown on these reports. The reason for making daily reports covering this class of work, instead of weekly, as is the general custom, is that when reports are checked daily there can be but little chance for dispute as to the number of men or the quantity of material used, but after reports have been left to accumulate until the end of the week before being compared, differences are likely to develop that are hard to adjust, owing to the length of time that has elapsed.

At the end of each month the contractor makes out a bill in the space provided on form 628, using for this purpose his copy of the daily reports. He then presents it to the engineer for his approval. The engineer checks the bill against the copy of the daily reports in his possession and if he finds that they agree, approves it and forwards it to the chief engineer's office for pay-

FORM 622

NORTHWESTERN PACIFIC RAILROAD COMPANY—ENGINEERING DEPARTMENT

89

Daily Report of Men, Stock and Equipment employed on Construction Willits North, Grubbing Right of Way

at Sta. 1487+92 to 1490+23 *by* John Jones & Company, Contractor / Frank Smith, Sub-Contractor Covelo, February 26th, *191* 1.

MEN					STOCK AND EQUIPMENT					MATERIAL				
	No	Occupation	Rate	Amount	No	Description	Rate	Amount		Quantity	Description	Rate	Amount	
	1	foreman	3.50	3 50	2	horses	1.00	2 00		1,000 #	40 % Giant	12¢	120	00
	1	powderman	2.75	2 75	1	wagon	.20	20		98	5X Caps	1¢		98
	12	laborers	2.00	24 00						140 ft.	T. T. Fuse	1-2¢		70
	1	two horse teamster	2.50	2 50										

Total Number of Men 15

Cost of Labor . . . . . $ 32.75

Cost of Stock and Equipment . $ 2.20

Cost of Material . . . . . $ 121.68

Total Cost of Job for day . . $ 156.63

Percentage to be added.

Give below any information of interest to Chief Engineer's Office affecting cost or progress of above job:

Grubbing on above section about 40 % completed.

I hereby certify that the above account is correct

Fred Mann for Contractor. A. C. Brown for Railroad

Daily Report of Labor, Equipment and Material Used.

ment. As contractors must pay their men each month, they are entitled to a settlement of their force account bills at the end of the month. If a force account job runs from one month to another, the engineer should furnish the contractor with a new order on the first day of each month.

A simple method of checking force account bills in the chief engineer's office, to ascertain that engineers in the field are properly comparing them with daily reports, is to keep a recapitulation sheet for each order on file with the daily reports. It is an easy matter to check the total of this sheet against the contractor's bill and if the totals do not agree the error can be readily located. If totals agree, the bill is attached to the voucher for payment and as it contains the order to perform the work signed by the engineer, as well as a detailed statement of the work performed approved by him, it represents a complete record of the entire transaction. The recapitulation sheets are attached to the daily reports and filed in envelopes for ready reference.

The privately owned railways in Chile had, on January 1, 1911, a length of 1,913 miles. At the same time the government-owned railways amounted to 1,660 miles. The total of railways in operation at the end of 1910 were therefore 3,573 miles. On the government railways the additions during 1910 were 157 miles.

General News Section.

The Missouri Pacific has adopted for night tail-end signals on all its trains a lamp having Fresnel lenses.

The floods of ten days ago in southwestern Colorado did great damage to railways, roads and bridges. The Denver & Rio Grande suffered to the extent of many thousands of dollars.

The Baltimore & Ohio, after negotiations covering several days, has revised the regulations of the telegraph department allowing increased vacations with pay, and granting other things asked for by the telegraphers; but the increase of pay asked for was not granted.

Mrs. Dorothy R. Batt of Tarrytown, N. Y., has sued the Pennsylvania Railroad for $100,000 damages, because of the death of her husband in June, 1910, which she charges was due to something poisonous which Mr. Batt had eaten in a dining car of the Pennsylvania the day before he died.

At Whitman, Minn., last Tuesday, Hugh Robinson, flying in a Curtiss aeroplane, announced that he had traversed the distance from Minneapolis to that town, 110 miles, in 89 minutes, without a stop; and he carried a passenger. He has started to fly from Minneapolis to the gulf of Mexico.

The Atchison, Topeka & Santa Fe announces that the new trains to be put in service between Los Angeles and San Francisco, about December 1, will be called the "Saint" and the "Angel," respectively. The cars will be cooled by air from a refrigerating compartment. It is understood that an extra fare will be charged.

On the Southern Pacific enginemen, conductors and station agents who have been on the road for 10 years are to have free annual passes over the district to which they belong; for 15 years' service, annual transportation for employee and wife; for 20 years, a pass for the employee, his wife and dependent members of his family.

Professor Emory R. Johnson, professor of transportation and commerce, at the University of Pennsylvania, has been appointed by President Taft a special commissioner on the industrial and commercial value of the Panama canal. He will investigate present and prospective available canal traffic and the question of what rates the traffic can bear.

The stockholders of the Louisville & Nashville at their recent annual meeting, authorized an amendment to the bylaws so as to permit the company to do a commercial telegraph and telephone business; and the company has notified the Western Union of a desire to terminate the contract made in 1884, by which the Western Union does telegraph business over the L. & N. lines.

Figures compiled by H. G. Askew from records filed with the Texas Railway Commission for the fiscal year ending June 30, 1911 show that after meeting the interest on outstanding bonds and other legal charges the thirty-two principal railways of that state had a surplus of only $344,297. The same roads spent during the year $9,018,194 for additions and betterments, which when paid resulted in a net deficit of $8,636,897.

The Pennsylvania Railroad reports that the Chicago-New York 18-hour train for five months has reached its destination behind time not over twice in each month; and the westbound train, [illegible] not late more than once in each month for nine months. For a continuous period of three months it was on time every day. In nearly all of the cases where these trains were late the detention was not over 15 minutes.

Beginning December 1 trains of the New York, Susquehanna & Western will run to and from the terminal station [illegible] at Jersey City instead of the Pennsylvania station, as at present. The Susquehanna is controlled by the Erie, but until recently the Erie station lacked facilities for the admission of the Susquehanna trains and the contract for the use of the Pennsylvania station was therefore continued. The Erie is about [illegible] miles west of the Pennsylvania.

Governors Harmon of Ohio, Hadley of Missouri and Aldrich of Nebraska met at St. Louis, Mo., on October 2 to outline the brief which they are to prepare and file in the United States Supreme Court for use in cases before the court where the power of the states to regulate rates on intrastate business is involved. Speaking of the issue raised by the governors at the recent conference at Spring Lake, N. J., Governor Hadley said that they are not attempting to interfere with the fixing of interstate rates; that "what we propose is simply to uphold the sovereignty of the states and the rights reserved by them when the federal constitution was drafted. We contend that the states have full power to regulate the rates of railways on all business which originates and ends wholly within a state."

The sixth annual convention of the Lakes-to-the-Gulf Deep Waterway Association was held at the Auditorium Hotel, Chicago, October 12, 13 and 14. Addresses were made by Governor Herbert S. Hadley of Missouri; Governor O. A. Eberhart of Minnesota; Joseph W. Folk, former governor of Missouri; O. P. Austin, chief of the bureau of statistics of the Department of Commerce and Labor; Mrs. Frederick K. Bowes, representing the Women's National Rivers and Harbors Congress, and Senator Duncan U. Fletcher of Florida. Hon. Champ Clark of Missouri, who was to have made an address, sent a letter which was read before the convention. The resolutions adopted followed closely the text of those adopted at St. Louis last year. Little Rock, Ark., was chosen as the place for the next meeting.

At a meeting of representatives of various commercial organizations and business houses, held at the LaSalle Hotel, Chicago, on October 16, an executive committee of 17 members was appointed to bring before the Interstate Commerce Commission the matter of the excess baggage rates which the roads propose to put into effect July 1, 1912, and July 1, 1914. It is planned to ask the commission to establish reasonable rates and regulations for handling excess baggage. This action amounts to a refusal on the part of the interested shippers to accept the compromise of the roads by which they postponed until July 1, 1914, the time when the rule imposing the 40-inch limit should go into effect and made a rule imposing a 45-inch limit to become effective July 1, 1912, instead of putting the 40-inch limit rule in force on July 1, 1912, as planned under the uniform baggage rules which were formulated by the roads last spring and have been in effect since May 1.

The commission appointed by the President to report to Congress on employers' liability and workmen's compensation matters, met at the Congress Hotel, Chicago, on October 16 and 17, the meeting being open to all persons interested who wished to offer suggestions or express their views as to improved methods or necessary legislation. At the session on the first day representatives of the railway brotherhoods told of the perilous lives led by railway trainmen and said the present liability law, which applies to territories and the District of Columbia, is too narrow in its scope. William G. Lee, president of the Brotherhood of Railway Trainmen, said that if the safety rules which a man is required to sign when he enters train service were followed to the letter there would be no accidents, but that the trainmen must do many things very quickly and without hesitation. He said compensation legislation should include free hospital service and the assurance to the employee that he will be taken care of physically and financially in case of accident, and that his family will be provided for in the event of his death.

Press despatches from Los Angeles October 16 say that at two o'clock on the morning of that day, about three hours before the arrival of a special train bearing President Taft and his party, 36 sticks of dynamite were found under a viaduct on the Southern Pacific at a point 20 miles north of Santa Barbara. A track watchman had a pistol battle with two men, who, however, were some distance away and escaped him. It is believed that the dynamite was placed to destroy the bridge and that the probable killing of the President of the United States may not have entered into the calculations of the plotters. Some think that the idea of the would-be dynamiters was to destroy the bridge in order to delay the passage of the President and throw discredit on the widely

printed assertion of the Southern Pacific that it was running its trains on schedule time, despite the strike of the shopmen. General Manager Calvin of the Southern Pacific has offered a reward of $5,000 for information which will lead to the arrest of the dynamiters.

The Florida East Coast Railway is to establish a telephone circuit throughout the length of its line. The Chicago, Rock Island & Pacific is installing telephone train despatching circuits on its West Kansas division, running from Caldwell, Kan., to Belleville, 277 miles, and on the West Iowa division, running from Des Moines, Ia., to Council Bluffs, 142 miles. The instruments are expected to be in operation the first of November. The Baltimore & Ohio has ordered from the Western Electric Company selector calling apparatus for five new telephone circuits; Rockwood, Pa., to Johnstown, 45 miles, two circuits; Newark, Ohio, to Cambridge, 52 miles, two circuits; Newark to Bernwood Junction, 105 miles. The despatcher at Newark manages 104 miles of line, from Newark to the Ohio river. One of the telephone circuits connects his office with the stations on the first 52 miles, and the other with the stations on the second 52 miles. One message circuit will have an inter-calling system; an arrangement by which an operator at a way-station can actuate the selector apparatus at the despatcher's office so as to call another way station without the intervention of he despatcher. The Cincinanti, Hamilton & Dayton has ordered from the Western Electric Company telephone and selectors for three new despatching circuits; Hamilton to Indianapolis, 99 miles; Cincinnati to Dayton, 60 miles, and Dayton to Toledo, 140 miles.

The four Italians arrested at Middletown, Conn., charged with murder in wrecking a passenger train on the New York, New Haven & Hartford, August 27, were discharged by the city court on October 11, Judge Pearne holding that there was no probable cause on which to hold the men for trial by the superior court. Judge Pearne found that the rail had been loosened by the withdrawal of spikes and bolts, as shown in the testimony of the railway officers and not contradicted by the defense; but to sustain the charge of murder it would be necessary, under the law of Connecticut, to have the evidence of two witnesses, or that which is equivalent hereto, and this the prosecution did not produce. The principal evidence was that of a detective who related what he had heard one of the accused say in the Italian language (and when shomewhat intoxicated), and there were inconsistencies in this narrative. The judge observed that the men might be re-arrested if new evidence should be found. In accepting the testimony that the rail had been maliciously removed, the judge went into the evidence in great detail, finding that the bolts and spikes were discovered lying on the ground with the threads of the bolts unharmed and bright; the spikes not bent or twisted; the spike holes smooth and square, not broken or splintered; splice bars not distorted, etc. The loosened rail was on the inside of the curve. None of this evidence was contradicted by the defense. The judge in his opening observed that the people of the state have a vital interest in cases of train wrecking, or suspected train wrecking, a feature of the case which has been largely neglected by the local press in its unusual interest in the disputes of the police officers and the detectives. After the release of the men, one of them sued the railway detective for $10,000 damages for slander, the charge being that when the Italians were arrested the detective accused this one of having committed murder by train wrecking in Pennsylvania. A representative of the railway company gave bail for the arrested detective.

Land Show in New York.

The first land show of the American Land & Irrigation Exposition is to be held at Madison Square Garden, New York, November 3-12. The show is to be under the management of the American Land & Irrigation Exposition Company, Inc., of which Arthur E. Stilwell, president of the Kansas City, Mexico & Orient, is president. On the advisory and governing board are W. C. Brown, of the New York Central; James McCrea, of the Pennsylvania; Darius Miller, of the Chicago, Burlington & Quincy; J. C. Stubbs, of the Union Pacific; the governors of a great number of the western and southern states, and many presidents of agricultural colleges. Exhibits have been secured from all parts of the United States, and the Department of Agriculture is co-operating with the managers of the exposition. There will be displays by railways and by various boards of trade and chambers of commerce. There is a long list of prizes valued at over $12,000. On each day of the exposition tracts of land, valued at from $1,000 to $2,000, will be given away to exposition visitors by some form of allotment.

Connected with the exposition hall is a lecture hall seating about 1,100, in which illustrated lectures are to be given each day throughout the exposition.

Space may be secured by railway companies desiring to make an exhibition by application to the American Land & Irrigation Exposition, Singer building, New York. Farm machinery, implements, etc., will be shown in the subway of the Madison Square Garden.

Connecticut Rest Law.

The legislature of Connecticut, at its session recently adjourned, passed a law which provides that except in cases of emergency an employee engaged in any commercial occupation or in the work of any industrial process shall be relieved of his occupation for one whole working day in every seven. The bill was introduced for and strongly backed by the labor organizations of the state.

Strike Notes.

Stating that they were in danger when working with the inexperienced men employed by the Illinois Central to take the places of the striking shop men on that road, members of the International Association of Car Workers at different shops along the line left their work on October 12. This action was taken in spite of orders of their general officers that they should not take part in the strike. Of about 800 members of the car workers' union on the Illinois Central about 300 were employed at the Burnside shops.

Officers of the road express satisfaction with the general situation. They say that acts of violence are becoming less frequent and that the movement of freight is but little less than normal. A temporary injunction was granted on application of the road by Judge Humphrey of the federal court at Springfield, Ill., on October 11, restraining strikers from picketing and barring them from the property of the railway in the state.

Representatives of the strikers say that few men are returning to work and that more are leaving their places. A committee representing them has demanded that the government authorities investigate the condition of rolling stock on the Illinois Central. They state that they have got into the service of the road as strike breakers skilled mechanics who report that inspection of safety devices and air brake equipment is being done by incompetent men.

An officer of the Harriman Lines is quoted as saying that he believed the strike on those lines and the Illinois Central would continue for a year. He said that while the men who strike on one road enter the service of another or secure other employment, the leaders will contend that the controversy is still in progress, and that officially the strike will probably last at least a year.

Mails by Freight Trains.

The post office department reports that the transportation of second-class mails by freight trains, in the central states, which was begun on September 1, has proved a great success and it is calculated that the government will be able to materially reduce the cost of carrying this class of mail matter. The estimates of the savings that will be accomplished are given, however, in rather vague figures. People in Nebraska who read magazines published in New York are said to find the delay due to freight transportation of not enough importance to notice, or in some cases perhaps not noticeable at all.

One publisher, however, the Review of Reviews Company, has begun suit in the federal court in New York against the postmaster-general, complaining that the freight-car arrangement is unduly prejudicial to the interests of the *Review of Reviews* and unduly preferential to other publications. The order directing postmasters to send mail matter by freight trains applies only to periodicals published fortnightly or less frequently. The *Review of Reviews*, being a monthly

publication, comes within the terms of the order; but the *Outlook* and the *Literary Digest*, two of the monthly's chief competitors, are both weekly, and so continue to go by fast trains and not by freight. The peculiarity of the situation lies in the fact that the issue of the *Outlook* for the last week in each month is larger than the issues of the other weeks, and is looked upon by the complainant as equivalent to a monthly publication. This fourth number is sold at 15 cents a copy, whereas the papers issued at other times are sold at 5 cents a copy. It is said also that 79 monthly publications have been exempted from the rule requiring such papers to go by freight; this apparently because these exempted papers are not shipped in very large quantities. A representative of the *Review of Reviews* is quoted in the newspapers as saying that he does not object to freight-car transportation in principle, but that in his case injustice has actually been done; and he says that many of his subscribers in the West have complained of very long delays.

Government, Transportation and Politics.

A faint suggestion of the kind of trouble with which both politics and business would be filled if the railway system of this country were to go into the possession of the government is furnished by the suit of the *Review of Reviews* against the postmaster-general of the United States and the postmaster of New York, asking for an injunction restraining them from enforcing the new postal regulation under which that magazine is to be carried by fast freight instead of on regular mail trains. The arrangements of the post office are of infantile simplicity in comparison with those of the railways, and the fact that the postal regulations have not, for the most part, brought about any serious complications between business and government is due entirely to the cast-iron uniformity of the few simple rules which govern the department's action. The moment a discrimination has to be made that is not absolutely mechanical, trouble begins. The part played by railway transportation in America, in the determination of prosperity or failure, not only for particular enterprises, but for whole communities, is something to which European conditions afford nothing like a parallel. With us government ownership would mean a tremendous plunge of politics into the deep waters of business, a plunge of which the experience of the compact European nations cannot give the faintest idea.—*Evening Post* (New York).

U. S. Steel Will Possibly Cancel Great Northern Ore Lease.

It is understood that the United States Steel Corporation will cancel its lease of the Great Northern Iron Ore Properties. The provisions of the lease are that the Steel Corporation may surrender the same in 1915 by giving two years' written notice. Unless so terminated, the lease continues in effect until all the merchantable ore containing 49 per cent. of iron has been shipped, and as long thereafter as the minimum royalty is paid. The lease reads to the Great Western Mining Company, a subsidiary of the United States Steel, and is guaranteed by the Steel Corporation. The lease covers 39,296 acres. A royalty is paid by the Great Western Mining Company on a basis of $1.65 for each [illegible] per cent. of iron delivered at the dock [illegible] The royalty increases 34 cents per ton annually, during the life of the lease. The minimum tonnage to be mined in 1907 was 2,000,000 tons, and is increased 1,000,000 tons annually until the maximum of 8,250,000 tons is reached in 1917. No [illegible] the minimum amount that the lease provided for in those years. The properties are held in trust by James N. Hill, Louis W. Hill, Walter J. Hill and E. T. Nichols, and 1,500,000 shares of permanent certificates for beneficial interests in the trust were [illegible]

Disastrous Collision at Gilmore Junction, Neb.

[illegible] on the Missouri Pacific at Gilmore Junction, [illegible] on October 11, [illegible] were killed and 10 or more [illegible] The collision occurred near Fort Crook and officers and soldiers, including medical men, went quickly to the rescue of the injured persons. Officers and surgeons of the Union Pacific Railroad and of the Omaha Street Railway also assisted. The injured persons were taken to Fort Crook for treatment. The freight train had encroached on the time of the passenger, the conductor and engineman both having left South Omaha without examining the train register and having for some unaccountable reason forgotten about passenger train No. 105; and this, notwithstanding they had a short time before received a message from the despatcher calling attention to that train. This conductor had been in the service of the Missouri Pacific 21 years and the engineman 7 years.

Railway Electrical Engineers.

The fourth annual convention of the Association of Railway Electrical Engineers will be held in Chicago at the La Salle hotel, November 6-10, inclusive. The programme includes committee reports and papers on Car Ventilation, Shop Practice, The Gas-Electric Car, Train Lighting Practice, and Industrial Trucks for Railway Service. J. Andreucetti, Chicago, is secretary.

M. M. & M. C. B. Conventions.

A joint meeting of the executive committees of the Master Mechanics' Association and the Master Car Builders' Association will be held at the Belmont Hotel, New York, on October 24, to decide on the time and place for holding the 1912 conventions. A meeting of the executive committee of the Railway Supply Manufacturers' Association will be held at the same time.

The Cleveland Engineering Society.

At the meeting of the Cleveland (Ohio) Engineering Society, held October 10, there was a talk on Profitable Sharing vs. Profit Sharing, by E. P. Roberts. A special meeting of the society will be held October 24, at which Charles S. Gingrich of the Cincinnati Milling Company, Cincinnati, Ohio, will deliver an illustrated lecture on Modern Machine Shop Milling Processes.

Western Society of Engineers.

At the extra and joint electrical meeting of the Western Society of Engineers, to be held October 25, there will be an address on Reactance in Alternating Current Circuits, by Dr. C. P. Steinmetz.

Brooklyn Engineers' Club.

At the meeting of the Brooklyn Engineers' Club, held on October 19, a paper was presented by W. G. Kaylor, of the Westinghouse Air Brake Company, New York, on the Air Brake as Related to Progress in Locomotion.

Car Foremen's Association of Chicago.

At the meeting of the Car Foremen's Association of Chicago on October 9, the following officers were elected: President, George Thomson (L. S. & M. S.); first vice-president, F. C. Schultz (C. B. & Q.), and second vice-president, C. H. Olson (C. & N. W.).

New York Railroad Club.

At the regular meeting of the New York Railroad Club, on October 20, A. R. Roy will present a paper on Swedish Steel.

MEETINGS AND CONVENTIONS.

[illegible] the following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

American Railway Association.—E. M. Nelly, 24 State St., Boston, Mass.
American Association of Demurrage Officers.—A. G. Thomason, Boston, Mass.
American Association of General Passenger and Ticket Agents.—C. M. Burt, Boston, Mass.
American Association of Freight Agents.—R. O. Wells, East St. Louis, Ill.
American Association of Railroad Superintendents.—O. G. Fetter, Carew building, Cincinnati, Ohio. 3d Friday of March and September.

American Electric Railway Association.—H. C. Donecker, 29 W. 39th St., New York.
American Railway Association.—W. F. Allen, 75 Church St., New York; November 15, Chicago.
American Railway Bridge and Building Association.—C. A. Lichty, C. & N. W., Chicago.
American Railway Engineering Association.—E. H. Fritch, Monadnock Block, Chicago; annual convention, March 19-21, 1912, Chicago.
American Railway Master Mechanics' Association.—J. W. Taylor, Old Colony building, Chicago.
American Railway Tool Foremen's Association.—O. T. Harroun, Bloomington, Ill.
American Society for Testing Materials.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.
American Society of Civil Engineers.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.
American Society of Engineering Contractors.—D. J. Haner, 13 Park Row, New York; 3d Tuesday of each month, New York.
American Society of Mechanical Engineers.—Calvin W. Rice, 29 W. 39th St., New York.
Association of American Railway Accounting Officers.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.
Association of Railway Claim Agents.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 22, 1912, Los Angeles, Cal.
Association of Railway Electrical Engineers.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago; annual, November 6-10, Chicago.
Association of Railway Telegraph Superintendents.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.
Association of Transportation and Car Accounting Officers.—G. P. Conard, 75 Church St., New York; December 12-13, Louisville, Ky.
Canadian Railway Club.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.
Canadian Society of Civil Engineers.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.
Car Foremen's Association of Chicago.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.
Central Railway Club.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.
Civil Engineers' Society of St. Paul.—D. F. Jurgensen, 116 Winter St., St. Paul, Minn.; 2d Monday, except June, July and Aug., St. Paul.
Engineers' Society of Pennsylvania.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.
Engineers' Society of Western Pennsylvania.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.
Freight Claim Association.—Warren P. Taylor, Richmond, Va.; annual Buffalo, N. Y.
General Superintendents' Association of Chicago.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.
International Railway Congress.—Executive Committee, rue de Louvain, 11 Brussels; 1915, Berlin.
International Railway Fuel Association.—D. B. Sebastian, La Salle St. Station, Chicago.
International Railway General Foremen's Association.—L. H. Bryan, D. & I. R. Ry., Two Harbors, Minn.
International Railroad Master Blacksmiths' Association.—A. L. Woodworth, Lima, Ohio.
Iowa Railway Club.—W. B. Harrison, Union Station, Des Moines, Ia.; 2d Friday in month, except July and August, Des Moines.
Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York.
Master Car Builders' Association.—J. W. Taylor, Old Colony building, Chicago.
Master Car and Locomotive Painters' Association, of United States and Canada.—A. P. Dane, B. & M., Reading, Mass.
New England Railroad Club.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston
New York Railroad Club.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.
Northern Railway Club.—C. L. Kennedy, C., M. & St. P., Duluth, Minn; 4th Saturday, Duluth.
Omaha Railway Club.—H. H. Maulick, Barker Block, Omaha, Neb.; second Wednesday.
Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.
Railway Club of Pittsburgh.—C. W. Alleman, P. & L. E., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.
Railway Industrial Association.—G. L. Stewart, St. L. S. W. Ry., St. Louis, Mo.; annual, May 12, 1912, Kansas City, Mo.
Railway Signal Association.—C. C. Rosenberg, Bethlehem, Pa.
Railway Storekeepers' Association.—J. P. Murphy, Box C, Collinwood, Ohio.
Richmond Railroad Club.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.
Roadmasters' and Maintenance of Way Association.—L. C. Ryan, C. & N. W., Sterling; Sept. 10, 1912, Buffalo, N. Y.
St. Louis Railway Club.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.
Society of Railway Financial Officers.—C. Nyquist, La Salle St. Station, Chicago.
Southern Association of Car Service Officers.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.
Southern & Southwestern Railway Club.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.
Toledo Transportation Club.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.
Traffic Club of Chicago.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.
Traffic Club of New York.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.
Traffic Club of Pittsburgh.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.
Train Despatchers' Association of America.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.
Transportation Club of Buffalo.—J. M. Sells, Buffalo; first Saturday after first Wednesday.
Transportation Club of Detroit.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.
Traveling Engineers' Association.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.
Western Canada Railway Club.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.
Western Railway Club.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.
Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Wednesday in month except July and August, Chicago.
Wood Preservers' Association. F. J. Angier, B. & O., Baltimore, Md.; annual, January 16-18, Chicago.

Traffic News.

The annual meeting of the National Industrial Traffic League will be held at the La Salle Hotel, Chicago, on November 16.

A shipment of 900 bales of cotton has been made from western Florida to New Orleans, said to be the first important movement of cotton in that direction for many years.

At the October meeting of the St. Louis Association of General Passenger Agents all but two of the lines entering the union station at that place voted to continue the joint validating agency, this with a view to prevent ticket scalping.

The legislature of Panama, which has recently adjourned, passed a bill to provide for the construction of the Panama & David railway, which has been under consideration throughout the session, but some of the provisions of the bill were so objectionable to the president of the republic that he vetoed it.

The freight movement on the Missouri Pacific-Iron Mountain for October 6 was the largest in the history of these lines, 13,309 loaded cars. The following day, Saturday, was almost as great, 13,049 loaded cars. On Monday, October 9, 3,415 cars were loaded on the Missouri Pacific-Iron Mountain tracks.

Mileage tickets of the Boston & Albany are now good over the New York, New Haven & Hartford and the Central New England. The Boston & Albany now has an arrangement of this kind with the New Haven, the New York Central, the Rutland, the Reading, the Central of New Jersey, the B. R. & P., and the Buffalo & Susquehanna.

Exporters of grain at New York City express marked satisfaction in the action of the railways last spring in reducing from 5.5 cents a bushel to 4 cents, the freight rate on grain from Lake Erie to New York habor. Receipts of wheat at New York this year for five months, May-September, have aggregated over 10,000,000 bushels, as compared with less than 2,000,000 last year.

From November 15 next the Sunset Railroad (California) will be operated by the Atchison, Topeka & Santa Fe. This road extends from Gosford, near Bakersfield, to Sunset, Shale and Monarch, in the oil district. The road is jointly owned by the Santa Fe and Southern Pacific, the terms of agreement being that each shall operate alternately for five year periods. The Southern Pacific has operated it during the past five years.

Announcement has been made that the carload rate on grain products of 7 cents per 100 lbs. from Chicago to St. Louis and East St. Louis, which has been made by the Chicago & Eastern Illinois since August 19, will on November 1 be raised. The 7-cent rate now applies on grain products milled or malted from grain originating at points in Wisconsin, Iowa, Minnesota and North and South Dakota, and this will be raised to 7½ cents on malt and 8 cents on other grain products, the same as on other lines.

The Oregon-Washington Railroad & Navigation Company is running throughout its lines in central Oregon a "hog and field pea special," carrying lecturers from the Oregon State Agricultural College. The Southern Railway is running an agricultural special on its lines in eastern Tennessee, a tour of something over three weeks having been laid out. This train is the most elaborate institution of the kind thus far noticed, judging by the number of cars: three lecture coaches, three cars for exhibits, a platform car, also for exhibits, and an Arms palace stock car. The latter is furnished by the Tennessee department of agriculture. The lecturers are from that department and from the state university. The Southern Railway bears the whole of the expense.

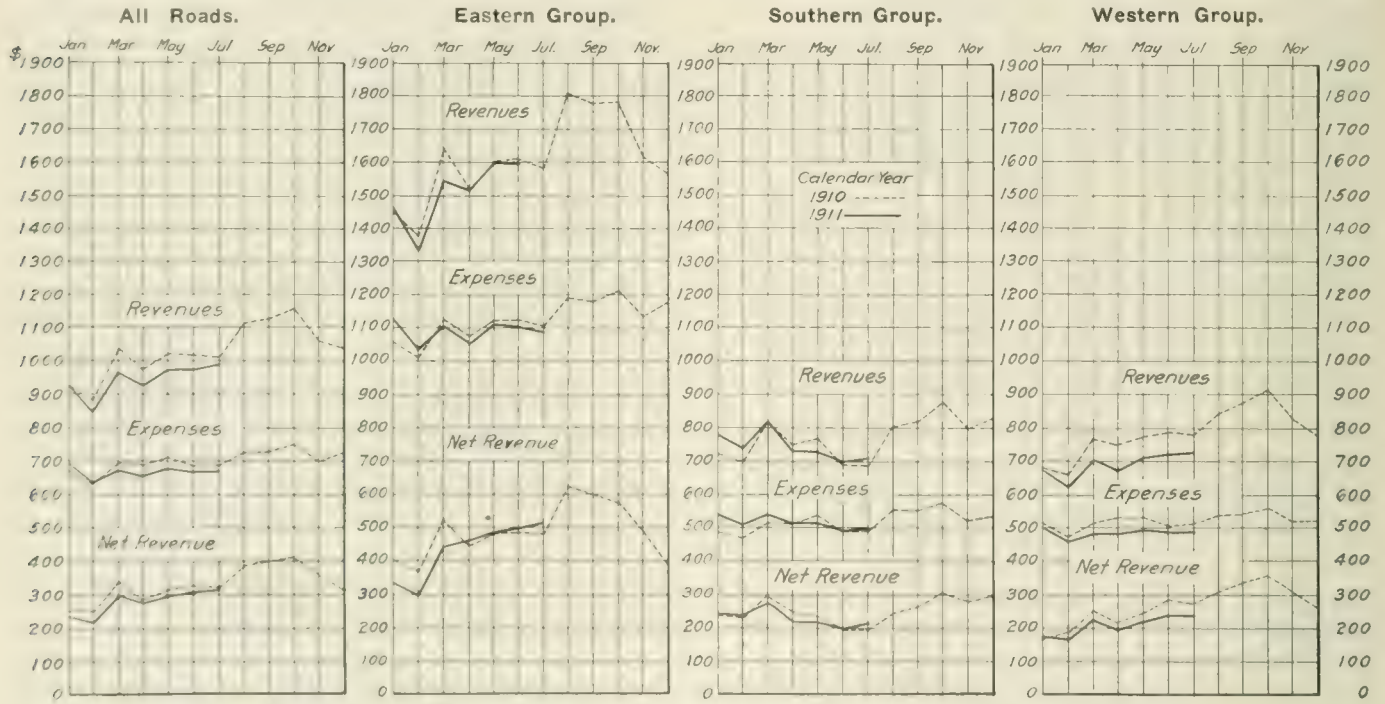
In an effort to force the railways to reduce their lake-and-rail rates on flour from Minneapolis to New York, via Duluth and Buffalo, representatives of the milling interests of Minneapolis have leased two large lake vessels, the "Scranton" and the "Lackawanna," to operate independently in the flour trade on the Great Lakes between Duluth and Buffalo. The millers say that they intend to insist on being allowed to land their vessels at the railway docks in Buffalo and on being given the same divisions of the through rates, as well as the same treatment generally, as the roads give to other vessels engaged in the same traf-

fic. The carriers recently reduced the rate from 23 cents per 100 lbs. to 21½ cents, but on September 28, before the reduced rate became effective, the Interstate Commerce Commission granted the application of the lines leading out of Minneapolis for leave to withdraw it.

Total Railway Revenues and Expenses.

Logan G. McPherson, director of the Bureau of Railway Economics in bulletin Number 20 giving a summary of revenues and expenses of steam roads in the United States for July, 1911, says:

"The railways whose returns are included in this bulletin cover 221,148 miles, or 90 per cent. of all the steam railway mileage in the United States. The total operating revenues for the month of July, 1911, amounted to $218,570,015. This includes revenues from freight and passenger traffic, from carrying mail and express, and from miscellaneous sources. Compared with July, 1910, these total operating revenues show a decrease of $1,414,327, which is equivalent to $22 per mile of line, or 2.1 per cent. This decrease was due wholly to a decrease in freight revenue amounting to $24 per mile, or 3.7 per cent. There were small increases in the other revenue accounts.



A Comparison of Revenues and Expenses of Steam Railways in 1910 and 1911.

"Operating expenses, which include all the costs of maintaining road and equipment, operating trains, securing traffic, and of administration, amounted to $148,322,468. This was $1,480,003 less than for July, 1910, a decrease which is equivalent to $17 per mile of line or 2.3 per cent. This was due to decreases in the maintenance of way and structures, traffic and transportation expenses. In the cost of maintaining way and structures, i.e. track and buildings, there was a decrease compared with July, 1910, of $11 per mile, or 7.3 per cent. Traffic expenses decreased 9 per cent. as compared with July, 1910, while the cost of conducting transportation declined 1.8 per cent.

"The operating revenue, which is total operating revenues less operating expenses, shows a decrease as compared with July, 1910, of $8 per mile, equivalent to 1.4 per cent. By cutting down operating expenses the railways have been able nearly to overcome the decrease of $22 per mile in operating revenues; but operating expenses have decreased largely in reducing the amount used for maintaining way and structures. The net revenue for each mile of line for each day of July averaged $10.23 as compared with $10.39 for July, 1910. It should be remembered that net revenue is gross profits before anything has been taken out for taxes, rentals, interest on bonds, appropriations for betterments, or dividends. Taxes for the month of July amounted to $8,960,481, or $41 per mile, an increase of 5 per cent. over July, 1910. The operating ratio for July, that is, the per cent. of the total operating revenues which was absorbed in operating expenses, was 67.9 per cent. as compared with 68.6 per cent. in June, 1911, and 68.1 per cent. in July, 1910.

"The western group of railways showed a decrease in total operating revenues per mile as compared with July, 1910, of 7.3 per cent., while the operating revenues per mile of the eastern group increased 1.3 per cent., and of the southern group 3 per cent. over July, 1910. Operating expenses per mile were reduced 4.6 per cent. by the western railways as compared with July, 1910, and by the eastern railways 1.3 per cent., but increased on the southern railways 1.1 per cent. The cost of maintenance of way and structures shows a decrease per mile in every group in comparison with July, 1910. Net operating revenue per mile in the western group declined 12.3 per cent. as compared with July, 1910, while that of the eastern group increased 7.3 per cent., and that of the southern group 7.8 per cent. Taxes increased in all the groups as compared with July, 1910, the increase per mile amounting to 13.4 per cent. in the southern group, and 7.2 per cent. in the eastern group.

"When the monthly averages for the seven months of the calendar year 1911 are compared with those of the corresponding months of 1910, they show decreases in total operating revenues per mile of 3.6 per cent., and in net operating revenue per mile of 7.2 per cent. The greatest relative decrease in net operating revenue was that of 11 per cent. in the western group.

"The diagram shows the variations in operating revenues, operating expenses, and net revenue per mile for the separate months of the calendar year 1910 and of the calendar year 1911 to date. The points on the lines for the different months represent the level attained by the revenues, expenses, and net revenue per mile for the respective months."

The following table shows the per cent. of each class of operating expense to total operating revenues for all the steam railways reporting to the Interstate Commerce Commission:

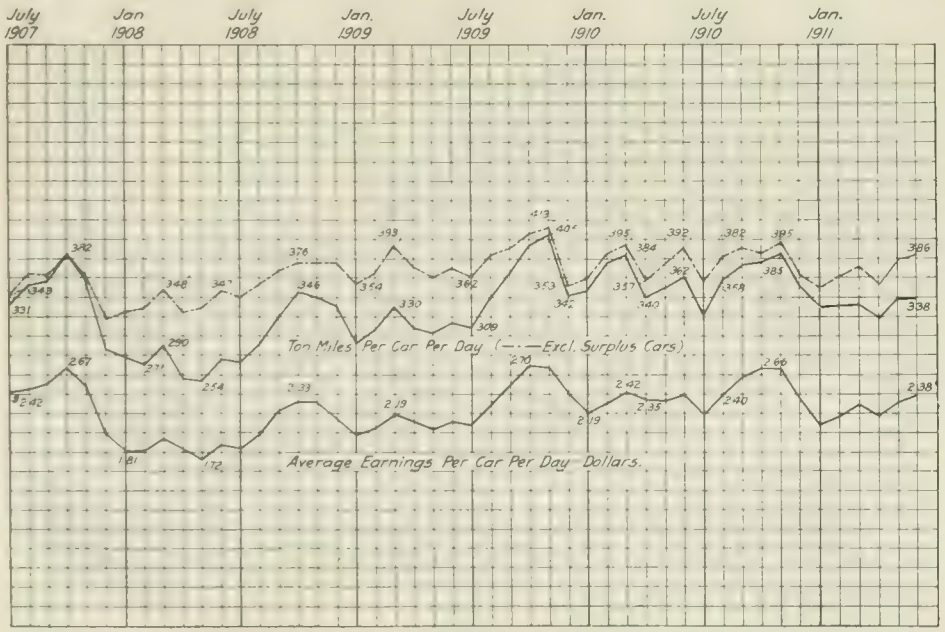
	July 1911	July 1910	Fiscal yr. ended June 30, 1911	Fiscal yr. ended June 30, 1910
Maintenance of way and structures	14.6	14.8	13.1	13.4
Maintenance of equipment	14.3	15.0	15.3	15.0
Traffic expenses	2.2	2.2	2.1	2.0
Transportation expenses	34.8	34.7	35.5	33.4
General expenses	2.6	2.4	2.6	2.8
Total operating expenses	67.9	68.1	68.6	66.3

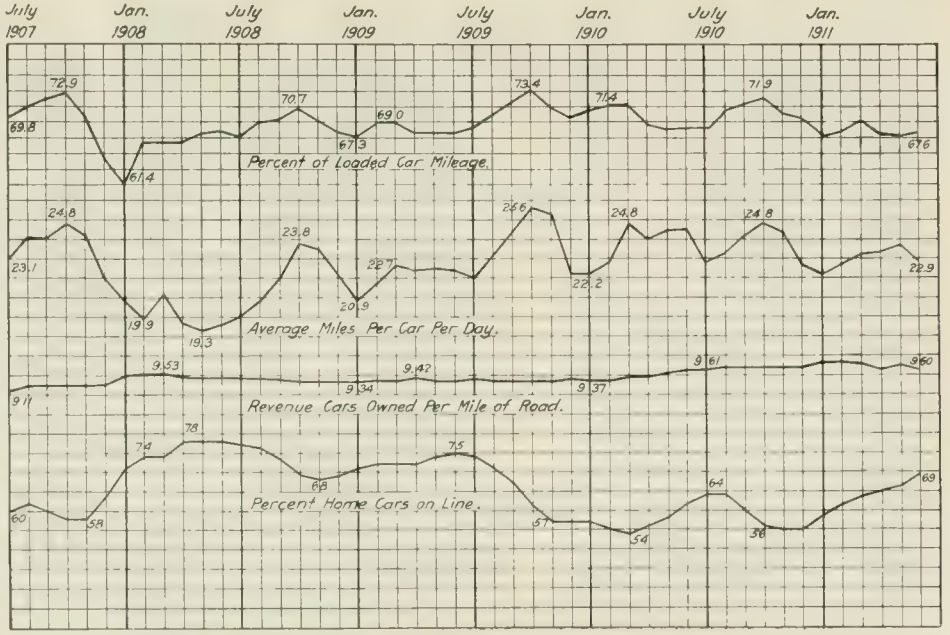
Freight Car Balance and Performance.

Arthur Hale, chairman of the committee on relations between railways of the American Railway Association in presenting

CAR BALANCE AND PERFORMANCE IN JUNE, 1911.

	New England.	N. Y., N. J., Del., Md., Eastern Pa.	Ohio, Ind., Mich., Western Pa.	Va., W. Va., No. and So. Carolina.	Ky., Tenn., Miss., Ala., Ga., Fla.	Iowa, Ill., Wis., Minn.	Mont., Wyo., Neb., Dakotas.	Kan., Colo., Okla., Mo., Ark.	Texas, La., New Mex.	Ore., Idaho, Nev., Cal., Ariz.	Canadian Lines.	Grand Total.
Revenue freight cars owned	79,810	492,618	215,151	183,826	173,394	386,585	18,708	135,339	19,636	143,899	106,540	1,955,506
Average number of system cars on line	46,153	341,167	158,164	120,645	115,535	290,930	7,850	98,202	17,989	69,927	76,386	1,347,948
Railway-owned cars: Average foreign on line	37,925	136,704	70,530	50,271	40,889	93,864	12,342	34,779	10,389	48,689	28,870	565,252
Total Railway-owned cars on line	84,078	477,871	228,694	170,916	156,424	384,794	20,192	132,981	28,378	118,616	105,256	1,908,200
Excess	4,268	.....	13,543	.....	.....	.....	1,484	.....	8,742	.....	.....	.....
Per cent. of cars on line to total owned:												
Home	58	69	73	66	67	75	42	72	92	48	72	69
Foreign	47	28	33	27	23	24	66	26	53	34	27	29
All railways	105	97	106	93	90	99	108	98	145	82	99	98
Private cars on line	3,177	30,778	11,124	3,706	6,828	14,788	1,226	6,454	1,439	11,714	2,884	94,118
Total, all cars on line	87,255	508,649	239,818	174,622	163,252	399,582	21,418	139,435	29,817	130,330	108,140	2,002,318
Per cent. of cars in shop	7.87	9.07	10.05	8.36	11.11	7.61	8.10	10.70	8.42	6.35	6.67	8.88
No. of freight engines owned	1,182	7,598	2,989	3,067	2,618	6,323	525	2,643	575	2,655	2,156	32,331
Average cars on line per freight engine owned	73	67	80	57	62	63	41	53	52	49	50	62
Total freight-car mileage	46,708,152	510,539,692	148,037,096	126,362,668	123,876,832	263,347,487	23,097,281	83,976,005	22,396,569	111,227,294	91,132,810	1,550,701,886
Average miles per car per day	17.8	21.9	20.6	24.1	25.3	22.0	35.9	21.1	25.0	28.4	28.1	22.9
Per cent. loaded mileage	71.6	65.2	66.6	63.0	67.6	70.2	73.7	69.3	65.9	60.6	72.9	67.6
Ton-miles of freight, including company freight	505,907,697	7,893,063,015	2,196,817,857	1,835,210,831	1,569,935,757	2,696,672,876	351,103,074	1,121,297,108	264,828,553	1,635,898,797	1,178,113,052	21,248,848,590
Average ton-miles, including company freight:												
Per car-mile	10.8	15.5	15.9	14.5	12.7	13.7	15.9	13.4	11.8	14.9	12.9	14.4
Per loaded car-mile	15.1	23.7	23.6	23.0	18.8	19.9	21.5	19.5	17.9	21.1	17.7	21.6
Per car per day	193	368	333	350	321	304	597	282	296	422	363	338
Gross freight earnings	$6,042,063	$46,612,682	$12,867,250	$10,484,737	$10,533,478	$27,589,514	$2,777,845	$9,339,133	$2,286,522	$16,150,856	$8,894,669	$153,578,749
Average daily earnings: Per car owned	$2.52	$2.35	$1.99	$1.90	$2.02	$2.38	$4.95	$2.30	$3.88	$3.75	$2.78	$2.42
Per railway car on line	2.40	2.42	1.88	2.04	2.24	2.39	4.59	2.34	2.69	4.57	2.82	2.49
All cars on line	2.31	2.27	1.79	2.00	2.15	2.30	4.32	2.23	2.55	4.16	2.74	2.38





Earnings and Performance of Freight Cars in 1907 to 1911.

statistical bulletin No. 106, covering car balance and performance for June, 1911, says:

"All items of performance show a normal or slightly improved condition over May, 1911, with the exception of average miles per car per day, which decreased from 23.7 to 22.9. The average ton miles per car per day for all cars remained the same (338), while the same item, excluding idle cars increased from 382 in May, 1911, to 386 in June, 1911, indicating a fewer number of idle cars in June.

"Average earnings per car per day increased from $2.33 to $2.38, while the average earnings per car per day excluding idle cars increased from $2.56 to $2.67."

The accompanying table gives figures for car balance and performance by groups for the month of June, and the charts show car earnings and performance for the years 1907 to 1911 inclusive.

INTERSTATE COMMERCE COMMISSION.

The commission has announced that it has reached no final conclusion in the tap line matter. The various lumber carrying roads in the Southwest are willing to maintain the present rate status, and the commission has postponed the date the proposed new tariffs may become effective from November 1 to February 1, 1912.

On complaint of the Oklahoma corporation commission the Interstate Commerce Commission will conduct a hearing at Oklahoma City, Okla., on October 27 on the question of merchandise rates between Oklahoma and Texas points. It has been contended that these rates have been lower from Texas to Oklahoma than from corresponding points in Oklahoma to Texas jobbing centers.

Refusal to Allow Cancellation of Joint Rates.

Pacific National Lumber Company, et al. v. Northern Pacific et al. Opinion by Commissioner Lane:

For ten years there have been in effect joint rates on lumber and lumber products from points on the Tacoma Eastern to points on the Northern Pacific east of Glendive, Mont., and to points on the C. B. & Q. and the Chicago & North Western. These rates were made in accordance with an agreement by which each company promised to give the other all the traffic that it lawfully could, and which also provided that if the Tacoma Eastern should be sold or leased to a competitor of the Northern Pacific, the contract might be terminated on six months' written notice. On the completion of the Chicago, Milwaukee & Puget Sound, this company obtained control of the Tacoma Eastern and published through tariffs to eastern points via its lines. The Northern Pacific, therefore, canceled its tariffs with the Tacoma Eastern. The sole question for consideration herein is whether this route established voluntarily by the Northern Pacific and the Tacoma Eastern, and the joint rates thereunder, should be continued. The Northern Pacific takes the position that inasmuch as the Tacoma Eastern is now, in effect, the property of the Milwaukee, it (the Northern Pacific) should not be required to give the [illegible] Pacific in competition with the producers of lumber on the Northern Pacific's own line. The commission refuses to rec[illegible] through rates, the total rate from point of origin to destination would be increased. The case falls under the category of those [illegible] a proposed increase in rates. No evidence whatever was offered [illegible] Pacific is forbidden, therefore, to cancel the through rates over its lines.

[illegible] is certainly entitled to a reasonable rate to every market, what is reasonable in the construction of through routes and joint tariffs [illegible]

STATE COMMISSIONS.

The governor of Massachusetts has appointed Garrett Droppers of Williamstown, professor of economics at Williams College, as a railway commissioner, in place of Clinton White.

The Indiana railway commission has ordered the Cincinnati, Bluffton & Chicago to comply with the law requiring railway companies to adopt a book of rules and hold periodical examination of employees. To the surprise of the commission it was found that the road was operating without a book of rules. This company operates a road 52 miles long, from Huntington to Portland.

COURT NEWS.

The supreme court of the state of Washington has handed down a decision affirming the constitutionality of the employers' liability law, which was recently passed by the legislature of that state.

The Supreme Court of the United States has assigned to be heard on January 8, all cases now pending before it involving conflicts between state and federal control of rates, or between interstate and intrastate rates. There are cases from Kentucky, Minnesota, Missouri, Oregon and West Virginia.

The Court of Commerce has denied the application for an injunction against the enforcement of the order of the Interstate Commerce Commission reducing rates on coal from the anthracite region in the state of Pennsylvania to tidewater, which order was issued in the case of Meeker & Co. against the Lehigh Valley.

The government has abandoned its suit against the National Stock Yards at St. Louis, for violation of the 28-hour law, regulating the feeding and watering of live stock in transit. The solicitor general has filed in the Supreme Court a stipulation for affirmance of the judgment of the lower court, which held that a stock yard was not a common carrier, and hence was not subject to the 28-hour law.

Dissolution of the National Electric Lamp Company Ordered.

Judge Killits, in the United States district court for the northern district of Ohio, has ordered the General Electric Company to conduct all its business under its own name, and has ordered the dissolution of the National Electric Lamp Company and about thirty-five subsidiaries. The attorney-general has given out a statement in which he says that the court forbids the practice of fixing the retail price on any style of lamp, whether patented or unpatented. The government claimed that competition on unpatented articles was stifled by a system of contracts with dealers, jobbers and consumers by which they were compelled to purchase from the defendants all their supply of carbon lamps (on which patents had expired), as a condition of the right to buy certain lamps still patented. By aggregating discounts on lamps patented and discounts on lamps not patented, competition on unpatented lamps was suppressed. The General Electric Company and subsidiary companies are enjoined from carrying out certain contracts with manufacturers of bulbs, tubing, and other parts necessary to complete lamps, by which the manufacturers of these parts are bound to sell only to the defendants except on unequal conditions. The attorney general says that "it may be proper to add that the investigation out of which this suit arose also disclosed eleven other patent pools by which the prices of various electrical devices and supplies were fixed, and to which some of the defendants were parties, but since the institution of the suit all of these pools have been voluntarily dissolved." He says that the investigation disclosed a general trade [illegible] patent agreement between the General Electric Company and the Westinghouse Electric & Manufacturing Company, covering substantially their whole business, but that this agreement, since the institution of the government suit, has expired by limitation and has not been, and it is believed will not be, renewed. The [illegible] and finding in favor of the government applies only to that part of the General Electric Company's business which has to do with the methods of sale of incandescent electric lamps. The decree was acquiesced in by the defendant companies.

REVENUES AND EXPENSES OF RAILWAYS.

TWO MONTHS OF FISCAL YEAR, 1912. (FOR MONTH OF AUGUST SEE ISSUE OF OCTOBER 12.)

Name of road.	Mileage operated at end of period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or dec.) comp. with last year.
		Freight.	Passenger.	Total, inc. misc.	Maintenance: Way and structures.	Maintenance: Of equipment.	Traffic.	Transportation.	General.	Total.					
Alabama & Vicksburg	142	$137,618	$92,896	$249,988	$45,757	$49,586	$7,451	$84,506	$10,618	$197,918	$52,070	$110	$9,200	$42,980	—$44,958
Alabama Great Southern	309	426,423	232,107	720,488	87,481	144,475	21,297	221,436	17,152	491,841	228,647	—492	29,496	198,659	11,958
Atchison, Topeka & Santa Fe	7,612[1]	9,048,819	3,891,426	14,055,719	2,581,651	2,387,314	286,674	4,039,758	309,194	9,604,591	4,451,128	.....	549,011	3,902,117	—1,148,337
Atlantic Coast Line	4,494	2,812,483	1,252,645	4,375,238	675,993	765,496	82,056	1,639,385	138,903	3,301,833	1,073,405	.....	214,000	859,405	— 35,166
Atlanta & West Point	92	96,969	87,788	202,026	24,476	38,368	10,088	59,260	9,298	141,490	60,536	337	10,378	50,495	16,387
Baltimore & Ohio System	4,433	11,768,433	2,920,324	15,611,671	2,016,096	2,804,698	324,617	5,081,013	331,349	10,557,773	5,053,898	- 66,737	480,699	4,506,462	—12,571
Baltimore & Ohio Chicago Terminal	77	.....	5,636	266,864	71,056	34,462	1,849	104,926	8,307	220,600	46,264	1,647	36,413	11,499	—3,899
Bangor & Aroostook	627a	345,136	120,804	501,521	100,034	69,186	8,317	151,892	25,913	355,342	146,179	.....	18,500	127,679	6,528
Bessemer & Lake Erie	203	1,841,134	87,314	1,947,145	164,798	282,860	16,884	403,726	16,241	884,509	1,062,636	.....	14,000	1,048,636	151,001
Boston & Maine	2,224[2]	4,155,035	3,307,036	8,047,979	1,206,552	995,124	82,386	3,310,561	172,625	5,767,248	2,280,731	55,869	344,471	1,992,129	—337,135
Buffalo, Rochester & Pittsburgh	572	1,396,176	237,884	1,689,011	282,317	288,714	21,269	505,971	33,448	1,131,719	557,292	725	34,000	524,017	—68,612
Buffalo & Susquehanna R. R.	265	270,519	19,319	302,374	60,925	53,554	2,701	101,554	13,520	232,254	70,120	.....	5,200	64,920	37,173
Buffalo & Susquehanna Ry.	91	82,796	25,606	112,742	11,170	57,483	1,022	45,719	5,532	120,926	- 8,184	131	2,800	—11,115	—46,735
Butte, Anaconda & Pacific	46	147,712	25,626	184,260	18,772	34,510	1,554	77,049	4,726	136,611	47,649	.....	4,000	43,649	—22,235
Carolina, Clinchfield & Ohio	238	307,892	31,978	348,349	23,483	43,643	10,482	67,876	15,511	160,995	187,354	1,029	14,000	174,383	93,817
Carolina, Clinchfield & Ohio of S. C.	17	14,936	2,960	18,418	926	158	1,885	5,016	782	9,651	8,767	.....	1,000	7,757	455
Central of Georgia	1,918	1,150,104	725,632	2,025,907	286,505	433,454	66,724	690,328	70,625	1,547,636	478,271	15,400	94,800	398,871	—80,043
Central New England	276	418,334	66,879	510,966	96,028	40,212	2,470	135,939	4,917	279,566	231,400	102	18,000	213,502	63,106
Central of New Jersey	671[3]	2,889,397	1,191,760	4,432,120	431,498	607,703	67,349	1,238,517	77,344	2,422,411	1,809,709	163,305	188,028	1,784,987	295,695
Central Vermont	411	485,809	239,803	733,310	94,150	90,758	16,778	314,403	15,471	531,660	201,650	2,065	23,500	180,215	65,921
Charleston & Western Carolina	140	199,892	70,879	295,962	56,896	42,657	5,246	98,486	8,220	211,505	74,457	.....	10,000	64,457	20,015
Chesapeake & Ohio Lines	2,341	4,284,536	1,117,517	5,736,721	696,862	1,053,314	112,353	1,652,033	125,536	3,640,078	2,096,643	8,168	186,200	1,918,611	- 14,347
Chicago, Burlington & Quincy	9,074[4]	9,403,773	4,328,683	15,060,121	2,384,360	2,601,137	265,387	4,589,528	377,168	10,137,580	4,922,541	- 25,004	528,825	4,368,712	292,907
Chicago & Eastern Illinois	1,275	1,856,413	559,321	2,600,487	313,100	431,535	59,695	852,711	81,935	1,741,976	858,511	- 2,856	77,000	778,655	—13,894
Chicago & Erie	69	654,459	134,540	869,040	140,014	165,858	41,654	371,224	18,509	737,259	131,781	.....	27,388	104,393	—44,137
Chicago & Northwestern	7,754[5]	7,850,021	3,912,643	12,907,471	1,866,600	1,598,244	259,457	4,879,087	253,698	8,856,996	4,050,475	7,328	550,000	3,507,803	61,189
Chicago Great Western	1,496	1,390,508	592,850	2,154,448	275,445	321,131	96,474	827,121	69,653	1,589,824	564,624	59	66,074	498,609	—19,104
Chicago, Indiana & Southern	341	503,147	60,764	579,371	62,623	125,279	16,399	315,688	16,863	466,852	112,519	861	27,800	85,580	39,570
Chicago, Milwaukee & Puget Sound	2,058[6]	2,178,857	476,831	2,695,063	184,425	255,953	113,178	936,145	32,458	1,522,160	1,172,903	41,577	158,668	1,055,812	—29,359
Chicago, Milwaukee & St. Paul	7,811	6,660,725	3,823,221	10,539,998	1,886,044	1,494,277	203,021	4,097,049	186,522	7,866,913	2,673,085	18,611	472,668	2,212,028	—708,986
Chicago, Peoria & St. Louis	255	206,518	75,128	295,450	40,395	58,498	14,836	118,884	10,828	243,441	52,009	.....	8,600	43,409	9,153
Chicago, Rock Island & Pacific	7,551[7]	6,173,756	3,554,730	10,933,071	1,769,098	1,534,059	316,046	3,988,660	278,471	7,886,334	2,506,737	- 19,568	413,430	2,073,739	—409,138
Chicago, St. Paul, Minneapolis & Omaha	1,743	1,428,604	867,716	2,471,454	493,965	327,875	54,454	924,682	61,270	1,862,246	609,208	3,116	126,037	486,287	—272,327
Chicago, Terre Haute & Southeastern	353	254,006	41,105	302,569	51,110	53,516	5,650	86,372	15,138	211,786	90,783	- 274	17,400	73,109	.....
Cincinnati, New Orleans & Texas Pacific	337	1,158,850	320,461	1,557,450	144,653	271,269	38,373	439,510	34,809	928,614	628,836	1,005	43,600	586,241	—34,100
Cincinnati, Hamilton & Dayton	1,014[8]	1,323,134	353,107	1,880,672	202,075	283,857	37,499	728,970	38,815	1,291,216	589,456	.....	76,036	513,420	181,029
Cincinnati, Northern	345	165,682	55,599	233,685	47,544	49,126	6,271	80,238	5,501	188,680	45,005	.....	10,400	34,605	—12,572
Cleveland, Akron & Cincinnati	344[9]	416,101	169,199	630,328	110,325	98,990	7,909	203,665	10,723	431,612	198,736	.....	39,200	159,536	330
Cleveland, Cincinnati, Chicago & St. Louis	2,610[10]	3,353,842	1,633,005	5,410,604	588,133	729,162	184,147	1,923,063	108,314	3,532,819	1,877,785	- 3,120	190,900	1,684,665	821,672
Colorado Midland	337	230,599	75,636	336,533	48,564	57,525	14,943	130,896	10,589	262,517	74,016	343	16,000	57,673	4,312
Colorado Southern	1,147	945,007	355,610	1,387,250	188,372	262,733	23,837	409,620	43,660	928,222	459,028	- 1,787	49,400	407,841	2,949
Cumberland Valley	162	327,240	121,897	470,697	88,202	57,160	9,160	149,792	13,719	318,033	152,664	1,085	10,282	143,465	—72,124
Delaware & Hudson Co. R R Dept.	851[11]	2,849,794	766,131	3,750,188	228,522	488,950	47,094	1,195,392	85,674	2,045,632	1,704,556	2,143	94,692	1,612,007	237,693
Delaware, Lackawanna & Western	930	4,401,035	1,499,963	6,303,271	977,690	944,821	132,504	1,760,174	125,421	3,940,610	2,362,661	66,497	287,000	2,142,158	- 99,306
Denver & Rio Grande	2,585	2,007,917	1,078,545	4,165,702	599,569	693,939	115,663	1,372,842	96,227	2,878,240	1,287,462	12,872	140,000	1,160,334	—254,108
Denver, Northwestern & Pacific	214	110,163	133,111	253,724	31,549	30,221	6,312	60,153	5,971	134,206	119,518	.....	6,000	113,518	14,288
Detroit & Mackinac	353	123,864	77,677	214,087	36,889	34,461	6,200	65,993	5,528	148,981	65,106	2,737	16,651	51,192	—19,211
Detroit, Toledo & Ironton	341	235,000	34,210	290,250	56,712	33,807	5,508	128,785	11,149	235,952	54,298	199	15,055	39,442	15,196
Duluth & Iron Range	190[12]	1,401,564	45,296	1,967,268	219,037	119,273	2,473	283,333	20,742	644,808	1,322,460	11,564	79,465	1,254,559	- 385,956
Duluth, Missabe & Northern	336	1,060,655	84,919	2,167,219	222,726	154,933	4,651	287,348	24,858	694,516	1,472,703	21,039	91,335	1,402,607	- 1,601,815
El Paso & Southwestern Co.	991	837,984	156,450	1,067,536	145,391	173,230	25,285	301,201	45,147	690,254	377,282	- 3,131	42,151	332,000	- 106,207
Elgin, Joliet & Eastern	241[13]	1,473,760	12	1,561,510	135,440	269,295	7,912	436,617	28,436	877,700	683,810	.....	33,450	650,370	254,991
Erie	1,995[14]	6,343,793	1,872,359	8,862,193	1,179,251	1,427,219	196,306	2,633,570	157,714	5,594,060	3,268,133	65,010	249,443	3,083,699	46,506
Florida East Coast	363	294,072	160,950	442,178	105,512	102,721	8,700	186,801	15,929	419,693	22,515	.....	31,000	—8,485	—9,573
Fort Worth & Denver City	474	487,199	315,921	793,622	60,170	113 851	15,673	232,907	24,301	446,902	346,720	—1,648	24,500	320,572	32,935
Galveston, Harrisburg & San Antonio	1,[illegible]	1,163,313	511,413	1,768,883	224,342	273,406	58,298	630,043	54,652	1,240,731	527,852	- 10,166	60,884	456,802	74,500
Georgia	907	787,891	166,010	484,478	54,558	82,943	22,521	210,102	15,069	385,193	99,285	.....	4,200	95,085	39,638
Grand Rapids & Indiana	587	431,885	427,656	930,073	94,432	124,665	23,421	360,421	28,439	631,378	298,695	—509	45,075	253,211	76,480
Great Northern	7,744[15]	8,150,185	2,772,130	11,746,868	1,758,780	1,297,283	170,798	2,922,079	187,752	6,336,692	5,410,176	55,355	575,397	4,890,134	806,179
Gulf & Ship Island	307	258,665	77,557	322,291	53,140	61,835	3,318	90,146	14,429	222,868	99,423	.....	10,349	89,074	- 8,991
Gulf, Colorado & Santa Fe	1,747[16]	1,179,180	566,119	1,807,932	406,374	305,983	49,679	686,329	63,494	1,511,859	296,073	.....	71,523	224,550	—81,947
Houston & Texas Central	759	695,836	339,061	1,063,486	169,221	135,447	38,194	394,529	42,720	780,111	283,375	3,010	35,667	244,698	3,631
Houston, East & West Texas	130	157,970	64,194	204,918	38,771	21,282	3,751	61,161	7,151	132,116	72,802	.....	6,709	66,093	—23,153
Illinois Central	4,755[17]	6,764,612	2,507,555	10,597,140	1,632,361	2,243,406	246,710	3,671,194	258,229	8,051,891	2,545,249	—16,086	461,523	2,067,640	—46,168
Iowa Central	558	419,151	110,127	556,633	75,964	98,138	14,605	223,331	16,300	428,238	128,395	.....	19,266	109,129	10,799
Kanawha & Michigan	175	527,103	65,468	601,372	73,168	96,939	4,780	159,777	13,704	348,369	253,003	39	18,435	234,529	12,987
Kansas City Southern	827	1,066,771	299,457	1,543,373	161,318	216,451	51,818	547,163	58,111	1,034,761	508,612	.....	69,223	439,389	—128,802
Lake Erie & Western	466	740,722	207,370	998,632	123,677	154,654	27,191	361,808	22,574	689,304	309,328	.....	39,751	269,577	71,776
Lake Shore & Michigan Southern	1,662	5,476,983	2,473,948	8,776,556	963,530	1,111,227	197,188	2,486,214	146,552	4,904,711	3,871,845	7,510	270,000	3,609,355	1,253,452
Long Island & Hudson River	96	227,145	10,654	240,613	35,425	36,943	2,156	77,523	9,367	161,414	79,199	.....	7,000	72,199	6,673
Lehigh Valley	1,179	5,210,425	1,086,881	6,515,141	730,291	1,074,923	163,341	2,088,746	133,248	4,190,549	2,324,592	- 49,337	210,400	2,064,855	213,176
Long Island	398	523,115	1,785,840	2,403,477	234,798	201,729	37,156	834,634	38,285	1,346,602	1,056,875	190,666	107,107	1,140,434	133,661
Louisiana & Arkansas	255	159,738	37,539	206,147	51,833	36,344	4,581	57,259	9,648	159,665	46,482	.....	6,400	40,082	- 52,232
Louisiana Ry. & Nav. Co.	350	221,700	49,719	292,807	44,164	28,887	11,430	106,399	13,013	203,893	88,914	.....	9,200	79,714	32,822
Louisiana Western	267	195,753	110,451	323,069	39,514	58,211	15,381	94,721	13,570	221,397	101,672	1,097	12,556	90,213	—1,282
Louisville & Nashville	4,643[18]	6,193,461	2,187,348	8,879,831	1,409,863	1,653,322	181,079	2,795,798	168,994	6,209,056	2,670,775	3,727	297,900	2,376,602	295,422

REVENUES AND EXPENSES OF RAILWAYS.

TWELVE MONTHS OF FISCAL YEAR, 1921—CONTINUED.

Name of road	Mileage operated at close of year	Operating revenues			Maintenance of Way and Structures	Maintenance of Equipment	Operating expenses				Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or dec.) comp. with last year.
		Freight.	Passenger.	Total.			Traffic.	Transportation.	General.	Total.					
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Maine Central	611	4,811,813	1,881,803	7,011,803	418,398	193,391	71,066	634,318	43,393	1,369,503	573,303	749	83,623	493,429	63,034
Midland Valley	1,431	1,000,114	5,000,114	6,000,000	1,000,000	481,340	140,131	1,831,897	90,596	3,047,687	2,116,162	11,182	220,000	1,907,344	646,670
Missouri Kansas & Texas	1,861	20,000,000	5,000,000	25,000,000	3,000,000	1,000,000	1,000,000	7,000,000	1,000,000	13,000,000	12,000,000	1,000,000	1,000,000	10,000,000	2,000,000
Missouri Kansas & Texas of Texas	1,861	20,000,000	5,000,000	25,000,000	3,000,000	1,000,000	1,000,000	7,000,000	1,000,000	13,000,000	12,000,000	1,000,000	1,000,000	10,000,000	2,000,000
Missouri Pacific	7,861	57,000,000	15,000,000	72,000,000	10,000,000	5,000,000	3,000,000	20,000,000	3,000,000	41,000,000	31,000,000	3,000,000	3,000,000	25,000,000	5,000,000
Missouri Pacific of Texas	1,861	20,000,000	5,000,000	25,000,000	3,000,000	1,000,000	1,000,000	7,000,000	1,000,000	13,000,000	12,000,000	1,000,000	1,000,000	10,000,000	2,000,000
Missouri Pacific Lines

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

W. N. Neff has been elected vice-president of the Dallas Terminal Railway & Union Depot Company, succeeding the late J. W. Maxwell.

W. B. Scott, assistant director of maintenance and operation of the Southern Pacific, the Union Pacific, the Oregon-Washington Railroad & Navigation Company and the Oregon Short Line, at Chicago, has been elected vice-president in charge of maintenance and operation and general manager of the Union Pacific, with office at Omaha, Neb., succeeding A. L. Mohler, elected president, his election becoming effective November 1. J. A. Munroe, freight traffic manager of the Union Pacific at Omaha, has been elected vice-president in charge of traffic, with office at Omaha. T. M. Orr, assistant general manager, has been appointed assistant to the president.

Robert S. Logan, who has been elected vice-president of the Grand Trunk, in charge of land, tax, claims and mail departments, with office at Montreal, Que., as has been announced in these columns, was born on February 13, 1864, at St. Louis, Mo., and was educated in the public schools of this native town. He began railway work on October 1, 1885, as a clerk in the office of the general manager of the Wabash, St. Louis & Pacific, and from December, 1890, to July, 1896, was secretary to the general manager of its successor, the Wabash Railroad. He was then appointed secretary to the general manager of the Grand Trunk, and from January, 1901, to March 15, was assistant to the general manager of the same road. Mr. Logan was elected vice-president and general manager of the Central Vermont on March 15, 1901, and the following March was appointed assistant to second vice-president of the Grand Trunk. Since January, 1910, he was assistant to president of the Grand Trunk and the Grand Trunk Pacific, and now becomes vice-president of the Grand Trunk, as above noted.

D. E. Galloway, whose appointment as assistant to president of the Grand Trunk, and the Grand Trunk Pacific, with office at Montreal, Que., has been announced in these columns, was born in the township of Puslinch, Ont., on August 31, 1882, and was educated in the high schools and later at business college. He entered the service of the Grand Trunk in February, 1901, in the office of the claims department at Hamilton, and in November of the same year was transferred to Montreal, Que., in the claims department under Vice-President W. Wainwright. His next position was in the general freight department of the same road. Mr. Galloway was appointed private secretary to President Charles M. Hays in September, 1904, which position he held at the time of his recent appointment as assistant to president as above.

D. E. Galloway.

Operating Officers.

A. A. Matthews has been appointed assistant general manager of the Texas Central, with office at Waco, Tex., succeeding J. B. Gilmer.

J. H. Stevens has been appointed acting superintendent of the Corvallis & Eastern, with office at Albany, Ore., succeeding J. T. Walch, deceased.

N. L. Howard has been appointed trainmaster of the Chicago, Burlington & Quincy, with office at Centerville, Iowa, succeeding N. C. Allen, transferred.

O. L. Dickeson, who a few months ago was elected vice-president of the White Pass & Yukon Route, with office at Vancouver, B. C., has been appointed also general manager.

Grant Hall, superintendent of motive power of the western lines of the Canadian Pacific at Winnipeg, Man., has been appointed assistant general manager, with office at Winnipeg. See item under Engineering and Rolling Stock Officers.

F. M. Nowell, superintendent of the Bangor & Portland division, of the Delaware, Lackawanna & Western, at Easton, Pa., has been appointed superintendent of the Scranton division, succeeding J. J. McCann, who will assume other duties, and J. R. Hamilton, general yardmaster at Buffalo, N. Y., has been transferred to Hoboken, N. J.

Robert M. White, whose appointment as superintendent of the Bangor & Portland division of the Delaware, Lackawanna & Western, with office at Easton, Pa., has been announced in these columns, was born in 1873 at Elmira, N. Y. Mr. White was a special student at the Lehigh University, and began railway work in May, 1893, in the engineering department of the Erie Railroad, as a chainman, and was later rodman, assistant engineer and acting supervisor on the same road. He left the service of that company in 1900 to go to the Mexican Coal & Coke Co. as assistant engineer and roadmaster, and from 1901, to September, 1908, he was resident engineer and roadmaster of the Delaware, Lackawana & Western, with office at Buffalo, N. Y. Mr. White was promoted to division engineer, with office at Scranton, Pa. in September, 1908, which position he held at the time of his recent appointment, as superintendent of the Bangor & Portland division.

R. M. White.

H. R. Laughlin, superintendent of the Monongah division, of the Baltimore & Ohio, at Grafton, W. Va., has been transferred to the general manager's staff at Baltimore, Md. J. F. Keegan, superintendent of the Wheeling division, at Wheeling, W. Va., succeeds Mr. Laughlin. H. B. Green, assistant superintendent of the Cleveland division, at Cleveland, Ohio, has been appointed superintendent at Wheeling, and W. T. Lechlider, inspector of transportation at Baltimore, Md., has been promoted to assistant superintendent at Cleveland, Ohio.

J. W. Walton, general superintendent of the Missouri, Kansas & Texas at St. Louis, Mo., has been appointed acting assistant general manager of the lines in Texas, with office at Dallas, Tex., succeeding C. M. Bryant, granted leave of absence on account of ill health. W. E. Williams, recently appointed superintendent at Sedalia, Mo., has been appointed acting general superintendent at St. Louis, succeeding Mr. Walton, and K. A. Easley, recently appointed superintendent at McAlester, Okla., succeeds Mr. Williams. J. F. Hickey, assistant superintendent at McAlester, succeeds Mr. Easley, and R. R. Farmer succeeds Mr. Hickey.

Jesse G. June, who was recently appointed assistant superintendent of terminals of the Erie Railroad at Jersey City, N. J., as has been announced in these columns, was born March 15, 1866 at Manlius, N. Y. He received a high school education and began railway work in July, 1884, in the engineering department of the Lehigh Valley. In 1901, he was appointed

supervisor of tracks at Easton, Pa., and in 1904 was made superintendent of the trolley lines of the Easton Transit Company. In December of the same year he was appointed division engineer of the Lehigh Valley at Auburn, N. Y., and in April, 1906, was transferred, in the same capacity, to Sayre, Pa. He was again transferred, as division engineer in September, 1907, to Easton. In March, 1908, he went to the Union Pacific as roadmaster at Green River, Wyo. The following December he went to the Erie Railroad as supervisor of tracks, and at the time of his recent appointment, was division engineer at Jersey City, N. J.

Traffic Officers.

W. G. Bowman has been appointed agent and customs broker for the Southern Pacific at Nogales, Sonora, Mex.

E. D. Moffett has been appointed traveling agent of the South Dakota Central, with office at Sioux Falls, S. D.

Doswell Brown, general passenger agent of the Jonesboro, Lake City & Eastern, with office at Jonesboro, Ark., has resigned.

Clinton McCullough, traveling agent of the Chicago & North Western at Chicago, has been appointed general coal agent, with office at Chicago.

A. F. Read, foreign freight agent of the Grand Trunk at Montreal, Que., has been appointed general foreign freight agent, with office at Montreal.

W. V. Howard, local freight agent of the Chicago Great Western at Leavenworth, Kan., has been appointed general agent, with office at Leavenworth.

S. L. Strauss has been appointed chief of tariff bureau of the Grand Trunk Pacific for the lines west of Detroit and St. Claire rivers, with office at Chicago.

Eugene Morris, assistant chairman of the Central Freight Association, has been elected chairman, with office at Chicago, succeeding Joseph F. Tucker, deceased.

G. F. Herr, assistant general passenger agent of the Western Pacific at San Francisco, Cal., has been appointed general passenger agent with office at San Francisco.

V. Kistler, district freight and passenger agent of the Great Northern at Grand Forks, B. C., has been appointed contracting freight agent, with office at Portland, Ore.

J. F. Davidson has been appointed district freight and passenger agent of the Oregon-Washington Railroad & Navigation Company, with headquarters at Aberdeen, Wash.

E. Ford, auditor and car accountant of the Groveton, Lufkin & Northern at Groveton, Tex., has been appointed general freight and passenger agent, with office at Grovton.

H. J. Gribling has been appointed soliciting freight agent of the Cleveland, Cincinnati, Chicago & St. Louis, with headquarters at Cincinnati, Ohio, succeeding John S. Moses, pro-

H. E. Heller, general agent in the freight and passenger department of the Chicago, Burlington & Quincy, at Philadelphia, Pa., has been appointed general agent at Kansas City, Mo., succeeding W. H. Hill, transferred.

L. B. Hendrix has been appointed district passenger agent of the Chicago Great Western, with headquarters at Pittsburgh, Pa., and Buffalo, N. Y., succeeding W. D. Jones, resigned to

division freight agent of the Texas & Pacific in charge of south-

James F. Murdy, soliciting agent of the Louisiana Railway & commercial agent, with office at New Orleans, succeeding H. W. succeeds Mr. Murdy.

H. G. Grant, soliciting freight and passenger agent of the Norfolk & Western at Cincinnati, Ohio, has been appointed traveling passenger agent, with office at Chicago, succeeding R. E. Scott, resigned to become city passenger agent of the Denver & Rio Grande at Chicago.

Robert E. Davis has been appointed commercial agent of the Georgia Southern & Florida, with office at Miami, Fla., and the following have been appointed soliciting freight agents: Elmer K. Yaeger, Chicago; Charles N. McNulty, St. Louis, Mo., and Truman N. Bradshore, Atlanta, Ga.

R. C. Kennedy, general agent in the passenger department of the Cleveland, Cincinnati, Chicago & St. Louis, at Louisville, Ky., has been appointed southwestern passenger agent, with office at St. Louis, Mo., succeeding to the duties of Charles Krotzenberger, assistant general passenger agent, resigned.

William Austin, general agent in the freight department of the Chicago, Burlington & Quincy at Cincinnati, Ohio, has been appointed general agent in the freight and passenger departments, with office at Philadelphia, Pa., succeeding H. E. Heller, transferred, and H. K. Miles, traveling freight agent at Cincinnati, succeeds Mr. Austin.

W. G. Trapp, soliciting freight agent of the Tennessee Central at Chicago, has been appointed traveling freight agent, with office at Chicago. As has been announced in these columns, W. D. Jones has been appointed soliciting freight agent, succeeding Mr. Trapp. S. A. Cherry has been appointed contracting freight agent, with headquarters at Hopkinsville, Ky.

C. A. Hayes, general freight agent of the Grand Trunk, at Montreal, Que., has been appointed freight traffic manager, with office at Montreal, succeeding John W. Loud, who was retired recently, as has been announced in these columns, and Robert L. Burnap, assistant general freight agent at Chicago, has been appointed assistant freight traffic manager, with office at Chicago. H. C. Martin, second assistant general freight agent at Chicago, has been appointed general freight agent, with office at Montreal.

W. C. Knowles has been appointed assistant general passenger agent of the International & Great Northern, with office at Houston, Tex., and W. E. Fitch has been appointed district passenger agent, with office at San Antonio, Tex. J. F. Zurn, recently appointed district passenger and ticket agent of the Texas & Pacific, with office at Fort Worth, Tex., has had his jurisdiction extended over the International & Great Northern. M. L. Morris, passenger and ticket agent at Houston, has been appointed district passenger agent, with office at Houston.

A. J. Dutcher, general agent of the Union Pacific, who recently had his office removed from Atlanta, Ga., to Birmingham, Ala., has been appointed general agent in the freight and passenger departments, with office at St. Louis, Mo., succeeding J. G. Lowe. O. P. Bartlett, general agent of the Louisville & Nashville at New Orleans, La., succeeds Mr. Dutcher. Joseph E. Maynard has been appointed contracting freight agent of the Union Pacific, with office at Chicago, succeeding John T. Farmer, resigned. J. Brown has been appointed traveling freight and passenger agent, and J. J. Angell has been appointed contracting freight agent, both with offices at Birmingham, Ala.

A. D. Bell, chief clerk to the general passenger agent of the St. Louis Southwestern at Tyler, Tex., has been appointed assistant general passenger and ticket agent of the Texas & Pacific, with office at Dallas, Tex., succeeding C. P. Fegan, appointed district passenger and ticket agent at Dallas. J. F. Zurn, general agent in the passenger department at Fort Worth, Tex., has been appointed district passenger and ticket agent, with office at Fort Worth, and O. B. Webb, passenger and ticket agent at New Orleans, La., has been appointed district passenger and ticket agent, with office at New Orleans. The offices of district passenger and ticket agent at Dallas, Fort Worth and

J. H. Lipsey, traveling freight agent of the Illinois Central at Mattoon, Ill., has been transferred to Bloomington, Ill., succeeding C. C. Backus, assigned to duties in the general freight

offices at Chicago, and H. E. Cusic, traveling freight agent at Carbondale, Ill., succeeds Mr. Lipsey. B. G. Day, contracting freight agent at Peoria, Ill., has been appointed traveling freight agent at Carbondale, succeeding Mr. Cusic, and W. F. Robinson, chief clerk in the Peoria freight office, succeeds Mr. Day. Julius Rosenzweig has been appointed traveling freight agent, with office at Waterloo, Iowa, and J. F. Barber has been appointed a traveling passenger agent, with office at Freeport, Ill. Freeman Bradford has been appointed contracting freight agent at Omaha, Neb., and T. A. Lewis, a contracting freight agent at Sioux City, Iowa. Ben Stone, contracting freight agent at Dubuque, Iowa, has been appointed traveling freight agent, with office at Fort Dodge, Iowa, succeeding F. E. Munger, assigned to other duties, and E. W. Stafford succeeds Mr. Stone.

George Dow Hunter, whose appointment as general passenger and ticket agent of the Texas & Pacific, with office at Dallas, Tex., has been announced in these columns, was born April 18, 1867, at Bloomington, Ind. He received a public school education, and began railway work in January, 1886, with the Galveston, Harrisburg & San Antonio, as a clerk in the roadmaster's office, at El Paso, Tex. He was subsequently station baggage master, ticket clerk and local freight office clerk with that road; was in Mexico with the Mexican Central, first in the material department, and later in the construction department, and then returned to El Paso to become city ticket agent of the Texas & Pacific. In June, 1889, he was appointed joint ticket agent of the International & Great Northern and the Missouri, Kansas & Texas at Taylor, Tex., and in the latter part of the next year went to Houston as city passenger and ticket agent of the International & Great Northern. He was promoted to assistant general passenger agent at Palestine, Tex., in August, 1905, and to general eastern traffice agent, with office in New York City, in December, 1907. From June 1, 1911, until the time of his appointment as above he had jurisdiction also over the Texas & Pacific.

G. D. Hunter

Engineering and Rolling Stock Officers.

D. B. McKenna, foreman of the car department of the International & Great Northern, with office at Palestine, Tex., has resigned.

Marion Morris has been appointed signal supervisor of the Chicago & Alton, with office at Marshall, Mo., succeeding J. R. Lyons, resigned.

A. G. Kantmann has been appointed acting superintendent of machinery of the Nashville, Chattanooga & St. Louis, with office at Nashville, Tenn.

W. R. Duff, general car foreman of the Trinity & Brazos Valley at Teague, Tex., has been appointed master car builder of the International & Great Northern, with office at Palestine, Tex.

Joseph Quigley, master mechanic of the Alabama Great Southern at Birmingham, Ala., has been appointed master mechanic of the Cincinnati, New Orleans & Texas Pacific, with office at Ferguson, Ky., succeeding T. O. Sechrist, resigned. H. B. Hayes, general foreman of the Chattanooga shops, succeeds Mr. Quigley, and H. F. Campbell succeeds Mr. Hayes.

J. G. Sullivan, assistant chief engineer of the western lines of the Canadian Pacific at Winnipeg, Man., has been appointed chief engineer of the western lines, with office at Winnipeg, and his former title has been abolished. Grant Hall, superintendent of motive power of the western lines, having been appointed assistant general manager, C. H. Temple, assistant superintendent of motive power, succeeds Mr. Hall, with office at Winnipeg.

Charles E. Roland, whose appointment as assistant engineer of maintenance of way of the Kentucky & Indiana general division, of the Chesapeake & Ohio, with office at Covington, Ky., has been announced in these columns, was born January 21, 1888, at Greenville, Ohio, and was educated at the Wayne Technical Academy. He began railway work in January, 1910, with the Cleveland, Cincinnati, Chicago & St. Louis, in the office of the chief engineer at Cincinnati, Ohio. Previous to this he had been with the Stonner Land & Construction Company in western Canada, and with the city engineer and county engineer at Greenville, Ohio. Mr. Roland was appointed assistant to the division engineer of the Chesapeake & Ohio, with office at Peru, Ind., on July 1, 1910, which position he held at the time of his recent appointment of assistant engineer of maintenance of way, as above noted.

Charles D. Young, who has been appointed engineer of tests of the Pennsylvania Railroad, with office at Altoona, Pa., as has been announced in these columns, was born on May 19, 1878, at Washington, D. C., and was educated at Washington High School and at Cornell University. He began railway work in June, 1900, as a special apprentice on the Pennsylvania Lines West of Pittsburgh, Southwest system, and in March, 1903, was made assistant roundhouse foreman at Columbus, Ohio. The following August he was appointed machine shop foreman at the same place, and from January, 1904, to December, of that year, was in the testing department, as chief computer on the locomotive testing plant at the World's Fair, St. Louis, Mo. He was then appointed motive power inspector and was later superintendent of motive power, with office at Columbus, Ohio. In May, 1906, he was made assistant master mechanic at Fort Wayne, Ind., and the following October was appointed assistant engineer of motive power on the Southwest system of the Pennsylvania Lines West. Mr. Young was appointed assistant enginerr of motive power in the office of the general superintendent of motive power at Pittsburgh, Pa., in June, 1910, and now becomes engineer of tests, as above noted.

W. P. Hobson, whose appointment as superintendent of motive power of the Kentucky & Indiana general division, of the Chesapeake & Ohio, with office at Covington, Ky., has been announced in these columns, was born on June 29, 1869, in Goochland county, Va., and was educated in the public and private schools of that state. He began railway work on September 1, 1886, as a machinist apprentice in the shops of the Chesapeake & Ohio at Huntington, W. Va., and since that time has been in the continuous service of that company. Four years later he went to Hinton as a machinist, and in April, 1891, was promoted to night roundhouse foreman. Mr. Hobson was appointed general roundhouse foreman at Clifton Forge, Va., in 1901, and three months later he was made assistant master mechanic of the Huntington division at Hinton. In December, 1904, he was appointed master mechanic of the Ashland division, with office at Lexington, Ky., and in May, 1910, was transferred to the Cincinnati division, at Covington, which position he held at the time of his recent appointment as superintendent of motive power.

W. P. Hobson.

H. R. Safford, whose appointment as chief engineer of the Grand Trunk, with office at Montreal, Que., has been announced in these columns, was born at Madison, Ind., and was educated at Purdue University, Lafayette. He began railway work on July 1, 1895, with the Illinois Central in the engineering department as a rodman on second track work, and in December, of the same year, was transferred to the lake front improvements at Chicago. From 1896, to 1897 he was resident engineer, engaged in second track construction work, and then for two years was assistant engineer of general work, and the following year was assistant engineer of grade revision. Mr. Safford was roadmaster on various divisions, from March, 1900, to May, 1903, and was then appointed principal assistant engineer of the same road. In May, 1905, he was promoted to assistant chief engineer, becoming chief engineer of maintenance of way, in July, 1907. He left the service of the Illinois Central in May, 1910, to become assistant to the president of the Edgar Allen American Manganese Steel Company, and since May, 1911, he was chief engineer of the George B. Swift Company, from which position he resigned to become chief engineer of the Grand Trunk.

H. R. Safford.

Charles H. Moore, who has been appointed principal assistant engineer of the Erie Railroad, with office at New York City, as has been announced in these columns, was born on December 9, 1863, at Baltimore, Md. He graduated from Lafayette College in 1884, and also took a post graduate course. Mr. Moore began railway work in March, 1888, in the engineering department of the New York, Lake Erie and Western (now the Erie Railroad) as a rodman. In June, 1890, he was appointed [illegible] engineer of the Northern Railroad of New Jersey, which is operated by the Erie, and the following March was made assistant engineer of the New York, Lake Erie & Western. For one year, from March, 1891, he was assistant engineer of the Quaker City & North Eastern Construction Company, Philadelphia, Pa., and from that [illegible] assistant engineer of the Erie Railroad, east of the New York, Susquehanna & Western, and in April, 1899, was made first assistant engineer of the Erie. In 1901, Mr. Moore went on a [illegible] tour for the Erie Railroad, made a reconnoissance, preliminary survey and report for the government of Ecuador for a railway to connect the head of navigation on the Amazon river with the Pacific ocean. In December, 1901, he was appointed engineer of grade crossings of the Erie Railroad, which position he held at the time of his recent appointment as chief [illegible].

C. H. Moore.

George E. Dyal, whose appointment as superintendent of bridges and buildings of the Delaware, Lackawanna & Western, with office at Scranton, Pa., has been announced in these columns, was born on February 26, 1874, at Roseville, Ill., and was educated in the public schools and at the University of Illinois. He began railway work on May 24, 1897, in the engineering department of the Illinois Central, since which time he has been consecutively, rodman, instrument man, resident engineer and assistant engineer, in both the construction and maintenance departments. From March, 1904, to May, 1905, he was roadmaster of the Omaha division of the Illinois Central, and was then transferred to the St. Louis division. He was again transferred in the same capacity in July, 1907, to the Illinois division, and now becomes superintendent of bridges and buildings of the Delaware, Lackawanna & Western.

Purchasing Officers.

Louis F. Beneke has been appointed stationer of the Philadelphia & Reading and subsidiary companies, with office at Spring Garden station, Philadelphia, Pa., succeeding John S. Carter, deceased.

OBITUARY.

J. H. Sayle, until a few weeks ago general agent of the Chicago Great Western, with office at Milwaukee, Wis., died on his way to Tucson, Ariz., on October 13.

Frederick S. Capron, traveling passenger agent of the Grand Trunk for 20 years following the Civil war, died at Evanston, Ill., on October 17, at the age of 84 years.

H. M. Brownlee, trainmaster of the Knoxville division of the Louisville & Nashville at Knoxville, Tenn., died on October 13 from injuries he received from the falling of a crown sheet of an engine.

A. I. Miller, purchasing agent of the Missouri, Kansas & Texas system, with office at St. Louis, Mo., died at that place on October 11. Mr. Miller was 46 years old and had been with the Missouri, Kansas & Texas 23 years.

Archer Harman, who built the Guayaquil & Quito Railroad, now operating about 300 miles of railway in Ecuador, S. A., and who was president of that company, died at Hot Springs, Va., on October 9, from injuries sustained in an accident.

Henry W. Fuller, passenger traffic manager of the Chesapeake & Ohio at Washington, D. C., died at his home, in that city, on October 13. Mr. Fuller was born at Corning, N. Y., and began railway work in 1866 as a brakeman. From February, 1866, to March, 1869, he was sleeping car conductor for the Woodruff Sleeping Car Company, and then for three years was traveling advertising agent of the Atlantic & Great Western, and the Erie Railroad, at Kansas City, Mo. In 1872 he was appointed general southern agent of the Erie at Cincinnati, Ohio, and two years later was made general southwestern agent at Indianapolis, becoming general western passenger agent in 1878. He was appointed general passenger agent of the Chesapeake & Ohio in June, 1881, and passenger traffic manager in May, 1907. Mr. Fuller had been ill for many months of a complication of diseases. He was one of the best known passenger men in the country.

The Siberian Railway does not seem as yet to be a profitable enterprise. The operating expenses were 144 per cent. of the gross earnings in 1906, 139 per cent. in 1907, and 124½ per cent. in 1908. In this last year the deficit was $6,693,000, to which must be added the interest on the capital invested, $235,292,862, to find what Russia is paying for the development of its Asiatic territory and for national defence. There is some development of earnings on that part of the line which is west of Lake Baikal, which alone the Russians call the Siberian Railway. The line east of the lake is called the Trans-Baikal, and the 570 miles on the Pacific coast from Vladivostock northeastward, the Ussuri Railway. The earnings of these last two have decreased materially since 1906; but the Siberian proper actually had some net earnings in 1908, about $488 per mile, against a deficit of $692 in 1907. There is a considerable amount of cultivable land along this line, and it is nearer the markets for its wheat, butter, etc.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The New York Central has ordered 30 Pacific type locomotives from the Baldwin Locomotive Works.

The Buffalo, Rochester & Pittsburgh is said to have ordered 7 mikado locomotives and 3 Pacific type locomotives from the American Locomotive Company. This item has not been confirmed.

The Virginia & Southwestern has ordered 1 mikado locomotive from the Baldwin Locomotive Works. The dimensions of the cylinders will be 27 in. x 30 in., the diameter of the driving wheels will be 63 in. and the total weight in working order will be 269,000 lbs.

Roger Miller & Son, Toronto, Can., have ordered 2 four-wheel switching locomotives from the Montreal Locomotive Works. The dimensions of the cylinders will be 11 in. x 16 in.; the diameter of the driving wheels will be 33 in., and the total weight in working order will be 39,000 lbs.

P. Lyall & Sons, Montreal, Que., have ordered one four-wheel switching locomotive from the Montreal Locomotive Works. The dimensions of the cylinders will be 13 in. x 18 in.; the diameter of the driving wheels will be 36 in.; and the total weight in working order will be 56,000 lbs.

CAR BUILDING.

The Boston & Maine has ordered 13 sixty-foot mail cars from the Laconia Car Company.

The Vredensburg Sawmill Co., Pine Hill, Ala., is in the market for 20 fifty-ton logging cars.

The Long Island has ordered 20 motor cars, 15 coaches and 5 mail cars from the American Car & Foundry Company.

The Arms Palace Horse Car Company, Chicago, has ordered three special passenger train horse cars from the Pullman Company.

The Independent High Grade Oil Company, Pittsburgh, Pa., has ordered 20 steel tank cars from the Warren Foundry Company.

The Chicago, Milwaukee & St. Paul, it is said, will build 1,400 freight cars at the company's shops. This item has not been confirmed.

The Southern is making inquiries for 500 all-steel 50-ton drop bottom gondola cars and 50 all-steel underframe 30-ton ventilated box cars.

The Akron, Canton & Youngstown, Akron, Ohio, has ordered 50 gondola cars, 35 box cars and 15 flat cars from the American Car & Foundry Company.

The American Refrigerator Transit Company, St. Louis, Mo., has ordered 600 steel underframes for reinforcing refrigerator cars from the American Car & Foundry Company.

The Pennsylvania has ordered 35 coaches and 17 combination passenger cars from the Pressed Steel Car Company, and 30 coaches from the American Car & Foundry Company. This road is now in the market for 300 tank cars.

The Board of Public Works, San Francisco, will receive bids until November 1, on 43 double truck and double end pay-as-you-enter cars and 4 extra trucks complete with axles, wheels and motors, for the Geary Street Municipal Railway. James L. McCormick is secretary of the Board of Public Works, San Francisco, Cal.

The Buffalo, Rochester & Pittsburgh, as mentioned in the *Railway Age Gazette* of October 6, has ordered 1,500 fifty-ton all-steel hopper cars, divided equally between the Pressed Steel Car Company, the Cambria Steel Company and the Standard Steel Car Company. These cars will weigh 38,000 lbs. Their inside measurements will be 30 ft. long, 9 ft. 5½ in. wide and 10 ft. high; their over-all measurements will be 31 ft. 6 in. long over striking plates, 10 ft. wide and 10 ft. 8 in. high. The special equipment will be as follows:

Axles	Open hearth steel.
Bolsters, body	Steel.
Bolsters, truck	Gould cast steel on 1,000. Pittsburgh Equipment Co. cast steel on 500 (Pressed Steel Car Co.).
Brakes	New York on 1,000. Westinghouse on 500 (Cambria Steel Co.).
Brake beams	Waycott on 1,000. Buffalo on 500 (Standard Steel Car Co.).
Brake shoes	Steel backed.
Brasses	Lawrenceville bronze.
Couplers	Gould.
Draft gear	Miner friction on 500 (Standard Steel Car Co.). Sessions' on 500 (Pressed Steel Car Co.). Farlow spring on 500 (Cambria Steel Co.).
Dust guards	Bass wood.
Journal boxes	Symington.
Paint	B. R. & P. standard black paint.
Side bearings	Plain friction.
Springs	M. C. B.
Trucks	Andrews' truck frames.
Wheels	Cast iron.

IRON AND STEEL.

The Canadian Pacific is in the market for 50,000 tons of rails.

The Baltimore & Ohio has ordered 700 tons of bridge steel from the Mt. Vernon Bridge Company.

The Delaware & Hudson has ordered 500 tons of Bessemer rails from the Maryland Steel Company.

The Central of Georgia has ordered 30,000 tons of 90-lb. rails from the Tennessee Coal, Iron & Railroad Company.

The Pennsylvania has ordered 560 tons of bridge steel for the bridge over the Schuylkill river from the Pennsylvania Steel Company.

The Central of New Jersey has ordered 5,000 tons of bridge steel for two bridges over the Hackensack and Passaic rivers from the American Bridge Company.

The Wabash has ordered 752 tons of bridge steel from the American Bridge Company for a bridge over the Illinois river, and 132 tons of structural steel for the new reinforced concrete freight house and office building at Ft. Wayne, Ind., from the Illinois Steel Company.

General Conditions in Steel.—Although the volume of business in the steel industry is 10 per cent. greater than the average in the three big years of 1905, 1906 and 1907, the conditions are not good, the productive capacity exceeding the demand and there being no price agreement. New business is being booked which, were it not for the present low prices, would not have been received until after the first of the year. If the prices are not raised soon the buyers will be well stocked up and business will be at a very low ebb when they are finally increased to normal.

FOREIGN RAILWAY NOTES.

The Suez canal tolls will be reduced on January 1, 1912, to $1.30 a ton for freighted ships and $.82 for ships in ballast. This is a reduction of 9.65 cents a ton.

Bolivia now has 635 miles of railways in operation. Of this total, 487 miles represent the length of the older railways, while the balance is being operated provisionally by the contractors on new lines now being constructed.

A petition has been placed before the Argentine national senate for a concession to construct and operate for a period of 60 years, cable railways in various parts of the Argentine Republic. The application also covers the generation and supply of electric power.

A decree of the president of Paraguay, dated May 26, 1911, declares null and void the concession granted on June 1, 1909, for the construction of a railway from Asuncion to the mouth of the Iguazu river, and orders the forfeiture of the deposit of $10,000. Failure on the part of the consessionaire to fulfill the conditions imposed on him by the contract is given as the reason for the annulment.

Supply Trade News.

Albert H. Wiggin, president of the Chase National Bank, New York, has been made a director of the American Locomotive Company, New York, succeeding Julius E. French, deceased.

The Warner Equipment Company, Cincinnati, Ohio, has purchased the plant of the Cincinnati Equipment Company at that city, where it will make and repair steam shovels, dump cars, locomotives and contractors' machinery.

George T. Cooke, formerly mechanical inspector of the Pullman Company, Chicago, has been made southern representative of the Chicago Car Heating Company, Chicago, with office at Atlanta, Ga., succeeding A. G. DeLang, resigned.

The Roberts & Schaefer Company, Chicago, has received a contract from the Central New England for designing and constructing a 600-ton locomotive coaling station at Maybrook, N. Y. The approximate contract price will be $13,000.

George W. Greene, manager of the American Bureau of Inspection & Tests, Chicago, with office at Pittsburgh, Pa., has resigned to become mechanical engineer of the Hildreth-Jones Company, Chicago, and Hildreth & Company, New York.

The American Locomotive Company, New York, has received an order from the Western Pacific for one rotary snow plow of the scoop-wheel type, with 18 in. x 26 in. cylinders, and an order from the Chickamauga Quarry Construction Company, Chattanooga, Tenn., for one steam shovel.

In our Court News columns is a short account of the decree of the United States district court dissolving the National Electric Lamp Company, Cleveland, Ohio, which company, having control of the sale of incandescent lamps for the General Electric Company, Schenectady, N. Y., was found to be in unlawful restraint of trade under the Sherman anti-trust law.

C. F. McCuen, manager of the railway department of the International Correspondence Schools, Scranton, Pa., has resigned this position to become western manager of the Ward Equipment Company, New York, with office in Chicago. Mr. McCuen was in the mechanical departments of the Missouri Pacific and the St. Louis Southwestern for 12 years.

The Railway Steel-Spring Company, New York, has issued $3,500,000 (the amount authorized) first mortgage 5 per cent. gold bonds, secured on the real estate and plant acquired from the Inter-Ocean Steel Company, Chicago. These bonds will mature October 1, 1931. They are being offered at 97 and accrued interest by the Continental & Commercial Trust & Savings Bank, Chicago, by Harvey Fisk & Sons, New York; and by Jackson & Curtis, Boston.

The September sales of the Western Electric Company, Chicago, show a gain of 12 per cent. over August, and are the largest September sales in the history of the company. For the nine months to September 30 the gross earnings were 4 per cent. more than for the corresponding period of last year, and it is estimated that the gross earnings for the full year will be [illegible] the company expects to occupy an additional 200,000 sq. ft. of floor space at its Hawthorne plant, including a new general merchandise building.

Gano Dunn, for many years first vice-president and chief engineer of the Crocker-Wheeler Company, Ampere, N. J., and a former president of the New York Electrical Society, has been made a director and a vice-president of J. G. White & Company, Inc., New York. Mr. Dunn has just returned from abroad, [illegible] he has been attending the International Electrical congress at Turin, Italy, and the meeting of the International Electro-[illegible] international uniformity of standards and practice in the electrical industry.

[illegible] and electric railways, which will be made at the Coliseum and First Regiment armory, Chicago, March 18-23, 1912, when the American Railway Engineering Association and the Railway Signal Association hold their meetings. The Railway Appliances Association has been incorporated under the name of the National Railway Appliances Association. The arrangement of the main floor space in the Coliseum will be almost the same as last year, but the balconies will not be used. In order to provide for the increasing demand for space, the First Regiment armory, adjoining the Coliseum, has been leased, which will give an additional 16,000 sq. ft. of floor space. The price of the floor space will be $0.45 per sq. ft., the additional charge of five cents per sq. ft. over last year, having been made because of the necessity of buying fixtures this year, instead of renting them as heretofore. The first allotment of space will be made on or about November 1, by the executive committee of the association. Therefore it is advisable to have all applications for space in the hands of the secretary, Bruce V. Crandall, 537 South Dearborn street, Chicago, before that date.

TRADE PUBLICATIONS.

Crayons.—The Zelnicker Crayon Works, St. Louis, Mo., has published a small illustrated folder on its crayons for marking cars, etc.

St. Louis Southwestern.—The passenger department of this company has published and is distributing a very attractive steel engraving, 23 in. x 50 in. of the double track bridge across the Mississippi river at Thebes, Ill.

Locomotive Cranes.—The Brown Hoisting Machinery Company, Cleveland, Ohio, has published a 55-page fully illustrated booklet entitled Brownhoist, showing a number of typical installations of cranes. Little attempt is made to describe them in detail.

Pumps.—The De Laval Steam Turbine Company, Trenton, N. J., has published a reprint of the report by Francis Head on the test made at the Torresdale filter plant on the Delaware river. The tests were made on six of the engine-driven pumps and the turbine-driven pump and extended over one years' time.

Electrical Equipment.—The General Electric Company, Schenectady, N. Y., has published in bulletin No. 4834 an article on the Electrical Equipment of the Detroit River Tunnel, reprinted from the *Electric Railway Journal* of January 14 and 21. The subject is treated in detail. The bulletin contains illustrations of exterior and interiors of converter and transformer sub-stations; it shows various methods of construction and insulation, as well as the size of locomotives and the location of the apparatus; also the construction and size of the tunnels and sub-station wiring.

Batteries.—Thomas A. Edison, Incorporated, Orange, N. J., has published a reprint of an argument comparing the relative economy of primary batteries and lead type portable storage batteries for railway signal operation. This article was prepared by E. E. Hudson, of the Edison Manufacturing Company, Orange, and read at the meeting of the Railway Signal Association, held in Chicago on March 20, 1911, with extracts from discussions and other additions in reply to a paper prepared by A. H. McKeen, signal engineer of the Oregon-Washington Railroad & Navigation Company, entitled Portable Storage Batteries as Applied to Automatic Signals on the Harriman Lines. Both of these papers were published in the daily edition of the *Railway Age Gazette* for March 21, 1911.

FOREIGN RAILWAY NOTES.

The Chilean press has opened a campaign against the service of the Transandine Railway. The line belongs to and is operated by two independent companies, one of which receives a subvention from the Chilean government. A leading Chilean paper [illegible] amalgamation of the now divided service and responsibility.

The survey now being carried on by engineers of the Central Railroad, Dominican Republic, for the deviation of the rack railway from San Marcos to Barrabas, is progressing rapidly. Upon the completion of the survey the construction of the line will be begun. This railway will establish a more rapid and comfortable connection between Santiago and Puerto Plata.

Railway Construction.

New Incorporations, Surveys, Etc.

Baltimore & Ohio.—This company has completed the work of changing the narrow gage line to standard gage, from Foxburg, Pa., via Kane to Mt. Jewett, 94 miles. Many sidings and industrial spur tracks were widened at the same time. The improvements included widening the cuts, strengthening the bridges and tressels, lengthening culverts and drains, moving section platforms, water tanks, coal and limestone tipples. The line has been laid with 85-lb. rail.

British Columbia (Electric).—An officer writes that a contract has been given to Moore & Petrick, and work is now under way, building from Victoria, B. C., north through the Saanich Peninsula to a point not yet decided upon, about 20 miles. The work will be fairly heavy, and maximum grade will be 2.5 per cent. A. T. Goward, manager, and G. M. Tripp, superintendent, Victoria, B. C. (October 6, p. 690.)

Canadian Roads.—Plans are being made to build a line from Gibson, N. B., to Minto, 33 miles, to provide a connection between the Canadian Pacific and the Grand Lake coal fields, as well as an outlet to the west for the coal. Sir Thomas Tait, Minto, N. B., is back of the project.

Canadian Northern Ontario.—The Gowganda sub-division has been extended from Gowganda Junction, Ont., to Ruel, 13 miles. A. F. Stewart, chief engineer, Toronto, Ont.

The first section of the Toronto-Montreal line, 110 miles, has been open for traffic between Toronto, Ont., and Trenton.

Canadian Pacific.—The Irricana sub-division of the Alberta division, has been opened for business from Irricana, Alberta, to Standard, 36.5 miles. J. G. Sullivan, chief engineer, Winnipeg, Man.

Chicago, Milwaukee & St. Paul.—The report of this company for the year ended June 30, 1911, shows that additional second main track has been completed on the La Crosse division from Camp Douglas, Wis., to West Salem, about 39 miles, except on a gap of about three miles west of Tunnel City; on the River division from Wabasha, Minn., to Minneiska, about 17 miles; from Richmond to Whitman, about 25 miles, and on the Prairie du Chien division from Elm Grove, Wis., to Blue Mound Junction, about 7 miles. During the year 72 steel bridges, aggregating 8,181 ft. in length, and 85 masonry bridges, aggregating 6,428 ft, in length, were built, replacing 9,433 ft. of wooden bridges, 4,811 ft. of iron bridges, and 365 ft. of embankment, and 662 wooden culverts were replaced with iron. About 2.2 miles of pile bridges were filled with earth, 76 bridges having been completely filled and 88 reduced in length by filling.

Clear Lake.—This company has plans made, it is said, to build extensions from Hopeland, Cal., east four miles, and south and west from Lakeport, five miles. C. M. Hammond, president, Upper Lake. (July 14, p. 104.)

Durham & South Carolina.—An officer writes that a contract has been given to John McKenney, Lynchburgh, Va., and grading work will be started at once on an extension of this line. The company expects to carry lumber, logs, wood, fertilizer and general merchandise, as well as secure through connections with the Raleigh & Southport and the Atlantic Coast Line. A. L. Cornell, chief engineer, Durham, N. C. (September 16, p. 1167.)

Fresno, Coaling & Tidewater (Electric).—An officer writes that this company and the Fresno Coalinga & Monterey, expects to let contracts very soon to build from Fresno, Cal., via Hollister and Salinas to Monterey. The work includes building a 1,400-ft., and an 800-ft. steel bridge, and there will be an 800-ft. tunnel. Some station buildings are also to be put up. The line is being built to carry grain, hay, oil, fruits, wine and oil-well supplies. A. Albrecht, secretary, and J. S. Bates, chief engineer, Fresno, Cal. (June 30, p. 1714.)

Fresno, Coalinga & Monterey.—See Fresno, Coalinga & Tidewater.

Grand Trunk.—See Southern New England.

Grand Trunk Pacific.—Regarding the progress of work on this line, President C. M. Hays recently made the following statement: "During the last fiscal year track-laying on the main line of the Western division had been extended from Wolf Creek, Alb., to Fitzhugh, west of the Athabaska river, in the Rocky mountains, which is 1,027 miles west of Winnipeg, Man., and will be made the divisional point for that section. Construction work is under full headway, with night and day forces, to Tete Jaune Cache, B. C., on the Fraser river beyond Yellowhead Pass, on the western slope of the Rocky mountains, and it is expected that track-laying will reach this point, which is 1,094 miles west of Winnipeg, before the close of the year. In the western provinces the company has under construction at the present time approximately 1,400 miles of branch lines, considerable portions of which have already been completed, the latter includes the lines to Yorkton, Sask., Canora, Regina and Moose Jaw. Lines are also under construction to Prince Albert, Battleford, Calgary, Alb., and Lethbridge, which will place all these cities in direct communication with the main line. Branch lines are also being built into the rich coal fields west of Edmonton. On all sections of the line which have been sufficiently completed trains are at present in operation. Throughout the country to be traversed by the company's lines it is proposed to construct a number of first-class modern hotels, a contract has been let for the construction of a large hotel in the city of Winnipeg at a cost of $1,300,000. Good progress has been made in the construction work on the Eastern division, and the present condition of that work shows a total of 1,223.45 miles of main line track and 136.50 miles of side track laid, and the remaining portions of this section are all under contract. Of the total 5,133 miles of railway, there has been laid at the present time, about 3,300 miles of main line track, and on some large sections on which the construction of the roadbed is already far advanced, a large addition will be made to the mileage within the next few months." B. B. Kelliher, chief engineer, Winnipeg, Man. (October 6, p. 690.)

Houston & Texas Central.—According to press reports, surveys have been made for the cut-off from Giddings, Texas, northeast via Caldwell, to Stone City, about 50 miles, and it is understood that construction work will be started soon. I. A. Cottingham, engineer m. w. and structures, Houston, Tex. (August 25, p. 391.)

Hudson & Manhattan.—The New York Public Service Commission, First district, has extended the time to April 28, 1912, for the completion of the extension from Thirty-third street, New York City, in the borough of Manhattan, to Grand Central station. J. V. Davies, chief engineer, 30 Church street, New York.

Intercolonial Railway.—A contract has been let, it is said, to M. P. Davis, to build the branch from Dartmouth, N. S., to Deans. A contract has also been let to the Nova Scotia Construction Company to build the Guysboro Country Harbor line from Guysboro to Country Harbor cross-roads, thence to deepwater at Country Harbor. W. B. MacKenzie, chief engineer, Moncton, N. B. (August 25, p. 391.)

Kansas City, Mexico & Orient.—A new extension was put in operation last month from San Angelo, Tex., to Barnhart, 55 miles. The line is now being extended west of Barnhart and work is expected to be finished to Fort Stockton, 164 miles from San Angelo, by January, 1912, and to Alpine, 65 miles additional, by April, 1912. W. W. Colpitts, chief engineer, Kansas City, Mo.

Louisville & Nashville.—The Washiota & Black Mountain has been extended from Baxter, Ky., south to Benham, 24 miles, and a line is now in operation between Pineville and Nield, 5.4 miles. W. H. Courtenay, chief engineer, Louisville, Ky.

Maine Central.—This company is now laying new rail on the line between Lewiston, Me., and Waterville. The company is also relocating about five miles of line near Bingham, to secure easier curves and grades. T. L. Dunn, chief engineer, Portland, Me.

Missouri, Oklahoma & Gulf.—The Bromide branch has been opened for business from Bromide Junction, Okla., to Bromide, 4 miles. J. J. Harrison, chief engineer, Muskogee, Okla.

Nashville, Lafayette & Eastern.—An officer writes that this company, which was recently incorporated in Tennessee, proposes to build from Westmoreland, Tenn., on the Louisville & Nashville, to Lafayette, and to Burnside, Ky., about 100 miles, where connection is to be made with the Queen & Crescent.

W. H. Whorley, chief engineer, Nashville, Tenn. (September 15, p. 544.)

Natchez, Columbia & Mobile.—An officer writes that this company, which operates a line from Norfield, Miss., to Log Switch, 20 miles, is building an extension southeast towards Morgantown. R. B. Butterfield, general manager, Norfield, Miss. (February 17, p. 334.)

Nevada-California-Oregon.—An officer writes that contracts had been given to Maney Bros. & Co., and Gibson & Tedford, for building an extension from a point north of Alturas, Cal., north via Willow Ranch, to Lake View, Ore., and work is now under way. (April 28, p. 1016.) G. S. Oliver, chief engineer, Reno, Nex.

Northern Illinois (Electric).—An officer writes that a contract has been given to Burns & Co., Chicago, and work is now under way building from Amboy, Ill., northeast to Rochelle. The company now operates about 10 miles of line. J. J. Burns, manager and engineer, 705 Isabella building, Chicago. (February 17, p. 334.)

North Louisiana & Gulf.—The line between Danville, La., on the Hodge division, and Walsh on the Bienville division, has been completed, and the entire line from Hodge to Bienville, 25.7 miles, has been opened for traffic. J. S. Hunt, general manager, Bienville, La.

Northern Pacific.—Work is to be started at once, it is said, to complete the extension of the Missouri River Railway (Mandan Northern Line) north to Hensler, N. D., 43 miles from Mandan. W. L. Darling, chief engineer, St. Paul, Minn.

North Yakima & Valley.—This company is said to have started construction work on an extension into the Cowiche district, Wash., about 12 miles. George Donald, president, North Yakima, Wash.

Pennsylvania Northern.—Incorporated in Pennsylvania, with $500,000 capital, to build a 50-mile line between Clarion, Pa., and Hallton, about 30 miles. H. Buckingham, president, Clarion. C. Miller, Franklin, is also interested in the project.

Portland & Southeastern.—According to press reports, arrangements have been made to start work on an extension from the present southern terminus at Albritton, Ark., south to Lake Providence, La., thence southwest to the Vicksburg, Shreveport & Pacific, in the northern part of Madison parish, about 50 miles. Charles P. Conger, general manager, St. Louis, Mo. (February 3, p. 258.)

Quebec Railway Light & Power Co.—Trains are now in operation from Beauport Junction, Que. (formerly Beauport), which is 2.8 miles from Quebec to Kent House, 3.5 miles. C. E. A. Carr, general manager, Quebec, Que.

Sacramento Short Line (Electric).—It is said that work is to be started soon on the lines projected from Oakland, Cal., northeast to Sacramento and to other points in the Sacramento valley, by this company and the San Jose Short Line, which was recently incorporated in California. Some of the incorporators are identified with the United Properties Company, and include B. M. Aikens, R. P. Henshaw, D. W. Mordecai and F. L. Stewart. (February 3, p. 258.)

Southern Pacific.—An officer writes that the Willamette Pacific, which is an auxiliary corporation of the Southern Pacific, will build a line from Eugene, Ore., via Suislaw river west to the Pacific ocean, thence south to Marshfield, 123 miles. Engineers are now locating the line, and it is expected that construction work will be started as soon as the right-of-way is secured [illegible] company expects to haul a traffic in timber, farming and dairy products. C. R. Breck is chief engineer of the Willamette Pacific, Eugene, Ore. (August 18, p. 357.)

[illegible] has been open for traffic from Hamilton, Tex., west of Comanche. W. T. Eaton, chief engineer, Tyler, Tex.

[illegible] to press reports [illegible] for an extension from [illegible] Tex., [illegible] to San Antonio, and it is understood that surveys will be started in the near future. W. B. Drake, vice-president, Ft. Worth, Tex.

Sumter & Choctaw.—This road has been extended from Edna, Ala., to Choctaw City, 7 miles. E. F. Allison, president and general manager, Bellamy, Ala.

Temiskaming & Northern Ontario.—A new branch has been opened for business from Iroquois Falls, Ont., to South Porcupine, 27 miles. S. B. Clement, chief engineer, North Bay, Ont., Canada.

Tennessee & Tombigbee.—An officer writes that surveys are now being made for a line from Red Bay, Ala., on the Illinois Central, east via Belgreen, Rockwood, Newberg, Mt. Hope and Moulton to Decatur, 74.48 miles. There will be three 60-ft. bridges and one trestle about 600-ft. long, also several smaller structures. The line expects to find a traffic in iron ore, stone, timber and farming products. Contracts for the work have not yet been let. A. J. Hackett, president, and W. R. Coleman, chief engineer, Red Bay, Ala.

Texas & Pacific.—An officer writes that this company is now relaying certain sections of the line with 6,000 tons of 75-lb. rail. C. S. Chamberlain, chief engineer, Dallas, Tex.

Southern New England.—This company, which was organized by the Grand Trunk to build from the Central Vermont through Palmer, Mass., to Providence, R. I., has petitioned the Massachusetts Railroad Commission for authority to issue $1,000,000 of stock. The estimated cost of the line is $3,711,632. $1,000,000 was paid in at the time the articles of association were signed. It is now desired to formally organize the company. Already some $50,000 has been spent. The proceeds of the stock will be used mainly for securing right of way, construction and equipment.

Tombigbee Valley.—This road has been extended from Souwilpa, Ala., to Toxey, 7.5 miles. William Toxey, chief engineer, York, Ala.

Union Pacific.—This company has just opened for traffic an additional section of double-track, it is said, and the company now has double-track all the way from Omaha, Neb., to Julesburg, Colo., 372 miles. There is over 600 miles of double-track between Omaha, Neb., and Ogden, Utah, and the remaining 400 miles between those two points will be double-tracked within the next three years. R. L. Huntley, chief engineer, Omaha, Neb. (May 5, p. 1085.)

United Properties Company.—See Sacramento Short Line.

Willamette Pacific.—See Southern Pacific.

RAILWAY STRUCTURES.

Aberdeen, Wash.—The Oregon-Washington Railroad & Navigation Company has given a contract to Alexander Pearson, Seattle, for putting up a freight terminal in Aberdeen, Wash., to cost $15,000. (September 29, p. 616.)

Calgary-Alberta.—According to press reports this company is planning to put up shops at Calgary, to cost $1,500,000.

Calumet, Ind.—The Cudahy Packing Company, South Omaha, Neb., is building a plant at Calumet, Ind., for constructing, repairing and rebuilding its own refrigerator cars and tank cars, to replace the main plant at South Omaha, Neb., which was recently burned.

Charleston, Ill.—The Chicago & Alton is taking bids on a one-story brick passenger station to replace the structure recently destroyed by fire.

Clarksburg, W. Va.—According to press reports, the Baltimore & Ohio has decided to make improvements at a cost of $1,000,000 during the next two years at Clarksburg. The work includes putting up a new freight station, which is to be finished by next spring, at a cost of $150,000, and building sheds at once to cost an additional $150,000 at the passenger station.

Cordova, Alaska.—The Copper River & Northwestern has started work on car and machine shops in Cordova.

Fairbury, Neb.—The Chicago, Rock Island & Pacific is planning to remodel its freight yard and to build a new passenger station to replace the one burned last summer.

Flushing, N. Y.—The Long Island Railroad recently gave a contract to F. H. Clements & Co., Philadelphia, Pa., for eliminating nine grade crossings in Flushing, over the following thoroughfares: Lawrence street, Main street, Parsons avenue, Percy street, Wilson avenue, Boerum avenue, Murray street and Broadway. It is estimated that the work will cost about $400,000.

Fresno, Cal.—See Fresno, Coalinga & Tidewater.

Galveston, Tex.—The Gulf, Colorado & Santa Fe has completed plans for a steel and concrete passenger station and office building. The structure will be 100 ft. x 125 ft. at the base and eight stories high, and will cost approximately $500,000. It is expected that all contracts will have been let and construction commence by January 1, 1912.

Houston, Tex.—According to press reports, the International & Great Northern is planning to make improvements to its freight terminals at Franklin and Jacinto streets in Houston.

Maybrook, N. Y.—A contract has been given by the Central New England to the Roberts & Schafer Co., engineers and contractors, Chicago, for the design and construction of a 600-ton locomotive coaling station, to be built at Maybrook, N. Y., at a cost of $13,000.

Meridian, Cal.—The Northern Electric and Colusa and Sutter counties will jointly build a bridge, it is said, over the Sacramento river at Meridian. The estimated cost of the improvement is $241,000.

Philadelphia, Pa.—An officer of the Pennsylvania Railroad, writes regarding the reports that work is to be started at once on a large elevator to be built at Philadelphia, Pa., that plans have not yet been prepared for this structure.

Richmond, Cal.—Announcement has been made that the Atchison, Topeka & Santa Fe will construct a pier 1,000-ft. long and 150-ft. wide at Richmond. The pier will have four tracks.

Riverhead, N. Y.—During the past year the Long Island Railroad has put up new stations at Riverhead, Greenlawn, Hillside, Merillon avenue and Forest Hills. These buildings cost in the neighborhood of $75,000. With the exception of Forest Hills station, all the buildings were put up by the company's construction department. Work is now under way on a new station at Bayshore.

Rossville, Ill.—The Elgin, Joliet & Eastern is planning to build a new and larger roundhouse to replace the present 5-stall structure.

San Bernardino, Cal.—The Atchison, Topeka & Santa Fe will build a concrete retaining wall, it is said, at the bridge over the Mojave river, to cost $10,000.

Slater, Mo.—The Chicago & Alton has let a contract for building an addition to its roundhouse, an addition to its powerhouse, a new machine shop and a 90-ft. turntable. The total cost of the improvements is $25,000.

Vallejo, Cal.—The Vallejo & Northern is planning to put up terminal buildings, it is said, in Vallejo, Cal.

FOREIGN RAILWAY NOTES.

Construction work on the Potosi Railway, Bolivia, is being rapidly pushed. On June 10, 1911, rails had been laid as far as kilometer 79. This line will traverse the highest region of Bolivia.

Work on the Uyuni-Tupiza Railway, in Bolivia, was formally inaugurated June 8, 1911. It is proposed to also build a branch that will connect this line with the railway from Quiaca to Buenos Aires, Argentina.

The Southern San Paulo Railway Company, an English corporation, has recently been registered in Brazil. The purpose of the company is to obtain from the government of the state of Sao Paulo, Brazil, a concession for the construction, equipment and operation of a railway in that state, connecting Santo Antonio do Juquia with Santos. The company also proposes to purchase or lease other lines and tramways with the object of operating them in connection with this line. The company is capitalized at $4,000,000.

Railway Financial News.

Chicago & Milwaukee.—It is understood that a committee of the Chicago & Milwaukee bondholders will buy the property at foreclosure sale, which will probably take place late in October. This will complete the reorganization which has been in progress for four yeras.

Denver, Northwestern & Pacific.—Stockholders have authorized an increase in the capital stock from $20,000,000 to $40,000,000, half of which is to be preferred and half common. Issues of $40,000,000 first mortgage 5 per cent. bonds and $8,000,000 6 per cent. income bonds have also been authorized. Holders of the present outstanding 4 per cent. bonds will be offered in exchange for each $1,000 bond, $500 in the new 5s and $500 in the 6 per cent. incomes. President W. G. Evans says: "We are not able to tell our stockholders that the extensions of the road have been financed, but under existing conditions there is not a doubt that this will be accomplished."

Denver & Rio Grande.—E. D. Adams, of the Deutsche Bank, of Berlin, Germany, has been elected a director to fill one of the vacancies created when the directors voted to increase the number of the board from nine to eleven. No permanent selection has yet been made to fill the other vacancy.

Detroit, Toledo & Ironton.—The special master appointed by the circuit court has issued a notice to all creditors of the Detroit, Toledo & Ironton that their claims must be filed before November 20.

Ferdinand Railway.—This road, which runs from Ferdinand, Ind., to Huntingburg, seven miles, has been sold under foreclosure proceedings for $20,000. The new company which is to take over operation of the road is the Ferdinand Railroad.

Grand Trunk.—See an item in regard to the organization of the Southern New England in Railway Construction news.

Illinois Central.—President C. H. Markham has been elected a director succeeding ex-President Harahan.

International & Great Northern.—The Texas Railroad Commission has finally formally approved an issue of $13,750,000 International & Great Northern refunding 5 per cent. bonds. These bonds are deposited to secure $11,000,000 3-year 5 per cent. notes. The Texas commission places a valuation on the International & Great Northern of $30,365,047.

Long Island.—The New York Public Service Commission, Second district (state) has authorized the Long Island Railroad to issue $4,000,000 10-year 4 per cent. bonds to be given to the Pennsylvania Railroad in payment of advances made by that company to the Long Island for new lines, equipment and acquisition of real estate.

Memphis Union Station.—Potter, Choate & Prentice, New York, have bought $2,100,000 2-year 5 per cent. notes, secured by $2,500,000 Memphis Union Station first mortgage 50-year 4 per cent. bonds. Both the notes and the bonds are guaranteed by the Louisville & Nashville, Nashville, Chattanooga & St. Louis, St. Louis, Iron Mountain & Southern; Southern Railway and the St. Louis Southwestern. From the proceeds of the sale of the bonds the railway company is to retire $1,500,000 2-year notes, which mature November 1, and to provide money for the completion of the property.

Portland Terminal Company.—This company, which is controlled by the Boston & Maine, has asked permission from the Maine railway commission to issue $10,000,000 bonds to pay for terminal property and to make betterments.

New Orleans, Mobile & Chicago.—B. F. Yoakum, chairman of the St. Louis & San Francisco, is quoted from Mobile as confirming the rumor of the acquisition by Frisco of a controlling interest in the New Orleans, Mobile & Chicago. Mr. Yoakum says that the Frisco does not own all of the stock of the new road, but has increased its holdings sufficiently to give it control. The Mobile line will be operated independently.

Wabash.—Howard Gould has been elected a director, succeeding J. T. Terry, resigned.

Wisconsin Central.—W. F. Fitch, of Marquette, Mich., has been elected a director, succeeding Newman Erb, of New York, resigned.

ANNUAL REPORTS

FOURTEENTH ANNUAL REPORT OF THE CHICAGO, INDIANAPOLIS & LOUISVILLE RAILWAY COMPANY.

CHICAGO, September 20, 1911.

To the Stockholders of the Chicago, Indianapolis and Louisville Railway Company:

The Board of Directors submit the following report of the affairs of the Company for the fiscal year ended June 30, 1911:

INCOME STATEMENT.

	1911.	1910.	Increase or Decrease.	
Miles of Road Operated....	616.63	615.75	Inc.	0.88
Gross Operating Revenues..	$6,186,878.62	$6,020,241.92	Inc.	$166,636.70
Total Operating Expenses..	4,257,162.67	3,948,135.34	Inc.	309,027.33
Net Operating Revenue....	$1,929,715.95	$2,072,106.58	Dec.	$142,390.63
Taxes	268,445.08	268,653.94	Dec.	208.86
Operating Income	$1,661,270.87	$1,803,452.64	Dec.	$142,181.77
Other Income	204,307.95	237,954.88	Dec.	33,646.93
Total Gross Income.....	$1,865,578.82	$2,041,407.52	Dec.	$175,828.70
Deductions from Total Gross Income, for fixed charges, including interest on funded debt	1,152,991.75	1,179,827.11	Dec.	26,835.36
Balance of Income over Charges, carried to credit of profit and loss.....	$712,587.07	$861,580.41	Dec.	$148,993.34

DIVIDENDS.

During the year the regular dividends were declared, paid and charged to Profit and Loss, as follows:

Preferred stock dividends Nos. 22 and 23, each two per cent., making four per cent. for the year.....$200,000.00

Common stock dividends Nos. 18 and 19, each one and five-eighths per cent., making three and one-quarter per cent. for the year 341,250.00

A statement of the accounts of the Company in the usual detail will be found in the tables hereto annexed.

The accounts have been examined by The Audit Company of New York, and their certificate is made a part of this report.

FUNDED DEBT.

On August 1, 1911, there matured and were redeemed by this Company the $2,300,000 of 6 per cent. bonds of the Louisville, New Albany and Chicago Railway Company, which were secured by a first mortgage upon the main line from the Illinois State line (Hammond, Ind.) to Indianapolis. The funds for this redemption were derived from the sale, prior to the close of the fiscal year, of a like amount of the Refunding Mortgage 4% bonds, Series C, of this Company, which had been reserved for that purpose. The discount on the Series C bonds so sold, as well as the balance of discount on the Series C bonds sold a year ago to refund the $3,000,000 Louisville, New Albany and Chicago Main Line 6s of 1910, was charged during the year to Profit and Loss. This last refunding operation will result in a further reduction of the current fixed charges in the amount of $54,000 per annum, and leaves the Refunding Mortgage a first and closed mortgage upon all the main lines of this Company; but of the entire outstanding issue of $15,000,000 of Refunding Mortgage bonds there are still held free in the Treasury of the Company $1,558,000 of the 5% series.

On March 15, 1911, there were created and issued $425,000 Equipment Four and one-half Per Cent. Gold bonds, Series A, payable in twenty substantially equal semi-annual installments to and including March 15, 1921. These bonds were delivered in part payment for certain necessary new equipment, viz.: 10 locomotives, 300 freight train cars, and 8 passenger train cars, constructed at a total cost of $525,241.64, the remainder of the cost, about [illegible] of this issue, being paid in advance by the Company.

OPERATING CONDITIONS.

The operating revenues for the year were the largest in the history of [illegible] tions of an American railway that six years ago, when the operating revenues for the year ended June 30, 1905, were 9.33% less than they are this year, the operating income was 19.17% greater than it is this year. The [illegible] of the basis of nearly every unit of [illegible]

[illegible] Maintenance of Way and Structures, $1,766,[illegible] General Expenses [illegible]

[illegible] and much [illegible] expenses and [illegible] the [illegible] Company, and a substantial [illegible] Company, [illegible] in the case of the year was of heavy [illegible] [illegible] of [illegible] [illegible] [illegible]

Miles of Track Laid with New Rail	42.07	21.46	20.61	96.04
New Ballast Placed in Track—Cubic Yards	47,436	34,560	128.76	37.26
Total Miles of Ballasted Track June 30	571.16	571.16	0.00	00.00
Percentage of Ballasted Track to Total Main Track Mileage Maintained	98.87	98.87		
Maintenance of Equipment.				
Total Charges	$878,721.75	$822,784.82	$55,936.93	6.80
Ratio to Operating Revenues	14.20	13.67	0.53	3.88
Ratio to Operating Expenses	20.64	20.84	—0.20	0.96
Average Number of Locomotives on Hand during the Year	127	122	5	4.10
Cost of Repairs per Locomotive, excluding Renewals and Depreciation	$2,723.26	$2,359.34	$363.92	15.42
Cost of Repairs per Locomotive, including Renewals and Depreciation	$2,978.38	$2,709.25	$269.13	9.93
Average Cost of Repairs of Locomotives per Mile Run, excluding Renewals and Depreciation (Cents)	8.08	6.95	1.13	16.26
Average Cost of Repairs of Locomotives per Mile Run, including Renewals and Depreciation (Cents)	8.84	7.98	0.86	10.78
Average Number of Passenger-Train Cars on hand during Year	107	107	0.00	0.00
Cost of Repairs per Passenger-Train Car excluding Renewals and Depreciation	$749.54	$753.32	—3.78	0.50
Cost of Repairs per Passenger-Train Car, including Renewals and Depreciation	$882.84	$905.01	—22.17	2.45
Average Number of Freight-Train Cars on hand during Year	5,985	6,023	—0.38	0.63
Cost of Repairs per Freight-Train Car, excluding Renewals and Depreciation	$49.21	$44.41	4.80	10.81
Cost of Repairs per Freight-Train Car, including Renewals and Depreciation	$57.35	$57.28	0.07	0.12
Traffic Expenses.				
Total Charges	$201,556.09	$175,640.94	$25,915.14	1.48
Ratio to Operating Revenues	3.26	2.92	0.34	11.64
Ratio to Operating Expenses	4.73	4.45	0.28	6.29
Transportation Expenses.				
Total Charges	$2,193,183.83	$1,973,814.49	$219,369.34	11.11
Ratio to Operating Revenues	35.45	32.79	2.66	8.11
Ratio to Operating Expenses	51.52	49.99	1.53	3.06
Transportation Expenses per Revenue Train Mile (Cents)	68.65	63.53	5.12	8.06
Locomotive Costs per Mile Run				
Enginemen (Cents)	7.96	7.09	0.87	12.27
Enginehouse Expenses (Cents)	1.64	1.74	—0.10	5.75
Fuel (Cents)	10.52	10.96	—0.44	4.01
Water (Cents)	.58	.53	0.05	9.43
Lubricants (Cents)	.30	.27	0.03	
Other Supplies (Cents)	.23	.26	—0.03	11.11
Total (Cents)	21.23	20.85	0.38	1.82
Average Number of Miles Run per Locomotive	37,196	37,334	—1.38	0.37
Average Number of Miles Run per Ton of Coal	11.88	11.94	—0.06	0.54
Coal Consumed—Tons	360,205	347,102	131.03	3.77
Train Costs per Mile Run				
Trainmen (Cents)	13.14	11.40	1.74	15.26
Train Supplies and Expenses (Cents)	3.16	2.92	0.24	8.22
Total Train Costs per Mile Run (Cents)	16.30	14.32	1.98	13.83

TWELFTH ANNUAL REPORT OF THE COLORADO & SOUTHERN RAILWAY COMPANY.

Denver, Colo., July 1, 1911.

Mr. D. Miller,
President,
Chicago, Ill.

Dear Sir:—I herewith submit the report for the fiscal year ended June 30, 1911, which report combines the operations and affairs of the lines operated by the companies named, and which are herein designated as the "Colorado & Southern Lines":

COLORADO & SOUTHERN LINES,
YEARS ENDED JUNE 30.

1911.	Per Cent. of Total Operating Revenues.	OPERATING REVENUES.	Per Cent. of Total Operating Revenues.	1910.
$11,120,361.01	70.27	Freight Revenue	71.77	$12,040,828.39
3,870,671.92	24.46	Passenger Revenue	23.35	3,918,092.98
216,068.73	1.37	Mail Revenue	1.02	170,391.82
280,613.32	1.77	Express Revenue	1.94	324,657.66
265,927.08	1.68	Miscellaneous Transportation Revenue	1.48	249,187.27
67,508.78	.43	Revenue from Operations other than Transportation	.43	72,652.85
2,913.67	.02	Joint Facilities	.01	2,169.76
$15,824,064.51	100.00	Total Operating Revenues	100.00	$16,777,980.73
		OPERATING EXPENSES.		
$1,688,223.20	10.67	Maintenance of Way and Structures	13.04	$2,188,644.76
2,779,142.78	17.56	Maintenance of Equipment	15.03	2,521,272.66
239,692.26	1.51	Traffic Expenses	1.64	274,271.16
5,112,951.78	32.31	Transportation Expenses	32.06	5,378,794.21
514,101.32	3.25	General Expenses	2.98	500,472.19
10,334,111.34	65.30	Total Operating Expenses	64.75	10,863,454.98
5,489,953.17	34.70	Net Operating Revenue	35.25	5,914,525.75
33,285.20	.....	Net Deficit from Outside Operations	.....	22,323.59
5,456,667.97	.....	Total Net Revenue	.....	5,892,202.16
478,323.05	.....	Taxes Accrued	.....	477,869.64
4,978,344.92	.....	Operating Income	.....	5,414,332.52
		OTHER INCOME.		
$42,920.85		Rents		$41,582.18
602,300.10		Miscellaneous Interest		586,043.92
645,220.95		Total Other Income		627,626.10
$5,623,565.87		Gross Corporate Income		$6,041,958.62
		DEDUCTIONS FROM GROSS CORPORATE INCOME.		
$471,846.44		Rents		$390,258.35
959.68		Miscellaneous Interest		3,975.05
2,811,682.34		Interest Accrued on Funded Debt		2,661,033.74
6,085.10		Extinguishment of Discount on Securities Sold		
34,399.94		Sinking Funds		35,058.19
3,324,973.50		Total Deductions		3,090,325.33
2,298,592.37		Net Corporate Income		2,951,633.29
1,300,000.00		Dividends		1,300,000.00
$998,592.37		Balance		$1,651,633.29
482,598.38		One-half of Deficit Trinity & Brazos Valley Railway Co.		466,718.00
$515,993.99		Surplus		$1,184,915.29

The percentage of Operating Revenues required for Operating Expenses was 65.30% as compared with 64.75% in the previous year, and the proportion of the Gross Corporate Income required for Interest on Funded Debt was 49.99% as compared with 44.04% in the previous year.

During the fiscal year, Refunding and Extension Mortgage Bonds of this Company were issued to cover expenditures for:

Additions and Betterments for the calendar year 1910	$1,067,890.00
And First Mortgage Bonds of C. S. & C. C. D. Ry. Co. were retired through Sinking Fund	33,000.00
Deferred Rentals under Equipment Leases were discharged	375,226.18
Making the net increase in Mortgage, Bonded and Secured Debt	$659,663.82

There were sold from the treasury of the Company $3,407,000.00 face amount of Refunding and Extension Mortgage Bonds; the proceeds of which reimbursed the treasury for expenditures made for new lines, equipment, and additions and betterments.

There were charges to Capital Account aggregating $4,770,749.55 for additions to the property. Of this amount there was expended for:

Structures and Machinery	$168,131.74
Substituting Permanent Bridges for Wooden Ones	104,226.05
New Line—Southern Jct. to Walsenburg Jct.	1,344,037.27
New Line—Wellington to Cheyenne	844,802.09
Extension of Cheyenne Terminals	68,119.08
Additions to Denver Terminals	56,393.14
Elimination of Grade Crossings—Denver	103,872.67
Additions to Trinidad Terminals	20,587.54
Extension of Main Line	11,785.70
Additional Spur and Industry Tracks	44,844.72
Additional Yard Tracks and Sidings	50,665.15
Various Other Additions and Betterments	188,757.16
Additional Equipment	1,764,527.24

During the fiscal year the deficit from operations of The Trinity & Brazos Valley Railway Company was made up equally by The Chicago, Rock Island & Pacific Railway Company and The Colorado & Southern Railway Company. Construction of the new passenger terminals at Houston has been completed and paid for, and the terminals and passenger station have been in use since February last.

The new line of double track railroad which is being built in conjunction with the Denver & Rio Grande Railroad Co. between Southern Junction and Walsenburg Junction is nearing completion, and will be opened for operation about October 15, 1911.

This Company has since its organization in 1899 operated its trains over the tracks of the Union Pacific Railroad Co. between Denver and Cheyenne. Owing to increased business of both companies it was deemed advisable to construct a new line of single track railroad between Wellington, Colorado, and the northernmost point on the Fort Collins District, to Cheyenne, Wyo.; there to connect with this Company's Wyoming Division, and also with the Chicago, Burlington & Quincy Railroad. This new line, which will be thirty-two miles long, will be opened for operation about October 15, 1911.

The following statistical tables have been compiled in the form required for the Annual Report of carriers to the Interstate Commerce Commission:

CAPITALIZATION.

CAPITAL STOCK.

Designation.	Number of Shares.	Total Par Value Outstanding.	Dividends Declared During the Year. Rate.	Amount.
C. & S. Ry. Common	310,000	$31,000,000.00	2%	$620,000.00
C. & S. Ry. First Preferred	85,000	8,500,000.00	4%	340,000.00
C. & S. Ry. Second Preferred	85,000	8,500,000.00	4%	340,000.00
Colorado R. R.	5	500.00	...	.....
Denver & Interurban R. R.	7	700.00	...	.....
C. S. & C. C. D. Ry. Common.	9	900.00	...	.....
F. W. & D. C. Ry., including $23,584.00 "Stamped"	254	25,484.00	...	.....
W. V. Ry.	9	900.00	...	.....
W. F. & O. Ry.	9	900.00	...	.....
W. V. R. R.	9	900.00	...	.....
A. & N. Ry.	9	900.00	...	.....
S. & N. W. Ry.	9	900.00	...	.....
F. W. & D. T. Ry.	9	900.00	...	.....
Total	480,329	$48,032,984.00	...	$1,300,000.00

FUNDED DEBT.

Designation. Mortgage Bonds.	Total Par Value. Outstanding.	In Hands of Public.	Interest Accrued During Year.
C. & S. First 4 %	$19,402,000.00	$19,402,000.00	$776,080.00
*C. & S. Refunding and Extension 4½%	29,306,439.36	29,288,900.00	1,281,746.86
C. S. & C. C. D. First 5 %	1,638,000.00	1,638,000.00	82,518.20
C. S. & C. C. D. First Consolidated 5 %	1,379,000.00	1,379,000.00	68,950.00
F. W. & D. C. First 6 %	8,176,000.00	8,176,000.00	490,560.00
†F. W. & D. T. First 6 %	728,000.00	300,000.00	18,000.00
Equipment Liens Deferred Rentals.			
C. & S., Series "A"	618,000.00	618,000.00	33,450.00
C. & S., Series "Pullman"	120,898.00	120,898.00	6,969.70
F. W. & D. C., Series "A"	234,000.00	234,000.00	14,300.00
F. W. & D. C., Series "B"	228,000.00	228,000.00	12,350.00
F. W. & D. C., Series "Pullman"	404,006.72	404,006.72	23,290.88
F. W. & D. C., Series "[illegible]"	52,000.00	52,000.00	3,466.65
Total	[illegible]	$61,840,804.72	$2,811,682.34

*$17,539.36 in Treasury or Pledged as Collateral.
†$428,000.00 in Treasury or Pledged as Collateral.

EXPENDITURES FOR NEW LINES AND EXTENSIONS AND EQUIPMENT, AND FOR ADDITIONS AND BETTERMENTS, DURING THE YEAR.

Account.	New Lines and Extensions. From Current Funds.	Additions to Betterments From Current Funds.	Total Expenditure.
I.—ROAD.			
Engineering	$75,960.04	$6,200.77	$82,160.81
[illegible]	[illegible]	41,212.05	167,664.62
[illegible]		8,117.75	8,117.75
[illegible]	[illegible]	35,317.92	1,388,113.46
[illegible]	[illegible]	122,021.01	509,390.22
[illegible]	[illegible]	34,281.35	116,401.25
[illegible]	[illegible]	62,517.41	167,390.71
[illegible]	[illegible]	9,139.23	11,997.90
[illegible]	[illegible]	45,987.05	77,652.83
[illegible]	[illegible]	41,651.56	48,663.16
[illegible]	[illegible]	20,550.25	37,495.95
[illegible]		660.66	660.66
[illegible]	[illegible]	3,517.09	5,593.07
[illegible]	[illegible]	88,789.54	88,805.69
[illegible]		1,846.52	1,846.52
[illegible]		1,933.94	1,933.94
[illegible]		85,932.63	85,932.63
[illegible]		16,697.67	16,697.67
[illegible]		9,464.74	9,464.74
Water Stations	3,395.94	25,450.40	28,846.34
Electric Power Transmission	.....	61,323.71	61,323.71
Miscellaneous Structures	.....	14,231.51	14,231.51
Rent of Equipment	3,720.08	.....	3,720.08
Repairs of Equipment	264.90	.....	264.90
Injuries to Persons	175.12	.....	175.12
Cost of Road Purchased	21,306.59	1,850.00	23,156.59
Total	$2,219,107.07	$738,694.76	$2,957,801.83
II.—EQUIPMENT.			
Steam Locomotives	.....	$325,150.92	$325,150.92
Passenger Train Cars	.....	36,945.64	36,945.64
Freight Train Cars	.....	1,570,472.61	1,570,472.61
Work Equipment	.....	Cr. 168,041.93	Cr. 168,041.93
Total	.....	$1,764,527.24	$1,764,527.24
III.—GENERAL EXPENDITURES.			
Stationery and Printing	$481.33	$97.58	$578.91
Insurance	578.04	.....	578.04
Interest and Commissions	45,110.18	Cr. 1,343.67	43,766.51
Other Expenditures	3,467.52	29.50	3,497.02
Total	$49,637.07	Cr. $1,216.59	$48,420.48
Grand Total	$2,268,744.14	$2,502,005.41	$4,770,749.55

MILEAGE STATISTICS.

Items.	1911. Miles.	1910. Miles.	Increase or Decrease. Miles.
Locomotive Mileage—Revenue Service.			
Freight Locomotive Miles	4,105,325	4,420,210	Dec. 314,885
Passenger Locomotive Miles	3,278,421	3,465,007	Dec. 186,586
Mixed Locomotive Miles	391,838	503,447	Dec. 111,609
Special Locomotive Miles	20,538	1,554	Inc. 18,984
Switching Locomotive Miles	1,495,698	1,738,234	Dec. 242,536
Total Revenue Locomotive Mileage	9,291,820	10,128,452	Dec. 836,632
Non-revenue Service Locomotive Miles	153,828	274,651	Dec. 120,823
Car Mileage—Revenue Service.			
Freight Car Miles.			
Loaded	56,653,374	61,776,103	Dec. 5,122,729
Empty	28,354,241	29,351,158	Dec. 996,917
Caboose	3,636,904	3,865,744	Dec. 228,840
Total Freight Car Miles	88,644,519	94,993,005	Dec. 6,348,486
Passenger Car Miles.			
Passenger	8,204,832	8,611,478	Dec. 406,646
Sleeper, Parlor and Observation.	2,128,060	2,351,700	Dec. 223,640
Other Passenger Train Cars	3,110,462	3,537,025	Dec. 426,563
Total Passenger Car Miles	13,443,354	14,500,203	Dec. 1,056,849
Special Car Miles.			
Freight, Loaded	157,671	8,003	Inc. 149,668
Freight, Empty	19,643	694	Inc. 18,949
Caboose	16,747	956	Inc. 15,791
Passenger	92,114	4,858	Inc. 87,256
Sleeper, Parlor and Observation.	24,969	3,534	Inc. 21,435
Other Passenger Train Cars	16,804	23,026	Dec. 6,222
Total Special Car Miles	327,948	41,071	Inc. 286,877
Total Revenue Car Mileage	102,415,821	109,534,279	Dec. 7,118,458
Non-revenue Service Car Miles	1,712,906	3,102,603	Dec. 1,389,697
Train Mileage—Revenue Service.			
Freight Train Miles	3,623,380	3,845,897	Dec. 222,517
Passenger Train Miles	3,192,406	3,363,329	Dec. 170,923
Mixed Train Miles	254,492	288,677	Dec. 34,185
Special Train Miles	20,386	1,554	Inc. 18,832
Total Revenue Train Mileage	7,090,664	7,499,457	Dec. 408,793
Non-revenue Service Train Miles	152,710	264,645	Dec. 111,935

Following is the report of the General Auditor, with statements prepared by him.

Respectfully submitted,

A. D. PARKER,
Vice President.

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E. A. Simmons, *President.*

L. B. Sherman, *Vice-President.* Henry Lee, *Sec'y & Treas.*

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IF every railway passenger would report to a general officer of the road every instance of poor service, neglect or incivility encountered on his journeys, making his letter full, accurate and prompt, our passenger service would be greatly improved. Of course, passengers cannot afford the time and care necessary to do this, and so we must be satisfied to expect only sporadic crops of useful passengers' reports. Very bad service will quite generally come to the railway officers' attention; and very particular people, having leisure, perhaps temporary, in which to write a letter, will report cases not so bad. The superintendent and the G. P. A. ought, of course, to maintain good service without prodding by the passengers, but we cannot tell when that millenium will arrive. We have brought up this topic at this time simply to commend a woman who is strong-minded (in the good sense of that term), and whose letter we print, for having complained to a railway in a proper and effective manner. She has not given us many details of her story. But the lady's letter is reasonable and forcible, and we fancy that its quality had something to do with its effectiveness. Every complainer should be just as good a diplomat as he can. It is profitable many times to buy or borrow diplomatic ability, if one is not skilled in that art. One should not make his letter so brief as to encourage a clerk to bury it out of sight; and, on the other hand, one should also take care not to bury the passenger agent's clerk in the profusion of one's words. At the same time, a reference to flowers and blue skies may be just the thing to give your letter the individuality necessary to secure for it the best attention.

BAGGAGE receives a good many favors to which it is not entitled. Why should a passenger with a large and heavy trunk pay the carrier no more than does the man with a small suitcase, cared for by himself? Or, granting that the trunk should be carried free, why should the public demand 100 per cent. perfection in the baggage department? That is more than is attained by any department. These queries arise in a consideration of the complaints of numerous passengers who, in returning from their summer vacations, about September 1-5, have to wait a day or more for their trunks. We do not say that all or any queries of this kind should be answered unfavorably to the passenger; but they are worth examination. "In Europe they do these things differently" we are often told; but even in Europe Mr. Roosevelt had to attend a dinner in his traveling clothes because his trunk was delayed. Around Labor Day a large American passenger station has to increase its baggage-handling forces 50 per cent. or more, and it is not strange that mistakes happen, for these added men are inexperienced. One manager admits that misbranding of baggage occurs from this cause. But what can be done? Can the passenger fairly ask that these extra men shall be trained in baggage-room work and kept on call throughout the year? Not, we should say, unless he is willing to pay something for the accommodation. Again, it is to be remembered that baggage work requires not only skill but long experience. At a busy junction the check men must have a thousand obscure routes at their tongue's end, for the passenger going to some distant small town asks him to do in one or two minutes a job that might reasonably demand three or five minutes, and scores of these passengers present themselves at once. Station men—ticket, baggage and freight—are so expert in making the principal combinations of routes and rates that their operations never fail to astonish passengers; and then they turn around and express surprise when the baggageman fails to do equally well in *all* his work; which would be possible only if baggagemen were geniuses, able to earn as many thousands as they receive hundreds. A large proportion of baggage delays are due to missing trains at junctions. A comprehensive remedy would be to allow longer time between trains for re-checking and to always keep the baggage cars with the passenger cars; but would that be the best way? In a rush-period like that, when three weeks' passengers return home in three days, delays are inevitable, and the problem is to meet these in the simplest way possible. Experienced travelers do it by carrying in their own hands enough clothes to get along without their trunks for at least two days. Is it unreasonable to ask the passenger to do this always or else to send a trunk or two by express a day before? The cost of expressage would be less than the cost of organizing a railway baggage service which could meet all emergencies.

IN short, it is fair—though it is very hard to convince the passenger of the fairness—to ask the public to put up with occasional inconvenience, in consideration of the low price that it pays. The difficulty of getting a passenger to put up with a slight loss on the ground that the system is the most economical for all passengers will always be with us, no doubt. The public is being educated, in a slight degree, in accepting inconvenience for the

sake of economy, by the practice, which is growing on many roads, of running trains with small baggage space. Trains which formerly included a whole car now allot to baggage a half of a smoking car or even a smaller fraction; and suburban trains, with no baggage space at all are very common. The smaller the baggage space, the greater the liability of inconvenience to some one. A considerable sprinkling of passengers send baggage ahead voluntarily. Whether or not the railway can increase the number of these is a question. People whose demands on the carriers seem to be boundless grow no fewer as time passes, and the men who act as the advocates of that class of people are increasing at an alarming rate. The small merchant who suffers an injustice at the hands of a railway—perhaps a really or supposedly burdensome freight rate on the empty boxes that he returns to some factory—has no difficulty at all in getting the whole community to take up his fight. The merchants establish a bureau and the man whom they put at the head of it spends his days and nights in getting things from the railways. With the Interstate Commerce Commission, the state commissions, the railways that are ready to cut a rate to beat a competitor whenever it can be done legally, and the advantages he enjoys from his acquaintance with his former associates, the railway traffic officers, it is a cold day when the "commissioner" cannot get something. Take, for example, the persistent opposition of certain Chicago people to the railways' efforts to reduce trunks to a reasonable size. They seem likely to carry their point by sheer persistency. We do not say that there is no justice in their demand for delay; but whatever the equitable decision is, or ought to be, those railway officers who are trying to adjust questions of this kind on the basis of economy and the general good are likely to find that their method of treatment is too "academic" to be finally acceptable. The outcome is pretty sure to depend not on logic or philosophy, but on which side possesses the greatest powers of patience and persistency.

BOSTON & MAINE.

THE annual report of the Boston & Maine for the last fiscal year appears in changed form, both outwardly and inwardly. Its pages have been amplified to correspond with those of the owning corporation, the New York, New Haven & Hartford, and the operating statements of the two systems are also made more nearly alike. As in the case of the New Haven, the Boston & Maine this year for the first time presents a "combined" set of figures showing income and expense—that is to say, a combination of the parent company and its subsidiaries, the latter eight in number, though for some reason not explained, the important Maine Central is not included. The subsidiaries that are included are not large—indeed only raise, for example, the total operating increase of the main corporation ($44,815,084) to $46,624,409. A combined statement for all the New Haven lines, owned or controlled, however, may not have to wait for actual mergers, and in such a showing the magnitude of the whole system may be revealed. It may be noted in this connection, that the gross revenue of the New Haven (combined) of the Boston & Maine (combined) and of the Maine Central amount in the past year to $142,923,17[illegible] to which might be added the gross earnings of the Ontario & [illegible] and large earnings of Massachusetts [illegible] which the New Haven owns, a holding [illegible] control. Total gross revenue of the properties in question [illegible] $150,000,000.

[illegible] Boston & Maine it is a single property [illegible] 2,500 miles and a single [illegible] $400 [illegible] capital to [illegible] [illegible] [illegible]

though the latter system and its force are much larger. This confirms the point raised at the time of the Boston & Maine wage increase that its force had been receiving a lower wage than normal on other lines, and the increase was consequently larger.

Considering the fact that the Boston & Maine is a system that is in the rebuilding, the year's operation and results bring out some interesting features. Its ratio of operating expense to revenue, 72.27 per cent. in 1910, rises to 78.43 per cent. With the new efficiency it will be strange if this large ratio is not materially cut down and, perhaps, ultimately fall toward the New Haven's present ratio of about 65.7 per cent. The company came out well in the matter of taxes, which rose only from $2,076,880 to $2,089,905. Hire of equipment shows the considerable rise from $752,670 to $848,580—an item that ought to fall low hereafter with the use of the new equipment purchased. The most noteworthy event of the year indicating the cost of rehabilitating the system has been the issue of 106,637 shares of common stock, which at the end of the fiscal year had brought in $11,077,935. In its stockholdings the company still remains a Massachusetts corporation with 5,319 shareholders in that state owning 368,929 shares, and only 47,863 shares held elsewhere—but in that connection must be remembered the New Haven's majority stock vested in its Boston Holding Company. The balance of the stock—except a small remnant—of the Worcester, Nashua & Rochester line, amounting to 12,689 shares, has been bought, and the old lease practically extinguished. With the merger, that company's stock disappears from the list of stocks and bonds owned, which reduces from $11,619,463 to $8,846,626, the most important holdings being 55,514 shares of the Fitchburg, with ledger value of $5,488,304, and the Maine Central holding of 25,160 shares, with ledger value of $2,516,000.

This last controlled property, which, whether regarded financially or as a feeder, is a most important asset of the Boston & Maine, paying 8 per cent. on an original investment at par, may fitly have its showing for the fiscal year annexed to that of the controlling corporation. As in the case of its owner, it shows a large decrease in the net applicable to dividends, which fell from $662,487 in 1910 to $431,036 in 1911, and its surplus over dividends has been for the latter year but $32,884. A slight increase in operating revenues of $145,490 was a good deal more than offset by an increase in operating expenses of $466,261, of which $374,989 went to increase in the pay rolls. The property is to undergo extensive refinancing. The capital stock of $4,995,700 is to be practically doubled by a vote of the stockholders last July, and next year $5,000,000 more stock will be issued to provide in part for the maturity of the company's consolidated mortgage bonds and notes (together, $15,484,000) and a new mortgage of $25,000,000 is to be placed on the property. In connection with these large financial operations appears the significant statement of the president: "It has been decided to reduce the regular dividend rate—now 8 per cent.—to a basis of 6 per cent., by reason of the uncertainty and agitation in regard to financial conditions prevailing throughout the country." The extensive financing, together with expenditures of $2,397,872 for new equipment and of $2,867,225 for additions and betterments, outline on the large subsidiary much of the same process of modernizing that marks the Boston & Maine.

The annexed table shows the principal figures for the operation of the Boston & Maine in 1911 as compared with 1910:

	1911.	1910.
Mileage operated	[illegible]	[illegible]
Freight revenue	$25,891,481	$25,451,[illegible]
Passenger revenue	15,524,431	14,655,065
Total operating revenue	44,815,084	42,680,707
Maintenance of way and structures	6,006,110	[illegible]
Maintenance of equipment	6,348,135	[illegible]
Traffic	500,350	544,016
Transportation	21,229,175	19,075,788
Total operating expenses	35,148,703	31,[illegible]
Taxes	2,089,905	2,076,880
Operating income	7,644,711	9,991,230
Gross corporate income	8,506,216	10,732,983
Net corporate income	355,988	2,850,621
Dividends	1,958,971	1,868,520
Surplus	*1,602,982	982,101

*Deficit.

NORFOLK & WESTERN AND CHESAPEAKE & OHIO.

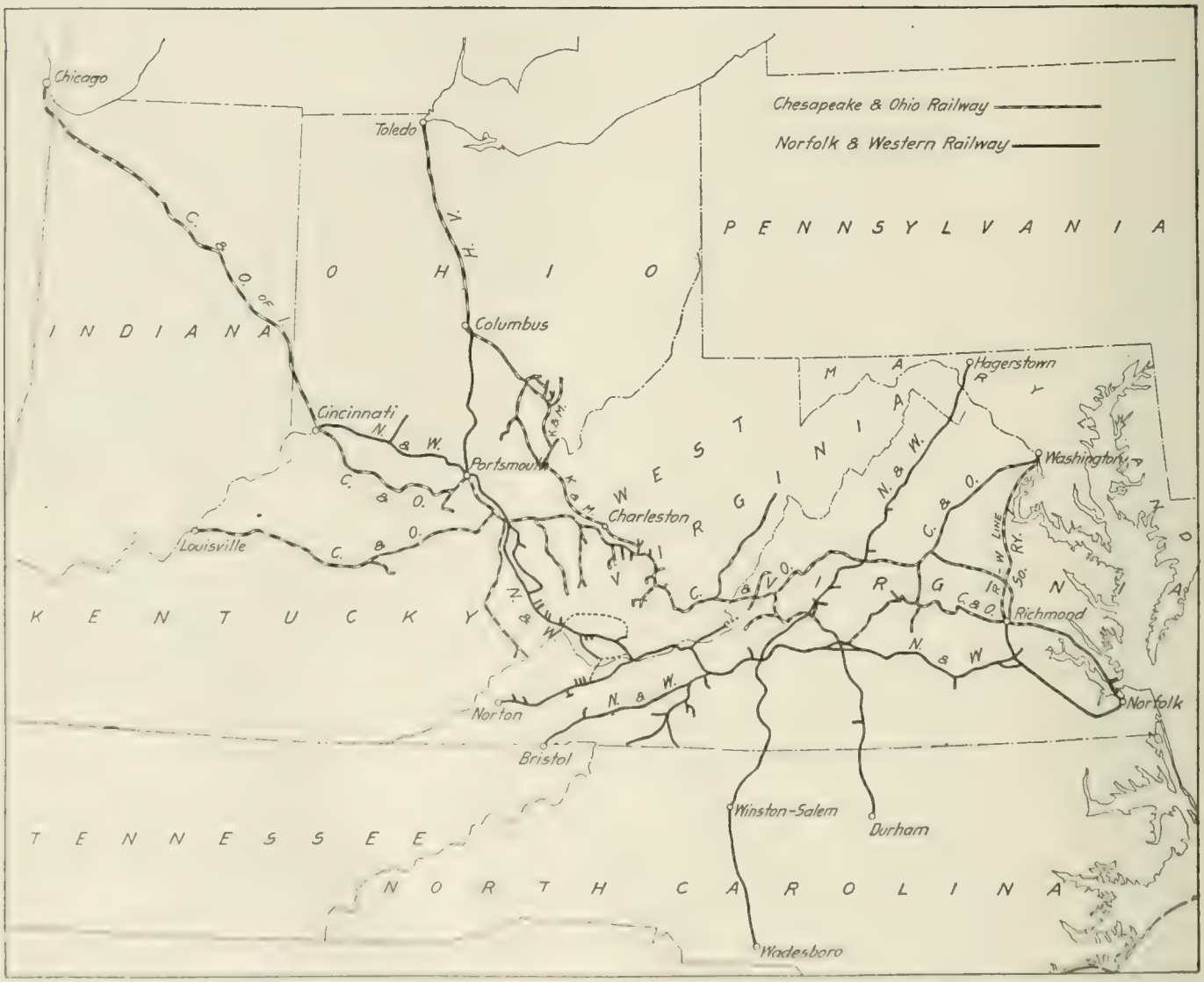
WHEN the annual report of the Norfolk & Western for the fiscal year ended June 30, 1911, was made public a few weeks ago, showing a decrease of $1,300,000 in net corporate income and a surplus of only $576,000 after the payment of 5 per cent. on the common stock, as compared with a surplus of $1,117,000 in the year before, there was no particular expression of either surprise or disappointment on the New York Stock Exchange. It is rather interesting, therefore, to note that when the Chesapeake & Ohio report was made public last Saturday there was a distinct expression of disappointment on the floor of the Stock Exchange, because the Chesapeake & Ohio showed a surplus of only $89,000 after the payment of 5 per cent. dividends on its common stock. Superficially, the difference in the way in which the two reports were received is easily explained. In the first place, the Norfolk & Western has a longer record of larger dividends earned and paid, while the Chesapeake & Ohio only paid 1 per cent. dividends from 1899 to 1909, and then the dividend rate was raised first to 4 per cent. and then to 5 per cent. Moreover, the comparatively small difference between the surplus shown by the Chesapeake & Ohio and that shown by the Norfolk & Western does not correctly show the difference between what was earned net in that year by the two companies. The Chesapeake & Ohio made no charge to income for additions and betterments, while the Norfolk & Western charged $2,597,000 to income for expenditures which the Interstate Commerce Commission classifies as additions and betterments.

A more detailed comparison of the operation of the two roads, however, appears to indicate that what really happened in 1911 in Chesapeake & Ohio operation was exactly what might have been expected by those familiar with the policy that is being pursued by the present management of the company, and probably the showing made by the road last year is neither a surprise nor a disappointment to them. The present management of the C. & O. bought control of the property after it had been sold to the banking firm of Kuhn, Loeb & Company by the Pennsylvania Railroad. The new management almost at once began a very much more aggressive policy, both from a financial standpoint and from the operating and traffic man's standpoint. Control of the Hocking Valley was bought, and also a half interest in the Kanawha & Michigan, giving the Chesapeake & Ohio its own line to Toledo, and when the old Chicago, Cincinnati & Louisville was sold under foreclosure it was bought in by the Chesapeake & Ohio of Indiana, and the line is now known as the Chicago line of the C. & O., and is operated as part of the main line of the C. & O. This year is the first in which the operations of the Chicago line are included with the C. & O. figures. There has been no such expansion and consequent strain on the Norfolk & Western. Its control by the Pennsylvania and the consequent close traffic relations between the two roads make it unnecessary for the Norfolk & Western to have a line of its own either to the Great Lakes or to Chicago. When, therefore, a year of very much higher operating costs struck both the Norfolk & Western and the Chesapeake & Ohio, the N. & W. could fall back on its reserve, while the C. & O. had little reserve to fall back on. The two companies might be likened to two men, one middle aged, with an accumulation of wealth, and one just beginning a business career. When these two men should come into financial difficulties, the older could draw on his reserve; the younger's reserve really consists in his future. And this is true of the Chesapeake & Ohio; its reserve consists in its potential power to increase its earnings when the benefits of its expansion can be realized.

There is hardly another pair of roads in the country that make as good a comparison, from the point of view of plant, business and capitalization, as the Chesapeake & Ohio and the Norfolk & Western. The accompanying map shows how closely parallel the two lines are between the Atlantic seaboard and Cincinnati. The profiles show that the C. & O. has somewhat the best of it as to grades. In 1911 the N. & W. operated an average road

mileage of 1,972 miles; the C. & O., 2,229 miles. In the case of the C. & O., this includes the Chicago line but not, of course, the Hocking Valley, which is operated separately, although shown on our map. Both the Norfolk & Western and the Chesapeake & Ohio are double-tracked the greater part of the way from Tidewater to Cincinnati. Here again, however, the C. & O. has a little the best of it, having 420 miles of second-track, as against 389 for the N. & W. The N. & W., however, has 1,059 miles of sidings; the C. & O., 858. Mention is made in our Railway Construction news columns of the second-track work that is now under way both on the C. & O. and the N. & W.

The Chesapeake & Ohio has $30,514 of stock outstanding per road mile owned and leased, $80,741 of bonds outstanding per



The Chesapeake & Ohio and Controlled Lines and the Norfolk & Western.

$11,000 per mile is subtracted from the outstanding capitalization of the C. & O., the two roads are capitalized at almost exactly the same amount per mile. With plant and capitalization so nearly alike, it is quite fair to compare the business handled and operating statistics.

In 1911 the revenue from freight traffic on the C. & O. was $25,590,000,* and from passenger traffic, $5,513,000; on the N. & W. freight traffic amounted to $30,115,000, and passenger traffic to $4,184,000. Care, therefore, must be taken, in comparing operating statistics, to bear in mind that the passenger business on the C. & O. is relatively more important than it is on the N. & W. Last year the Chesapeake & Ohio carried 23,358,000 tons, of revenue freight, an increase of 466,000 tons over 1910;

[illegible] and $2,472 of equipment trust certificates of the C. & O. Equipment Corporation, which are guaranteed by the parent company and upon which corporation the C. & O. rents the rolling stock by which the certificates are secured. It is therefore, not to be considered that equipment certificates are a capital obligation of the C. & O. and the total security outstanding per mile of road owned for the Chesapeake & Ohio amounts to $114,1[illegible]. The Norfolk & Western has $48,[illegible] of stock outstanding per mile, and $54,[illegible] of bonds and equipment trust certificates, a total of $103,303 per mile. But, as has already been explained, the C. & O. has an investment not only in property but also in the stock and bonds of the Hocking Valley and the Kanawha & Michigan and other railway companies, and these securities are pledged under its mortgages. They are carried on the 1911 balance sheet at a valuation of $23,317,000, or about $11,000 per mile, and if this

while the Norfolk & Western carried 25,828,000 tons, an increase of 416,000 tons over the tonnage carried in 1910. On the C. & O., 15,393,000 tons out of the total was bituminous coal, and on the N. & W., 15,468,000 tons was bituminous coal. In the case of the Chesapeake & Ohio there was an increase of 319,000 tons in bituminous coal, while on the Norfolk & Western there was an increase of 1,482,000. The N. & W. carried a large tonnage of coke also. Last year the tonnage of this commodity was 1,970,000, while the C. & O. carried only 308,000 tons of coke last year. In both cases the tonnage carried in 1911 was very materially less than that carried in 1910. The Norfolk & Western report does not divide the tonnage as between that originating on its own line and that delivered to it by connections,

*In all cases where figures are given for the C. & O. for 1911 they include the Chicago line, unless specifically stated otherwise.

but the C. & O. proper, not including the Chicago line, originates 87.67 per cent. of its total tonnage, while the Chicago line originates only 28.08 per cent. of its own traffic. There is, however, quite a large local traffic that is naturally tributary to the Chicago line, and it is the expectation of the management to develop quite a large business for this line from its own territory. The N. & W. divides its traffic as between local and foreign; and, of the 25,828,000 tons carried, 2,183,000 tons was foreign business destined to foreign lines, and 23,645,000 tons was what is called local business, being either from foreign lines to local points, from local points to foreign points, or from one point on the line to another.

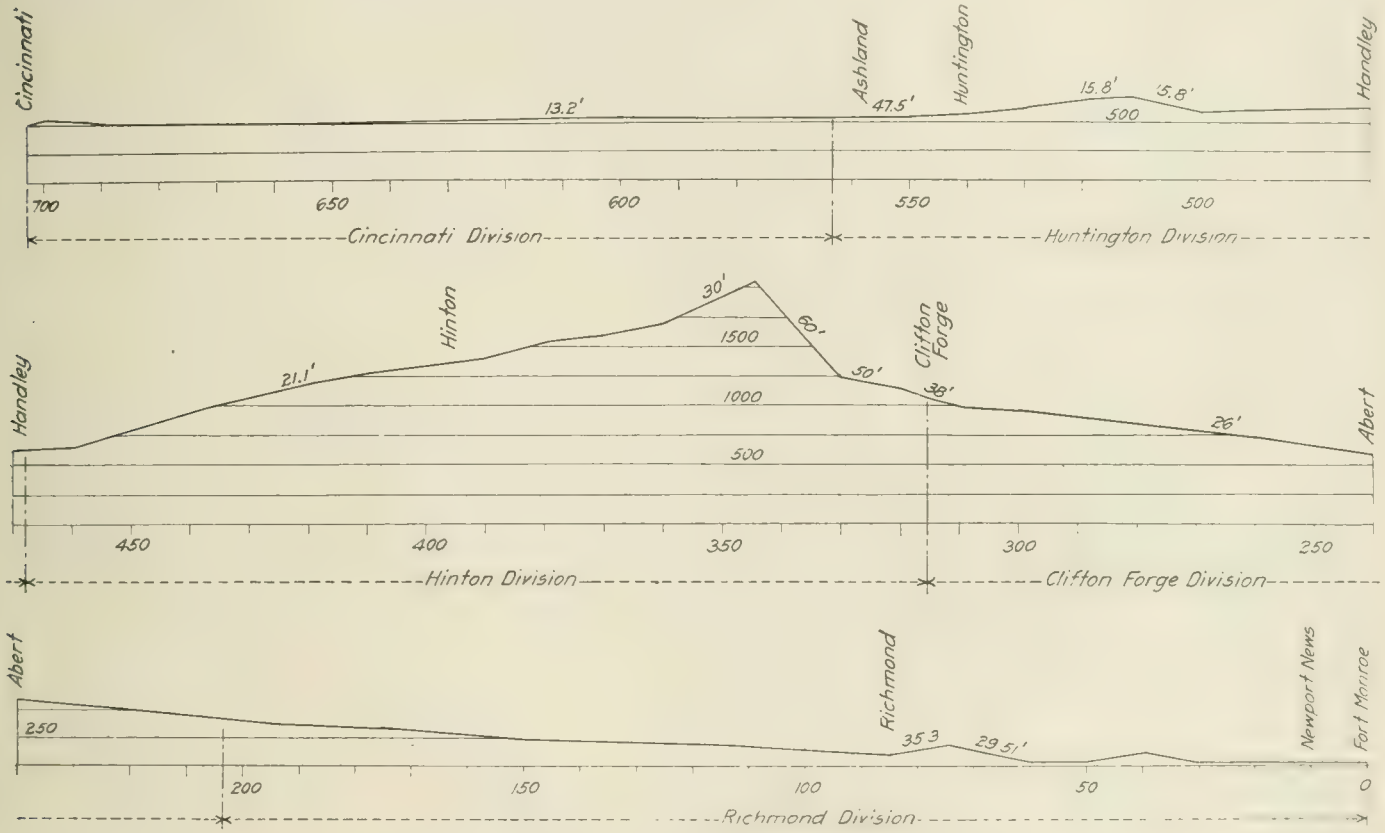
It is hardly fair as yet to compare traffic figures for the Chesapeake & Ohio lines, including the Chicago line, with the Norfolk & Western, because of the physical condition of the Chicago line, but comparing the figures for the C. & O. proper with the N. & W. we find that the total number of revenue tons carried one mile was 5,853,000,000, in 1911, a decrease of 4.4 per cent.; while the total ton mileage of the N. & W. was 6,797,000,000, an increase of 1.1 per cent. over the previous year. The average haul on the C. & O. last year was 251 miles, and on the N. & W. 263 miles. The fact is, however, that the C. & O. average haul decreased by 6 per cent., while the N. & W. was shorter by only about one-half of 1 per cent. Freight density on the C. & O. was 3,010,000 tons, and on the N. & W., 3,447,000 tons. The average revenue per ton per mile of all freight was 4.17 mills for the C. & O., and 4.43 mills for the N. & W. The C. & O. gives its coal revenue per ton mile separately; last year the average was 3.22 mills.

The average revenue train load on the C. & O. was 683 tons in 1911, and on the N. & W., 643 tons. In the case of the Chesapeake & Ohio, this train load is revenue tonnage. The Norfolk & Western report does not say whether it includes company freight or is revenue tonnage only. The N. & W. gets an average of 36.44 cars per train, and the C. & O., 37.3. The N. & W. has 22.17 loaded cars in the average train, and the C. & O. has 23.1.

The Norfolk & Western last year handled its business, which consisted of 6,797,000,000 ton miles and 194,000,000 passenger miles, with 23,323,000 total locomotive miles, an increase of just 1 per cent. over the locomotive mileage of the year before. The Chesapeake & Ohio, including the Chicago line, handled its business, which, including the Chicago line, amounted to 6,083,000,000 ton miles and 253,000,000 passenger miles, with 20,732,000 locomotive miles. Here, apparently, the C. & O. makes a considerably better showing. The C. & O., including the Chicago line, had at the end of the year 780 locomotives, 343 passenger train cars and 42,868 freight and work equipment cars, while the Norfolk & Western had 991 locomotives, 402 passenger train cars and 42,655 freight and work equipment cars. The total tractive power of all locomotives for the C. & O. was 27,197,197 lbs., and for the N. & W., 34,282,399 lbs.

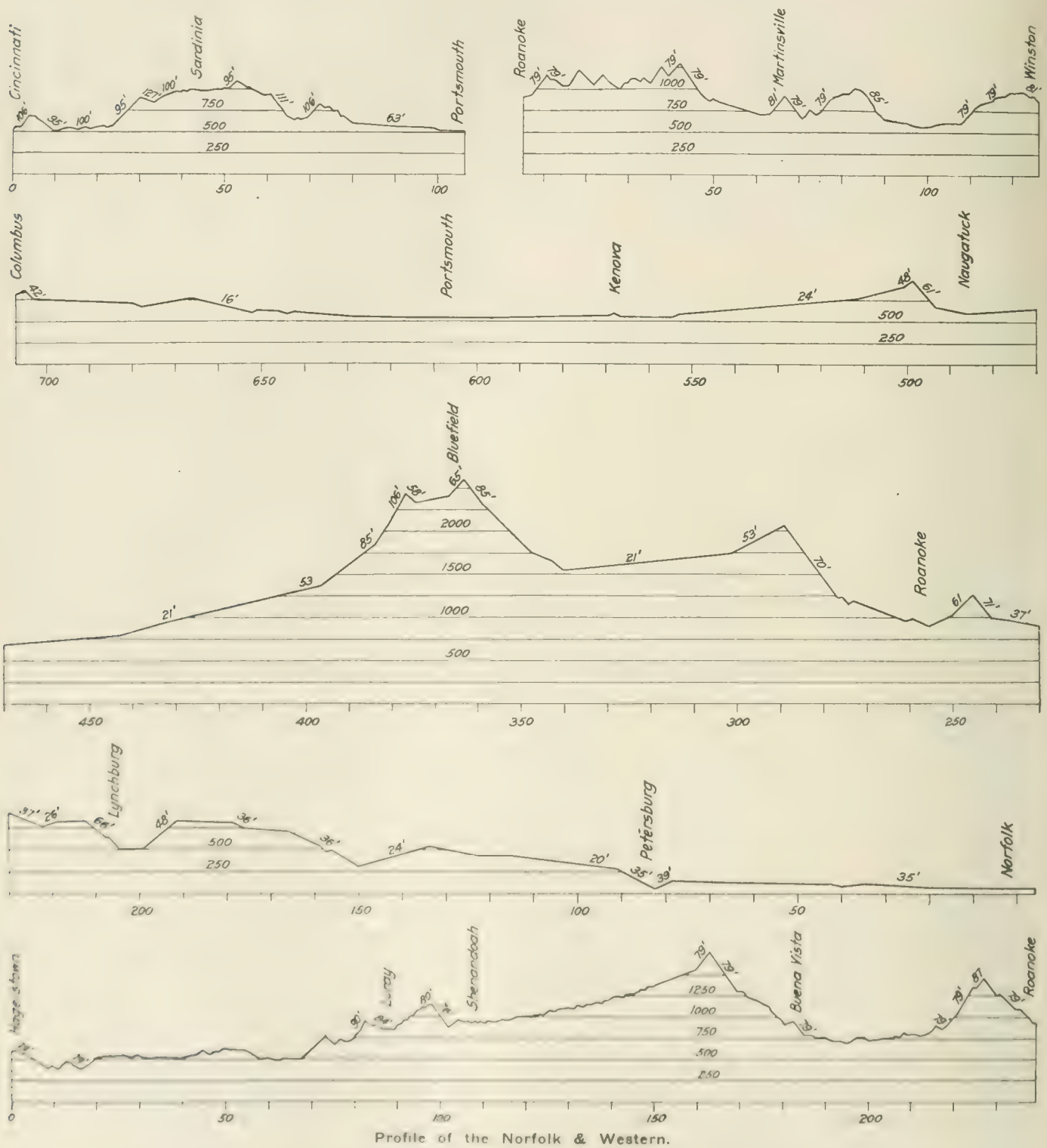
It was increased expenses that cut into the net of both the Norfolk & Western and the Chesapeake & Ohio. The total for each class of expense is given in the tables at the end of these comments, but it is of interest, in comparing the two properties, to take certain details of expenditures and compare them on a track mileage basis. The Norfolk & Western last year spent $26 per track mile for ballast; the C. & O., $57. The N. & W. spent $196 per mile for ties; the C. & O., $186. The N. & W. spent $113 for rails; the C. & O. only $49. These are items which show materials bought, and the increased cost of labor does not enter into them to any great extent. In 1911 the C. & O. laid a total of 20,110 tons of new rail, as against 23,629 tons the year before; the N. & W. laid 26,485 tons in 1911, as against 25,086 tons in 1910. The N. & W. does not give the class of rails laid last year, but the C. & O. laid 6,194 tons of 100-lb. rail, something over 9,000 tons of 90-lb. rail, and about 4,400 tons of 85-lb. rail. The Chesapeake & Ohio put 1,087,000 ties in track last year, as against 952,000 the year before; and the Norfolk & Western put 1,191,000 in 1911 and 982,000 in 1910. The C. & O. put a total of 458,000 cu. yds. of ballast under track in 1911 and 562,000 in 1910; the N. & W. put 581,000 cu. yds. under track last year and 418,000 the year before.

Apparently, heretofore the standard weight of rail for the Norfolk & Western has been 85-lb., for, out of the total 1,543



Profile of the Main Line of the Chesapeake & Ohio.

miles of first track, 1,309 was laid with 85-lb. rail. The present standard on the C. & O. is 100-lb. rail, and of the total 1,172 miles of first track of the C. & O. proper, excluding the Chicago line, 461 miles is laid with 100-lb. rail, 126 with 90-lb. rail and 354 with 85-lb. rail. The Chicago line is at present largely laid with 70-lb. rail. From these figures it is evident that the standard of maintenance on both lines is high, and apparently neither the forces down as well as the N. & W. The expenses for roadway and track, which are largely made up of the cost of placing material in track—in other words, almost entirely labor cost—amounted to $424 per track mile for the C. & O. in 1911, and to $411 for the N. & W. The increase over the previous year for the N. & W. was only about 5 per cent., while the increase for the C. & O. was 6 per cent.



Profile of the Norfolk & Western.

Chesapeake & Ohio nor the Norfolk & Western felt that they could afford, even as a year of higher expense, to lower their standard in any way.

Increased labor cost, however, either bore down on the Chesapeake & Ohio border than it did on the Norfolk & Western, or else the C. & O. was not able to keep the number of its track

The total cost of transportation on the N. & W. last year was $10,673,000, an increase of $603,000 over the previous year; while on the C. & O., transportation cost $10,044,000, an increase of $1,535,000. It must be remembered, however, that the figures for 1911 include the Chicago line and do not include this line in 1910.

As to present financial condition: The balance sheet of the

Chesapeake & Ohio shows cash on hand amounting to $9,371,000, with total working liabilities of $5,037,000; while the Norfolk & Western has $5,454,000 cash on hand and total working liabilities of $3,567,000. The N. & W., however, has no bonds or notes outstanding falling due before 1922, and then only an issue of $600,000 5 per cent. bonds; while the Chesapeake & Ohio has $16,000,000 secured gold notes which are due in 1914. Both companies, however, have amply provided themselves with means of financing future needs, the C. & O. having authorized $125,000,000 first lien and improvement mortgage bonds, maturing 1930, none of which have been issued; and the N. & W. having authorized $50,000,000 convertible bonds and a corresponding amount of common stock into which these bonds are convertible.

A detailed comparison with the N. & W., when taken in connection with an understanding of the policy of the present management of the C. & O., hardly justified the disappointment apparently shown on the New York Stock Exchange when the C. & O. report was made public, and certainly does not justify any surprise at this showing. The figures for the year show two things clearly: First, that the expected benefits of expansion have not as yet been realized, and any one who knows the condition in which the Chicago line was in when the C. & O. took it would have been surprised if much result had been shown this year. The other is that, despite the present burden that the C. & O. is carrying, the maintenance of the property was fully up to its former standard and appears to be on the whole as high, and in some respects higher, than the Norfolk & Western. It will be recalled that both the N. & W. and the C. & O. had a shorter average haul last year than the year before. The decrease, however, was more notable in the case of the C. & O. than in the N. & W., and it seems probable that this simply indicates that the Chicago line had not been put in shape last year to handle the through traffic that might be expected to be given to it, both destined to Chicago from C. & O. territory and from Chicago to C. & O. territory. Probably a good deal of money will still have to be spent on the Chicago line before it is by any means up to C. & O. standard.

The Hocking Valley, on the other hand, is generally believed to be in first class shape, and as soon as that company's legal difficulties are entirely straightened out, the Chesapeake & Ohio's investment in it should prove of great value to the company.

The following table shows the figures for operation of the Chesapeake & Ohio for 1911, as compared with 1910. In 1911 the figures for the Chicago line are included, but are not included in the 1910 figures.

	1911.	1910.
Average mileage operated	2,220	1,937
Freight revenue	$25,590,027	$24,901,200
Passenger revenue	5,512,932	5,002,205
Total operating revenue	32,583,411	31,237,169
Maint. of way and structures	4,141,572	3,891,032
Maint. of equipment	615,338	535,208
Transportation	10,044,173	8,509,434
Total operating expenses	21,793,615	18,936,699
Taxes	1,065,858	873,744
Operating income	9,723,943	11,426,726
Gross corporate income	11,284,757	12,588,091
Net corporate income	3,228,285	6,290,586
Dividends	3,139,625	2,668,617
Surplus	88,600	3,621,969

The following table shows the figures for operation of the Norfolk & Western for 1911, as compared with 1910:

	1911.	1910.
Average mileage operated	1,972	1,945
Freight revenue	$30,115,483	$30,037,796
Passenger revenue	4,184,246	3,924,890
Total operating revenue	35,557,572	35,063,870
Maint. of way and structures	4,328,717	3,752,045
Maint. of equipment	6,638,842	5,951,907
Traffic	586,716	551,806
Transportation	10,672,624	10,069,726
Total operating expenses	22,958,280	21,046,760
Taxes	1,320,000	1,118,965
Net operating income	11,297,242	12,898,146
Gross corporate income	12,581,689	14,044,353
Net corporate income	7,740,379	9,043,165
Additions and betterments	2,597,109	3,573,598
*Dividends	4,560,806	4,352,511
Surplus	576,465	1,117,056

*Includes $148,000 in 1911 and $138,000 in 1910 payment to Pocahontas Coal & Coke Co. on account of deficiency of sinking fund and interest on N. & W.-Pocahontas joint bonds

THE ARROGANCE OF GRAND CHIEF STONE.

THERE has come to the *Railway Age Gazette* a copy of an extraordinary and startling communication which was sent on September 2 by Warren S. Stone, grand chief of the Brotherhood of Locomotive Engineers, to the heads of the branches of this organization on the Harriman railways and the Illinois Central, and by them transmitted to members of the brotherhood employed on these lines. The text of the communication is as follows:

"Our attention has been called to the pending strike of the federated shop employees on the Harriman Lines, and we have been asked to explain the duties of our members, particularly members holding official positions, should a strike be declared. As you no doubt know, it has always been the policy of this organization to remain neutral during a strike of any other organization. Our members should continue to perform their usual duties, *but must not, under any circumstances, take the place or do the work of strikers.* We have never understood that it is any part of an official's duty to do work in or about the shops; therefore, *members holding official positions cannot do the work or take the place of strikers without violating the laws of the organization.* When an engine fails on the line of road it is clearly the duty of the men in charge of it to make such repairs as are necessary to get the engine to the terminal."

The significance of this can be appreciated only by those knowing who are the "officials" referred to. On many roads, including those where the federated shop employees recently struck, the pick of locomotive engineers are promoted to traveling engineers, or, as they are known on some roads, road foremen of engines. Their duty is to instruct locomotive enginemen in their duties, exercise a certain amount of supervision over them, and do all they can to promote locomotive efficiency. They are as truly officers of the railway as the division superintendent or the general manager. They are as much bound to perform all their duties to it that may be assigned to them. Under the unit organization on the Harriman Lines some of them have the title of "assistant superintendent" and, in the absence of assistant superintendents having other matters especially in charge, are the superiors of all operating officers and employees below their rank, including shop employees.

After their promotion as travelling engineers they commonly retain their memberships in the Brotherhood of Locomotive Engineers. As members of the brotherhood, a secret order, they are obliged to obey the instructions of its grand chief and other officials. As officers of the roads they are obligated to obey the orders of all their superiors in the railway service. While their grand chief is instructing them that they "should continue to perform their usual duties, but must not, under any circumstances, take the place or do the work of strikers," their superior officers on the railways must and do require them to do everything they can to help the roads to continue to perform their duty by maintaining public service, even to doing the work of strikers.

No man can serve two masters—not, at least, when they give directly conflicting orders. Therefore, Mr. Stone's communication compels traveling engineers to choose whether they will put first their allegiance to the brotherhood or to the railways. It will be noted Mr. Stone does not say they must either withdraw from the brotherhood or resign from the railways. He implies they are to retain their railway offices and their brotherhood memberships, and take their orders regarding the performance of certain of their duties as railway officers from him. But railway managers cannot long allow any officers of their companies to retain memberships in a secret organization, from whose chief, instructions issue explicitly requiring them to violate their duties as railway officers, or in future risk promoting members of that organization to official positions. If Chief Stone's order stands and the heads of other railway brotherhoods should take a similar position, members of railway brotherhoods must be cut off from all chance of promotion to official positions.

The instructions issued by the Grand Chief of the Brotherhood of Locomotive Engineers were secret. It is fortunate information of them came to railway officers and that the *Railway Age Gazette* is able to make them public. Otherwise railway managers might have found subordinate officers whom they were relying on to help them deal with the strikes working against them; and the public might never have learned of the extent

to which the arrogance of the heads of railway brotherhoods, in attempting, without assuming any of the responsibilities, to exercise the authority of railway management, now goes. If Grand Chief Stone's order had bound only members of the brotherhood who are not railway officers, the case would have been different. But it evidently was intended primarily to bind railway officers. Such action by one entirely without responsibility to railway corporations or the public, is intolerable alike to the railways and the public. It illustrates a tendency of railway brotherhoods to try to dominate the entire transportation industry which must be resisted to the last extremity by railway managements and the public for their common protection. The railways have been subjected to detailed regulation. How can the public properly or effectively hold their managers responsible for the way the carriers serve it, if officials of the railways are to receive their orders, not from the railway managers, but from the heads of labor organizations?

CHICAGO, BURLINGTON & QUINCY.

THROUGH economies in the cost of maintenance of way, maintenance of equipment and traffic expenses, and a holding down of transportation expenses, in spite of the increase in

Maintenance of way and structures last year cost but $12,400,000, as against $15,730,000 the year before; maintenance of equipment cost $14,760,000 last year, and $15,060,000 the year before. The fact that business, both passenger and freight, was less last year than the year before would affect to some extent cost of maintenance of equipment, but it would have only a very slight effect on cost of maintenance of way and structures. On the other hand, the increased wage scale would tend to make these costs, for both equipment and structures, higher, even if no more work were done in 1911 than in 1910. With a road like the Burlington, it is almost inconceivable that maintenance charges would be scaled down to the detriment of the property, and we must conclude, therefore, that the effect of past improvements in both right of way and equipment has put the Burlington in shape to be maintained more economically. This conclusion is strengthened by the fact that large sums have been spent in previous years both for maintenance and for additions and betterments. Since June 30, 1907, $13,580,000 has been spent for additions and betterments to the property from income alone. In 1911, $11,030,000 was spent for additions to the property, of which $4,830,000 was charged to income and the remainder to capital account.

There are no detailed figures for the sums spent for main-

The Chicago, Burlington & Quincy.

tenance of way, equipment, etc., given in the annual report. Some reduction, however, of economies, especially in the cost of conducting transportation, are given by the traffic statistics.

The total number of passengers carried one mile last year was 1,173,000,000, a decrease of 109,000,000 from 1910, the number of tons of freight carried one mile totaled 7,116,000,000 in 1911, a decrease of 319,000,000 from 1910. Freight locomotive miles, however, amounted to 18,330,000 in 1911, a decrease of 2,330,000 miles from 1910. This is a decrease of more than 10 per cent. Passenger locomotive miles totaled 17,700,000 in 1911, and 17,880,000 in 1910. It is very seldom indeed that a road can decrease its passenger locomotive mileage in proportion to a temporary decrease in passenger business. The reasons for this are, of course, obvious. The decrease, however, in the freight locomotive mileage presumably accounts to a considerable extent for the saving in transportation expenses, because, as was pointed out

before, while transportation expenses amounted to $28,540,000 in 1911 and to $28,340,000 in 1910, trainmen's wages, etc., were so considerably higher during the whole of 1911 that there must have been actual economies in this department to prevent expenses from running up 6 or 7 per cent. higher than they were the year before.

The Burlington's train load is that of a Hill road. In 1911 the average was 406 tons, an increase of 25 tons over the average in 1910. Although it is not stated in the report whether this is revenue train load or revenue and company freight, the figures are high for a road with the large branch line mileage the Burlington has, and the gain over the previous year is notable. The average number of loaded cars per train was 23.61 in 1911 and 22.44 in 1910; the average number of empty cars was 10.15 last year and 9.28 the year before.

The average haul was 251 miles in 1911 and 267 miles in 1910; and the average receipts per ton per mile were 8.16 mills in 1911 and 7.83 mills in 1910. It is just possible that the Burlington is having a certain amount of through business taken away from it by competitors this year, which would account for the shorter average haul; and some color is lent to this theory by the fact that the Burlington is making especial efforts to establish new through routes for freight. In our comments on the Colorado & Southern's annual report, published last week, mention was made of the new route which the Northern Pacific and the Burlington will have from the Northwest to the Gulf, when the connecting link is built on the Colorado & Southern between its Fort Collins branch and its Wyoming division, and when the Burlington has built a line from Thermopolis, Wyo., to Orin Junction. The Burlington now has in operation a line from Kirby to Thermopolis, and last year $2,260,000 was spent on the extension from Kirby to Powder River. Track is laid on 14 miles of grade south of Thermopolis and grading almost finished on 82 miles more. Another extension which the Burlington has made which should give it new traffic relations is the line from Herrin, Ill., to Metropolis, on which $730,000 was spent last year, but which was opened for business on October 15, 1910. Arrangements have now been made by which freight is transferred across the Ohio river to Paducah, Ky., giving the Burlington an outlet into southern territory and putting it in a better position to compete with the Harriman Lines which deliver freight to the Illinois Central, the Illinois Central having a line to Paducah.

The following table compares the operations in 1911 with 1910.

	1911.	1910.
Average mileage operated	9,072	9,023
Freight revenue	$58,033,243	$58,274,587
Passenger revenue	22,552,567	22,380,306
Total operating revenue	88,275,108	87,869,317
Maint. of way and structures	12,406,279	15,725,461
Maint. of equipment	14,761,138	15,057,165
Traffic	1,581,805	1,654,452
Transportation	28,543,205	28,340,052
Total operating expenses	59,541,926	63,010,965
Taxes	3,049,124	2,970,737
Operating income	25,574,069	21,723,533
Gross operating income	27,748,768	24,247,227
Net corporate income	16,843,763	13,308,746
Appropriated for betterments	4,826,755	3,329,006
Dividends	8,867,128	8,867,128
Surplus	3,149,880	1,112,612

NEW BOOKS.

Proceedings of the Western Railway Club for 1910-11. Published by the Western Railway Club. Secretary, J. W. Taylor, 390 Old Colony Bldg., Chicago. Cloth, 6 in. x 9 in., 358 pages.

The work of the Western Railway Club during the past year has been of varied interest, and the value of the papers and discussions compares favorably with that of previous years. The principal papers and discussions relate to automatic connectors for air brakes, signals and steam train pipes; the new Commerce Court; locomotive flue failures; re-working old materials; the standardization of chilled iron wheels; car interchange in the Union Stock Yards district, Chicago; electrification of Chicago railways. There are also included the usual report on the rules of interchange, the secretary's report, list of accessions to the Barnes Library, and a list of the members with their addresses.

Letters to the Editor.

POOR PASSENGER SERVICE AND PUBLIC CO-OPERATION.

October 20, 1911.

To the Editor of the Railway Age Gazette:

Reading your editorial note of October 6, concerning the duty of the public to co-operate with railway officers to secure efficiency, it occurs to me that you may be interested in an experience of mine last summer; and I enclose a letter which I wrote to the general passenger agent of the railway on which I had my troubles. No railway officer, nor any one else, can correct faults until they know that such faults exist; and from my experience I believe that railway men generally would be glad to be informed of deficiencies in their service and to remedy those deficiencies, so far as they can. M.

[The letter to the general passenger agent, referred to above, says that Miss M. and three other ladies began about the middle of June to engage their sleeping car berths and steamboat staterooms, to avoid crowds. They went to the city ticket office and made known their wishes to the young man there. When the interview was nearly finished, he deserted the ladies to talk with a printing contractor (about printed matter to be used a year hence). The ladies became impatient and concluded to go to a rival road, but just then the young man then came back, made the necessary notations and agreed to advise by telephone. After a week, Miss M. called him up and found that he had made the reservations but had not notified her. For the steamboat connection he gave her no tickets, but simply told her to tell the purser the numbers of the staterooms. This arrangement proved to be useless; for on arriving at the boat the ladies had to wait until all the other passengers had been attended to and then, after two hours, secured some staterooms which someone else had given up. On the third stage of the journey, no reservations at all had been made, although the three passengers had honestly thought they had settled the matter in June, three weeks before. Other passengers were found in equally unpleasant situations. One lady of advanced years could secure no bed at all on the boat until another woman, learning of her predicament, shared her berth with the one who was in straits. Other cases are mentioned.

On the return trip, Miss M. had to wait five weeks for one piece of her baggage, finally getting it when, she says, she had convinced the railway people that she would make life miserable for them until she got satisfaction. In the meantime she had to spend $7.65 to replace some of the missing clothing. These incidents she rehearsed to the general passenger agent, in a detailed and carefully worded letter; she got her money back and received a visit from the general passenger agent. And so she thinks it is proper to give him credit. However, she tells us not to publish his name.

In her letter, Miss M. discusses at some length the movement among railway officers for the promotion of efficiency, as looked at by the public since Mr. Brandeis has exploited that subject; and she tells the G. P. A. that beautifying station grounds and furnishing flowers for the tables in the dining cars cannot always fill the bill. Economy of construction, maintenance and operation is all right, but it is also important to keep the passengers pleasant. "Every one loves flowers, of course, but what good do they do at a railway station if you fear that the conductor will put you off the train if your ticket is wrong; or what satisfaction is there in any amount of beauty if you have to sit up all night because your berth reservation has been incorrectly made? What good are emerald banks rising to skies of Italian blue, or flowers on a dining-car table, if your heart is beating with the fear that, when you go to call for your trunk, it cannot be found?"]

LOCOMOTIVE EFFICIENCY AND CONDITION REPORTS.

BY N. D. BALLANTINE,
Superintendent Car Service, Rock Island Lines.

What is the motive power situation on your road? How many railway managements really know the correct answer to this question? How can they unless an accurate current record is made of the service obtained from their power in such a way, and in sufficient detail, that it may be correlated and intelligently analyzed? Is there any branch of the transportation department more important than that having to do with the proper distribution and use made of the motive power? Are not the roads as a whole deficient in compiling data along this line? There is a need for more information as to the real efficiency being obtained from the motive power; and for comparative purposes as between railways, or as between divisions of a given road, it is desirable to have such data prepared along uniform lines. Most roads are spending considerable money in an endeavor to obtain correct car reports, and a good part of the telegraph facilities are being utilized in obtaining the details and transmitting the summaries to the general and division offices. Is the same proportion of energy and money being spent to secure prompt and reliable information covering the use of locomotives? I do not think so.

Much of the locomotive data now produced by the average superintendent as to the average miles per day, mechanical and terminal detention, is unreliable and of little or no value for comparative purposes. It is of little use for comparisons, not only between different roads, but between different divisions of the same road. There are a number of reasons for this condition, among which the following are the principal:

First: Failure to check the reports in detail so as to account for each engine assigned to the division during each hour of the twenty-four in a day.

Second: Variations in methods, some roads eliminating from their reports the engines held in engine houses 24 hours or more for repairs, and others allowing for during engine house detentions.

Third: Failure to base the report at a specified hour covering a fixed number of hours, but instead using the hours and mileage made during a calendar day.

Fourth: Lack of uniformity with reference to including or excluding yard-duty assigned engines.

Fifth: Lack of uniformity with reference to including engines assigned, or available, thus injecting the bad order feature.

As a general proposition, too many reports are being made, such as they are. They close at various times of the day, have various bases, and are not susceptible of being checked, nor are they checked, for accuracy. If a comprehensive report were required, which closed at midnight and included all the mileage made during the calendar day, accounting for each engine assigned for each hour of the day regardless of whether it was available for service, bad ordered, in engine house, shops, O. K., or white-leaded; and which analyzed the time it was in the hands of the mechanical department and the transportation department —the time it was in the hands of the latter being divided between the periods at terminals and between terminals—such a report would make practicable an intelligent analysis and estimate of the efficiency obtained, and would indicate the remedy for any bad condition that might be disclosed.

Following is an outline of the principal points the average railway management should know about its power; some of the items, however, are variables depending on local conditions, and may be kept separately or included in the miscellaneous column:

Mechanical Department Detention: In shops for heavy repairs; in shops for light repairs; in the engine house; on the ash pit, and the total time held.

Transportation Department Detention: At terminals: to protect the regular trains; to protect the stock rains; to protect fruit, vegetable or meat trains; on account of superior trains interfering; on account of insufficient tonnage; main line obstructions due to wrecks, washouts, etc.; rest for the crews; call time—when the engine is reported ready in less time than is required to allow crews for the call; miscellaneous; total time held at terminals. Between terminals: meeting trains; station work; track conditions; 16-hour law; wrecks, derailments, washouts, etc.; block signals; equipment failures, locomotives; equipment failures, cars; weather conditions; miscellaneous; total time between the terminals.

To show how the above data may be obtained in operation with a minimum amount of labor and expense, the forms to be used are given herewith, together with some of the information to be filled in, and the instructions which are printed on the backs of the forms. The mechanical department report, Form C. T. 107A, is used for information which nearly all roads now gather. It will be noted that telegraphic symbols are put

Mechanical Department Telegraph Report of Power Detention (C. T. 107-A.)

To Chief Dispr. Rock Island ..... for 24 Hrs. ending 11:59 p. m. ... Jan. 1 ... 19 11 ...
At ... Paris ... on Locomotives assigned to Ohio ... Div.

West or Southbound

Class of Service	Eng. Number	On Hand at: Time Received	On Hand at: Time Released	Total Time Held	Analysis of Detention: Shopped for Repairs: Heavy	Shopped for Repairs: Light	Round House Repairs	Ash Pit
A	B	F	G	J	M	G	W	AB
Time	1900	12 01 a	10 15 p	10 15			8'45"	1'30"

East or Northbound

GA	GB	GF	GH	GJ	GK	GN	GS	GW

Size of Form 8½ x 11½ inches

Round House Foreman. Yardmaster or Agent.

Mechanical Department Form for Engine Detentions.

at the top of the columns, so that when the report is transmitted to the despatcher's office it will be so tabulated that all delays in the hands of the mechanical department, to a given engine, regardless of the point at which it occurs, will be combined and, as far as the engine house foreman can determine, the direction in which the power is next to be used will be shown. Space is also provided for the joint signature of the engine house foreman and the yardmaster, thus providing a check on the time the power is interchanged. This is essential, as the yardmaster has to take up and account for the power at the time the mechanical department releases it, or *vice versa*. If other reports are eliminated this report should not entail any additional work other than that required for more closely checking the time the engine is received and released.

The following are the instructions for the use of Form C. T. 107A:

This report is to be made by the mechanical department and approved as to total time held by a proper representative of the transportation department.

It is to be made in triplicate; the original to be mailed to the chief despatcher of the division and a carbon copy to be sent to the telegraph office for transmission by wire as early as practicable after midnight, unless otherwise instructed.

Engines listed should be arranged in column *B* in numerical order by groups, according to the class of service; namely, local and branch runs, dead freight, and fast freight.

Time received and released by mechanical department should be the time the engines are placed on a designated track agreed on as a delivery point for such engines and when returned to a designated track by the mechanical department.

The sum of the hours shown under heading Analysis of Detention should agree with the figures in the column headed Total Time Held.

The report should be signed and agreed to by representatives of the mechanical and transportation departments.

Yardmaster's Telegraph Report of Power Detention

(C. T. 107-B.)

To Chief Dispr. Rock Island ..... for 24 Hrs. ending 11:59 p. m. Jan. 1 1911.

At Paris ..... on Locomotives assigned to Ohio ..... Div.

For Movement West or Southbound

Class of Svc	Eng. Number	On Hand or: Time Recd.	On Hand or: Time Ford	Total Hours Held	Analysis of Detention: To Protect: Regular Sched.	To Protect: Stock	To Protect: Fruit, Veg. or Meat	Superior Trains	Insuffic. Tonnage	M. L. Obstructed Wrecks, W. O., &c.	Rest for Crews	Call Time	Mcls.
A	B	AF	AG	AH	AJ	AM	AQ	AU	AX	BA	BF	BH	BJ
Time	1900	10[15]a	2[10]p	3'55"	3'55"								

East or Northbound.

GA	GB	GZ	HA	HB	HF	HI	HK	HN	HS	HW	HZ	JB	JF

Size of Form 9 x 12 inches.

Yardmaster or Agent.

Yardmaster's Report of Engine Detentions.

Under heading Analysis of Detention show in the proper columns the number of hours and minutes the power is actually held. It is assumed that the chief despatcher will advise the party in charge of the power at the terminals when the engines, after being OK'd, are not ordered on account of various factors shown, so as to enable the report to be properly made up, and put the party in charge of the power in possession of full information concerning its detention.

Under the heading To Protect Regular Schedule the following example will illustrate the manner in which this column should be used: Engine 1900, assigned to a fast freight run, is OK'd at 10.15 a. m., but its schedule provides for leaving at 6 p. m.; then this column would show 3 hours and 55 minutes detention.

In the case of stock, an engine which may be held on account of an uncertain number of cars of stock, or for fruit, vegetable or meat extras, should be shown in the same manner as if being held for regular trains, but under the proper column so that the detention on account of stock can be separated from that due to other classes of traffic. It is not the intention, when fruit, vegetables, meat or stock are handled in regular scheduled trains that they shall be shown as separate items, but only when handled as extras.

If an engine to protect a regular train is held after its regular leaving time in order to protect stock, fruit or meat, this delay should be shown under the proper heading rather than in the column headed Regular Schedule.

In the column headed Superior Trains should be shown detentions which occur by reason of a knowledge on the part of the despatcher that a train permitted to leave at the time the engine is OK'd would not make anything by attempting to get over the road because of having to meet other trains or would be unable to get out of the way of higher class trains following it within a short time.

Column headed Rest for Crews covers cases where engines are assigned to certain crews and although OK'd by the mechanical department cannot be used until the crew has had the required allowance for rest.

Column headed Call Time covers a case where the interval of time between the advice from the mechanical department that the power will be OK'd at a given time is less than the time required to call the crew. For example, at 10 a. m. the mechanical department advised that an engine would be O. K. at 11 a. m., but the crew could not be called before 12 m., thus resulting in the loss of an hour's time.

In the column headed Miscellaneous, show all other items of delay not otherwise accounted for.

The yardmaster's report, Form C. T. 107B, accounts for the total time the power is in the yardmaster's possession. The telegraphic symbols at the heads of the columns bring this part of the information into the despatcher's office on the large blank in the proper space opposite to the given engine number and on the same line with the mechanical department data. This is also information which is usually kept, but seldom in such detail; with this form it should not entail much, if any, additional work.

The following are the instructions for the use of Form C. T. 107B:

This report is to be made in triplicate; the original to be mailed to the chief despatcher of the division, and the duplicate to be filed in the telegraph office for transmission by wire as soon after midnight as practicable.

Engines should be arranged in column *B* in numerical order by groups, according to the class of service; namely, local and branch runs, dead freight and fast freight.

Time received should agree with the time released by the mechanical department, as shown on its Form C. T. 107A, column *G*. The time forwarded should agree with the train register as to the time the engines left the terminals.

The conductor's report, Form C. T. 107C, accounts for the total time the engine is on the road on each trip, or from leaving time until midnight; in the latter case a second report is made covering the remainder of the trip after midnight, thus giving a definite closing time for the report regardless of where the engine may be. As the report closes at midnight, ample time is given for the data to be transmitted by wire, tabulated by the receiving operator and summarized before the superintendent usually reaches his office in the morning. Conductors generally make a report of delays, but instead of sending it in the form of a message, they make it up on a standard form, frequently saving time in telegraphing and putting it in such shape that all delays of similar nature can be tabulated with a minimum amount of labor and their total easily determined. Provision is also made for accounting for loss in efficiency by reason of reductions in tonnage caused by unusual conditions. This infor-

mation, if properly used, may afford a basis for placing a cash equivalent opposite such factors and will readily reflect the bearing they have on the total cost of operation.

Following are the instructions for using Form C. T. 107C:

This report is to be made in triplicate; the original and a carbon copy are to be filed in the telegraph office promptly on arrival at the terminal, or at the first telegraph office reached after midnight, it being understood that when trains are on the road at midnight two reports shall be made for the run, one to cover the time between leaving the terminal and midnight, and another from midnight to the time of arrival at the terminal.

Under the heading Analysis of Delays shall be shown the total delays as they actually occur, whether the train reaches its destination on time or not. The headings are self-explanatory, except, possibly, the column headed Equipment Failures, the intention being to cover under that head, delays due to engine failures or cars with hot boxes, draw bars pulled out, or other similar mechanical defects.

Under the heading Tonnage Set Out Short of Train Terminal Destination, should be shown, in the proper column as to the cause, the total number of tons and the distance such tonnage would have moved had the emergency not arisen, multiplying these two factors together to give the ton-miles lost.

Under the heading Miscellaneous give any other information which is considered of special interest with reference to delays in transit.

Form C. T. 107 is the blank used in the despatcher's office on which the receiving operator can directly tabulate the data as transmitted by the division offices, or as obtained from the conductor's delay report; it will be noted that in reality this blank, in addition to showing the utility of the motive power, contains a condensed train sheet where all the principal delays to trains can be analyzed either in detail, or as a whole. In the preparation of the blank for the reception of the information it may, of course, be lined up in the way that would be desirable to meet the local requirements—that is, entirely on a numerical order basis, or separated as between local, dead and time freights, with each class of engine arranged numerically.

After the various reports have been received, they should be checked to see that each locomotive is accounted for during each hour of the day, and that the analysis of the various delays corresponds with the total time shown on the various reports. After this the various columns may be added for the totals, which latter are, of course, all that the division superintendent or higher officer should need, unless he desires to analyze in detail some condition which is reflected as needing attention. The same blank may also be used for tabulating the totals by days for each division by classes. For example, if the reports are to be classified as between local, dead and time freights, three sheets will be needed for each division for each month, and by returning the blanks to the telegraph office each night the receiving operator can tabulate at once without extra work or delay. After having a few days' reports recorded, he will be less likely to make errors, because he will have some general figures to guide him.

Table for Converting Minutes into Decimals of an Hour.

1 to 3 minutes	Do not count.	34 to 39 minutes	.6 hour.
4 to 9 minutes	.1 hour.	40 to 45 minutes	.7 hour.
10 to 15 minutes	.2 hour.	46 to 51 minutes	.8 hour.
16 to 21 minutes	.3 hour.	52 to 57 minutes	.9 hour.
22 to 27 minutes	.4 hour.	58 to 60 minutes	1.0 hour.
28 to 33 minutes	.5 hour.		

Locomotive of 25,000 Pounds Tractive Effort.

Loco. Hrs.	T. E. Hrs.	Loco. Hrs.	T. E. Hrs.	Loco. Hrs.	T. E. Hrs.	Loco. Hrs.	T. E. Hrs.	Loco. Hrs.	T. E. Hrs.
		5.0		10.0	250	15.0	375	20.0	
	2.5				252.5	.1	377.5	.1	502.5
.2		.2			255	.2		.2	505
	7.5	.3		.3	257.5	.3	382.5	.3	507.5
.4		.4	135	.4	260	.4		.4	
	12.5	.5		.5	262.5	.5	387.5	.5	512.5
.6	15	.6		.6	265	.6		.6	515
.7		.7	142.5	.7	267.5	.7	392.5	.7	517.5
		.8		.8	270	.8	395	.8	520
.9	22.5	.9	147.5	.9	272.5	.9	397.5	.9	522.5
		6.0	150	11.0	275	16.0		21.0	
	27.5		152.5	.1	277.5	.1	402.5		527.5
.2	30	.2	155	.2	280	.2	405	.2	530
	32.5	.3	157.5	.3	282.5		407.5	.3	532.5
.4		.4		.4	285	.4	410	.4	535
.5	37.5	.5	162.5	.5	287.5	.5		.5	537.5
.6		.6	165	.6	290	.6	415	.6	540
	42.5	.7	167.5	.7	292.5	.7	417.5	.7	542.5
		.8	170	.8	295	.8	420		545
		.9	172.5	.9	297.5	.9	422.5	.9	547.5
.0	50	7.0	175	12.0		17.0	425	22.0	550
	52.5	.1	177.5	.1	302.5	.1	427.5	.1	552.5
		.2		.2	305	.2	430	.2	555
		.3	182.5	.3	307.5	.3	432.5	.3	557.5
.4	60			.4		.4	435	.4	560
		.5	187.5	.5	312.5	.5	437.5	.5	562.5
		.6	190	.6	315	.6	440	.6	565
.7	67.5	.7	192.5	.7	317.5	.7	442.5	.7	567.5
	70	.8	195	.8	320	.8	445	.8	570
.9	72.5	.9	197.5	.9	322.5	.9	447.5	.9	572.5

Loco. Hrs.	T. E. Hrs.	Loco. Hrs.	T. E. Hrs.	Loco. Hrs.	T. E. Hrs.	Loco. Hrs.	T. E. Hrs.	Loco. Hrs.	T. E. Hrs.
3.0	75	8.0	200	13.0	325	18.0	450	23.0	575
.1	77.5	.1	202.5	.1	327.5	.1	452.5	.1	577.5
.2	80	.2	205	.2	330	.2	455	.2	580
.3	82.5	.3	207.5	.3	332.5	.3	457.5	.3	582.5
.4	85	.4	210	.4	335	.4	460	.4	585
.5	87.5	.5	212.5	.5	337.5	.5	462.5	.5	587.5
.6	90	.6	215	.6	340	.6	465	.6	590
.7	92.5	.7	217.5	.7	342.5	.7	467.5	.7	592.5
.8	95	.8	220	.8	345	.8	470	.8	595
.9	97.5	.9	222.5	.9	347.5	.9	472.5	.9	597.5
4.0	100	9.0	225	14.0	350	19.0	475	24.0	600
.1	102.5	.1	227.5	.1	352.5	.1	477.5	.1	602.5
.2	105	.2	230	.2	355	.2	480	.2	605
.3	107.5	.3	232.5	.3	357.5	.3	482.5	.3	607.5
.4	110	.4	235	.4	360	.4	485	.4	610
.5	112.5	.5	237.5	.5	362.5	.5	487.5	.5	612.5
.6	115	.6	240	.6	365	.6	490	.6	615
.7	117.5	.7	242.5	.7	367.5	.7	492.5	.7	617.5
.8	120	.8	245	.8	370	.8	495	.8	620
.9	122.5	.9	247.5	.9	372.5	.9	497.5	.9	622.5

Of course the question of working out the tractive effort hours in the despatcher's office is optional. However, this is the only basis upon which the real measure of efficiency can be determined. Actual experience has shown that by the use of conversion tables such as are given herewith, the time required for such conversion is nominal. Fifteen or 20 minutes is enough for this work on a division with about forty freight engines of four or five different tractive efforts. It should, of course, be understood that such a table would be needed for each different size locomotive on the division, but by grouping all the locomotives of the same size, and adding their various delays, and making one conversion for the total instead of for each item, considerable time may be saved.

The part of the work requiring the most time is getting those who make up the details to correctly account for the full time. It is essential to know what every engine is doing each hour out of the 24. The expense of preparing such a report would not generally be more, and in many cases would be less, than that of preparing the present conglomerate mass of locomotive data. The expense of the additional work (if it is found to be additional) will depend on whether, under local conditions, it can be taken care of by the present force, or whether occasionally an extra clerk may have to be put on to take care of it. In the division office where the tabulation and summarization is made it should not require (assuming an assignment of approximately 40 freight engines and the running of 25 to 30 trains per day) over 5 or 6 hours of the time of a bright boy who knows how to make additions quickly and accurately.

Let any officer distributing power between several divisions ask a division superintendent about October 1: "How many engines can you spare?" The information he would get in response to such a query would not relieve much of a congestion. If there is a congestion to relieve, he must arbitrarily order engines away from some division. Which division he shall take the engines from is largely a matter of guessing on his part, because of the lack of sufficient current data to enable him to act with definite knowledge; and unless he orders specifically by engine numbers, selecting engines which are known to be in good condition, the chances are that the division receiving the power will really be burdened by having to haul the engines received "dead" to the shops for repairs.

Of course, it is impossible to officer a railway with men who see things exactly alike, and in many ways this probably is a good thing; but it is not impossible or impractical to prepare a report as suggested and show just what is done with the motive power, so that the chief despatcher, trainmaster, superintendent, general superintendent and general manager have before them each day the details or the summarized, results. All having similar information, each can draw his own conclusions from an analysis of the data. If, however, one or more

of the officers are of the class that do not believe in theorizing from statistics—preferring to theorize from practical observation or experience, probably because of past failures to reconcile statistical data—this should not prevent us from preparing the data so as to reflect the real situation. The officer preferring to theorize from practical experience is not to be censured, because he has probably been working with disjointed and unreliable statistics.

My idea is that with a comprehensive, correlated and reliable report the practical man will be able to agree with the so-called theorist; the real trouble having been that the theorist has to take the figures given him at their face value, while the practical man knows they are unreliable; having perhaps prepared them himself does not necessarily mean that the data is reliable, and, if it is, has the efficient and sincere officer anything to fear by letting the facts go to headquarters? No! I believe further that is no better way for the new or inexperienced superintendent to attain efficiency than by having it understood down the line that he will stand for almost any-

Conductor's Telegraph Report of Locomotive Service and Delays

(C. T 107-C.)

To Chief Dispr. Rock Island for Trip between Paris and Amsterdam during calendar day ending 11:59 p. m. Jan. 1 19 11.

West or Southbound																
Class of Svc.	Eng No.	Time Leaving Term'l	Time Arriving Term'l	Time bet'n Term'ls	Total Miles Made	Actual Running Time	Analysis of Delays. Meet'g Trains	Station Work	Track Cond'ns	16 Hr Law	Wrecks Derlmt W.O..&c.	Block Sig's	Equipm't Failures Loco's	Equipm't Failures Cars	Weather Cond'ns	Miscls
A	B	BM	BN	BQ	BU	BX	DA	DF	DH	DJ	DM	DQ	DU	DX	FB	FG
Time	1900	2.10 P	12 M.	9'50"	80											
Meet	Ed. 1432 Brussells						25"									
Total																
East or Northbound																
GA	GB	JH	JI	JK	JN	JS	JW	JZ	KB	KF	KH	KJ	KN	KS	KW	KZ
Total																

Tonnage Set Out Short of Train Terminal Destination on Account of								
Engine Failures			Wrecks, Washouts, &c.			Weather Conditions		
Tons	Miles	Ton Miles	Tons	Miles	Ton Miles	Tons	Miles	Ton Miles
Set out	Short dest'n	MI	Set out	Short dest'n	MJ	Set out	Short dest'n	MK

Size of Form 8¾ x 12 inches.

Conductor's Report of Engine Detentions.

thing except deliberate misrepresentation or the rendering of misleading reports. To ignore or wink at these things will in time be his undoing.

Can we not, then, sum up the matter of reports as follows: Will the report be of value to anyone? Can it be prepared in such a way as to be of value to more than one officer or department? If it is worth while making at all, it is worth while making carefully, a check being provided to assume its accuracy and provision being made for tabulation or graphic charts that will disclose its true significance. *An explanation or analysis should be made by the party directly interested in the data which should correspond with what the data shows.* If it does not, the basis of the report is wrong, the reports themselves are wrong, or the analysis is wrong. It should not take long to find the real trouble.

Many able railway men hold diametrically opposite views with reference to the methods which should be pursued to obtain given results under given conditions. For example, they differ widely as to what type of engine is best for any given service. Again, there is a congestion to clear quickly, they will give widely varying answers to the questions whether there should be a reduction or increase of tonnage per train; whether engine crews should be pooled or assigned; whether the engine house or shop facilities or force, or both, are adequate for the present or for additional power; whether the coaling and water facilities are adequate for present or additional power; whether the track conditions are such that they would warrant a higher speed if the tonnage per train were reduced; whether the side track facilities are adequate for the present number of trains or more; whether it is advisable to run freight train in "fleets" or to string them out, the answer in each case depending on the individual's opinion as to whether delays caused by the meeting of trains would be increased or decreased by a change, and as to whether delays to power at terminals would be increased or decreased; and whether double heading on any part of a division is economical.

I cannot help believing that the local man with data, kept during dull as well as busy periods, and competent along the lines suggested, would be able definitely to answer many of these questions and defend his answers; and that he frequently would be able to put a monetry value opposite to most items, enabling a proper deduction to be made to the best place to spend money to operate more economically; and this is of course, the real object of keeping such data. A few moment's study of such information would enable a superintendent to know what is being done with his power; what the train and engine mileage amounts to; how the trains are getting over the road as a whole; and thus keep his attention on the principal variable factors in his transportation expense. By tabulating the data, a ready comparison may be made of each factor and any unusual conditions affecting the general results may readily be located and its bearing on the whole situation determined. The fact that there are so many factors involved, to my mind emphasizes the importance of correctly producing them and comparing definite data, rather than to make a rough guess or to depend on recollection of details. Can there be any question about the wisdom of a division officer having boiled-down facts promptly

placed before him so that he can at a glance know the following:

Per cent. of time the power is utilized between terminals.

Per cent. of time the power is in the hands of the mechanical and transportation departments at terminals.

Average speed of trains between terminals.

Total miles made by locomotives.

Average miles made by locomotives including and excluding those in shops.

Effect of delays due to the meeting of trains on the average miles per hour between terminals, or of any other of the various factors that may be kept covering unusual local conditions.

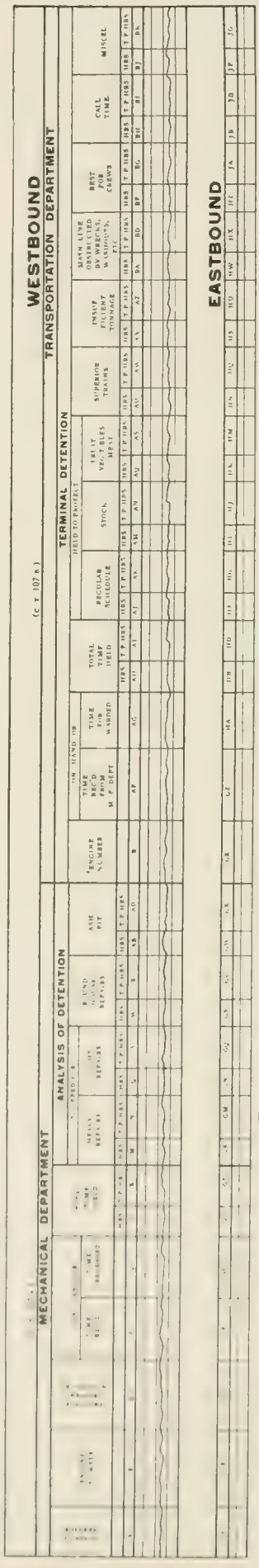
A sample of the results which can be quickly shown is given below; this may be worked out daily, weekly or monthly, as desired:

	Local Freight.	Dead Freight.	Time Freight.	Total.
Number of engines	9	22	13	44
Mech. Dep't time, per cent. of total	15.0	62.0	30.0	44.0
Heavy repairs, per cent	....	54.0	.4	39.7
Light repairs, per cent	....	14.2	1.4	10.7
Engine house repairs, per cent	80.0	28.3	85.7	43.3
Ash pit repairs, per cent	20.0	3.5	12.5	6.3
Terminal detention, per cent. of total	43.0	13.0	28.0	23.0
Regular schedule, per cent	92.0	21.0	41.7	55.3
Stock, per cent	.6	3.2	19.2	7.6
Fruit, etc., per cent	....	1.6	6.8	2.7
Superior trains, per cent	.2	.5	.6	.4
Insufficient tonnage, per cent	1.2	50.3	16.1	20.1
Rest for crews, per cent	1.2	6.2	4.7	3.8
Call time, per cent	.5	2.1	1.1	1.2
Miscellaneous, per cent	4.3	14.2	9.8	8.9
Road service, per cent. of total	42.0	25.0	42.0	33.0
Meeting trains, per cent	9.3	15.1	14.9	13.5
Station work, per cent	47.3	11.4	9.7	20.3
Track conditions, per cent	.2	.3	.5	.3
Wrecks, etc., per cent	.2	.1	.3	.2
Block signals, per cent	....	.5	.6	.4
Equipment failures:				
Locomotives, per cent	.1	.7	.6	.5
Cars, per cent	.5	1.8	1.7	1.4
Miscellaneous, per cent	.6	2.6	2.4	2.0
Actual running time, per cent	42.0	67.5	69.3	61.4
Locomotive Mileage Averages.				
All locomotives:				
Including heavy and light repairs, per day	77	77	150	98
Including heavy and light repairs, per day	77	135	151	125
Between terminals:				
Including delays, per hour	7.6	13.0	14.8	12.2
Excluding delays, per hour	18.1	19.3	21.4	19.9

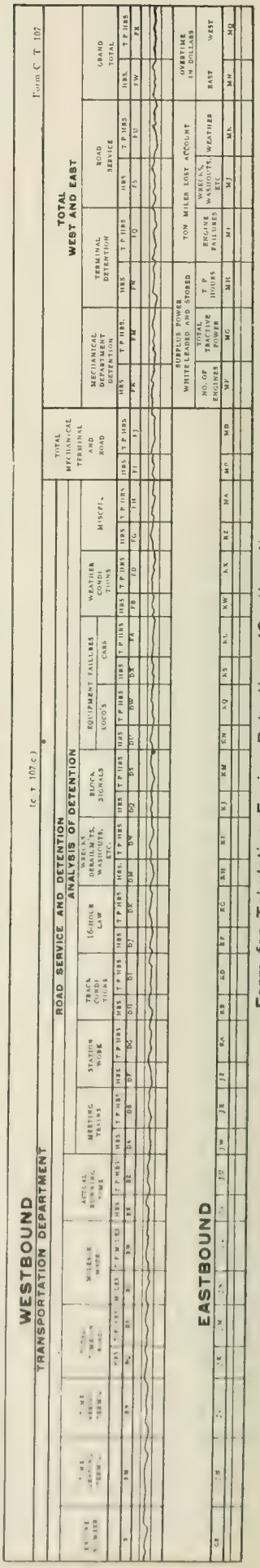
All of this information and more can readily be compiled by a clerk between midnight and 7:00 a. m. from such a report as is outlined in this article, so that a division officer can readily locate the particular item in the operation of his division, which is varying or has a vital bearing on the cost or net results.

The advantage of such a record to either the practical man, or to the so-called theorist, is that it would enable him quickly to demonstrate the value or lack of value of any particular plan tried on a division. Local conditions are so dissimilar that comparisons between divisions are apt to be valueless; but this record could be made of inestimable value as a means of comparing the division with itself; and doubtless in many instances it would surprise an officer whose recommendations for improvements had been acted on to find that the additional facilities afforded had so slight a bearing on the final results that in the light of more complete data it would have been better to have applied the money in some other direction.

There are times on all roads when the maximum business is offering and all facilities are being taxed to their limit, that questions of vital import arise with reference to the method [illegible] may be moved within a given [illegible] to be questioned that tall tonnage trains [illegible] which operating officers must look to [illegible] must be a happy medium, and this happy medium cannot be the same over all divisions. Each division [illegible] account if the best results are to be obtained; and such information [illegible] one competent [illegible] would greatly reduce the proper procedure.



Form Used in the Despatcher's Office for Tabulating Engine Detentions.



Form for Tabulating Engine Detentions (Continued).

To show how such knowledge may be used to determine the best plan to follow, let us assume the following conditions:

Division, 100 miles long.
Freight engines, average 25,000 lbs. tractive effort.
Dead freight rating, 1,000 gross tons.
Average speed of trains between terminals, 10 m. p. h.
Average delay to power at each division terminal, 12 hours.

Question: Would a reduction of tonnage to 800 tons, or 20 per cent., enabling trains to make an average speed of 15 m. p. h. between terminals, result in an increase or a decrease in the gross ton-miles moved per day per locomotive in the direction of traffic; their being no change in the average delay at terminals?

Answer: A decrease of 3,600 gross ton-miles moved per day, or over 6 per cent. would ensue.

Question: Would there be an increase or decrease in locomotive miles per day?

Answer: An average increase of 16 miles, or over 14 per cent.

It is quite evident that unless a material reduction in terminal delay to power is obtained concurrently with the inauguration of such a practice, the expense will materially increase, and there will be an actual decrease in the movement. If, however, a reduction of terminal delay can be effected by reason of lighter tonnage while on the road and a shortening of the time consumed between terminals, let us see how it would work out with all conditions the same as in the preceding example, except an average terminal delay of 10 hours instead of 12 hours.

Question: With a reduction of 800 tons, an average speed of 15 m. p. h. between terminals and an average terminal delay of 10 hours, would there be an increase or decrease in gross ton-miles per day per locomotive as compared with the full tonnage trains, 10 m. p. h. speed and 12 hours terminal delay?

Answer: An increase of 3,600 gross tons one mile, or over 6 per cent.

Question: Would there be an increase or decrease in locomotive miles per day?

Answer: An average increase of 36 miles, or over 33 per cent.

Question: In the case just cited, would the increased expense of train mileage equal or exceed the increased revenue produced by the locomotive per day.

Answer: This of course depends on the average earnings per net ton-mile and the expense per train mile after eliminating overhead expense and fixed charges.

If we assume average earnings of 9 mills per net ton-mile, and that the net ton-mileage on the road is 43 per cent. of the gross, it would be equivalent to average earnings per gross ton-mile of $.00387, or 3.9 mills, 3,600 gross tons one mile would, at the rate of 3.9 mills per gross ton, equal an increased earning of $14.04 per day, this being based only on the traffic moving in the direction of the greatest volume of movement.

Suppose the expense for wages of engineers, firemen, trainmen, fuel, oil, water, supplies, proportion of loss and damage, wrecks, etc., amounts to 35 cents per train mile, then the additional train miles, 36, would cost $12.60 more per day per locomotive, which amount deducted from the increased gross earnings per day leaves a balance of $1.44 net per day.

To illustrate that these same percentages of variation do not apply to a division of a different length, I have worked out in the accompanying table the same kind of a comparison on a division 150 miles in length.

Daily basis, per locomotive.	Miles per hour.	100-Mile Division. Average Terminal Delay. 12 hrs.	100-Mile Division. Average Terminal Delay. 10 hrs.	150-Mile Division. Average Terminal Delay. 12 hrs.	150-Mile Division. Average Terminal Delay. 10 hrs.
Average time between terminals in direction of traffic	10	5.4 hr.	....	6.6 hr.	....
Average time between terminals in direction of traffic	15	4.2 hr.	4.8 hr.	5.4 hr.	6 hr.
Average locomotive miles per day in direction of traffic	10	54 mi.	....	66 mi.	....
Average locomotive miles per day in direction of traffic	15	63 mi.	72 mi.	81 mi.	90 mi.
Average locomotive miles per day (both directions)	10	108 mi.	....	132 mi.	....
Average locomotive miles per day (both directions)	15	126 mi.	144 mi.	162 mi.	180 mi.
Increase in miles per day	..	16 mi.	36 mi.	30 mi.	48 mi.
Cost increase train miles at 35c. per mile	..	$5.60	$12.60	$10.50	$16.80
Average gross ton miles produced per day per locomotive in direction of traffic:					
Basis 1,000 gross tons per train mile	10	54,000	.....	66,000	.....
Basis 800 gross tons per train mile	15	50,400	57,600	64,800	72,000
Increase or decrease, gross ton miles	..	—3,600	+3,600	—1,200	+6,000
Increase or decrease, revenue on gross ton (basis 3.9 mills)	..	—$14.04	+$14.04	—$4.68	+$23.40

COMPARATIVE STATEMENT OF CONDITION OF FREIGHT POWER.

January 1, 1911, vs. January 1, 1910.

	January 1, 1911. Number Locos.	January 1, 1911. T. P. in 1,000 lbs. Total.	Per Cent. Grand Total.	Aver-age.	January 1, 1910. Number Locos.	January 1, 1910. T. P. in 1,000 lbs. Total.	Per Cent. Grand Total.	Aver-age.	Increase (+); Decrease (—). Number Locos.	Increase (+); Decrease (—). T. P. in 1,000 lbs. Total.	Per Cent.
Good for 12 months	35	1,047	34.2	29.9	35	975	35.3	27.8	....	+ 72	+ 7.4
Good for 6 months	31	835	27.3	26.9	29	785	28.4	27.0	+ 2	+ 50	+ 6.3
Good for 3 months	15	397	12.7	26.4	18	461	16.7	25.6	— 3	— 64	— 16.1
Total good for 3 months or more	81	2,279	74.4	28.1	82	2,221	80.4	27.0	— 1	+ 58	+ 2.6
In Service:											
Needing heavy repairs	3	76	2.5	25.3	6	165	6.0	29.1	— 3	— 89	—117.1
Needing light repairs	1	20	.7	20.0	1	15	.5	15.0	....	+ 5	+ 33.3
Total serviceable	85	2,375	77.5	27.9	89	2,401	86.7	26.9	— 4	— 26	— 1.1
Waiting:											
For heavy repairs	8	252	8.2	31.5	3	82	3.0	27.3	+ 5	+170	+207.3
For light repairs	1	26	.8	26.0	....	....	....	....	+ 1	+ 26	
In shops	13	387	12.6	29.7	9	265	9.6	29.4	+ 4	+122	+ 46.0
Condemned	1	23	.8	23.0	1	15	.5	15.0	....	+ 8	+ 53.3
Total unserviceable	23	688	22.5	29.8	13	362	13.1	27.8	+10	+326	+ 90.1
Grand total	108	3,063	100.0	28.3	102	2,763	100.0	27.0	+ 6	+300	+ 10.9

A comparison of the condition of motive power is also of considerable value and below is shown a method which appeals to me as of value in this respect, in that it shows not only the number of locomotives, but the total tractive effort thereof. The report should be compiled from data prepared by the mechanical department as to the physical condition of each locomotive on the first of each month showing: Good for 12 months; good for 6 months; good for 3 months; in service needing heavy repairs; in service needing light repairs; waiting shops for heavy repairs; waiting shops for light repairs; in shops undergoing repairs and condemned.

An analysis of the report shows that with an increase of the equivalent of 6 engines with an aggregate tractive effort of 300,000 lbs., or 10.9 per cent., there is 1.1 per cent. less power available for service; there is 46 per cent. more in the shops and 207.3 per cent. more held outside of shops awaiting heavy repairs. If, under these conditions during January an increase of 10 or 15 per cent. in gross ton-miles was moved, it would clearly indicate an increased utilization of the power; or, if business was not moved as well as last year, it would clearly point out that all of the increased power acquired by the purchase of new engines and some of the old power had been absorbed by the increase in bad order power, and, therefore, that really a smaller amount of power was available for service.

GOVERNMENT REPORT ON FORT WAYNE DERAILMENT.

H. W. Belnap, chief inspector of safety appliances, has made to the Interstate Commerce Commission a report on the derailment of passenger train No. 28 on the Pennsylvania Lines West of Pittsburgh, at Fort Wayne, Ind., August 13, in which 4 trainmen were killed and 22 trainmen and 38 passengers were injured, 17 of the injured trainmen being dining-car or sleeping-car employees. This accident was reported in the *Railway Age Gazette* September 15, page 502. We give the principal facts brought out by Mr. Belnap which were not given in our earlier account. The account printed September 15 says that the two engines, backing from Fort Wayne west to get the disabled train, were stopped at a point near where the derailment afterward occurred and that both of the engine crews looked over the layout at that place. Mr. Belnap's report makes no mention of this. He is silent also as to the testimony to the effect that fire was flying from the brakeshoes at the rear of the train just before the derailment. The report gives many particulars of the location and circumstances, but for the lack of a diagram these cannot be made clear to one unfamiliar with the location.

The company reported the accident by telegraph on the 14th and safety appliance inspectors Smith, Coutts and Archer arrived at the place the next morning. The representatives of the Interstate Commerce Commission acted jointly with the railroad commission of Indiana. Mr. Belnap took part in a hearing held September 7. The testimony of engineman Malone, who had charge of the leading engine, and who was badly injured, was taken in a hospital, September 13, by Commissioner Payne and Chief Inspector Scott of the state commission.

The train had traveled the last 36 miles in 33 minutes and it is scheduled over this part of the road at the rate of 124 miles in two hours.

The two eastern-division engines were sent west from Fort Wayne by order of the assistant trainmaster (whose name is not given). Engineman Malone in his testimony said that the depot master came to the engine and gave him the order. Malone asked for a pilot and the depot master said "all right." Later, at the office, Malone asked "Mr. Richardson" (title not given) for a pilot, and he said that none was needed. At this point the testimony seems to indicate that the engines went west for a part of the way on the eastbound track, but there is no explanation of this, and the statement is not clear. Malone had not been over this part of the road for nearly two years, and the other engineman not since September, 1910. It will be remembered that the only formal information which had been given to Malone, as to the crossover which must be passed at reduced speed, was a bulletin order which he had signed ten days previous. His testimony indicates that he had forgotten about this order; but he must have had some notion of the situation, for he says that to his fireman, who had been over the road "a little while previously," he said, "What do you know about this track?" The fireman replied, "It is all right to Broadway and fifteen miles an hour from there in [to Fort Wayne]." It is impossible to make out from the report whether this information given by the fireman was or

[illegible]

testing air brakes and finds that the test made when these en-

[illegible]

or that, if there was such failure, it contributed to the disaster. Malone says that he applied the emergency brakes when he saw the sharp curve ahead of him, but apparently this was too late to be of any benefit. (Nothing is said in the government report as to the testimony of the surviving fireman of the second engine, that he warned his engineman of the excessive speed approaching the crossover, and that the engineman signaled to the leading engine to slacken speed.) There was no slow-board to indicate approach to this short temporary crossover; but the practice of the road is said to be to set up slow-boards where the route is in any way obscure or difficult to locate. Although order No. 83, requiring low speed at this point, had been issued August 1, and signed for by these engineman eleven days before the accident, there was another order, No. 86, to go into effect on the day following the accident, which was signed for by these men only about three hours before the disaster happened. According to this later order (evidently announcing change in tracks), schedule speed was to be allowed at the place of the accident at nine o'clock on the morning of the 14th.

This part of the Pennsylvania Lines is equipped with automatic block signals, but, because of the track elevation work a short section, including the point where the derailment occurred, is worked by the manual block system.

The speed of the train is believed to have been 65 miles an hour. Several six-wheel trucks were "buried entirely in the rock ballast." To the steel cars can be attributed the fact that not a passenger lost his life and only one was seriously injured.

Mr. Belnap's conclusions are that the engineman in control of the train was unfamiliar with the track; that he failed to observe the low speed rules; that no signal or slow-board was provided to indicate the location of the short crossover and therefore that the signals and rules were not adequate; that there was no official knowledge that employees regularly and promptly acknowledged bulletin notices by their signatures; that the air brake tests are not adequate; that in this case the air brake testing rules were not properly complied with; that notice of conditions like these here found should be given by train orders and slow-boards; that enginemen should not be required or permitted to run engines of passenger trains over unfamiliar tracks except with a competent pilot; and that all-steel passenger cars should be required to be used in high speed trains "at the earliest practicable date." He also repeats his recommendation, made in the case of the derailment at Bridgeport, Conn., in July, that automatic stops should be installed generally, and that on high speed tracks not having automatic stops trains should be signaled to proceed over a short crossover only after they have been brought to a stop.

FOREIGN RAILWAY NOTES.

The Railways Standing Committee of Victoria has recommended to the legislative assembly the extension of the Swan Hill Railway through Hyah to Piangil, about 29 miles, at a cost of $420,500. It is said that the line will ultimately be continued to Narrong, near the junction of the Murray and Murrumbidgee railways, so as to serve the Balranald district of New South Wales.

Final plans for the extension of a branch of the Central of Brazil Railway which will connect the station, G. Portella, on that railway with Vassouras on the Spaucahy Railway, also for the extension of a short line to Itacurussa have been approved. One of the most important of the recent extensions on the Central is to be a branch to Monte Claros, 37 miles long, and to cost $800,000. Twenty one miles of the line running north from Lafayette are to be changed to broad gage in accordance with the general plans for the standardization of the main line of the Central of Brazil running into the state of Minas Geraes from Rio de Janeiro.

SWEDISH STEEL.

At the meeting of the New York Railroad Club, held on the evening of Friday, October 20, A. R. Roy read a paper on Swedish Steels, the intent of which was to show the superiority of that brand of steel over others on the market. The early portion of the paper was devoted to an historical statement of the development of irons and steels ending with data showing the high regard with which Swedish steels have been held in the markets of the world for the past one hundred and seventy years.

Nature gave Sweden the best iron ores in the world. It would appear that the chemical amalgams inherent in the ore in the state of nature are such that when the ore is worked it imparts to the final product qualities not to be found in other irons, although much of this amalgam is apparently eliminated in the process of manufacture. The most recent discovery appears to be that vanadium is found present in the natural ore. Analysis of Swedish iron shows no trace of vanadium. It is possible that the heat in the furnace eliminates all trace of vanadium, but not before it has imparted to the iron the purity that makes the ore of Sweden so famous.

Charcoal, the purest fuel, is used in Sweden of necessity, as Sweden has no coal beds of her own. It may be unfortunate for the wealth of Sweden's iron masters that there is no coal handy for use, but it is a decided advantage to the world in general. Could Sweden use coal in her furnaces the chances are that the quality of her iron would deteriorate. By using charcoal the gases that are impregnated into the molten fluid steel by the employment of coal or coke is completely avoided. Naturally, a steel is produced that is much purer than any that can be made with coke or coal, as is the custom in other countries. Further, large quantities of iron are never produced at a time. The largest converters have a capacity of not more than 2½ to 12 tons, while in America and England there are converters with treble the capacity. The consequence of this is that greater care is taken in the manufacture and there is a more even quality and homeogeneity in the steel produced for the simple reason that it is easier to boil more thoroughly a small quantity of matter than a larger one—and boil it evenly through and through. Greater care is taken in Sweden in manufacturing, because the use of charcoal necessarily prohibits production on a large scale; therefore, quality not quantity is Sweden's principal aim.

Discussion.—Very little was added in the discussion in regard to the physical and chemical properties of the Swedish steels. Much was said as to their high qualities in a general way, but nothing as to the metallurgical methods pursued in order to attain those qualities. Attention was first called to the development of American steels, and it was asserted that these were equal to any in the world, and that American manufacturers could turn out an unequalled product if they were given the time and were paid for their labor. There was a time when crucible steel was the only kind that was considered fit to put in a firebox, but this limitation has long since been swept away. First the acid open-hearth steel came in and then the basic, and though the latter process is acknowledged to be inferior to the former, no discrimination is made in specifications, by at least one large road, against the basic steel. Processes of steel making have been so improved that good steel is now made from poor materials. Naturally the best ores are mined first, but with the development of furnace practice the proper ores are coming into use.

It is probable that Sweden can continue to produce her present output indefinitely, though an increase up to the furnace capacities of those of the United States will be out of the question, unless the electric furnace is developed to a point of economical operation. Some electrical furnaces are being introduced. As a contrast between the capacities of the Swedish furnaces and those of the United States where capacities of 100 tons are not uncommon, the Swedish furnaces can rarely melt more than 12 tons. The metal is cast in small ingots and the crop ends average 35 per cent., so that only the very best portion of an exceedingly high grade metal is put upon the market. This is shown by the small sizes of Swedish billets that are available. The greatest length obtainable of a Lancashire bar measuring 5 in. x 5 in. is 3 ft., and if the highest grade of Swedish iron is to be obtained the specifications must not merely call for Swedish iron, but Swedish Lancashire bar.

The real value of Swedish steel is shown in the service that can be obtained from it in construction work and in the abuse which it can stand at the hands of unskilled blacksmiths without being ruined. In construction work its economic value is shown by the speed with which drilling can be done, as compared with other steels. A speaker estimated a saving of 33⅓ per cent. in the time of drilling, and this when multiplied by a large number of drills may mean the difference between profit and loss on a contract.

REPORT ON UNIFORM CLASSIFICATION.

The committee on uniform classification of freight and simplification of tariffs made a report to the national convention of railway commissioners at Washington, October 11, which sets forth the situation in regard to classification so lucidly that we quote below some paragraphs from the report. The chairman of this committee is Interstate Commerce Commissioner E. E. Clark. It will be observed that the work of the railways in this difficult matter is fully approved.

The separate classifications now in force have been built up through years of operation in the different classification territories, the carriers in each territory considering particularly their own interests and acceding in numberless instances to the desires or demands of their patrons.

In bringing about uniformity the prime interest of the carriers is their revenue, to which, of course, is added the interest of each carrier that the shippers upon its line are not at a disadvantage as compared with competing shippers on competitive railways The shippers are interested in the total of the charges which they pay and in seeing that they are not at a disadvantage as compared with their competitors.

At first blush it might be said that if the railways would bring about uniform classification entirely by reductions in charges it would be satisfactory to shippers, but . . . it might contain elements of discrimination against some of them which would be of more importance to them than the measure of the rates they pay. In its 1910 convention this association recommended that the Interstate Commerce Commission take the necessary steps to secure uniformity in classification . . . The members of your committee have given this matter much consideration and thought, and the deeper we go into the subject, the more we appreciate and realize the multitude of difficulties that must be met and overcome, and the magnitude of the work of bringing into uniformity all of the rules, regulations, specifications, requirements, minimum weights, and ratings contained in the present classifications and the multitudes of exceptions thereto.

We have inquired with considerable particularity as to the progress of the work undertaken and so far accomplished by the carriers' committee, composed of three representatives from each of the three classification territories, which, as we are convinced, has been intelligently, efficiently and industriously working in good faith, to prepare for adoption by the carriers uniformity in the particulars of rules, descriptions, specifications and minimum weights. The carriers' committee is composed of men of skill and wide experience in classification matters, and if such committee, working, as we are convinced this committee has done, in good faith and industriously, is necessarily employed for so long a period in this work, it seems obvious that a less experienced committee must either take a substantially greater time to per-

form the same work or must do it in a less efficient and consequently less satisfactory manner . . . The committees in charge of the several present classifications are giving due consideration to the provisions of the other classifications, and are seeking to bring about uniformity in different features and items as changes are made. Every such step contributes toward ultimate uniformity.

It is better for all concerned to permit the present plan of action to continue so long as substantial and continuing progress is thus made, rather than to now undertake to prepare and prescribe a uniform classification. We also think that behind this effort on the part of the carriers there should be the spur of continued interest and activity on the part of all interested or vested with any authority in the premises, and a definite understanding, that if continued, and substantial progress is not made, the work will be undertaken through other means by those having authority so to do.

Experiences of the past justify, we think, the conclusion that even if uniform classification were today agreed upon by carriers and shippers, competitive influences and the desire to get traffic would very soon destroy the uniformity unless it were supported by the force of authority in law to require adoption, maintenance and observance thereof.

More or less suspicion lurks in the minds of some, but it is frequently found that protests against proposed changes are based in misunderstandings. Uniformity can never be reached as the result of the adoption of the views of the extremists on either side.

In the work of preparing uniformity of ratings many objections would be averted if the carriers would invite one representative of the state commissions and one representative of shippers from each classification territory, together with one representative of the Interstate Commerce Commission, to sit with the committee . . . for the purpose of presenting to the committee views of their constituents on certain phases of the work, and of keeping their several principals informed as to the general progress of the work, while, at the same time, equipping themselves to give needed and dependable advice to their principals with regard to the work as a whole, or with regard to certain features of it when such work or such features come up for final adoption. We believe that wherever it has been tried the policy of intelligent, fair-minded representatives of contending parties sitting down together, to a temperate exchange of views has been found profitable, and to make for substantial progress and to greatly reduce misunderstandings as to purpose, policy and facts.

[illegible] classification can perhaps only be reached by resort in some [illegible] not wish to be understood as suggesting that uniform classifica[illegible] leads to the conviction that it would be more harmful than help[illegible]

parent all along in recent years and is apparent today. There is yet much room for improvement, but your committee is not prepared to recommend the adoption of a uniform form of tariffs for the railroads of the United States.

It would contribute much to simplification if each road would arrange all of its commodity rates upon the same commodity in one tariff.

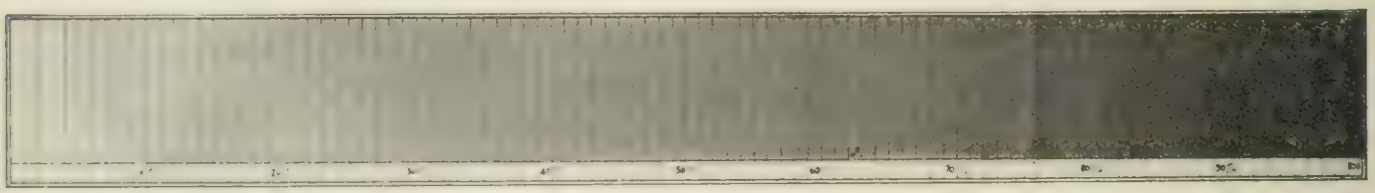
IMPROVED SMOKE CHART.

BY M. E. WELLS,

Assistant Master Mechanic, Wheeling & Lake Erie, Brewster, O.

The work of reducing the smoke from locomotives in Cleveland has been carried on enthusiastically by the railways entering that city. It was found, however, to be very difficult to estimate the percentages of smoke with the Ringleman smoke chart, as it has to be set up 50 ft. from the observer, making it practically impossible to obtain accurate results for the locomotives, which are in motion. The improvement shown in the accompanying illustration was made by the writer. This chart corresponds to the Ringleman chart, but can be held in the hand while estimating, and gives all conditions of smoke from 0 to 100 per cent., instead of only 20, 40, 60 and 80 per cent. as given on the Ringleman chart.

The railways are co-operating with the city smoke inspector, and have arranged monthly meetings of the road foremen of engines, railway smoke inspectors, and others directly in charge of locomotive operation on all the roads entering Cleveland. The ways and means of smoke reduction and the general subject of fuel consumption are taken up and discussed. The city smoke inspector is invited to these meetings and enters into the discussions. The arrangement has worked out splendidly and considerable competition has been aroused among the different roads. The roads with the best showing are constantly making efforts to hold their records, while those with the poor records are continually trying to better them. This co-operation between the city inspector and the railway inspectors puts the matter on a very smooth running basis, and there is no friction, as everybody feels that each one is doing the best he can.



Improved Smoke Chart.

There is a general smoke committee composed of the higher railway and the higher city officials, of which D. R. McBain, superintendent of motive power of the Lake Shore & Michigan Southern, is chairman. This committee only meets occasionally. The accompanying table gives an average of the smoke percentages on different railways entering Cleveland for the first six months in 1911. For obvious reasons letters are substituted for the names of the different railways.

[illegible] Cleveland, Ohio [illegible] 1911.

[illegible] Road	Number of Observations	Average, Per Cent.
A	426	3.16
B	165	4.67
C	[illegible]	6.33
D	[illegible]	6.37
E	591	6.63
F	307	6.88
G	68	7.30
H	191	12.88

The construction of a railway in Victoria from Bairnsdale, about 170 miles east of Melbourne, to Orbost, about 61 miles, will be commenced shortly. The estimated cost is $1,930,000. It will be the most important railway recently built in Victoria.

THE DESIGN OF RAILWAY BRIDGE ABUTMENTS.*

BY J. H. PRIOR,
Assistant Engineer, Chicago, Milwaukee & St. Paul.

The following paper gives the result of an investigation ordered by C. F. Loweth, chief engineer of the Chicago, Milwaukee & St. Paul, and made by the writer.

A railway bridge abutment is ordinarily a masonry structure which gives vertical support to one end of a steel span, and at the same time gives whatever lateral support is necessary to prevent the adjoining embankment from slipping into the stream.

The most common type has a cross-section similar to that shown in Fig. 1, in which *a* is the bridge seat, consisting of a horizontal surface carrying the steel span; *b* is the back wall which supports the embankment and prevents its spilling forward on the bridge seat; the base *e* of the back wall *b* being made of such width as will make the back wall stable against overturning on account of the lateral pressure *R*-1 of the earth; *c* is the main body of the neatwork, and must have sufficient base *f* so that it will also be stable against overturning from the lateral pressure of the earthwork *R*-2; *d* is the footing, which must have a base *g* large enough to carry all the vertical

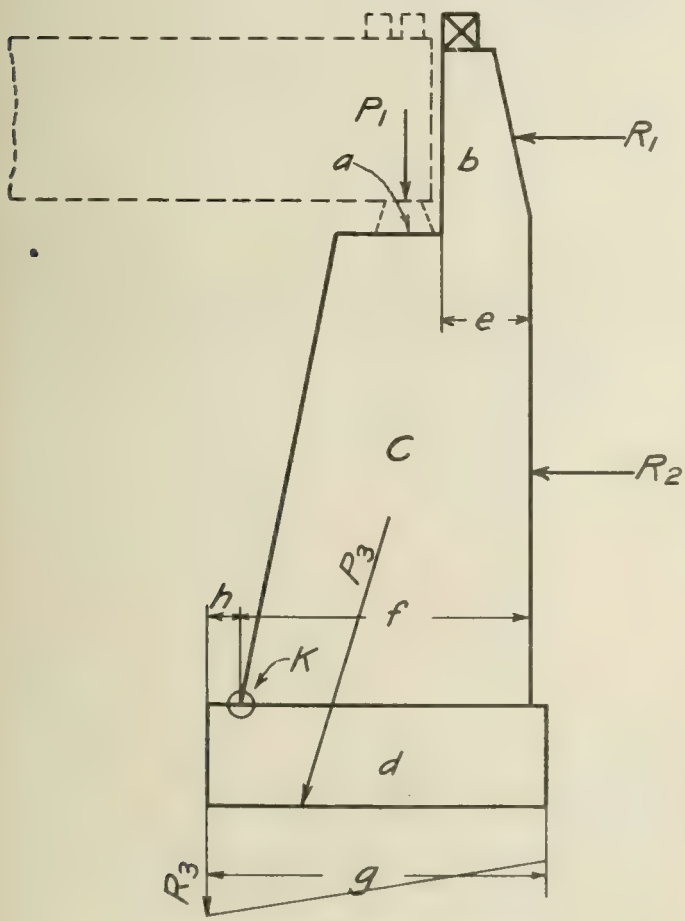


Fig. 1—Common Type of Abutment.

loads, and offset *h* should be large enough to keep the pressure at the toe of the footing *R*-3 within the allowable limit.

The three principal types are the wing, U, and T abutments. In the wing abutment the wings keep the embankment from slipping into the stream. In the U abutment the wings are made parallel to the track, thus giving the lateral support to the embankment which is required to extend the embankment to the bridge seat. In the T abutment the floor is supported directly back of the bridge seat by the stem of the abutment, which carries the track back to a point where the embankment is of sufficient height to support it.

In addition to conforming to the ordinary laws of structural design, properly designed abutments should have the following properties, which may be called major requirements, because they affect the integrity of the structure:

m_1. The neatwork should be stable against overturning by revolving on the line *k*, Fig. 1, at the intersection of the front face of the neatwork and footing, and should also be safe against crushing on the same line.

m_2. The abutments should be stable against sliding, either

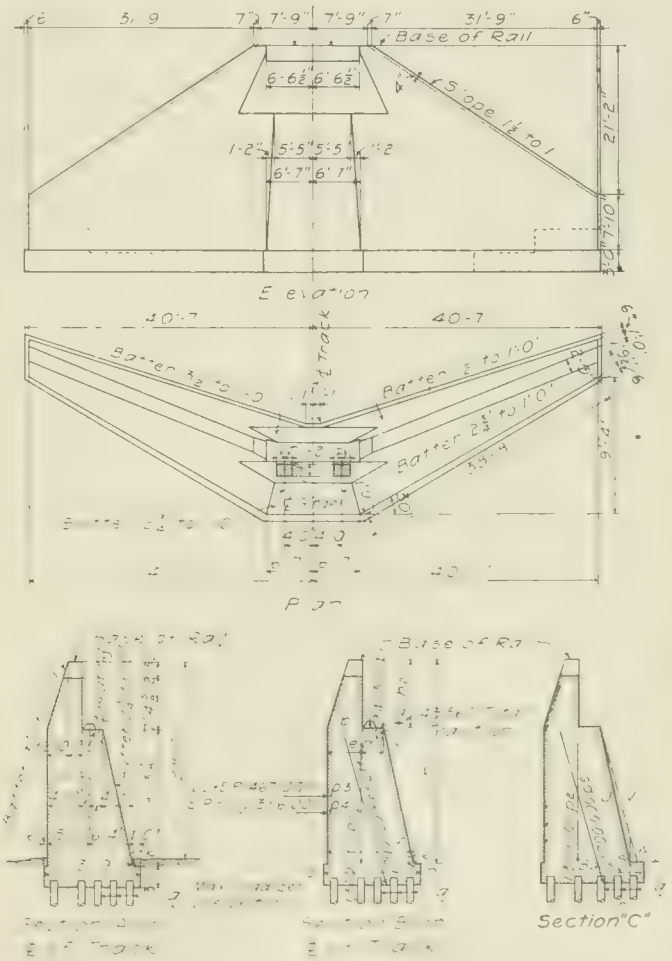


Fig. 2—Type B_1; Plain Concrete Wing Abutment, with Plain Concrete Backwall.

by the neatwork sliding on the footing or the footing sliding upon the foundation bed.

m_3. The pressure of the toe of the footing upon the foundation should not be excessive.

They should have the following properties, among others, which may be called minor requirements:

n_1. The abutments should protect the bank against scour.

n_2. The abutments should prevent the embankment drainage from washing away the shoulder of the bank adjacent to the back wall.

n_3. The abutments should provide a joint which will support the track in an easy and continuous manner from embankment to superstructure.

n_4. The abutment should be easily drained.

As by far the greater number of abutments being built are either of plain or reinforced concrete, the term "Design of Bridge Abutments" at present means the design of bridge abutments in concrete masonry.

In order to compare the properties and economy of the various types, it was necessary to assume the same conditions in the

*Abstracted from Bulletin 140 of the American Railway Engineering Association. Copyrighted by the association.

design[illegible] types. The more important assumptions which were made for this purpose are as follows:

(1) The height of the abutment is the distance from the base of rail to the natural ground.

(2) Slope of fill 1½ to 1.

(3) Slope of the natural ground away from stream or bridge opening 4 to 1.

PLAIN CONCRETE ABUTMENTS.

Type B₁.—The plain concrete masonry abutment without reinforcement in the back wall, type B_1, is shown in Fig. 2. The cross-section of the abutment, marked "section B on the center line of track" is determined about as follows:

The distance h_2, from the base of rail to the top of the bridge seat *a*, is determined by the depth required by the floor, girders and bearings of the superstructure; and in new work the abutment must conform to these dimensions. The dimension *e*, which is the width of the back wall at its base, is taken as 4/10 h_2 if the lateral pressure of the earthwork tending to overturn the back wall is alone considered, or it is taken at 5/10 h_2 if a slight further provision is made for the overturning action of frost in the bank. The width of the bridge seat *m* is determined by

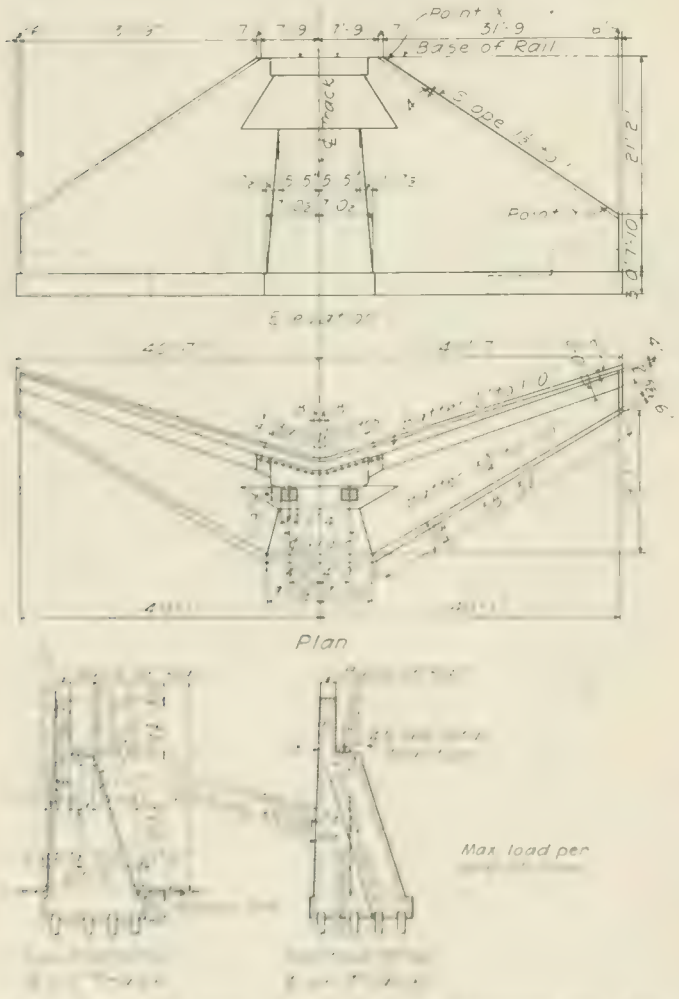


Fig. 2—Type B; Plain Concrete Wing Abutment with Reinforced Backwall.

or crushing on the line *k*, at the lower edge of the neatwork. The dimension *f* together with the width of bridge seat *m* and thickness of back wall *e* having been determined, we have the choice of setting the bridge seat and back wall vertically over the rear edge of the footing, or of locating the bridge seat and back wall nearer the front of the footing, thus increasing the length of our superstructure at the expense of an increased bearing on the toe of the foundation.

Type B₂.—Abutment B_2 is similar to abutment type B_1, except that the defect of that type, is the absence of bars in the back wall is eliminated.

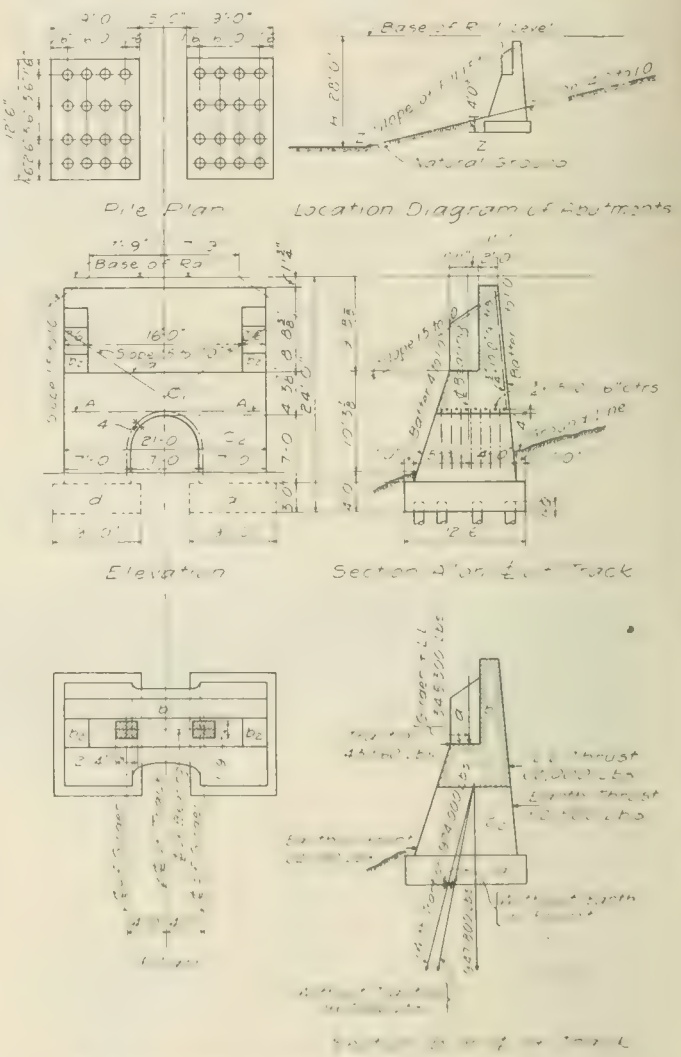


Fig. 4—Type B; Plain Concrete Pier Abutment.

The two abutments are similar in other respects. The abutment type B_2 is a wing abutment built practically of plain concrete masonry. This type is by far the most widely used, and is an economical abutment for certain heights.

Abutments of this type do not cause the drainage water to wash away the corner of the bank adjacent to the back wall at *x* in Fig. 3, but at the lower point *y* on the bank, where the amount of the drainage water is greater, there seems to be a tendency to wash the portion of the bank adjacent to the end of the wing wall, and, therefore, this point is often found protected by loose rip rap.

Type B₃.—The U abutment of plain concrete masonry, type B_3, is shown in Fig. 11. This abutment is designed with the side walls, c_6, long enough to provide for an embankment slope of 1½ to 1, as experience shows that the slopes at the end of the embankment cannot be made much steeper than the side slopes of the same embankment. This lengthening of the side walls results in making the neatwork yardage for abutment B

greater than for abutment B_2. This difference in yardage in the neatwork is overcome by the lower foundation costs of abutment B_3 so that the total cost of abutment B_3 is somewhat less than abutment B_2 for heights over 23 ft.

Type B_5. An examination of section B, Fig. 3, shows that it is more difficult to make provision in an abutment to resist the lateral forces p_3 and p_4 tending to overturn the abutment than it is to take care of the vertical loads p_1 and p_2. The lateral forces are exceeded in magnitude by the vertical forces, but

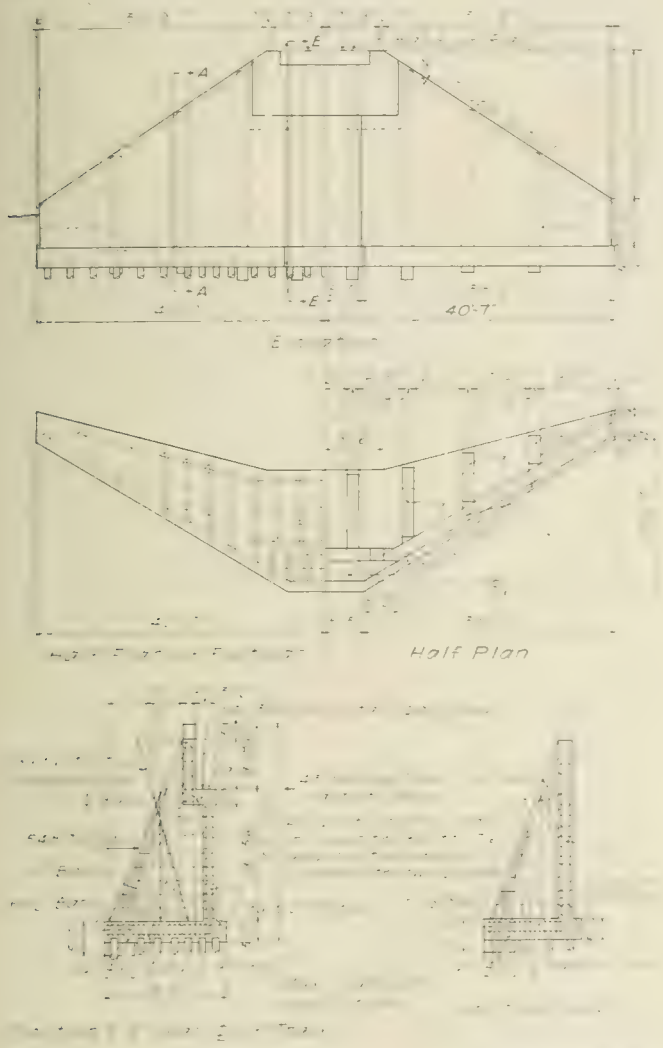


Fig. 5—Type C_1; Reinforced Concrete Counterfort Abutment.

the vertical forces are directly opposed by the equal and opposite reaction on the foundation, whereas no such equal and opposite reaction can be placed on the line p_5 continued, which shows the direction and location of the lateral pressure of the earthwork. As a consequence it would seem that a considerable economy could be effected in a design in which the lateral forces p_3 and p_4 were eliminated or greatly diminished. In abutment B_5, Fig. 4, little provision is made for resisting the lateral pressure of the earthwork. Instead, provision is made for diminishing the lateral pressure by omitting the wings and allowing the bank to spill around in front of the abutment. Abutment type B_5 consists, as shown in the elevation and Section B, of two short piers, which carry a beam c-1, the top of which forms the bridge seat a. The earthwork is kept off the bridge seat by the back wall b_1, and the side walls b_2. The bank is permitted to run around in front of the abutment to the point z where the natural slope of the fill intersects the ground line.

If an abutment type B_5 and an abutment type B_1 were so located as to have their bridge seats in the same position, the abutment B_5 would give a smaller waterway than the abutment type B_1 by the distance from z to z_1 in Fig. 4, to which the fill extends in front of the abutment. In order to get the abutment B_5 on the same basis for comparison as the other abutments, it is necessary to add to the cost of abutment B_5 the cost of extending the superstructure so as to permit the location of the abutment to be moved from z to z_1. As shown in the table herewith, this element of cost is an important item, amounting to 59 per cent. of the total.

REINFORCED CONCRETE ABUTMENTS

Type C_1. The reinforced concrete wing abutment type C_1, shown in Fig. 5, is similar to the abutment type B_2 except that it is constructed of reinforced concrete instead of plain concrete. If the abutment is properly proportioned, the curtain wall c_2 can not be pushed outward by the lateral pressure of the earthwork without carrying with it the buttresses c_3 and without lifting the slab d from the pile foundations and also lifting the entire weight of the earth which rests vertically on the slab d. At the front of the abutment, the curtain wall c_2 is

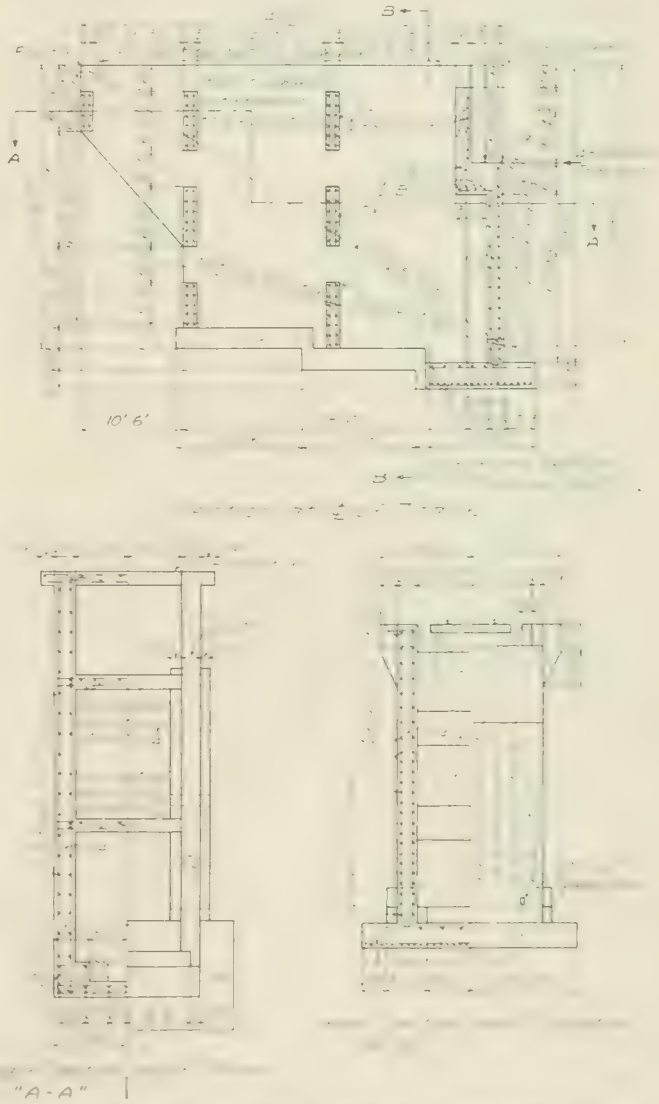


Fig. 6—Type C: Reinforced Concrete U Abutment Filled: Long Sidewalls.

given a horizontal offset c_4, as shown in section E, to provide for the bridge seat a. The curtain wall is carried up vertically from the bridge seat a, forming the back wall b, as shown in the same section.

The abutment shown in Fig. 5 has no particular advantage over type B_2, the introduction of buttresses not decreasing the cost of neatwork and the provisions for anchoring buttresses to the footings greatly increasing the cost of [illegible]

above 20 ft. Fig. 5 does not, however, show the best design that can be made of reinforced concrete wing abutment. It contains two defects; the bridge seat is set too far forward and the footings have insufficient projecton in front of the neatwork.

If these defects are corrected we have an improved and cheaper abutment. Estimates show that it costs about 10 per cent. less than type B_2 for the 36-ft. height and 25 per cent. less for the 50 ft. height which is outside the limits of the diagram.

If, in addition, the sections of all walls and buttresses are reduced to the minimum which can be placed by experienced workers under proper supervision, the economy over B_2 is still further increased.

Type C_2.—Abutment type C_2, Fig. 6, is a U abutment of reinforced concrete. It resembles the U abutment of plain con-

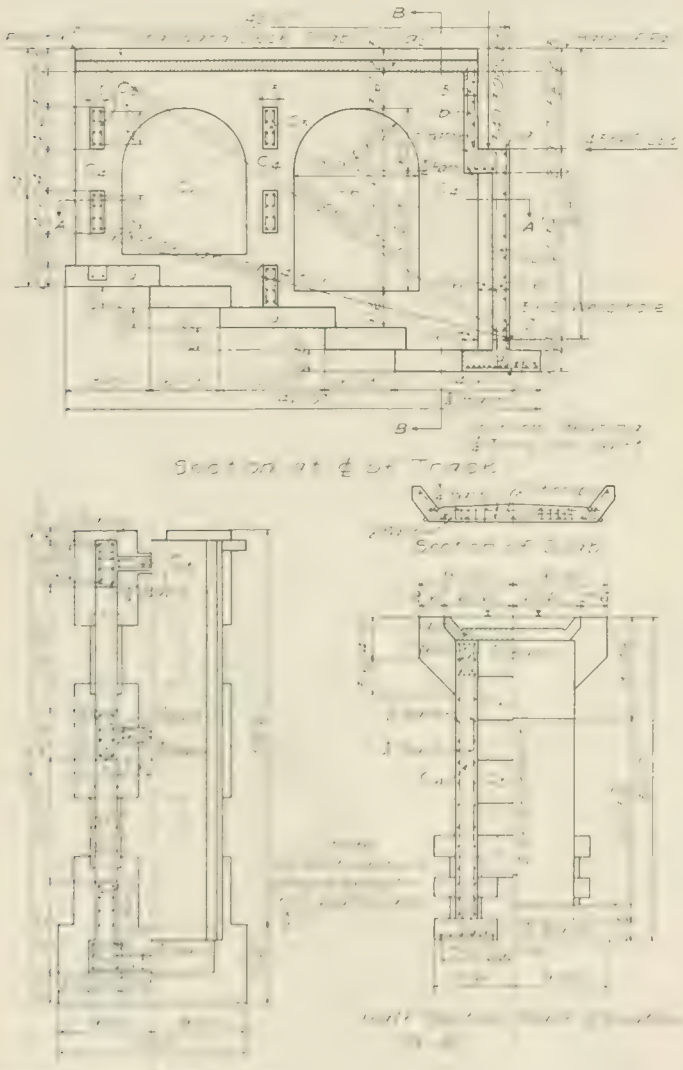


Fig. 7—Type C_1; Reinforced Concrete U Abutment, Covered.

That of type C_1 is 18 ft. The corresponding dimension on abutment C_2 is the distance from the front to back of abutment, or 45 ft.

It is true that the wing walls of abutments B_2 and C_1 protect, perhaps, five times as much of the embankment against scour as does abutment C_2, but if we compare the protection afforded

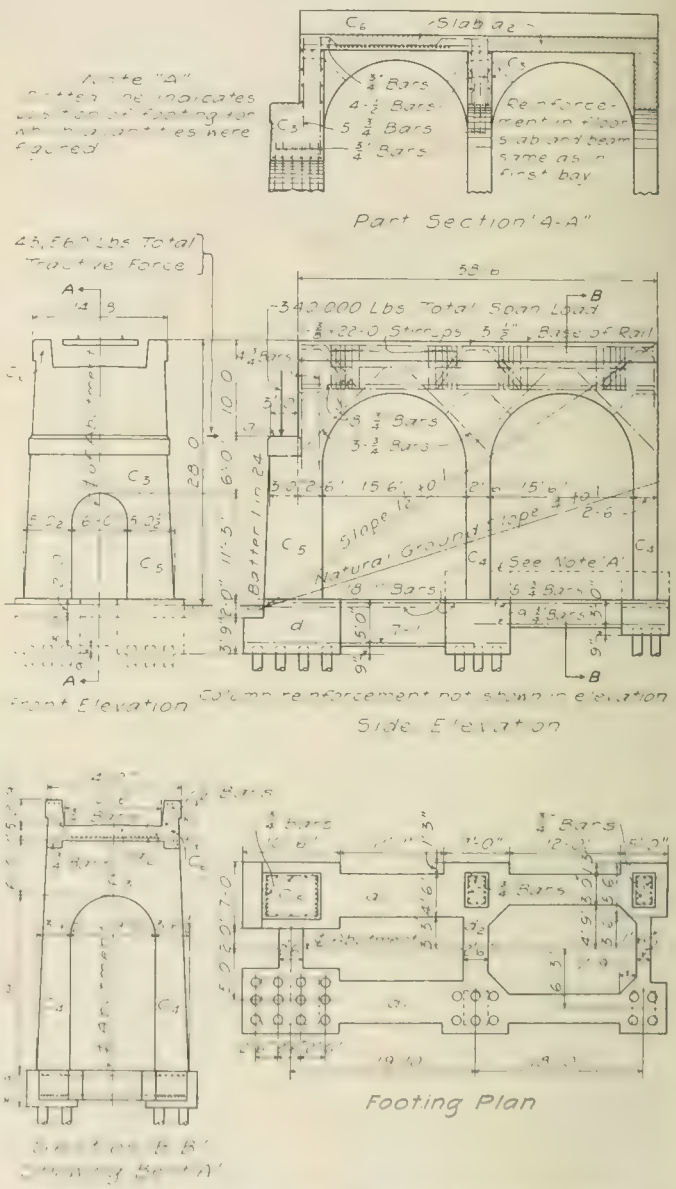


Fig. 8—Type C_3; Reinforced Concrete Arch Abutment.

by either type B_2 or C_2 with the total amount of bank protection required, the difference between the two abutments in this respect is not much. One of the defects of this abutment is that practically all of the surface water from the track for the entire length of abutment must drain past the point *x*, Fig. 6. As the amount of water is considerable, it tends to wash away the embankment at the end of the wing wall, which is, of course, an important matter, as the material is washed away at a point not far from the end of the track ties and requires much more attention than if the material was washed away at the end of the wing wall.

Type C_3.—Abutment type C_3 and all of the abutments which follow have one feature differing from any of the abutments previously mentioned, that of carrying the track directly on the body of the abutment over the entire length of the abutment instead of on the bank.

To save material and to equalize the pressure of the earth work on both sides of the side walls c_1, two large openings c_6 are

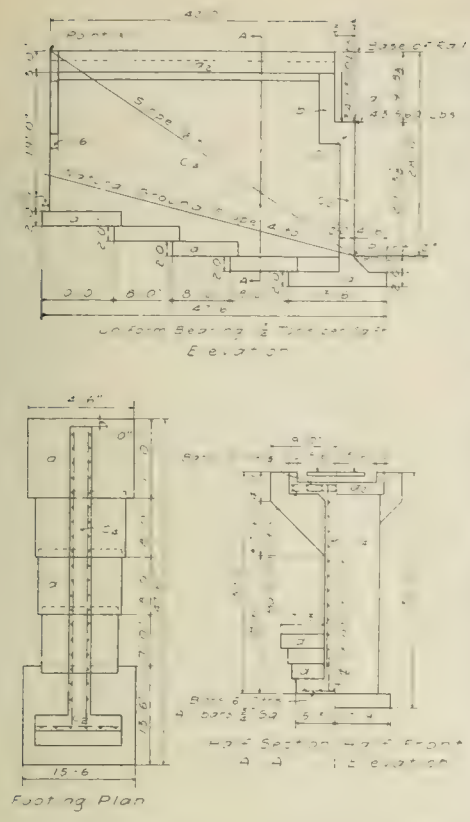


Fig. 10—Type C_6; Reinforced Concrete T Abutment.

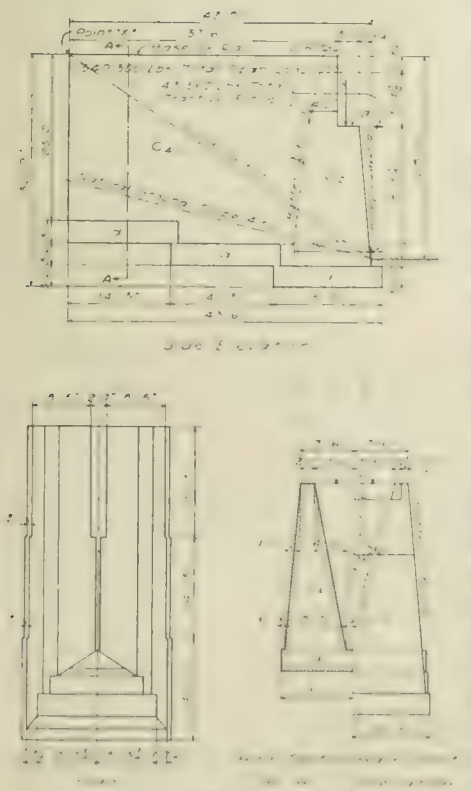


Fig. 11—Type B; Plain Concrete U Abutment, Filled.

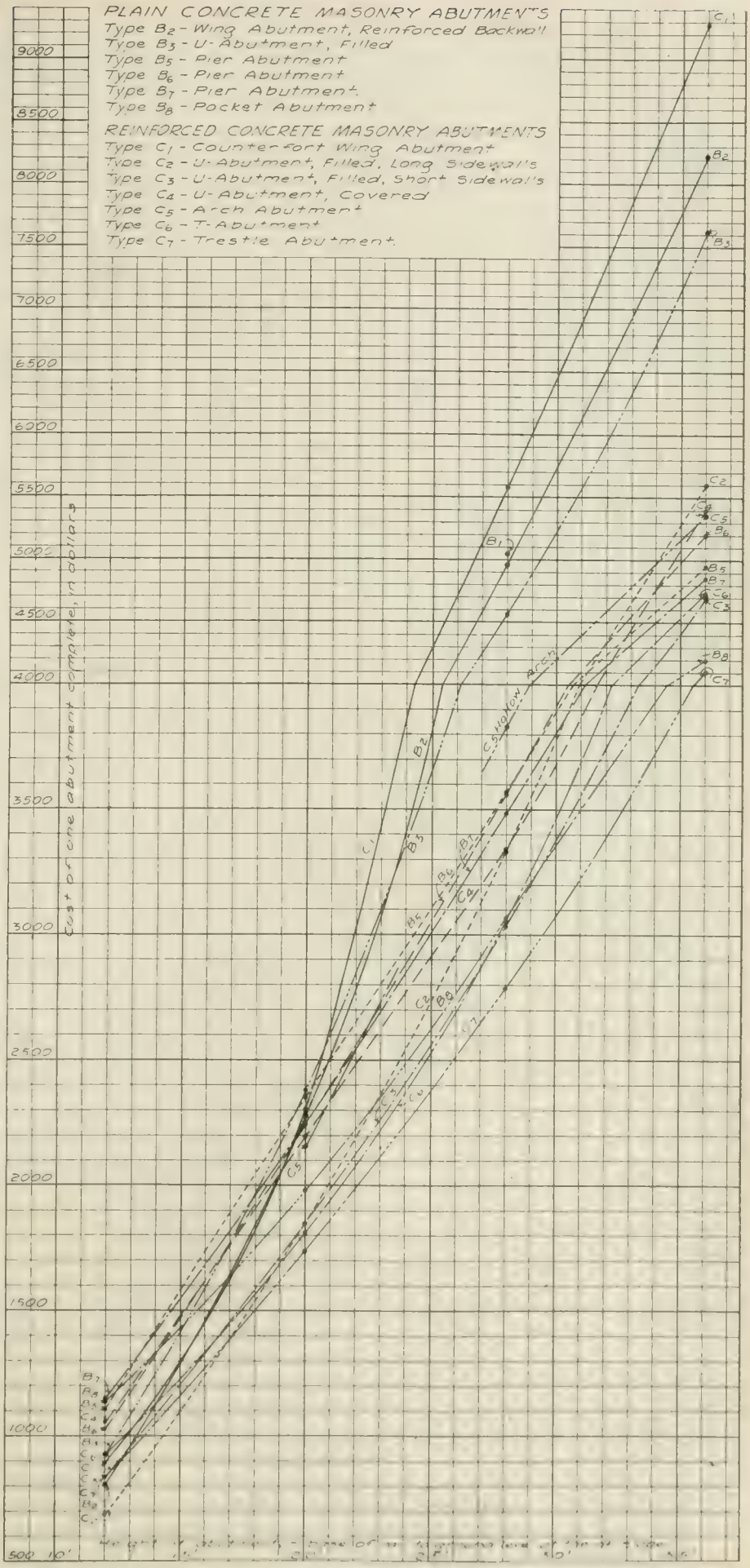


Fig. 9—Graphical Comparison of Costs.

made in the walls. The portion of the side wall remaining between the openings c_6 forms a column; and the portion of the side walls above the openings forms a beam between columns. The openings are shown circular on top, although structurally they could have been as easily made square.

Abutment C_4 has an advantage over abutment C_2 in that its foundation loads are less, due to the fact that the interior of the abutment is only partially filled with earth. The side walls of C_4 are subjected to practically no unbalanced lateral pressure of the earthwork. It has the disadvantage that it requires a considerable amount of material for the construction of the floor slab a_2, and as a consequence it does not show much economy for low fills.

As there are practically no unbalanced lateral earthwork pressures in action against abutment C_4 no provision need be made to make it conform to the requirements m_1, and m_2 and m_3. This abutment gives, perhaps, slightly less protection to the embankment against scour than abutment C_2, but it will probably not wash away at the shoulder of the embankment at x, as drainage for the top of the abutment is provided through holes in the sides of the floor slabs.

Type C₅.—Abutment type C_5, consists in general of six vertical posts c_4 and c_5, which support the slab a_2. At the bottom they are tied together by the footings a_1 and d_2. The footings d_1 and d_2 act partly as foundation beams and partly as ties, which hold the bottoms of columns in their true relative position and afford them support against any unbalanced lateral pressure of the earthwork. At the top the cross beam c_3 spans transversely between the posts c_4. Two posts and the cross beam c_3 form a single bent.

At the top, also longitudinal beam c_6 spans longitudinally between the bents A. By this arrangement the slab a_2 is supported on four sides, the two ends of the slab resting on cross beams c_3, and the two sides of the slab are supported by longitudinal beam c_6.

At the front of the abutment the posts c_5 are made much heavier, as the beam c_3 which connects them together at the top carries the weight of the adjacent span of the superstructure, and also carries one end of a slab a_2. The divisions mentioned are only those which have to be made in order to execute the design; the structure itself being tied together by steel in all directions so as to resemble a monolith. In service this abutment has all the advantages and disadvantages of type C_4, which it resembles structurally in many respects. As it is somewhat more open than type C_4, it drains itself a little better. The abutment shown in Fig. 8 is the design of W. S. Lacher.

Type C₆.—A T abutment of reinforced concrete type C_6 is [illegible] slab a_2, which is supported longitudinally along its center line by [illegible] overturning by the front curtain wall c_3 and by the reinforce- [illegible] the footings. The curtain wall c_3 is carried up to form the [illegible]

This abutment has the defect that it is not safe under a de- [illegible] structure much greater stresses than in the other types. If we in- [illegible] tually $4000 and filling the structure so full of bars that the [illegible]

[illegible] a concrete trestle of sufficient length to carry the track from the point z, or from the end of the superstructure, to the point x, where the bank has attained its full height. Commencing at the top, this abutment consists of two standard U-shaped trestle slabs a_2 which contain the ballast, which in turn supports the ties and rails. These slabs rest on the neatwork of the bents c_2 and c_4, which are ordinarily reinforced concrete trestle bents with spread footings d. To resist unbalanced longitudinal pressure of the earthwork, and also to add longitudinal stability to the abutment, the struts c_3 are introduced between the tops of the bents c_2 and c_4, and the struts d_1 introduced between the bottoms of the same bents. In addition to acting as struts these members c_3 and d_1 combine the three bents and the two spans

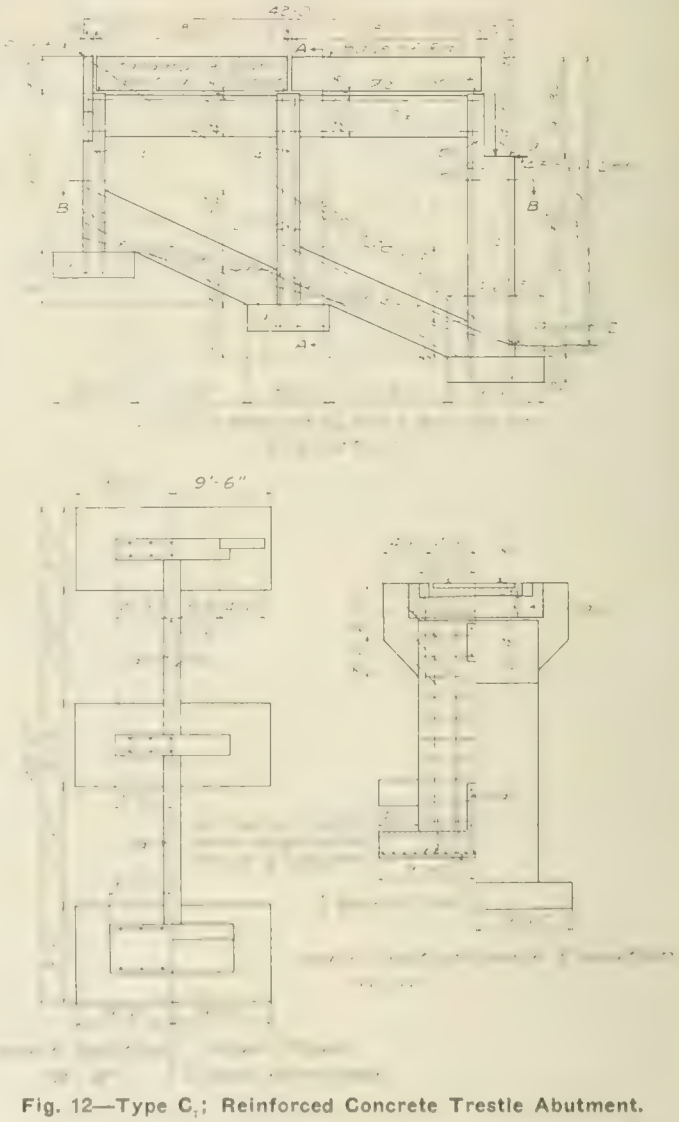


Fig. 12—Type C_1; Reinforced Concrete Trestle Abutment.

into two rigid quadrilaterals. The trestle bent c_2 at the front end of the abutment is made considerably thicker than the bents c_4 in the bank in order to leave room for the bridge seat a_3. In service this abutment is much like C_4 and C_5. Structurally it resembles C_4 more closely in that the floor a_2 is a separate member and can be placed after the abutment has been built. The remaining portion of the abutment forms a complete structure without the slab. The slab is only used to afford direct vertical support to the track.

[illegible] OF TOTAL COSTS OF VARIOUS TYPES

The table shows the manner in which the total estimated costs of the foregoing abutments were made up. This table should give dependable estimated costs, as the division of the total costs into their elements has been carried as far as could be conveniently done. It shows the quantities as well as the unit costs

and makes it possible for the reader to substitute different unit costs for those shown, where the conditions are such that the unit costs given in the table would not apply. It is not believed, however, that any ordinary changes will affect the relations between the totals.

In Fig. 9 the total cost of abutments are platted as ordinates to the heights platted as abscissas.

The objection most frequently made to abutments types C_2 to C_7 is their high cost, especially, it is said, if constructed by men experienced mostly in the construction of plain concrete work. On account of this objection the principal unit costs for this type were taken rather high, as it was believed that there was enough economy in the design of some of these types to more than offset the highest unit cost which could be reasonably selected. Examination of Fig. 9 will show that this prediction was substantially correct.

In examining these cost curves, it is important that the following should be noted:

Types C_6 and C_7 are untried, and unexpected weaknesses may develop in their use. C_6 does not take care of derailment.

B_5 or C_7 cannot be used where much scour is anticipated or where the high water is near the bridge seat, without the use of rip-rap, whose cost has not been included.

It should be observed that the necessity of carrying the footings further below the ground will make a proportionately greater increased cost in types B_1 to B_5 than in types C_2 to C_7.

The use of any type of superstructure which gives a less depth of bridge seat below base of rail will mean a greater

TABLE SHOWING METHOD OF CALCULATING COST OF ABUTMENTS.

Height in Ft.		Item.	Floor. Cu. Yds. of Conc.	Floor. Lbs. of Steel.	Floor. Sq. Yds. of Forms.	Neatwork. Cu. Yds. of Conc.	Neatwork. Lbs. of Steel.	Neatwork. Sq. Yds. of Forms.	Footings. Cu. Yds. of Conc.	Footings. Lbs. of Steel.	Footings. Sq. Yds. of Forms.	Cu. Yds. of Excavation.	Piles.	Cu. Yds. of Fill.	False-work.	Change in Length of Bridge one Abutment.	Engng. and Incidentals.	Grand Total.
B_1	28	Quant...	.....	.....	.....	406	.....	425	103	.....	63	260	71	1,500	.....	4.42 ft.	(5%)	.....
		Cost....	.....	.....	.....	$2,030	.....	$510	$515	.....	$76	$390	$568	$375	$50	$270	$239	$5,022
B_2	12	Quant..	.....	.....	.....	60	270	121	21	.....	23	65	.....	170	.....	.71 ft.	(5%)	.....
		Cost....	.....	.....	.....	$300	$9	$145	$105	.....	$28	$98	.....	$43	.....	$43	$38	$809
	20	Quant...	.....	.....	.....	160	270	220	56	.....	49	120	34	600	.....	2.79 ft.	(5%)	.....
		Cost....	.....	.....	.....	$800	$9	$264	$280	.....	$59	$180	$272	$150	.....	$170	$109	$2,293
	28	Quant...	.....	.....	.....	387	270	420	102	.....	60	260	64	1,500	.....	6.04 ft.	(5%)	.....
		Cost....	.....	.....	.....	$1,935	$9	$504	$510	.....	$72	$390	$512	$375	$50	$368	$236	$4,961
	36	Quant...	.....	.....	.....	696	270	628	142	.....	75	400	108	3,100	.....	8.38 ft.	(5%)	.....
		Cost....	.....	.....	.....	$3,480	$9	$754	$710	.....	$90	$600	$864	$775	$50	$511	$392	$8,235
B_3	12	Quant...	.....	.....	.....	74	.....	125	31	.....	.....	60	.....	60	.....	.....	(5%)	.....
		Cost....	.....	.....	.....	$370	.....	$150	$155	.....	.....	$90	.....	$15	$100	.....	$44	$924
	20	Quant...	.....	.....	.....	229	.....	285	59	.....	.....	115	.....	250	.....	.85 ft.	(5%)	.....
		Cost....	.....	.....	.....	$1,145	.....	$342	$295	.....	.....	$173	.....	$63	$200	$52	$113	$2,383
	28	Quant...	.....	.....	.....	496	.....	450	103	.....	.....	210	.....	525	.....	1.52 ft.	(5%)	.....
		Cost....	.....	.....	.....	$2,480	.....	$540	$515	.....	.....	$315	.....	$131	$300	$93	$219	$4,593
	36	Quant...	.....	.....	.....	880	.....	780	137	.....	.....	290	.....	1,075	.....	2.27 ft.	(5%)	.....
		Cost....	.....	.....	.....	$4,400	.....	$936	$685	.....	.....	$435	.....	$269	$400	$139	$363	$7,627
B_5	12	Quant...	.....	.....	.....	26	540	64	26	.....	.....	45	.....	76	.....	10 ft.	(5%)	.....
		Cost....	.....	.....	.....	$130	$19	$77	$130	.....	.....	$68	.....	$19	.....	$610	$53	$1,106
	20	Quant...	.....	.....	.....	52	540	96	25	.....	.....	48	27	400	.....	22 ft.	(5%)	.....
		Cost....	.....	.....	.....	$260	$19	$115	$125	.....	.....	$72	$216	$100	.....	$1,340	$112	$2,359
	28	Quant...	.....	.....	.....	80	945	134	25	.....	.....	46	32	960	.....	34 ft.	(5%)	.....
		Cost....	.....	.....	.....	$400	$33	$161	$125	.....	.....	$69	$256	$240	$45	$2,075	$170	$3,574
	36	Quant...	.....	.....	.....	103	945	172	36	550	.....	68	45	1,860	.....	46 ft.	(5%)	.....
		Cost....	.....	.....	.....	$515	$33	$206	$180	$19	.....	$102	$360	$465	$00	$2,800	$237	$4,977
C_1	12	Quant...	.....	.....	.....	38	680	120	24	700	32	79	.....	171	.....	.....	(12%)	.....
		Cost....	.....	.....	.....	$247*	$24	$144	$156*	$25	$38	$119	.....	$43	.....	.....	$96	$892
	20	Quant...	.....	.....	.....	100	5,050	316	45	2,380	48	182	.....	630	.....	.....	(12%)	.....
		Cost....	.....	.....	.....	$650*	$177	$379	$293*	$83	$58	$273	.....	$158	.....	.....	$249	$2,320
	28	Quant...	.....	.....	.....	183	9,950	608	113	7,754	80	358	85	1,702	.....	.....	(12%)	.....
		Cost....	.....	.....	.....	$1,190*	$348	$730	$735*	$271	$96	$537	$680	$426	.....	.....	$602	$5,615
	36	Quant...	.....	.....	.....	306	16,600	1,007	176	12,070	86	602	141	3,450	.....	.....	(12%)	.....
		Cost....	.....	.....	.....	$1,989*	$581	$1,208	$1,144*	$422	$103	$903	$1,128	$86	.....	.....	$1,001	$9,341
C_2	12	Quant...	.....	.....	.....	37	2,440	134	10	200	14	30	.....	80	.....	.....	(8%)	.....
		Cost....	.....	.....	.....	$241*	$85	$161	$50	$7	$17	$45	.....	$20	$10	.....	$51	$687
	20	Quant...	.....	.....	.....	102	6,730	349	20	900	34	65	.....	300	.....	.....	(8%)	.....
		Cost....	.....	.....	.....	$663*	$236	$419	$130*	$32	$41	$98	.....	$75	$20	.....	$137	$1,851
	28	Quant...	.....	.....	.....	189	12,130	602	37	1,180	41	130	.....	630	.....	.....	(8%)	.....
		Cost....	.....	.....	.....	$1,229*	$425	$722	$241*	$41	$49	$195	.....	$158	$30	.....	$247	$3,337
	36	Quant...	.....	.....	.....	304	20,000	1,015	42	840	74	140	54	1,200	.....	.....	(8%)	.....
		Cost....	.....	.....	.....	$1,976*	$700	$1,218	$210	$29	$89	$210	$432	$300	$30	.....	$416	$5,610
C_4	12	Quant...	8	2,180	48	31	1,950	25 99	16	400	24	60	.....	70	.....	.....	(10%)	.....
		Cost....	$52*	$76	$120*	$202*	$68	$63* $119	$80	$14	$29	$90	.....	$18	$20	.....	$95	$1,046
	20	Quant...	15	4,100	81	69	4,340	45 224	31	2,110	47	100	.....	200	.....	.....	(10%)	.....
		Cost....	**$98***	**$144**	$203*	$449*	$152	$113* $269	$202*	$74	$56	$150	.....	$50	$40	.....	$200	$2,200
	28	Quant...	21	5,370	115	114	7,180	100 298	41	2,790	65	130	.....	550	.....	.....	(10%)	.....
		Cost....	$137*	$201	$288*	$741*	$251	$250* $358	$267*	$98	$78	$195	.....	$138	$60	.....	$306	$3,368
	36	Quant...	27	7,360	148	175	11,000	125 534	68	1,500	94	220	62	1,050	.....	.....	(10%)	.....
		Cost....	$176*	$258	$370*	$1,138*	$385	$313* $641	$340	$53	$113	$330	$496	$262	$60	.....	$493	$5,428
C_5	20	Quant...	30	2,740	80	49	2,668	130	48	2,373	.....	67	6	239	.....	2.2 ft.	(10%)	.....
		Cost....	$195*	$96	$96	$319*	$93	$156	$312*	$83	.....	$101	$208	$60	$100	$140	$196	$2,155
	28	Quant...	48	5,250	135	90	6,873	250	84	2,198	.....	130	44	550	.....	0.5 ft.	(10%)	.....
		Cost....	$312*	$184	$162	$585*	$241	$300	$546*	$252	.....	$195	$352	$138	$200	$30	$350	$3,847
	36	Quant...	51	5,296	140	125	8,922	345	113	9,852	.....	145	52	1,050	.....	8.0 ft.	(10%)	.....
		Cost....	$332*	$185	$168	$813*	$312	$414	$735*	$345	.....	$218	$416	$262	$200	$490	$489	$5,379
	44	Quant...	81	7,781	200	234	15,165	570	153	12,254	.....	244	80	1,912	.....	5.2 ft.	(10%)	.....
		Cost....	$527*	$272	$240	$1,521*	$531	$684	$995*	$429	.....	$366	$640	$478	$300	$320	$730	$8,033
C_6	12	Quant...	13	1,038	33	33	1,084	80	20	890	21	50	..	63	.....	.....	(10%)	.....
		Cost....	$85*	$36	$83*	$215*	$38	$96	$130*	$31	$25	$75	..	$16	$10	.....	$84	$924
	20	Quant...	23	1,835	58	73	2,365	177	33	2,000	37	83	..	224	..	.....	(10%)	.....
		Cost....	$150*	$64	$145*	$468*	$83	$212	$215*	$70	$44	$125	..	$56	$30	.....	$165	$1,817
	28	Quant...	33	2,633	84	133	4,371	301	50	5,066	52	130	..	467	.....	.....	(10%)	.....
		Cost....	$215*	$92	$210*	$865*	$153	$361	$325*	$177	$62	$195	..	$117	$30	.....	$280	$3,082
	36	Quant...	43	3,430	108	208	6,840	471	82	8,320	80	200	..	1,100	.....	.....	(10%)	.....
		Cost....	$280*	$120	$270*	$1,352*	$239	$565	$533*	$291	$98	$300	..	$250	$30	.....	$433	$4,761
C_7	12	Quant...	12	2,960	54	24	910	76	14	250	18	40	..	60	..	.....	(8%)	.....
		Cost....	$78*	$104	$135*	$156*	$32	$91	$70	$9	$23	$60	..	$15	..	..	$62	$834
	20	Quant...	21	5,170	91	58	2,190	186	26	1,380	31	70	..	150	..	..	(8%)	.....
		Cost....	$137*	$181	$228*	$377*	$77	$223	$169*	$48	$37	$105	..	$38	..	..	$130	$1,760
	28	Quant...	41	10,100	139	87	3,290	283	36	1,910	37	100	..	500	..	..	(8%)	.....
		Cost....	$267*	$354	$323*	$566*	$115	$340	$234*	$67	$44	$150	..	$125	..	..	$207	$2,792
	36	Quant...	45	11,100	166	145	5,480	451	61	3,240	53	150	..	950	..	..	(8%)	.....
		Cost....	$293*	$389	$415*	$943*	$192	$541	$397*	$113	$64	$225	..	$238	..	..	$305	$4,115

NOTE.—The unit prices used in calculating costs in the above table were as follows:
Concrete, $5.00 per yard, except in cases where the total cost is marked with an asterisk (*), where $6.50 per cu. yd. was used.
Steel, 3½ cents per pound.
Forms, $1.20 per sq. yd., except in cases marked with an asterisk (*), where $2.50 per sq. yd. was used.
Excavation, $1.50 per cu. yd.
Piles, $8 each.
Fill, 25 cents per cu. yd.

proportionate increase in cost in types B_1 to B_5 and C_6 than in types C_7 to C_9 and C_{10}.

Type C_1 is highest in cost of any abutment for heights over 21 ft. As previously mentioned, this type is created by the substitution of reinforced concrete in a mediocre design intended for plain concrete, making the least number of changes in the design which would permit the use of the new material.

If this design is improved, its cost can be reduced by an amount which will make it of less cost than type B_2 for heights above 28 ft. If advantage is taken of other known refinements in design of abutments of this character, its cost can be still further reduced.

For nearly all heights types C_5, C_6 and C_7 are the lowest in cost of those types in which the neatwork is carried to a sufficient depth to place footings on the natural ground.

CONCLUSION.

The writer finds that a general statement about the foregoing abutments has to be qualified in so many directions that it becomes merely a group of more or less disconnected facts.

Inspection, however, will show that the cheapest abutments for the higher fills, C_5, C_6 and C_7 are those in which no provision is made to restrain the lateral pressure of the earthwork, but where instead the earthwork is allowed to spill forward to its own natural slope.

As soon as departure is made from the gravity abutment, the greatest latitude is obtained for the ingenuity and skill of the designer. The types mentioned in this paper are only a few of the large number of abutment types which promise considerable economy.

As the minimum sections adopted are more liberal in the reinforced concrete abutments than in the plain abutments, it is probable that there is a wider margin for new economies in the reinforced than there is in the plain abutments.

FOREIGN RAILWAY NOTES.

At the end of 1910 the extent of railways in Cuba was 2,123 miles. This makes Cuba, in proportion to its size, one of the best served republics in the Americas in respect to railway transportation.

The extension of the Cairns Railway, Queensland, from Atherton to Evelyn, has been completed and opened to traffic. This line opens up splendid brush and forest country, and is the highest railway in the state. The average altitude for 20 miles is over 3,000 ft., and the highest point is 3,200 ft. above sea level.

A proposal is under consideration for a line to connect the Great Southern and the Southwestern railway systems in Western Australia at points near Mount Barker and Bridgeton. Between these places there is a vast area of cultivable country suitable for mixed agriculture and horticulture, and carrying very fine timber. This country is almost without a settler, although it [illegible] has been for many years a subject of ministerial promise. If carried out this work will greatly add to the [illegible] of Albany as an exporting port.

The Longitudinal Railway is the one toward which Chile is persistently devoting its energies. The peculiar contour of the country has [illegible] to the coast line, except south of Santiago through the central valley, but the policy of the government is to [illegible] where the [illegible] with the center, altogether on land. Therefore it is extending this railway [illegible] as possible. The [illegible] from Arica in the north to Puerto Montt in the south is 2,147 miles, of which about 1,000 miles are in operation, and 370 miles are under construction, while the remainder is being surveyed. The railways from the coast to the interior are chiefly private lines, serving special interests such as the nitrate fields, but the government controls the railway between Santiago and Valparaiso, and has purchased the Caldera Railway.

TRAIN ACCIDENTS IN SEPTEMBER.[1]

Following is a list of the most notable train accidents that occurred on the railways of the United States in the month of September, 1911. This record is based on accounts published in local daily newspapers, except in the case of accidents of such magnitude that it seems proper to write to the railway manager for details or for confirmation.

Collisions.

Date.	Road.	Place.	Kind of Accident.	Kind of Train.	Kil'd.	Inj'd.
*4.	L. S. & M. S.	Erie, Pa.	xc.	P. & F.	3	13
7.	Central Ga.	Cedartown.	bc.	F. & F.	0	1
14.	N. Y. Central	Albany.	xc.	P. & F.	1	2
*14.	N. Y. Central	Rice's.	rc.	F. & F.	0	3
14.	N. Y., N. H. & H.	New Haven.	xc.	F. & F.	1	0
14.	Atlantic C. L.	Quitman.	bc.	P. & F.	0	3
18.	Atlantic C. L.	Smithfield.	bc.	P. & F.	1	0
20.	Boston & M.	Somersworth.	xc.	P. & F.	0	3
21.	Mo. Pac.: A. T. & S. F.	Kansas City.	xc.	P. & P.	1	20
22.	Southern	Atlanta.	bc.	P. & F.	2	10
24.	Penn.	Larimer.	xc.	F. & P.	1	5
27.	Wheeling & L. E.	Canton.	xc.	F. & P.	2	12

Derailments.

Date.	Road.	Place.	Cause of derailmt.	Kind of Train.	Kil'd.	Inj'd.
3.	Union Pac.	Kersey, Col.	acc. obst.	P.	0	12
4.	Pere Marq.	Hard.	d. track.	P.	1	4
5.	M., St. P. & S. S. M.	Fremont.	ms.	P.	4	40
5.	Penn.	Mayport.	slide.	P.	1	1
6.	Texas Mid.	Enloe.	unx.	F.	1	2
7.	Wab., C. & West.	Pinckneyville.	d. track.	P.	0	14
8.	Southern	Anniston.	d. track.	P.	0	0
7.	Atl. C. L.	Tennille.	d. engine.	F.	0	3
7.	St. Louis & S. F.	Cordova.	unx.	F.	1	2
10.	Mo., K. & Tex.	Brookshire.	unx.	F.	2	0
10.	Sou. Pacific	Los Angeles.	st. car.	P.	..	..
13.	L. E. & Pittsburgh.	Cleveland.	d. track.	F.	4	17
15.	Chi., R. I. & Pac.	Ainsworth.	unx.	P.	0	3
17.	Chi., M. & St. Paul.	Monroe.	unx.	F.	0	5
29.	L. S. & M. S.	Delray.	der. sw.	P.	0	5
29.	N. Y. C. & H. R.	Newark.	acc. obst.	P.	0	1

The collision at Erie, Pa., on the 4th at about 9 p. m., was between a passenger train of the Pennsylvania and a freight of the Lake Shore, at the junction of the two roads, four miles west of the city. It is said that the passenger train had run past more than one block signal, and that steam had not been shut off when it struck the freight train. Both engines and many cars were wrecked, and the wreck took fire, and the bodies of the persons killed were pinned under the mass of wreckage.

The collision at Larimer, Pa., on the 24th, at about 1 a. m., was between the eastbound Pennsylvania special express train No. 28 and a westbound freight. At Larimer westbound freight trains regularly cross to the south side of the roadway preparatory to entering the yard at Pitcairn. Both trains were running slowly, but the fireman of the passenger train was killed by being caught between the engine and the tender. The engineman of the freight and the signalman in the tower appear to have been at fault.

The derailment at Kersey, Colo., on the 3d, was due to the displacement of a switch by a mail bag which fell violently against the switch stand when thrown out of the mail car of the train, and, according to the reports, the bag was thrown off at this place because the mail clerk saw a group of children standing at the place where he ordinarily threw it off, and who held it a few seconds until he had passed the station platform. The two rear cars of the train only were thrown off the track. Ten passengers were injured.

The derailment at Fremont, Wis., on the 5th, is said to have been due to the misplacement of a switch by a boy of fifteen years, the son of a former section foreman. According to the reports, the boy had a grudge against the road, because he had been refused a ride.

Miscellaneous.—Among the serious accidents on railways in September which do not appear in our table are a collision between a work train and a live-stock train on the Canadian Pa-

[1] Abbreviations used in Accident List.
Rear collision.—hc, Head collision.—xc, Other collisions.—b, Broken rail.—d, Defective rail.—bt, Broken or defective tire.—unx, Unexplained.—dsw, Open or wrong switch.—ms, Misplaced switch.—acc. obst, Accidental obstruction.—malice, Malicious obstruction of track, etc.—bridge, Explosion of locomotive on road.—bfc, Car burned while running.—P. or Pass., Passenger train.—F. or Ft., Freight train.—Mixed, Mixed train.—engine, Light engine, [illegible] train, etc.—Derailed, Wrecked wholly or partly derailed by [illegible].—Trigger, Out or more passengers killed.

cific at Chapleau, Ont., on the 21st, in which seven drovers were killed, and the killing of thirteen persons at Neenah, Wis., on the 24th at a highway crossing. The seven men killed in the Canadian accident were sleeping in the caboose of the stock train. The persons killed at Neenah were members of a party of about thirty, riding in a hay-rack, which was struck by a train of the Chicago & Northwestern.

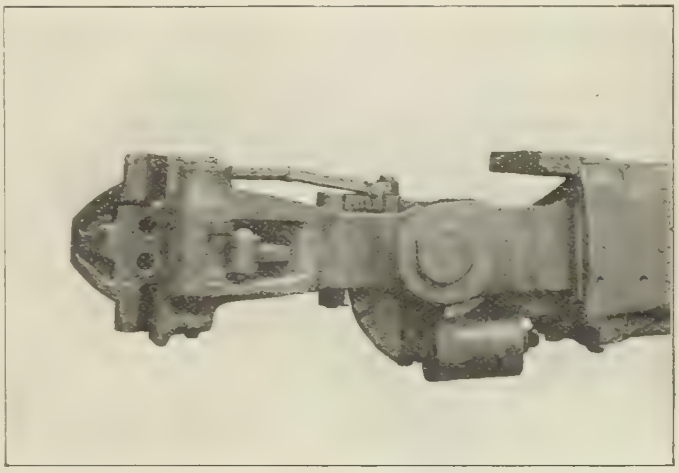
Electric Accidents.—Of the twelve accidents to electric cars reported in the newspapers as occurring in the United States in the month of September, only one is reported as resulting in fatal injury to the occupants of the car. This was a case at El Monte, Cal., where a car which became uncontrollable fell down a bank and against a train of the Southern Pacific, killing two persons and injuring eight. This case also appears in our table above, as the accounts indicate that the electric car caused the derailment of the locomotive of the Southern Pacific train.

AUTOMATIC CAR AND AIR COUPLER.

In anticipation of the growing demand for economy in time and the safety of coupling cars, especially in the operation of rapid transit trains, the Westinghouse Air Brake Company, Pittsburgh, Pa., has designed a coupler which automatically connects both the drawbars and the air connections of two cars. This device is perfected and has been largely adopted by the Interborough Rapid Transit Company, New York. The coupler head consists of a solid body casting, which has a suitable hook and recess in its face to engage with the corresponding face of the other coupler. The heads are so designed that they will couple when 3 in. out of vertical alinement and 7 in. out of horizontal alinement. The couplers are held to the drawbar by a horizontal pin, which allows them to swing up or down, giving the necessary flexibility when passing over imperfections in the track. When uncoupled they are held in a horizontal plane by a spring located underneath the drawbar and pressing against the coupler.

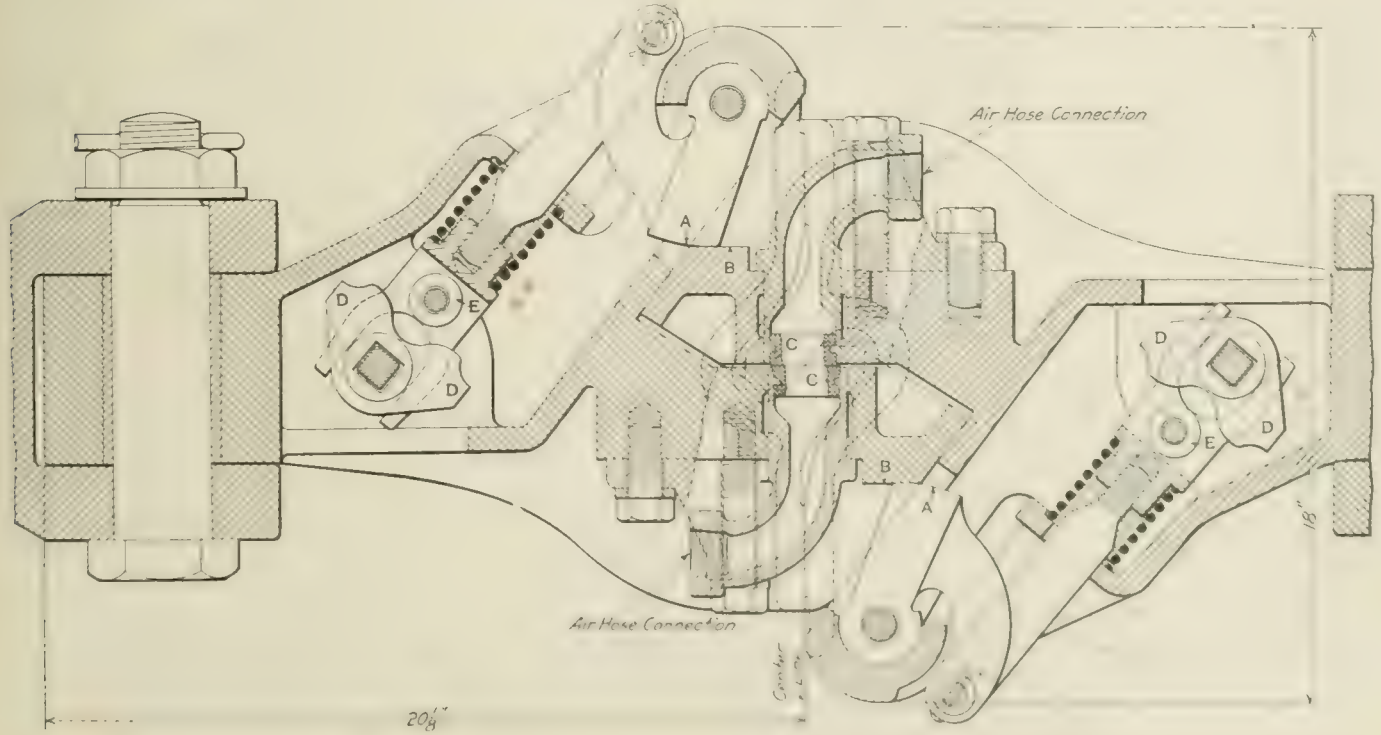
The air connections run alongside of the drawbar and are connected to the coupler by a flexible hose, which is comparatively short in length and has no bends, thus eliminating any possibility of kinking. This hose is permanently connected and will wear for a longer time than the hose of the ordinary air connections. When coupled, the couplers are locked so that there is no lost motion between them. This is accomplished by the type of lock used, which, as will be seen in the sectional illustration, automatically takes up the play as the couplers become more closely interlocked. In coupling the two heads slide into each other for about 1½ in. in a direction about 40 degs. with the axis of the drawbar.

The face of the locking cam *A* engages with the machined surface *B* of the opposite coupler. In case one locking cam should be out of service, it will be seen that the other is sufficient to hold the connection. It will also be noticed that



Automatic Car and Air Coupler.

the air connection gaskets *C* come together in almost a perpendicular line, which prevents undue wear from abrasion. The locking cam is controlled by a lever on top of the drawbar, which operates the cam *D* through segmental gears. This cam, working on the pin *E* throws the locking cam in and out of service as desired. Both of these locking cams must be thrown out before the cars can be separated and after being uncoupled they can be thrown into the coupling position again, allowing the couplers to lock automatically. When the couplers are locked together they are as rigid as a single casting, thus providing a tight joint for the air connections.



Section of Coupler Heads, Coupled.

General News Section.

It was announced last week that the Cape Cod Canal would be finished in 1913. The canal, which will have no locks, will connect Cape Cod bay with Buzzards' bay by a wide channel 30 ft. deep at high water.

The report that the United States Steel Corporation had decided to terminate the lease of the Great Northern's ore property, mentioned last week on page 802, has been confirmed. The cancelation is to take effect January 1, 1915.

At Indianapolis, last week, W. R. Lawrence, a fireman on the Big Four, was arrested on a warrant issued on an indictment in the federal court at Cleveland, charging him with violating the law by obtaining a pass for himself and permitting others to use it. The penalty may be either a fine or imprisonment.

Shipping men in London are forming a steamship line to run from Sydney, N. S. W., to Valparaiso, Chile, with a view to utilizing the railway over the Andes between Chile and Argentina for a shorter route between Australia and England than is now possible. It is calculated that mails can be carried over this route in four days less than the time taken by way of San Francisco and New York.

The Southern Pacific, which has been carrying "first aid" kits on baggage cars, combination cars and cabooses, is now putting on each car a number of small kits, each containing only such bandages, etc., as are likely to be needed for the treatment of a single injury, instead of the large kits containing a number of bandages and dressings, which were formerly carried. When one of these large kits is opened and a part of the contents used, the remaining material loses its aseptic qualities.

The directors of the National Association of Manufacturers have passed the following resolution: "Whereas, The National Association of Manufacturers unqualifiedly stands for the equal enforcement of law; Be it resolved, That we demand the enforcement of the Sherman anti-trust law upon the restraint of trade practiced by labor unionism, which already stands convicted before the Supreme Court of the United States, with the same vigor as corporations and individuals are now being prosecuted under that law."

Returns to the Bureau of Labor Statistics of New York State from 190 representative trade unions, with 120,000 members, as to idleness during the first half of the year 1911, indicate a smaller demand for labor than any other recent year except 1908. The mean percentage of members reported idle at the close of each month was 24.8 this year, as compared with 19.2 last year and 22.3 in 1909. In 1908, when the business depression was at its worst, the mean percentage was 34.7, the highest on record since 1901. But from 1902 to 1907 the mean for the first half of the year was below 20 in every year except 1904, when it was 20.2.

A train laden with two million dollars' worth of silk recently [illegible] the New York Central. This means that the train traveled at an [illegible] hours in switching at Chicago, of more than 38½ miles per hour [illegible] vening 431 miles in 9 hrs. 45 min. Leaving Chicago at 4:30 [illegible] alternate methods of connecting the stations are suggested in [illegible] in connection with existing transportation lines. The report

The Indiana railway commission has ordered the Lake Erie & Western to install automatic block signals between Templeton and Lafayette, 19 miles, as soon as the installation can be made. The order also requires a manual block system between Indianapolis and Kokomo, 54 miles, until the matter of double track is determined, when automatic signals may be installed instead. Other parts of the line maintain manual block where the density of traffic requires it. The Grand Trunk has agreed to comply with the Indiana railway commission's order requiring automatic block signals on its single track line in Indiana, and controlled manual block on the rest of its 90 miles of line in the state.

The New York Central, which is credited with having been the first road to use selector calling apparatus on a telephone line for train despatchers, has established 12 additional despatchers' circuits and has received 249 selector box outfits from the United States Electric Company of New York City. These selectors are of the Gill bridging design and the signal bells are run by the main line battery. The Baltimore & Ohio, which also uses the Gill design, has ordered from the United States Electric Co. 96 selector box outfits, one half of which are to be used on message circuits. On these message circuits the inter-calling system is to be used, by which one way-station may call another without the intervention of the main despatcher's office.

Old-Time Railroading in Missouri.

Once I was called at Holden to take out a train of 12 cars of stock that was coming from Kansas City. It was midnight and raining very hard. I called my three brakemen who were sleeping in the caboose. We had not been off the road more than four hours. They got up and saw what a terrible night it was and refused to go out. I told them to get their things out of the caboose, that I was going out if I had to go alone. They left the caboose and went to the depot. The train arrived. As I was going along the train getting the numbers, I found a man standing between two of the stock cars. I said, "Hello, my friend. What are you doing there?" He said, "I am trying to get to St. Louis." "Have you not got money enough to pay your way on a passenger train?" I asked. Said he: "My God, man, if I had a cent, do you think I would be standing here in this rain?" I knew I was going to be alone. This man would be company if no help, so I told him to go back in the caboose. He did so. I started alone with my train. I told the engineer he might have to reverse his engine to help stop. His name was Pat Grace. He said "All right." When we got to Post Oak, two and one half miles west of Warrensburg, and at the foot of Centreview Hill, I think we were going 40 miles an hour. We ran until we struck Warrensburg Hill and the train stopped itself. Then we backed up a mile, took water and went ahead. We had the old open top stock cars with a single running board; and brakes not the best. I learned from this man that he used to be a brakeman on the Philadelphia & Reading. After daylight he helped me stop the train and I arrived in Jefferson City with my 12 cars of stock. I kept this man as one of my brakemen.

At another time I had an experience with a train of cattle. Texas steers, in cars with open tops and a running board one foot wide to walk on. If the train was running 15 miles or more per hour you could not go across these cars on a walk, you had to run. If not, you would fall in. I wanted to get over on the engine leaving Warrensburg, so I started across the top of the train going down the hill. The train was running fast. I miscalculated my steps and fell in the car on the backs of the cattle. I lost my book of waybills in the car. I scrambled out on top of the running board and when going up Knobnoster Hill I went over to the engine and told the engineer we would stop and unload the cattle to get my waybills, load up the cattle and go ahead. I thought I could do this in 30 minutes. Well, we were just three hours. I did not know Texas steers as well then as I did afterwards, as I had never seen any except in cars. As soon as we got the cars to the chutes and opened the door, out they rushed and commenced charging the fence to break out. If you got on the run, they would charge at you. I was told by a stock

man there that the only way I could load them again would be on a horse. I went to a livery stable in town, got two men and horses, loaded the steers, then paid the men $5 for doing so. If the steers had ever broken out of that stock yard I should have been paying for them yet or else had to go to Texas after them, for I never saw an animal so wild. Early day conductors and stockmen will agree with me. They were afraid of nothing except a cowboy on a horse.—J. K. Merrifield, in *Missouri Pacific Agent's Bulletin.*

Santa Fe Demonstration Train.

As mentioned in the *Railway Age Gazette* of June 9 and September 22, the Atchison, Topeka & Santa Fe has been operating over a portion of its eastern and western lines a demonstration train, illustrating the progress made in railway equipment and roadbed construction during the last 30 years. The accompanying photograph shows the train as it appeared while making its run. It was on the road four weeks. The train made stops at all towns of importance, and officers of the road who accompanied it explained the exhibits to the crowds who gathered to see them. The exhibit created a great deal of interest wherever it was shown, and the educational features of the train were commented on freely by newspapers throughout the states covered. A number of officers of the lines not covered have requested that the train be run through their territory, and it is possible that further use will be made of it. The train is pulled by engine No. 3,009, a hybrid Mallet reconstructed from two decapod locomotives in the company shops at Topeka. This locomotive, which is the largest in the world, was described in the *Railway Age Gazette* of April 14, 1911, page 906. Just behind the Mallet is engine No. 048, built in 1880. The other equipment in the train includes flat cars, coal cars, stock cars, box cars, way cars, smokers and coaches. In each case a modern car and one of the type used 30 years ago being coupled together. In addition to the engines and cars, a number of smaller exhibits were shown on the flat cars, such as couplers, draft rigging, brakes and other equipment appliances, and comparative sections of roadbed and comparative signal installations illustrating the difference in practice between 1881 and 1911. The train was in charge of E. B. Sill, the oldest conductor on the road, who has been in service 33 years. The small locomotive was in charge of Peter Tellin, the oldest engineman on the road, who has been in service 39 years. Frank McClure, who was born the year the small engine was built, was in charge of the Mallet. The following table shows comparisons between the old and new equipment used in the train:

	Relative Weight.		Relative Capacity.		Relative Cost.	
	Old Equipment.	New Equipment.	Old Equipment.	New Equipment.	Old Equipment.	New Equipment.
Locomotive.	133,000 lbs.	850,000 lbs.	14,000 lbs. (Drawbar pull)	110,000 lbs. (Drawbar pull)	$7,740	$43,880
Flat car	19,200 lbs.	32,100 lbs.	40,000 lbs.	80,000 lbs.	300	943
Coal car	22,000 lbs.	36,500 lbs.	50,000 lbs.	80,000 lbs.	338	1,036
Box car....	22,600 lbs.	46,900 lbs.	40,000 lbs.	80,000 lbs.	475	1,265
Way car....	23,800 lbs.	38,000 lbs.	...	...	630	1,787
Smoker	49,400 lbs.	119,100 lbs.	28 pass'gers	56 pass'gers	3,000	12,124
Coach	50,300 lbs.	123,100 lbs.	48 pass'gers	72 pass'gers	3,605	12,820

Politics and the Postoffice.

No more pertinent nor appropriate example to other departments of the government than the conversion of a post office deficit, reported year after year, into a surplus, could be desired. . . . The surplus, however, should be one obtained legitimately, and as the result of better and more commodious service. If it is only secured by the sacrifice of the largest section of the public to a portion politically more useful, the surplus is costing more than it is worth. . . . The farmer in remote districts needs his mail, and deserves to get it regularly. It is, however, not an indispensable part of his business; while the punctual delivery of mail in the towns is essential to the prosperity of the country, without which the farmer would find a mighty poor market for his produce.

Mr. Hitchcock, however, plays up to, or down to, the farmer's vote, at the expense of the cities. Rural free delivery is not curtailed, but the number of letter carriers, already inadequate, in one section of Greater New York is reduced from 47 to 29.

We have no better public servant than the railway postal clerk. In cars which should contain five men three are now asked to do the work, with the result that mail matter overruns its destination, and the largest cities in the Union are thereby grossly ill served.—*Wall Street Journal.*

Railway Nationalization in Great Britain.

Among other results of the railway strikes has been a busy revival of the demand for nationalization. The advocates of that policy have found the opportunity to their hand and made the most of it. The trade union congress voted an instruction to the parliamentary committee to promote a bill for the nationalization of railways and canals next year. This demand has for many years been a regular item in socialist and labor-socialist programmes; but circumstances this year have given it more point and substance than it could hitherto claim. It is not a chimerical demand. Railways are one of those public services which have been transferred from private enterprise to the state in many countries, and they may conceivably be so treated here. Indeed, provision was made by Parliament, in 1844, as to the terms upon which the transfer might be made.

Santa Fe Demonstration Train.

Some well informed authorities on railway matters, who do not desire the change and do not see any advantage in it, nevertheless believe it to be inevitable, because the conditions under which the business is carried on have gradually become more and more onerous and tend eventually to make it impossible as a commercial concern. What with increasing statutory restrictions, government control, public demands for more facilities and lower charges, rising demands of labor, stoppages by strikes, and growing burdens of taxation without representation, the railways have lost irretrievably the commercial position they once held, and find it more and more difficult to live and thrive.

From this point of view the recent and present troubles constitute a real crisis, the significance of which seems hardly to be grasped by those who advocate nationalization on theoretical grounds. The railway companies have gone into the inquiry by royal commission on the understanding that they may be allowed to raise their charges if the result is such as to compel that step. This means that in the opinion of those who manage them the strain has reached such a point that, if it is increased on one side it must be relaxed on another. If, for instance, wages are raised, the public must be prepared to pay more, and to that attitude the government has assented.

Now there is evidently a vital difference between the negative view that railways cannot be much longer carried on under conditions which are thus seen to be reached, or nearly reached, the point of incompatibility, and the positive view that they ought to be nationalized in the public interest. The latter rests on the assumption that the public would gain by the change. Those who

advocate it hold that the present pass is due either to private ownership in itself, which is the pure socialist argument, or to bad management, which is a half socialist one; and they assume that nationalization would cure all the existing troubles. They believe—we must presume seriously—that state ownership and management would at the same time give the public better facilities at lower rates, pay higher wages and grant better conditions to railway servants, abolish discontent, and make strikes impossible.

These contentions are constantly put forward, though not all together. The last is the point chiefly emphasized by recent experience. The railway companies, it is said, have shown that they cannot manage the business, and therefore it must be taken from them. The tacit assumption is that no such trouble would then occur. This is merely a pious belief, which is contradicted by experience, and by express declarations made on behalf of the men. The assumed immunity from discontent and strikes conferred by state ownership has been disproved in several countries, but in the clearest manner in France, which offers a particularly favorable opportunity of comparing private and public ownership under the same conditions. Comparison of one country which has state ownership with another which has not may be open to objection, because of the difference in other conditions; but, when both systems are found operating in the same country, a valid comparison can be made.

That is the case in France. Of the five great trunk lines radiating from Paris, one, the Western, has been taken over by the state. Was it spared in the great railway strike of last year? Quite the contrary. The trouble was rather worse on that line than on the others, and much worse than on three of them. It was more acute, more obstinate, and accompanied by more acts of violence; and, to speak generally, discontent among the railwaymen appears to be more chronic on that line.—*London Times.*

Canadian Pacific Dining Cars.

At Winnipeg, Calgary and Vancouver the Canadian Pacific in connection with the dining car department has in use three new buildings which have been erected at a cost of $15,000 for lodgings for the employees of the dining car department. Coming into these cities after a long run the men will not have to look up a hotel or boarding house, but will go to the new buildings. These houses are built to accommodate sixty-two employees and are of the most modern construction in every respect. Everything is free, including the laundry. Conductors, chefs and waiters all have separate quarters, and these quarters include baths, bedrooms, reading rooms, libraries, cardrooms and billiard rooms. Nice gardens beautify the premises and the men have all the comforts of home. The men will always be clean and tidy. It is compulsory for the men to take a bath and a change of underwear after each trip. A check system has been installed which makes it necessary for the men to comply with this rule. When a car is called away on short notice at night it is not necessary to seek for a crew. The men are right at hand when needed. It is expected that the C. P. R. will build these houses at all divisional points, and one is now projected for Moose Jaw.

Harriman Lines Strike.

[illegible] railways connecting with it that no freight from them would be received [illegible] of the possible violence of the strikers has been withdrawn, indi[illegible]

[illegible] Illinois Central pay for the services of 72 policemen detailed to protect the property of the company, it being alleged that the policemen were stationed inside the fences, and that they per[illegible]

Reports from Galveston, Tex., say that members of the Brotherhood of Railway Trainmen and of the Order of Railway Conductors employed on the Harriman lines have voted to strike; also, that strike votes are being taken on the Harriman lines by members of the Brotherhood of Locomotive Engineers, the Brotherhood of Locomotive Firemen and Enginemen, and the Order of Railway Telegraphers.

Reports that shop employees of the Rock Island lines were about to go out in sympathy with their co-workers on the Illinois Central were discredited by officers of those lines.

Iron and Steel Production in 1910.

The report on the production of iron ore, pig iron and steel in 1910, published by the Geological Survey, says in part: "Although the iron and steel industry in the United States in 1910 broke all previous records by a small margin, the total volume of business was not as great as was anticipated at the beginning of the year. On December 31, 1910, there were 205 furnaces in blast out of a total of 473; on the same date in 1909, there were 338 furnaces in blast out of a total of 469. As a consequence of the active demand, the iron ore output exceeded that of 1909 by 5,734,297 long tons, and that of 1907, which was previously the record year, by 5,169,115 tons. The total quantity of iron ore marketed in 1910 for the purpose of making pig iron (not including stocks left at mines or iron ore used for fluxing other metallic ores, nor in the manufacture of paints, was 56,889,734 long tons, as compared with 51,155,437 tons in 1909, and with 35,924,771 tons in 1908. The output of pig iron in 1910 was 27,303,567 long tons, as compared with 25,795,471 tons in 1909 and with 15,936,018 tons in 1908. The increase in the production of iron ore in 1910 over that of 1909 was 11.21 per cent., and the increase in the production of pig iron and steel was 5.85 per cent. and 8.93 per cent., respectively."

British Report on Labor Controversy.

The British commission appointed last August to try to settle the questions at issue between the railway companies and their employees has issued its report. The commissioners feel that recognition by the companies of the men's unions is not desirable. It says that the companies, with their great responsibilities, cannot and should not be expected to permit any interference by their men on the subjects of discipline and management.

The commission recommends the adoption of a new scheme, to be in force until January 6, 1914, by which all questions affecting hours of work, wages and conditions of service that cannot be settled by negotiation shall be referred to a conciliation board to be formed along the lines of the existing sectional boards of conciliation. It is proposed also that the existing agreements between the companies and the men shall remain in force until January 7, 1912. The commissioners recommend, in conclusion, that men on strike shall not be allowed to coerce by threats or intimation other men who wish to work.

After the report was made public, meetings were held by a number of unions, and resolutions refusing to accept the commission's findings were passed. When the commission was appointed the Board of Trade announced that both parties had promised to accept the findings. Several labor leaders now say that neither the men nor the union executives were consulted, that acceptance was not pledged, and that they will not recognize such an obligation.

Government Regulations of Industrials.

At a speech in Brooklyn last Tuesday, Interstate Commerce Commissioner Prouty advocated the appointment of a commission to regulate industrials. He said:

"There is no greater joke to-day than the treatment of the trust problem by the government of the United States. For more than twenty years the Sherman anti-trust law has been the subject of judicial interpretation, and yet to-day no lawyer can advise his client with certainty whether he is within or without the inhibition of that law.

The [illegible] Steel Corporation is profoundly uncertain whether its enterprises are legal or not. If there are evils connected with the organization or operation of monopolies—and there are very grave evils—they must be reached by some method different from dissolution decrees. Drastic regulation by a trust commission could meet the difficulty.

"I believe the only practical relief from trust oppression is to be found in more direct and drastic government regulation. First a commission should be appointed, in most respects similar to the Interstate Commerce Commission. It should devote considerable time to investigation before taking action. That was what the Interstate Commerce Commission did before it began to exercise real power. The time will not be wasted.

"Just as in the case of the railways, the way to regulate industrial monopolies is for the government to take hold and regulate them itself."

Employers' Liability Legislation.

The joint congressional commission on employers' liability, which has been holding meetings in Washington to formulate a bill to be presented at the next session of Congress, has agreed on the main points. It is to apply only to interstate carriers, on the ground that this is as far as the power of Congress extends. The compensation is to be paid by the employer directly and not out of a general fund created by any form of taxation. The law is to be compulsory, except that if any company and its employees agree on a plan of compensation which is as favorable to the employees as is the law, this plan may be substituted for the law. The amounts of payments are to be based on a percentage of the pay received by the injured employee at the time of his injury. Public hearings are to begin on November 6 in Washington.

M. M. and M. C. B. Conventions.

At a joint meeting of the executive committees of the Master Mechanics', Master Car Builders' and Railway Supply Manufacturers' Association, held at the Belmont Hotel, New York, October 24, it was decided to hold the 1912 conventions at Atlantic City. The Master Mechanics' Association will meet June 12, 13 and 14, and the Master Car Builders' Association, June 17, 18 and 19. At the suggestion of railway men it was decided to make a change in the entertainment features and the manner of handling them.

Dining Car Superintendents.

The American Association of Dining Car Superintendents at its meeting at Cincinnati, Ohio, last week, elected the following officers: President, George L. Best (Southern); vice-president, A. D. Gilleland (Colorado & Southern); secretary and treasurer, F. M. Dow (Illinois Central), Chicago; executive committee, P. A. Danzer (Denver & Rio Grande), G. M. Hart (Wabash), and E. W. Smith (Grand Trunk). The next convention will be held in October, 1912, at Denver, Colo.

The American Railway Association.

The fall session of the American Railway Association will be held at the Blackstone, Chicago, November 15. Reports will be presented by the committees on Transportation, on Maintenance, on Relations Between Railways, on Explosives, and on Electrical Working.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

Air Brake Association.—F. M. Nellis, 53 State St., Boston, Mass.

American Association of Demurrage Officers.—A. G. Thomason, Boston, Mass.

American Association of General Passenger and Ticket Agents.—W. C. Hope, New York, next convention, Seattle, Wash.

American Association of Freight Agents.—R. O. Wells, East St. Louis, Ill.

American Association of Railroad Superintendents.—O. G. Fetter, Carew building, Cincinnati, Ohio; 3d Friday of March and September.

American Electric Railway Association.—H. C. Donecker, 29 W. 39th St., New York.

American Railway Association.—W. F. Allen, 75 Church St., New York; November 15, Chicago.

American Railway Bridge and Building Association.—C. A. Lichty, C. & N. W., Chicago. Next annual convention, third week in October, 1912, Baltimore, Md.

American Railway Engineering Association.—E. H. Fritch, Monadnock Block, Chicago; annual convention, March 19-21, 1912, Chicago.

American Railway Master Mechanics' Association.—J. W. Taylor, Old Colony building, Chicago. Annual convention, Atlantic City, N. J., June 12-14.

American Railway Tool Foremen's Association.—O. T. Harroun, Bloomington, Ill.

American Society for Testing Materials.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.

American Society of Civil Engineers.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

American Society of Engineering Contractors.—J. R. Wemlinger, 13 Park Row, New York, 3d Tuesday of each month, New York.

American Society of Mechanical Engineers.—Calvin W. Rice, 29 W. 39th St., New York.

Association of American Railway Accounting Officers.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.

Association of Railway Claim Agents.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 22, 1912, Los Angeles, Cal.

Association of Railway Electrical Engineers.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago; annual, November 6 10, Chicago.

Association of Railway Telegraph Superintendents.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.

Association of Transportation and Car Accounting Officers.—G. P. Conard, 75 Church St., New York; December 12-13, Louisville, Ky.

Canadian Railway Club.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.

Canadian Society of Civil Engineers.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

Car Foremen's Association of Chicago.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

Civil Engineers' Society of St. Paul.—D. F. Jurgensen, 116 Winter St., St. Paul, Minn.; 2d Monday, except June, July and Aug., St. Paul.

Engineers' Society of Pennsylvania.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

Engineers' Society of Western Pennsylvania.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

Freight Claim Association.—Warren P. Taylor, Richmond, Va.; annual May 15, Buffalo, N. Y.

General Superintendents' Association of Chicago.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

International Railway Congress.—Executive Committee, rue de Louvain, 11 Brussels; 1915, Berlin.

International Railway Fuel Association.—D. B. Sebastian, La Salle St. Station, Chicago.

International Railway General Foremen's Association.—L. H. Bryan, D. & I. R. Ry., Two Harbors, Minn.

International Railroad Master Blacksmiths' Association.—A. L. Woodworth, Lima, Ohio.

Iowa Railway Club.—W. B. Harrison, Union Station, Des Moines, Ia.; 2d Friday in month, except July and August, Des Moines.

Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York.

Master Car Builders' Association.—J. W. Taylor, Old Colony building, Chicago. Annual convention, Atlantic City, N. J., June 17-19.

Master Car and Locomotive Painters' Association of United States and Canada.—A. P. Dane, B. & M., Reading, Mass. Next annual convention, second week in September, 1912.

New England Railroad Club.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston

New York Railroad Club.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

Northern Railway Club.—C. L. Kennedy, C., M. & St. P., Duluth, Minn; 4th Saturday, Duluth.

Omaha Railway Club.—H. H. Maulick, Barker Block, Omaha, Neb.; second Wednesday.

Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

Railway Club of Pittsburgh.—C. W. Alleman, P. & L. E., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

Railway Industrial Association.—G. L. Stewart, St. L. S. W. Ry., St. Louis, Mo.; annual, May 12, 1912, Kansas City, Mo.

Railway Signal Association.—C. C. Rosenberg, Bethlehem, Pa.

Railway Storekeepers' Association.—J. P. Murphy, Box C, Collinwood, Ohio.

Richmond Railroad Club.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

Roadmasters' and Maintenance of Way Association.—L. C. Ryan, C. & N. W., Sterling; Sept. 10, 1912, Buffalo, N. Y.

St. Louis Railway Club.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

Society of Railway Financial Officers.—C. Nyquist, La Salle St. Station, Chicago.

Southern Association of Car Service Officers.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.

Southern & Southwestern Railway Club.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

Toledo Transportation Club.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

Traffic Club of Chicago.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.

Traffic Club of New York.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

Traffic Club of Pittsburgh.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

Train Despatchers' Association of America.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.

Transportation Club of Buffalo.—J. M. Sells, Buffalo; first Saturday after last Wednesday.

Transportation Club of Detroit.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.

Traveling Engineers' Association.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y., August, 1912.

Western Canada Railway Club.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

Western Railway Club.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Wednesday in month except July and August, Chicago.

Wood Preservers' Association.—F. J. Angier, B. & O., Baltimore, Md.; annual, January 16-18, Chicago.

Traffic News.

Business men of Savannah have held a meeting and given formal assurance to the Atlantic & Pacific Transport Company of sympathy with the plan for making Savannah a port of call on the New York-Colon line of the company.

The new transatlantic line between Boston and Rotterdam in connection with the New York, New Haven & Hartford and Canadian Pacific systems, will begin service in about ten days with two large steamers owned by the Canadian Pacific. This line expects to secure some of the grain traffic.

Morgan's Louisiana & Texas Railroad & Steamship Company will begin to run freight trains over its new line from Lafayette, La., to Baton Rouge, on November 5. On this line, which is 57 miles long, there are 15 stations between the points mentioned, 10 of which have agents.

Western lines have declined the proposition of Canadian lines to make reduced round trips for the so-called visitors' excursions from western Canada to Central West points during December on the ground that the proposition is an immigration scheme to induce more Americans to move into western Canada.

The new through express route between the Pacific Coast and New York was inaugurated on October 20. The route is from Oakland, Cal., via the Western Pacific, to Salt Lake City, Utah; via the Denver & Rio Grande to Denver, Colo.; via the Chicago, Burlington & Quincy to Chicago, and via the Pennsylvania to New York.

Florida's law prohibiting the shipment of immature fruit will be carried to the United States Court on the ground that the law as applied to interstate shipments is in violation of the commerce clause of the United States Constitution. According to C. H. B. Floyd, of counsel for Fred Fee, of St. Lucie County, who is under indictment in Florida for the shipment of fruit alleged to be immature.

In an appeal to the Secretary of State, the express companies say that their Oklahoma assessments were raised 10,000 to 50,000 per cent. by the State Board of Equalization. The Pacific Express Company placed the amount of assessable property within the state at $850, and the board raised the amount to $182,380. The valuation of the Wells Fargo company was raised from $27,200 to $672,635, the United States from $41,636 to $1,421,365, and the American from $7,100 to $702,145.

The Duluth & Iron Range and the Duluth, Missabe & Northern, both subsidiaries of the United States Steel Corporation, are to reduce the rate on ore from 80 cents to 60 cents. This 80-cent rate covers all shipping points on the Duluth, Missabe & Northern, and all Missabe Range points on the Duluth & Iron Range. From Tower the rate is 90 cents to the docks at Two Harbors, and from Ely $1. The new rate will be a flat one of 60 cents per gross ton from all points on the two railways.

The Southern Pacific has put into active service between New York and Galveston four additional ships which had been idle all summer, and is now at work getting three other ships ready for the heavy autumn trade. Officers of the company say freight business between here and the two southern ports is fully 100 per cent. better than only a few months ago. In addition to the enormous northward movement of cotton there are unusually heavy shipments of sugar for this early season.

[illegible] in an appeal to the Interstate Commerce Commission asking that [illegible] ive November 1, be suspended until these concerns can be heard [illegible]

[illegible] the Lehigh Valley to receive and forward flour from Buffalo to New York at a rate as low as is secured by the regular steamer lines. Questions by Judge Knapp indicated that the court would refuse a permanent writ on the ground that the Flour City line should first go to the Interstate Commerce Commission for a determination of the facts. The Flour City line has filed a complaint with the commission against the eastern lines asking for the establishment of a through rate and joint rate from Minneapolis to New York, which is set for a hearing on Saturday, October 28.

The Wall Street Journal's Analysis of the Pacific Coast Rate Question.

When Wall Street read in its morning paper July 25 last that the Interstate Commerce Commission had ordered a wholesale reduction in inter-mountain commodity rates transcontinental stocks dropped. The average estimate of the aggregate annual loss to the roads was about $12,000,000. That estimate now appears just $12,000,000 too high.

The traffic director of one of the largest systems affected by the ruling now declares that the roads do not expect to lose a dollar under the inter-mountain decision.

In that decision the commission said the interior rates were too far above coast rates. One way of correction was to lower the interior rates. The other, and for the roads the saving way, was to raise the coast rates.

The transcontinental lines have notified the commission of an increase in all class rates to the Pacific coast from eastern territory, and have completed a new tariff advancing commodity rates to the coast an average of 20 per cent. The roads thus not only give notice that they are preparing not to suffer any loss under the inter-mountain decisions, but go so far as to set forth the reasons for their utter confidence that the advances will be granted. They say that in its decisions the commission left the roads, perhaps intentionally, a tremendous loophole through which to escape from reduction of revenues. It did so by not declaring the interior rates too high of themselves, but merely too high as compared with coast rates.

In condensed detail the situation is as follows: As to class or general group rates the commission, in its decision of June 6, 1910, fixed lower definite class rates to inter-mountain points as reasonable charges for the service given. The roads are now taking those rates to interior points, fixed by the commission as reasonable, and adding to them a reasonable charge for the additional haul to the coast. Two members of the commission have already expressed their approval of this move as carrying out the principle laid down by the commission itself. This means that unless the commission's inter-mountain decisions are thrown out by the Commerce Court, the roads are prepared to abandon the water competition basis of rate making. They will boost the rate to the coast irrespective of water rates, to bring it into adjustment with the rate to interior points. They will do so even though thereby considerable coast business is lost to water competition.

This loss in coast traffic will probably offset the roads' additional revenue from the higher coast rates. This still leaves the roads to stand the loss suffered through lowered rates to the interior. The significance of the advance in coast class rates, however, is that the roads are thereby withdrawing a violation of the long and short haul principle and justifying application of that principle to commodity or article rates to the coast. Had the commission fixed definite lower commodity rates to the interior there would be little or no point to increasing commodity rates to the coast, as the higher rates would merely mean loss of business to water competitors.

In the Utah cases the commission did fix specific commodity rates to Utah points at what it considered a reasonable level, and the roads, accepting these rates as reasonable, will simply add a reasonable additional charge for the plus haul to the Pacific. In the Nevada and other inter-mountain cases, however, the commission did not fix definite commodity rates. It ruled that the existing interior points commodity rates were wrong as compared with those to more distant points. It held that, from the Missouri river, commodity rates to interior points should not be higher than those through to the coast; from Chicago points, not more than 7 per cent. higher; from Buffalo-Pittsburgh points, not more than 15 per cent higher, and from New York and trunk

line territory, not more than 25 per cent. above the coast rates. This means that if the roads left the coast rate unchanged they must lower the interior rates, which averaged well above these percentages over coast rates. If the roads raised the coast rates, however, while the rates to the interior must still be readjusted, there would be no need of lowering the average rate. Therefore the roads are raising the coast rates.

The complaints which opened the inter-mountain cases were complaints of certain communities that other communities were being fatted at their expense, and certainly the main point in the decisions was adjustment among communities. If the commission refuses the proposed coast advances now it must be on the ground that the (commodity) rates to interior points are unreasonable in themselves; that therefore it will not permit advance of rates to the coast which would permit the roads to maintain the present rates to the interior. This would require a new move by the commission which it has shown no reason for undertaking.

That the commission did declare the interior rates unreasonable to Utah but not in the Nevada and other cases is fair evidence that they intended to leave the roads the above way out of their threatened loss in revenue; that is, that the main and important point they were making was that there must be a readjustment of relation between interior and coast rates. It would seem that the increase in coast rates will solve the problem and that the adjustment will not after all be accomplished by any loss in revenue.

As the readjustment ordered was not to go into effect until October 15, in the Nevada cases and November 1 in the other cases, and the dates have been postponed pending a decision by the Commerce Court as to whether the inter-mountain decisions shall stand, the roads have suffered no loss as yet. If the court overrules the commission the roads will be where they were before the inter-mountain cases were decided, and if it sustains the commission the higher coast rates will be filed in time to obviate the necessity of reducing interior rates on the average, leaving the mere readjustment of zones, a clerical burden, but easier to bear than reduced earning power.—*Wall Street Journal.*

Car Surpluses and Shortages.

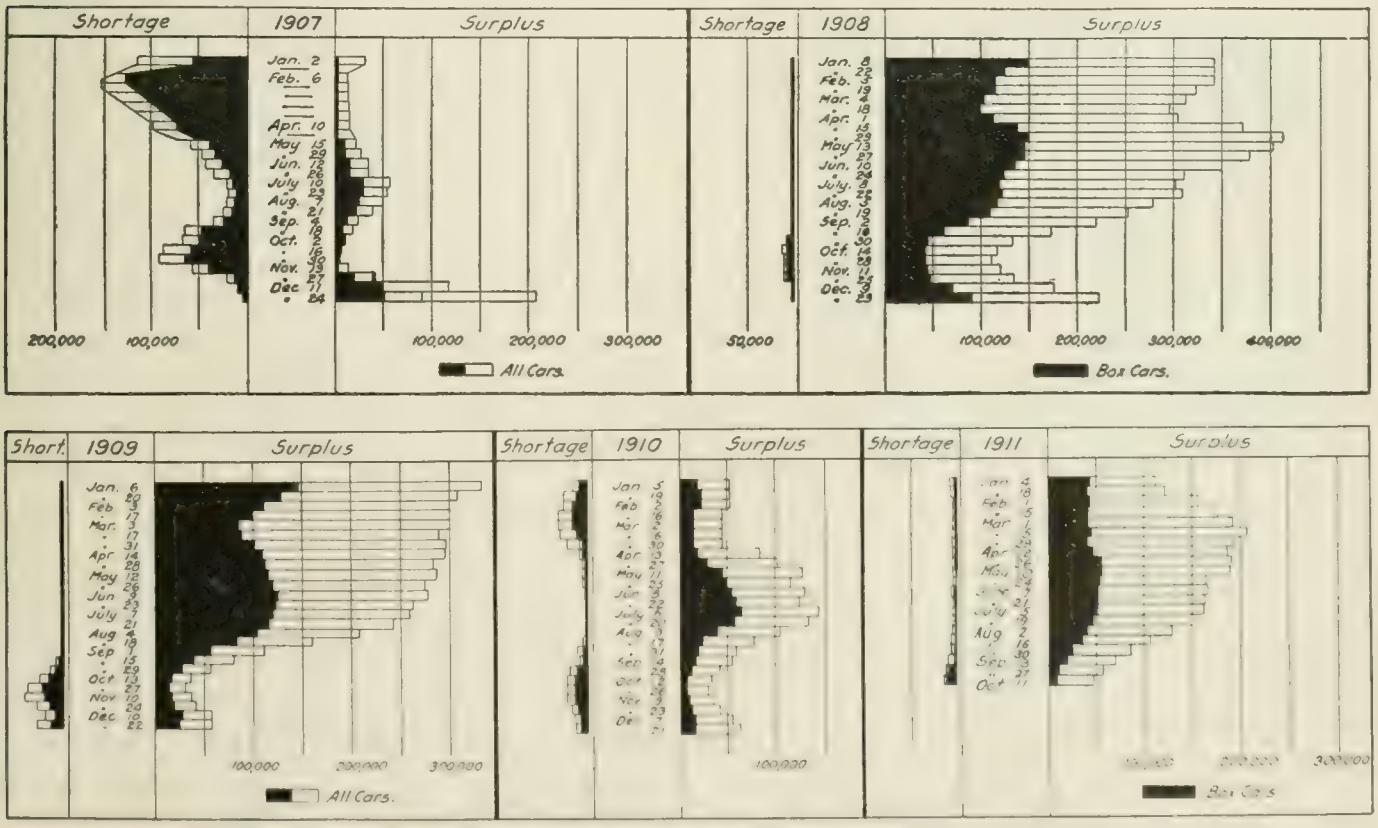
Arthur Hale, chairman of the committee on relations between railways of the American Railway Association in presenting statistical bulletin No. 105, giving a summary of car shortages and surpluses by groups from June 8, 1910, to October 11, 1911, says:

"The total car surplus reported for the period ending October 11, 1911, is 48,854 cars, and is the smallest surplus reported since November 23, 1910. During the two weeks ending with October 11, 1911, the total car surplus decreased 9,528 cars. Of this de-

Car Surpluses and Shortages.

Date.	No. of roads.	Surpluses— Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.	Shortages— Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.
Group *1. October 11, 1911	7	181	463	243	217	1,104	807	160	350	0	1,317
" 2.— " 11, 1911	[illegible]	1,249	98	4,695	1,94[illegible]	7,982	259	1	186	55	601
" 3.— " 11, 1911	25	1,485	246	5,758	1,6[illegible]	9,092	616	54	2[illegible]5	52	947
" 4.— " 11, 1911	20	143	59	614	1,350	2,166	715	257	350	14	1,336
" 5.— " 11, 1911	17	130	25	725	1,141	2,0[illegible]	460	170	50	0	680
" 6.— " 11, 1911	24	5,584	744	1,345	3,141	10,564	85	4	101	32	222
" 7.— " 11, 1911	3	19	0	45	[illegible]23	[illegible]87	200	61	0	0	261
" 8.— " 11, 1911	17	1,006	60	986	1,653	3,735	995	142	250	1	1,388
" 9.— " 11, 1911	11	668	355	330	631	1,9[illegible]	50	0	0	0	50
" 10.— " 11, 1911	19	253	680	1,703	5,376	8,0[illegible]	1,017	13	6	6	2,636
" 11.— " 11, 1911	5	84	901	82	903	1,970	3,186	221	0	112	3,519
Total	160	10,487	3,661	16,4[illegible]	18,1[illegible]	48,854	10,050	1,083	1,512	272	12,957

*Group 1 is composed of New England lines; Group 2—New York, New Jersey, Delaware, Maryland and Eastern Pennsylvania lines; Group 3—Ohio Indiana, Michigan and Western Pennsylvania lines; Group 4—West Virginia, Virginia, North and South Carolina lines; Group 5—Kentucky, Tennessee, Mississippi, Alabama, Georgia and Florida lines; Group 6—Iowa, Illinois, Wisconsin, Minnesota and the Dakotas lines; Group 7—Montana, Wyoming and Nebraska lines; Group 8—Kansas, Colorado, Missouri, Arkansas and Oklahoma lines; Group 9—Texas, Louisiana and New Mexico lines; Group 10—Oregon, Idaho, California and Arizona lines; Group 11—Canadian lines.



Car Surpluses and Shortages in 1907 to 1911.

crease 1,885 are box cars, 183 are flat cars, 3,047 are coal cars and 4,413 are miscellaneous cars. The decrease is chiefly in group 6, and there is a slight decrease in all other groups with the exception of group 4 (West Virginia, Virginia, North Carolina and South Carolina), which reports a very small increase.

"There is an increase of 4,613 cars reported in the total shortage. Box car shortage increased from 6,632 cars on September 27 to 10,090 on October 11, an increase of 3,458 cars or 52.14 per cent. Miscellaneous cars show a decrease of 118 cars, while flat and coal cars increased 716 cars, and 567 cars respectively."

The accompanying table gives the figures by groups for the last period covered by the report and the charts show total bi-weekly surpluses and shortages from 1907 to 1911.

Traffic Club of New York.

At the meeting of the Traffic Club of New York, to be held October 31, Edwin J. Clapp, of New York University, will make an address on German waterways.

INTERSTATE COMMERCE COMMISSION.

A hearing will begin at Des Moines, Iowa, on October 28, on complaints that have been filed with the Interstate Commerce Commission at different times on a variety of freight rates and adjustments of rates which are alleged to discriminate against Des Moines. Certain class and commodity rates between points in Iowa and points in adjacent states will also be investigated, and it is intended to continue the hearing until all the Iowa cases are heard.

In its investigation of express rates, the commission has issued an order to express companies to furnish the commission by December 1 with a great mass of details of the company's operations. These details include the names of officers and stockholders; amount of issues of securities; copies of contracts with railways; number of packages, newspapers and magazines handled; changes in express rates during the last 20 years; considerations, if any, paid to railway officers to induce the execution of contracts, and total amount paid to railways for the year ended June 30, 1911.

Complaint Dismissed.

American Manufacturing Co. v. Louisville & Nashville et al.

Pieces of iron may be manufactured into various articles without remelting should not be classed as scrap iron under the definition contained in the southern classification, which provides that scrap-iron rates will apply only on scraps and pieces of iron and steel which have value for remelting purposes only. (21 I. C. C., 483.)

Minimum Weight Ruling.

C. W. Hull Company v. Missouri Pacific Railway Co. et al. Opinion by the commission:

Tariff rule providing minimum weight of 50,000 lbs. on brick

Complaints to the Commission and Suspensions of Tariffs.

Lake.

lines which were to have become effective on November 1.

The United States Navy Department has complained to the Interstate Commerce Commission that the roads participating in a shipment of launches from Portsmouth, N. H., to Norfolk, made an overcharge of $35.21, due to having furnished cars with a minimum carload rating of 20,000 lbs. when the Navy Department asked for cars with a 16,200-lb. minimum.

STATE COMMISSIONS.

The Indiana Commission has appointed James Donahue, of Indianapolis, locomotive boiler inspector; salary, $2,000 a year.

The Railroad Commission of Louisiana is to hold a hearing on October 25 on the question of abolishing all concentration charges on cotton seed at cotton seed mill points.

The New York State Public Service Commission, First district, has adopted an order that after June 1, 1912, all surface street cars in New York City must have power brakes and geared hand-brakes.

The Railroad Commission of Louisiana has ordered the American Express Company and certain other express companies to put sufficient men on their delivery wagons to unload such shipments as are too heavy or bulky to be handled by one man.

Prof. Garrett Droppers, professor of political economy at Williams College, who has been appointed a member of the Massachusetts State Railway Commission, was born in Milwaukee, April 12, 1860, and graduated from Harvard in 1887. He pursued special studies in economics, finance and political science. In 1888-89 he studied at the University of Berlin. From 1889 to 1898 he was professor of political economy and finance at Tokio University, Japan, and then for nine years was president of the University of South Dakota. In 1907-8 he lectured on political economy at Chicago University. He translated Schopenhauer's essays. He has contributed many articles on economic and political topics to learned societies' publications.

The Public Utilities Commission of New Jersey has ordered the New York & Long Branch, after November 1 to stop passenger trains at Asbury Park on Sundays. For many years the trains of this road have run through Ocean Grove and Asbury Park on Sundays without stopping. This is in pursuance of an agreement made with the Ocean Grove Camp Meeting Association. Asbury Park is outside the Ocean Grove reservation, but the Camp Meeting Association has, until now, succeeded in regulating this matter of train stops both on its own grounds and in Asbury Park. The commission seems to have held, in substance, that the contract of the railways with the Camp Meeting Association was contrary to public policy.

COURT NEWS.

The Supreme Court has set the hearing in the government's appeal in the Union Pacific-Southern Pacific merger suit for January 8.

The Commerce Court is now hearing the argument on a petition to set aside the orders of the Interstate Commerce Commission in Pacific Coast cases of the Atchison, Topeka & Santa Fe and the Union Pacific.

At Cincinnati, October 16, the Louisville & Nashville was fined $200 in the United States District Court on the charge of transporting two cars of scabby sheep from Southern Kentucky without properly branding the cars.

Judge Thurman in the circuit court at Nevada, Mo., on October 16, held as legal the law recently passed by the general assembly of Missouri requiring employers, including railways, to pay their employees at least twice a month. The case which was tried to

The Commerce Court has issued a temporary injunction suspending the order of the Interstate Commerce Commission in the case known as the Nashville grain rebilling case, in which the Interstate Commerce Commission had ordered the discontinuance of an allowance for rebilling or reshipping grain, hay, etc., at Nashville while refusing the same privilege at Atlanta and other Georgia points.

COMPARATIVE SUMMARY OF MONTHLY REPORTS OF REVENUES AND EXPENSES OF STEAM ROADS IN THE UNITED STATES.

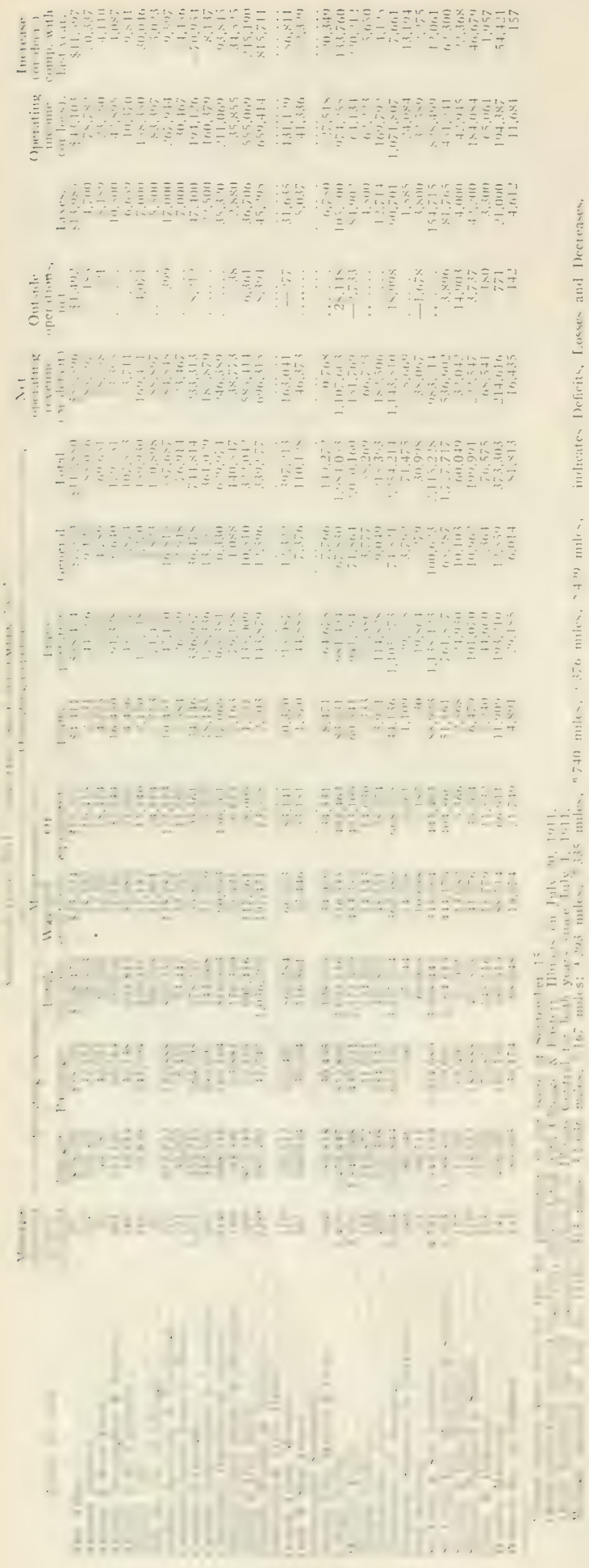
RAIL OPERATIONS.

YEAR ENDING JUNE 30, 1911. YEAR ENDING JUNE 30, 1910.	Mileage Operated at End of Month.	Freight Revenue. (Account 1.)	Passenger Revenue. (Account 2.)	Other Transportation Revenue. (Accounts 3 to 11)	Nontransportation Revenue. (Accounts 12 to 21)	Total Operating Revenues.	Maintenance of Way and Structures.	Maintenance of Equipment.	Traffic Expenses.	Transportation Expenses.
July 1910	23,816,864	$149,982,357.95	$[illegible]54,710.26	$16,183,340.26	$2,195,367.44	$230,615,775.91	$34,371,454.29	$34,201,986.39	$5,138,038.44	$77,924,459.33
July 1909	23,370,324	14[illegible]073,572.49	58,823,123.15	14,985,519.66	1,921,139.01	217,803,354.31	31,556,367.12	31,579,924.70	4,600,825.30	67,087,014.37
August 1910	3,849,268	168,778,[illegible]43.48	66,308,[illegible]62.44	16,579,760.07	2,339,706.43	254,005,972.42	36,417,687.16	36,289,309.10	5,243,889.56	80,814,438.14
August 1909	23,560,944	154,713,178.48	63,757,865.51	15,238,351.54	2,031,604.79	235,720,000.32	32,652,711.41	33,557,782.95	4,575,136.41	69,597,611.52
September 1910	24,067,822	178,633,258.94	65,642,253.93	16,926,389.73	2,445,799.57	256,647,702.17	35,405,650.50	36,090,001.17	5,115,253.17	82,512,878.97
September 1909	23,752,485	167,673,871.28	60,737,499.27	15,641,454.11	2,186,495.37	246,189,320.03	33,486,476.94	34,386,902.21	4,575,724.99	72,939,656.64
October 1910	24,121,455	185,102,929.75	58,199,262.64	17,611,874.90	2,550,538.27	263,464,605.06	33,943,166.14	38,161,542.72	4,969,625.34	86,794,564.60
October 1909	23,783,454	186,582,219.29	55,340,487.97	16,556,464.59	2,372,374.25	260,821,546.10	33,319,213.13	35,163,118.00	4,695,760.65	78,089,152.05
November 1910	24,127,017	177,340,840.27	51,853,174.17	17,027,475.19	2,331,630.29	248,559,119.92	29,907,735.61	37,445,427.74	4,756,726.49	86,526,280.58
November 1909	23,754,539	179,536,502.08	49,350,0[illegible].5.88	16,312,008.84	2,365,933.04	247,564,470.44	29,570,596.92	35,417,121.82	4,499,771.87	78,194,077.31
December 1910	24,136,415	163,81[illegible],075.80	53,680,943.74	17,336,465.97	2,505,818.58	236,835,304.09	27,516,771.65	37,560,061.46	4,983,669.26	89,868,891.98
December 1909	23,808,004	152,5[illegible]859.60	49,804,271.89	16,403,100.56	2,136,919.71	220,870,151.16	26,333,540.95	35,232,966.50	4,718,888.62	80,693,073.12
January 1911	24,247,942	147,908,101.84	48,452,726.49	16,255,867.41	2,440,321.34	215,057,017.68	25,108,048.67	36,815,368.82	4,848,234.07	88,146,084.73
January 1910	23,886,880	147,9[illegible],680.17	44,899,411.48	15,643,506.27	2,266,648.76	210,808,246.68	25,831,419.75	35,208,460.37	4,658,190.42	81,932,164.45
February 1911	24,063,971	137,8[illegible]6,287.43	44,228,760.63	15,239,907.79	2,340,301.13	199,025,256.98	23,531,857.70	34,332,101.74	4,691,819.85	80,532,067.58
February 1910	23,810,831	144,5[illegible]6,806.25	41,199,[illegible]30.94	14,812,887.74	1,953,195.22	202,492,[illegible]0.15	24,500,996.46	33,213,327.50	4,577,553.78	77,660,961.51
March 1911	24,228,602	159,1[illegible]5,[illegible]3.74	48,984,385.10	16,594,334.63	2,223,037.62	[illegible]6,997,481.09	26,122,37[illegible]	35,902,784.58	4,760,141.44	84,812,573.03
March 1910	23,854,075	171,617,119.63	48,511,063.27	15,996,270.15	2,[illegible]12,155.85	[illegible]38,336,608.90	29,704,032.55	37,008,684.48	4,602,954.75	82,916,139.03
April 1911	24,293,341	149,030,344.64	49,899,106.92	16,813,872.12	2,433,599.02	[illegible]18,177,122.70	29,1[illegible]5,866.91	33,547,186.95	4,769,838.28	80,139,729.36
April 1910	23,913,115	157,835,139.07	48,871,066.18	16,440,319.02	2,554,287.01	[illegible]5,700,811.28	33,9[illegible]842.93	35,451,095.65	4,671,580.46	79,140,803.06
May 1911	24,317,004	156,436,587.40	52,581,331.46	16,748,791.31	2,076,591.22	229,[illegible]771.39	33,4[illegible]765.36	35,615,452.69	4,858,868.64	79,614,478.51
May 1910	23,835,707	163,0[illegible],484.68	5[illegible]304,[illegible]59.29	16,590,537.50	2,382,893.06	234,339,874.53	36,036,147.60	35,652,731.98	4,759,271.88	80,284,488.18
June 1911	24,373,346	1[illegible]4,012,[illegible]06.56	56,959,006.12	18,[illegible]05,880.59	2,517,160.21	[illegible]31,697,053.48	33,643,105.97	34,702,291.19	5,071,706.89	78,990,969.06
June 1910	24,011,256	161,808,912.38	55,904,466.95	18,036,555.74	2,406,819.89	238,156,754.96	35,184,036.59	34,293,987.38	5,126,067.47	79,741,029.09
Total for Year Ending June 30, 1911		$1,994,067,757.30	8656,843,923.90	$201,523,429.07	$28,300,071.12	$2,810,735,182.29	$368,513,482.08	$430,663,514.55	$59,207,751.43	$996,677,415.87
Total for Year Ending June 30, 1910		1,929,873,345.40	629,503,471.78	192,641,975.72	26,790,465.96	2,778,809,258.86	372,096,582.35	416,166,103.54	56,061,726.60	928,276,170.33
Increase 1911 Over 1910						31,925,923.43				
Decrease 1911 Under 1910										
Average per Mile of Line, 1911	24[illegible]6,9[illegible]	7,904.87	2,719.07	834.23	117.15	11,635.39	1,525.49	1,782.77	245.10	4,125.84
Average per Mile of Line, 1910	23,761,745	8,111.52	2,648.89	809.70	112.61	11,679.72	1,563.97	1,749.30	235.63	3,901.67

YEAR ENDING JUNE 30, 1911. YEAR ENDING JUNE 30, 1910.	RAIL OPERATIONS. General Expenses.	RAIL OPERATIONS. Total Operating Expenses.	RAIL OPERATIONS. Net Operating Revenue (or Deficit).	OUTSIDE OPERATIONS. Total Revenues.	OUTSIDE OPERATIONS. Total Expenses.	OUTSIDE OPERATIONS. Net Revenue (or Deficit).	Total Net Revenue (or Deficit).	Taxes.	Operating Income (or Loss).	Ratio of Operating Expenses to Operating Revenues. Per Cent.
July 1910	$5,8[illegible]4,224.27[1]	$157,458,[illegible]6.55	$73,157,517.36	$5,509,964.86	$5,189,923.21	$320,041.65	$73,477,589.01	$8,730,819.67	$64,746,769.34	68.28
July 1909	[illegible]84	140,160,048.65	77,643,305.66	5,229,529.59	4,738,792.66	498,736.93	78,139,042.59	7,839,609.63	70,299,432.96	64.35
August 1910	5,[illegible]4[illegible]31	164,488,8[illegible]6	89,517,073.56	5,992,250.46	5,480,573.36	511,677.10	90,028,750.66	8,865,741.52	81,163,009.14	64.76
August 1909	[illegible]16,[illegible]67b	145,54[illegible],063.15	90,176,937.27	5,751,145.38	4,929,799.70	821,345.68	90,998,282.95	7,997,593.23	83,000,689.72	61.74
September 1910	7,937,005.28	165,067,268.21	91,580,133.96	5,900,801.06	5,386,659.06	514,742.00	92,095,175.96	9,031,997.41	83,063,178.55	64.32
September 1909	[illegible]65,[illegible]0.34	150,759,396.71	95,429,923.32	5,667,916.36	5,077,924.08	589,992.28	96,019,915.60	8,360,063.67	87,659,851.93	61.24
October 1910	5,[illegible]7,[illegible]76.40[3]	169,552,381.05	93,612,224.01	5,679,804.21	5,409,138.09	250,666.12	93,862,890.13	8,880,293.80	84,982,596.33	64.47
October 1909	[illegible]46,[illegible]277d	156,[illegible]20,318.01	104,101,228.09	5,492,116.73	5,027,906.59	464,210.14	104,565,438.23	8,569,267.33	95,996,170.90	60.09
November 1910	5,[illegible]7,714.31[5]	164,636,683.56	83,922,437.36	5,332,813.02	5,185,945.42	146,867.60	84,069,304.96	8,923,649.18	75,145,655.78	66.23
November 1909	[illegible]46,[illegible]4[illegible]	158,184,073.64	94,383,396.80	5,098,759.08	4,938,698.23	160,060.85	94,544,057.65	8,593,812.49	85,950,245.16	61.88
December 1910	[illegible]42,[illegible]1.89	166,478,[illegible]0.90	70,357,004.19	5,368,545.36	5,150,063.02	218,482.34	70,575,486.53	9,458,777.96	61,116,708.57	70.29
December 1909	[illegible]4,[illegible]1[illegible]	153,011,601.90	67,858,550.16	5,265,722.91	4,914,123.77	351,599.14	68,210,149.30	8,741,699.47	59,468,449.83	69.28
January 1911	6,347,5[illegible].77	161,166,357.95	53,890,659.13	4,708,177.02	5,025,568.54	—317,391.52	53,573,267.61	8,895,791.08	44,677,476.53	74.94
January 1910	[illegible]7,[illegible]2.03[4]	153,434,27[illegible].84	57,373,967.84	4,636,822.53	4,857,420.88	—220,598.35	57,143,369.49	8,494,079.69	48,649,289.80	72.78
February 1911	[illegible]5,[illegible]3.30	149,146,67[illegible].55	49,885,584.43	4,304,677.85	4,632,388.15	—327,710.30	49,560,874.13	8,902,923.64	40,657,950.49	74.93
February 1910	[illegible]1,[illegible]65,342	145,571,333.93	56,920,786.22	4,307,704.88	4,541,252.48	—234,547.60	56,686,238.62	8,568,672.92	48,117,565.70	71.89
March 1911	[illegible]3,[illegible]14,044	168,093,07[illegible].92	68,994,408.17	4,840,094.24	4,863,623.15	—23,528.91	68,970,879.26	9,132,819.06	59,838,060.20	69.61
March 1910	[illegible]4,[illegible]70,01[illegible]	160,074,48[illegible].98	78,[illegible]125.92	4,670,316.93	4,658,846.32	11,470.61	78,273,596.53	8,771,590.81	69,501,005.72	67.16
April 1911	[illegible]1,[illegible]47,369	153,747,409.91	64,459,712.79	4,898,723.38	4,859,363.90	39,359.48	64,499,072.27	9,102,988.62	55,396,083.65	70.46
April 1910	[illegible]8,[illegible]64,899	159,054,438.04	66,646,373.34	4,938,882.81	4,912,146.89	26,735.92	66,673,109.16	8,860,309.07	57,812,800.09	70.47
May 1911	[illegible]4,[illegible]3.30	153,794,071.16	69,848,750.23	5,286,677.97	5,097,514.60	189,163.37	70,037,913.60	9,379,854.56	60,658,059.04	69.58
May 1910	[illegible]7,[illegible]50,758	162,496,330.45	71,843,544.98	5,356,[illegible]56.00	5,200,057.04	156,198.96	71,999,743.04	9,154,781.28	62,844,961.76	.....
June 1911	[illegible]7,[illegible]6[illegible]	155,932,[illegible]1.14	72,764,132.34	5,544,611.49	5,155,907.41	388,704.08	73,152,836.42	9,444,[illegible]3.58	63,708,412.84	68.60
June 1910	[illegible]6,[illegible]87,721	160,999,171.36	77,157,583.61	5,658,242.67	5,752,081.80	—93,839.13	77,063,744.48	10,553,170.51	66,510,573.97	67.60
Total for Year Ending June 30, 1911	$73,638,652.66	$1,938,742,214.76	$881,992,967.53	$63,347,140.92	$61,436,067.91	$1,911,073.01	$883,904,040.54	$108,750,080.08	$775,153,960.46	68.62
Total for Year Ending June 30, 1910	[illegible],[illegible]3,[illegible]0.65	1,841,011,[illegible]36.65	937,797,722.21	62,063,415.87	59,544,450.44	2,518,965.43	940,316,687.64	104,504,650.10	835,812,037.54	66.25
Increase 1911 Over 1910	.....	87,730,[illegible]78.11	[illegible]	.....	.....	.....	.....	4,245,429.98	.....	.....
Decrease 1911 Under 1910	.....	.....	55,804,[illegible]54.68	.....	.....	607,892.42	.....	.....	60,658,077.08	.....
Average per Mile of Line, 1911	304.84	7,984.22	3,651.10	260.[illegible]3	[illegible]54.32	7.91	3,659.01	450.18	3,208.83	.....
Average per Mile of Line, 1910	[illegible]7.[illegible]4	7,738.03	3,941.69	260.86	250.27	10.59	3,952.28	439.25	3,513.03	....

[1] Includes undetermined, $7,065.[illegible]; [illegible]6,731.59; [illegible]6,479.14; [illegible]47,907.85; [illegible]3,797.83; [illegible]1,874.27; [7] $1,039.30; [illegible]2,006.38; [9] $1,587.61; [10] $1,873.02; [11] $1,499.21; [12] $1,555.07; [13] $42,398.17; .18 average.

a Includes undetermined, $2,964.[illegible]; [illegible]3,796.79; [illegible]4,995.54; d $6,381.11; [illegible]6,965.88. f $8,562.69; g $5,720.82; h $6,209.34; i $5,996.16; j $6,431.05; k $6,434.03, l $7,915.10; m $71,473.18; .30 average.



REVENUES AND EXPENSES OF RAILWAYS.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

A. A. Allen, president of the Missouri, Kansas & Texas System, has been elected also president of the Texas Central, succeeding R. H. Baker, resigned.

W. H. Bruce has been elected secretary and treasurer of the Atlanta & West Point and the Western Railway of Alabama, with office at Atlanta, Ga., succeeding F. H. Hill.

T. O. Edwards, auditor of Morgan's Louisiana & Texas Railroad & Steamship Company, has been appointed auditor of freight accounts of the Southern Pacific, with office at San Francisco.

J. A. Munroe, whose election as vice-president in charge of traffic of the Union Pacific, has been announced in these columns, has been elected also vice-president in charge of traffic of the Oregon Short Line, with office at Omaha, Neb.

The following officers of the Gulf, Colorado & Santa Fe, with headquarters at Galveston, Tex., have had their jurisdiction extended over the Santa Fe Dock & Channel Company; D. W. McLeod, auditor; W. L. Alexander, general claim agent; O. L. Clarke, land and tax commissioner, and Terry, Cavin & Mills, solicitors.

M. J. Caples, vice-president and general manager of the Carolina, Clinchfield & Ohio, has been elected fourth vice-president of the Chesapeake & Ohio, and the Hocking Valley Railroad, with supervision over the operating and construction department, with offices at Richmond, Va., and at Columbus, Ohio, effective November 1.

The following officers of the Southern Pacific, all of whom have headquarters at San Francisco, Cal., have had their jurisdiction extended over the Southern Pacific lines in Oregon and the Southern Pacific lines east of Sparks: E. E. Calvin, vice-president and general manager; W. F. Herrin, vice-president and chief counsel, and E. O. McCormick, vice-president in charge of traffic. Since 1904 the lines in Oregon have been in charge of J. P. O'Brien and the lines east of Sparks have been in charge of W. H. Bancroft, both of whom will hereafter devote all of their time to the Oregon-Washington Railroad & Navigation Company.

Howard G. Kelley, who was recently elected vice-president, in charge of construction, transportation and maintenance departments, of the Grand Trunk, with office at Montreal, Que., as has already been announced in these columns, was born on July 12, 1858, at Philadelphia, Pa., and graduated from the Polytechnic College of Pennsylvania. He began railway work in 1881 and was assistant engineer on location, and construction and bridge construction on the Western and Pacific divisions of the Northern Pacific. From 1884 to 1887 he was engaged in mining, and was then appointed resident engineer and superintendent of bridges and buildings, of the St. Louis Southwestern system. From January, 1890, to March, 1898, he was chief engineer of the same road. In March, 1898, he was appointed chief engineer of the Minneapolis & St. Louis, and in July, 1900, he was appointed also chief engineer of the Iowa Central. He was consulting engineer also of the St. Louis Southwestern from March, 1898, to May, 1899. In July, 1907, Mr. Kelley was appointed chief engineer of the Grand Trunk, which position he held at the time of his recent election as vice-president of the same company. In March, 1905, he was elected president of the American Railway Engineering & Maintenance of Way Association.

Operating Officers.

R. R. Porterfield has been appointed trainmaster of the Chicago, Peoria & St. Louis, with office at Springfield, Ill., succeeding J. F. Cody, resigned.

C. H. Crooks, traffic manager of the Fort Dodge, Des Moines & Southern at Boone, Iowa, has been appointed general manager, with office at Boone.

E. H. Dean, chief dispatcher of the Temiskaming & Northern Ontario, has been appointed trainmaster, and J. C. Campbell,

formerly second trick despatcher, has been appointed chief train despatcher.

The following officers of the Gulf, Colorado & Santa Fe, with headquarters at Galveston, Tex., have had their jurisdiction extended over the Santa Fe Dock & Channel Company: J. H. Keefe, assistant general manager; W. E. Maxson, general superintendent; J. Matthews, telegraph manager, and W. L. Sheldon, car accountant.

Traffic Officers.

A. J. Orth has been appointed contracting freight agent of the Erie, with office at Cincinnati, Ohio.

Joseph Folkman has been appointed a traveling passenger agent of the New York, Chicago & St. Louis, with office at Cleveland, Ohio.

Walter Shipley, commercial agent of the Southern Railway at Dallas, Tex., has been appointed district freight agent, with office at New Orleans, La.

F. M. Miller, soliciting agent of the Kanawha Despatch at Salt Lake City, Utah, has been transferred to Los Angeles, Cal. E. C. Doolittle succeeds Mr. Miller.

J. L. Sullivan, assistant general freight agent of the Fort Dodge, Des Moines & Southern at Chicago, has been appointed general freight and passenger agent.

E. F. Flinn, commercial agent of the Grand Trunk at Pittsburgh, Pa., has been appointed division freight agent, with office at Chicago. S. E. Dewey, traveling freight agent at New York, succeeds Mr. Flinn.

The duties of the passenger traffic manager of the Chesapeake & Ohio will be assumed hereafter by J. D. Potts, general passenger agent at Richmond, Va., H. W. Fuller, passenger traffic manager, having died on October 12, as has already been announced in these columns.

G. S. Burnam, general agent of the Louisville & Nashville at St. Louis, Mo., has been appointed general agent, with office at New Orleans, La., succeeding O. P. Bartlett, resigned to accept service with another company. A. E. Mann, commercial agent at Cleveland, Ohio, succeeds Mr. Burnam.

The following officers of the Gulf, Colorado & Santa Fe, with headquarters at Galveston, Tex., have had their jurisdiction extended over the Santa Fe Dock & Channel Company: J. S. Hershey, general freight agent; W. S. Keenan, general passenger agent, and J. B. Moore, general baggage agent.

P. C. Stohr, assistant director of traffic of the Southern Pacific company, the Union Pacific, the Oregon Short Line and the Oregon-Washington Railroad & Navigation Company, will continue to have his office at Chicago, while the director of traffic has had his office moved to New York City, as has been announced in these columns.

H. Berterman, general agent in the passenger department of the Cleveland, Cincinnati, Chicago & St. Louis & Peoria, Ill., has been appointed general agent in the passenger department with office at Louisville, Ky., succeeding R. C. Kennedy, promoted. M. L. Griffin, traveling passenger agent at Huntington, W. Va., succeeds Mr. Berterman.

W. O Warthen, district passenger agent of the Chesapeake & Ohio at Richmond, Va., has been appointed assistant general passenger agent, with office at Richmond, succeeding William S. Bronson, who has been transferred to the legal department, and R. R. Bilter, commercial agent at Kansas City, has been transferred to Chicago; effective November 1.

N. C. Barnett, traveling freight agent of the St. Louis & San Francisco at New Orleans, La., has been appointed commercial agent, with office at New Orleans, succeeding S. B. Franklin, resigned to go with another company. G. N. Donaldson, soliciting freight agent at New Orleans, succeeds Mr. Barnett as traveling freight agent, and E. B. Wood, traveling freight agent of the Pere Marquette at St. Louis, Mo., succeeds Mr. Donaldson, with office at New Orleans, La.

A. B. Scott, agent of the Anchor Line of the Pennsylvania Railroad at New York City, has been appointed district freight solicitor of the Pennsylvania Railroad, with office at Philadelphia, Pa. Joseph Weed, freight solicitor at Philadelphia, succeeds Mr. Scott; J. Harry Cross, freight solicitor at Newark, N. J., succeeds Mr. Weed; R. Alan Turner, freight solicitor at Philadelphia, succeeds Mr. Cross; H. P. Dunbar, Jr., freight solicitor at Buffalo, N. Y., succeeds Mr. Turner, and W. McL. Pomeroy, freight rate clerk at Philadelphia, succeeds Mr. Dunbar.

Engineering and Rolling Stock Officers.

F. C. Pickard, master mechanic of the Cincinnati, Hamilton & Dayton, has been appointed master mechanic of the Pere Marquette, with office at Saginaw, Mich.

F. Merritt, chief engineer of the Gulf, Colorado & Santa Fe, with office at Galveston, Tex., has had his jurisdiction extended over the Santa Fe Dock & Channel Company.

John Burns has been appointed master mechanic, Eastern division, of the Canadian Pacific, with office at Montreal, Que., succeeding J. B. Elliott, retired under the pension rules of the company.

James W. Gibbs, whose appointment as master mechanic of the Virginia & Southwestern, with office at Bristol, Va.-Tenn., has been announced in these columns, was born in Rutherfordton county, N. C., on August 31, 1873, and began railway work on May 12, 1902, as a machinist on the Southern Railway at Spencer. Previous to this he had been in the service of the Mecklenburg Iron Works at Charlotte, as a machinist apprentice. In July, 1902, he was appointed roundhouse foreman of the Southern Railway, remaining in that position until July, 1906, when he became fireman on the Ashville division, and was promoted to engineman the following August. In March, 1908, he entered the mechanical department of the same road as assistant roundhouse foreman at Atlanta, Ga., and the following October was promoted to general foreman of the Southern Railway shops at Ashville, N. C., which position he held at the time of his recent appointment as master mechanic of the Virginia & Southwestern.

J. W. Gibbs.

OBITUARY.

T. J. Conners, superintendent of the Cincinnati division of the Chesapeake & Ohio, at Covington, Ky., died in that city on October 21.

F. C. Falvey, traveling agent of the Minneapolis, St. Paul & Sault Ste. Marie, with office at Minot, N. D., died at his home in that city on October 23.

John Nelson Purviance, chief clerk to W. A. Patton, assistant to the president of the Pennsylvania Railroad, died on October 23, at Philadelphia, Pa. Mr. Purviance was born at Pittsburgh, Pa., in July, 1873, and entered the service of the Pennsylvania Railroad in the accounting department at Philadelphia in January, 1890.

Henry Strong, president of the Atchison, Topeka & Santa Fe from May, 1873, to May, 1874, died in Denver, Colo., on October 21, at the age of 82 years. Mr. Strong was born in Glasgow, Scotland, and, except for the time he spent at his summer homes at Lake Geneva, Wis., and Santa Barbara, Cal., he has been a resident of Chicago since 1874. He began the practice of law at Keokuk, Iowa, and previous to his election as president of the Santa Fe, was counsel of the Chicago, Burlington & Quincy. He had large real estate holdings in Chicago.

John R. Walsh, formerly president of the Southern Indiana and the Chicago Southern, died at Chicago on October 23. Mr. Walsh was born in Ireland in 1837, and came to Chicago in 1847. He founded the Chicago National Bank in 1882, of which he was president until it was placed in liquidation in December, 1905. From 1897 to 1910 he was president of the railways mentioned above, which have since been reorganized as the Chicago, Terre Haute & Southeastern. Mr. Walsh was a man of great energy and ambition. His schemes for railways and other enterprises got the better of him. As bank president he lent the depositors' money to himself as railway president. In his eagerness he neglected to keep within the law, and was indicted on many counts and tried. In 1908 he was found guilty and sentenced to five years and sent to prison. He was pardoned only nine days before his death. He attempted to build a road from Terre Haute, Ind., to Chicago in competition with the Pennsylvania and the Chicago & Eastern Illinois. Into this and the Southern Indiana, a coal road, operating 225 miles of track between Westport and Terre Haute, he sunk his private fortune and the assets of his bank.

Robert Mather, general counsel of the Chicago & Alton, and chairman of the board of directors of the Westinghouse Electric & Manufacturing Company, also a director of many banks and railways, and for many years prominent as counsel for large corporations and an expert on railway affairs, died of peritonitis at his home, in New York City, on October 24. Mr. Mather was born at Salt Lake City, Utah, in 1859, and was educated in the public schools and at Knox College, Galesburg, Ill., graduating with the degree of A. B. in 1882, and later receiving degree of A. M. He began railway work in 1882, and previous to 1885 he was in the treasurer's office of the Chicago, Burlington & Quincy, and in 1886 he was admitted to the Illinois bar. In 1889 he became local attorney at Chicago for the Chicago, Rock Island & Pacific, and was then successively assistant general attorney, general attorney and general counsel for the road. He was also elected to various offices of that road, becoming second vice-president in 1889, first vice-president in April, 1904, chairman of the executive committee in October, 1904, and president of the Rock Island Company in the same year. In 1903 he was also elected third vice-president of the St. Louis & San Francisco, and in 1904 became first vice-president of that road. He was also first vice-president of the Chicago & Eastern Illinois and the Evansville & Terre Haute, and chairman of the board of directors of the St. Louis, Kansas City & Colorado. In January, 1907, at the time of the reorganization of the Westinghouse Electric & Manufacturing Company, Mr. Mather was elected chairman of the board of directors and three years ago [illegible] At the time of his death, Mr. Mather was director of the [illegible] the United States, the Mercantile Trust Company, the Havana [illegible] Company, the Westinghouse Lamp Company, the [illegible] Company, the [illegible] Company, the Niagara, Lockport & Ontario Power Company, the [illegible] Company, the [illegible] Company, the [illegible]

Supply Trade News.

Frank B. Goebler, formerly in the purchasing department of the Atchison, Topeka & Santa Fe, has been made manager of the Railway & Supplymen's Mutual Catalog Company, Chicago, with office in that city.

E. A. Johnson, eastern sales manager of the Duff Manufacturing Company, Pittsburgh, Pa., with office in New York, has been made general sales manager, with office in Pittsburgh, C. A. Methfessel succeeds Mr. Johnson.

The Lehon Company, Chicago, is supplying the insulating paper used in the construction of the 2,500 refrigerator cars now being built for the St. Louis & San Francisco by the American Car & Foundry Company, New York. This large order amounts to 20,000,000 sq. ft. of paper, and requires 40 cars to ship.

The Association of Railway Electrical Engineers will hold its annual convention at the Hotel LaSalle, Chicago, November 6-10 as noted in last week's issue. Twenty-nine booths ranging in size from 70 sq. ft. to 182 sq. ft., have been provided in the ball room on the nineteenth floor of the hotel. Inquiries concerning exhibits at this convention should be sent to W. E. Ballantine, 436 So. Dearborn street, Chicago.

TRADE PUBLICATIONS.

Spark Coils.—The Nungesser Electric Battery Company, Cleveland, Ohio, has published Practical Pointers About Spark Coil Adjustment, a booklet giving useful data on dry batteries and spark coils.

Tube Expanders.—Gustav Wiedeke & Company, Dayton, Ohio, have issued bulletin No. 30 on tube expanders. This bulletin, which consists of 24 pages, describes the various types of expanders, and gives list prices of the different sizes.

Denver & Rio Grande.—The passenger department of the Denver & Rio Grande has issued an illustrated pamphlet entitled The Land of Irrigation, giving panoramic views of the irrigated orchards and farms in the territory through which this road runs.

Asphalt Floors.—The Standard Asphalt & Rubber Company, Chicago, has issued a booklet entitled Asphalt Floors, describing the floors furnished by this company for factories, railway stations, warehouses, etc., and giving illustrations of installations. This company has also published Permanent Waterproofing, a booklet treating of its products for waterproofing bridges, reservoirs and subways. Another booklet, Asphalt Products, lists other articles made by this company.

Air Compressors.—The Ingersoll-Rand Company, New York, has published form 3109, on class NF-1, steam-driven, single-stage, straight-line air compressors, and form 3210, on class NE-1, power-driven, single-stage, straight-line air compressors. The steam driven compressors consist of a twin flywheel, center crank, with the steam and air cylinders arranged in tandem. The power-driven compressors consist of an air cylinder, supported by a main frame, with a piston operated by a center crank shaft, having a belt wheel on one side and a flywheel on the other. The booklets show several views of these machines in section and include tables of sizes and capacities.

Locomotives.—The American Locomotive Company, New York, has issued bulletin No. 1011, entitled An Epoch Making Passenger Locomotive. Two of these locomotives were built for the Chesapeake & Ohio to replace the Pacific type engines which previously handled the passenger traffic over the Clifton Forge division. They have the 4-8-2 wheel arrangement, and have been named the mountain type. They are the largest passenger engines of the rigid frame construction ever built, and include interesting special features in their construction. The bulletin includes reports of the operation of these engines, both in trial service and in passenger service on their regular runs, which shows that hey will haul 645 tons over 1.82 per cent. grades at 26 miles per hour. The important dimensions of these engines are also compared with the dimensions of the Pacific type locomotives which they replaced.

Railway Construction.

New Incorporations, Surveys, Etc.

Aransas Pass Channel & Dock Co.—An officer writes that this company has not yet definitely secured the right of way for the proposed improvements to be made at Aransas Pass, Tex. Under the name of the Aransas Harbor Terminal, six miles of line are to be built from the mainland at Aransas City, east to Harbor Island. The company has already laid about three-quarters of a mile of track, and has grading finished on about five miles; 8,000 ft. of fill is partly finished; this work is to be completed across a shallow bay, and calls for handling about 32,000 cu. yds. There will be 500 ft. of trestle and a plate girder drawbridge with a 40-ft. opening; also a 600-ft. dock and warehouse. T. H. Franklin, president, San Antonio, Tex. (See Aransas Terminal, Jan. 27, p. 183.)

Canadian Northern.—Application will be made to the Alberta legislature for permission to build 14 new lines in that province. One of the most important of these lines is to be built from Athabasca Landing to Peace river crossing. T. Turnbull, assistant chief engineer, Winnipeg, Man.

Canadian Pacific.—A contract has been given to Burns & Johnson, it is said, to build from Fort Steele, B. C., to Skookumchuck, 60 miles. J. G. Sullivan, chief engineer, Winnipeg, Man.

Chesapeake & Ohio.—The report of this company for the year ended June 30, 1911, shows that work is nearing completion on extensions as follows: Raleigh & Southwestern, 14.6 miles; Coal River branch, 11.2 miles; Guyandotte Valley branch, 12.4 miles, and on the Buffalo Creek branch, 11.5 miles. Second track work has been completed as follows: Walker, Va., to Elko, 15.8 miles; Korah to Westham, 3 miles; Gladstone to Riverville, 3 miles; Fort Spring, W. Va., to Rockland, 2.1 miles; Riverton, Ky., to South Portsmouth, 19 miles; Quicks' Run to Robtown, 13.5 miles; Manchester to Crooked Creek, 3.3 miles; Carntown, Ky., to Brent, 19.9 miles; a total of 79.6 miles. Of the 67 miles of second track on the Cincinnati division, authorized in 1910, 12 miles were not completed at the end of the fiscal year, and construction of 48 miles additional, to complete the double-track on this division, has been authorized. About 30 miles of this work has been finished since the close of the fiscal year, and it is expected to have the entire 60 miles in operation by December, 1911. During the year the company put in 20,110 tons of new rail, equal to 140 track miles, which was used in renewal of existing main tracks. H. Pierce, chief engineer, Richmond, Va.

Chicago, Burlington & Quincy.—The report of this company for the year ended June 30, 1911, shows that the Herrin & Southern, from Herrin, Ill., to Metropolis, was opened for operation in October, 1910. The line from Scribner, Mont., to Fromberg, where connection is made with the Northern Pacific, was opened for traffic in April, 1911, and on the extension from Kirby, Wyo., to Powder River, a section of 12 miles from Kirby to Thermopolis, is in operation; track has been laid on 14 miles south of Thermopolis, and grading is almost finished on 82 miles additional. Work on the Hudson-Greeley line, Colo., has not been pushed, and the money spent during the past year for this improvement was principally for the right-of-way. A large amount of second track has been laid at various points, and new freight and passenger stations rebuilt or enlarged. Additional land has been bought for improved facilities at St. Louis, Mo., and at Denver, Colo. Improvements at the Havelock's shops at Havelock, Neb., have been completed, and a site has been bought in Chicago, on which a new building, to accommodate the general offices, is now being put up. T. E. Calvert, chief engineer, Chicago.

Great Northern.—According to press reports, Coughren & Woldson, Spokane, Wash., have been given a contract for excavating and grading work from Bluestem to Peach, about 45 miles. This work has been sublet as follows: O. D. Wolf, Seattle, 10 miles; P. P. Johnson, Spokane, 7 miles; S. J. Dalberg, Spokane, 8 miles; Burpee & Elliott, Portland, Ore., 2 miles; O. E. Grant, Spokane, 5 miles; N. A. Degrestrom, Everett, 2 miles; Ehricson & Olson, Spokane, 4 miles; Boynston, Church & McCoy, Spokane, 7 miles; A. H. Hogeland, chief engineer, St. Paul, Minn.

Kaul's Lumber Company's Lines.—An officer writes that a contract has been let to P. W. Turner, Birmingham, Ala., to build a line southeast from Tuscaloosa, about 25 miles. Minimum grades will be 1½ per cent. and minimum curvature 8 deg. The line is being built to carry lumber. John L. Kaul, president, Birmingham, Ala.

Marshall & East Texas.—This company is planning to build important extensions, it is said, to include one from Elysian Fields, Tex., south to Newton, about 120 miles, where connection is to be made with the Orange & Northwestern. It is also planned to build an extension from Winsboro, north to Paris, about 50 miles. R. J. Lockwood, chief engineer, Marshall. (March 10, p. 479.)

Missouri, Kansas & Texas.—This company has started the reconstruction of its main line from the Texas state line at Red river northward to Kansas City and St. Louis. The road, originally constructed on a 1 per cent. grade, uncompensated for curvature, is being double-tracked and reconstructed on a 0.4 per cent. grade compensated, from the south line of Oklahoma as far as Wagoner, and work is projected from there to Paola, near Kansas City, on a 0.3 per cent. grade. At present 53 miles of this work has been completed and put in operation. On the line from Stringtown to McAlester three heavy grades will have to be reduced. The line from Parsons, Kan., to Atoka, Okla., 223 miles, will be double-tracked. It is contemplated to extend the double-track northward from its present terminus at Stringtown to Parsons, Kan. This will make a double-track line from Denison, Tex., to Parsons, Kan.

Missouri, Oklahoma & Gulf.—An officer writes that a locating party is making surveys between Wagoner, Okla., and Pittsburg, Kan., and Joplin, Mo. The line has been located from Wagoner north to Horsecreek, 60 miles, and the preliminary survey has been made from Horsecreek north to Pittsburg and Joplin. A locating party is also working west between Henryetta, Okla., and Oklahoma City. The line has been located to Shawnee and it is expected that this will be finished to Oklahoma City within 30 days. Two location parties are in the field between Denison, Tex., and Fort Worth, and Dallas. A preliminary survey has been made from Denison to Dallas, and in a few days will be started from Denison, via McKenney, to Fort Worth. The company's plans for construction in Texas are not yet complete and when surveys are finished they will decide which lines are to be built. The three lines above aggregate between 250 and 300 miles. It is expected that construction work will be begun as soon as the survey and plans are completed. J. J. Harrison, chief engineer, Muskogee, Okla.

Morgan's Louisiana & Texas.—This company will begin operating freight trains between La Fayette, La., and Baton Rouge, 57.38 miles, on November 5. E. B. Cushing, chief engineer, Houston, Tex.

Nevada-California-Oregon.—An officer writes that the company expects to have all the work finished to complete the line from Reno, Nev., north via Alturas, Cal., to Lake View, Ore., 237 miles, and the line in operation by December 1. George S. Oliver, chief engineer, Reno, Nev. (October 20, p. 816.)

[illegible] & Western.—The report of this company for the year ended June 30 1911 [illegible] Petersburg Belt Line, which extends from [illegible] Va., to Abilene, comprising 5.87 miles of main line and 1.10 miles of connecting track, and 4.06 miles of sidings, has been completed for operation. The Dry Fork branch [illegible] operation No. 4 of the [illegible] Coal Companies, [illegible] on 1.04 miles from the present end of track, above Canebrake, W. Va., to the Hardy Creek branch. Work is also under way on the Hardy Creek branch from the Dry Fork branch to a connection with the Indian Creek branch, at the Virginia state line, 1.65 miles. The Indian Creek branch is now under construction from connections with the Hardy Creek branch and at the West Virginia state line to Cedar Bluff, Va., 12.22 miles; and a "Y" connection at the station at Cedar Bluff, 0.37 miles. It is expected to have all this work finished by 1912, and these improvements will provide connections between the main line at Iaeger, W. Va., with the Clinch Valley district at Cedar Bluff, Va. Work is now under way on the North Fork branch of Tug Fork branch, from Jeanette, W. Va., 4.31 miles, and it is expected to be finished about November, 1911. The Sycamore branch has been put in operation from a point 2.8 miles east of Williamson, W. Va., up Sycamore Creek to the coal operation of the Sycamore Coal Company, 2.69 miles. The Winston-Salem southbound, which was built jointly by the Norfolk & Western and the Atlantic Coast Line, from Winston-Salem, N. C., to Wadesboro, 89 miles, has been completed and is now opened for operation. Further progress is being made in securing the right-of-way for the Guyandote and Tug River Railroad, and connections. Double-track work is now under way from Vivian, W. Va., to Huger, 5.03 miles, including four tunnels, and it is expected to be finished during November, 1911. The grade of the east approach of the Ohio river bridge at Kenova, W. Va., is being reduced from 0.5 per cent. to 0.3 per cent., and the viaduct and bridge will be double-tracked, removing 0.7 miles of gauntlet. It is expected that this work will be finished late in 1912. When these improvements are completed the company will have, between Lambert's Point, Va., and Columbus, Ohio, including as second track the lines around Petersburg, Va., and Lynchburg and the big Sandy line, 512.09 miles of double main track, and 191.67 miles of single track, including two gauntlets, 0.38 and 0.55 miles respectively. A single track is between Gilmerton and Phoebe, 172.06 miles; between Radford and Coaldale, W. Va., in sections, 16.46 miles, and between the Pocahontas coal field and Columbus, Ohio, 3.15 miles.

Oregon Electric.—A contract has been given to Guthrie & McDougall, it is said, for grading 20 miles between Albany, Ore., and Eugene. The work has been sublet to Fuller & Bain. These contractors are now building the line from Salem to Albany. L. B. Wickersham, chief engineer, Portland, Ore.

Piedmont & Northern (Electric).—An officer writes that contracts have been let to W. J. Oliver and to Stuart & Jones to build from Charlotte, N. C., west to Gastonia, 23 miles; also to build from Greenwood, S. C., north to Greenville, 60 miles, with a branch of this line from a point south of Belton west to Anderson, 10 miles; in all 93 miles. The plans also call for building a connecting line from Greenville, S. C., northeast to Gastonia, N. C., and an extension from Charlotte northeast, via Greensboro, to Durham. Work is now under way and track has been laid on six miles. J. B. Duke, president; W. S. Lee, vice-president; E. Thomason, assistant vice-president and general manager, Charlotte, N. C.

Rockingham Railroad.—This road is now in operation from Gibson, N. C., to Rockingham, 19 miles. J. L. Hawley, superintendent, Rockingham.

Santa Fe, Prescott & Phoenix.—According to press reports, a contract has been given to build from Cedar Glade, Ariz., through the Verde valley, to Jerome, 38 miles. J. A. Jaeger, chief engineer, Prescott. (July 14, p. 105.)

Terre Haute & Ohio River.—Incorporated in Illinois with $100,000 capital, to build from Clark county, Ill., opposite Terre Haute, to Elizabethtown in Hardin county on the Ohio river. The incorporators are residents of Chicago. It is understood that the Frisco interests are back of the project.

RAILWAY STRUCTURES.

Cuero, Tex.—The Gulf, Colorado & Santa Fe is preparing plans for a one-story brick passenger station.

Clarksburg, W. Va.—An officer of the Baltimore & Ohio writes regarding the improvements to be carried out at Clarksburg, that the company will shortly erect umbrella sheds at the passenger station, and next spring will build an extension to the freight house. (October 20, p. 816.)

Clarkston, Wash.—It is understood that the Oregon Washington Railroad & Navigation Company will soon start work on a bridge over the Snake river, near Clarkston.

Cullman, Ala.—The Louisville & Nashville will build a reinforced concrete and brick passenger station, to cost approximately $30,000. The work will probably be done by company forces.

Fair Oaks, Ark.—The St. Louis Southwestern will build a passenger station 20 ft. x 70 ft., to replace the structure recently destroyed by fire.

Kansas City, Kan.—The Union Pacific is preparing plans for a reinforced concrete viaduct over Mill street, Kansas City, to cost about $90,000.

Kansas City, Mo.—The Kansas City Terminal Company has let contracts to the W. P. Carmichael Co., Kansas City, for building a retaining wall east of Brooklyn avenue, and to O'Hagan & Lake, Aurora, Ill., for the subway at Independence Road. The Freeborn Engineering Company, Kansas City, has secured the contract amounting to $35,000 for the concrete abutments for a viaduct on Eighteenth street, near Agnes avenue. It is expected that the contracts for the Burlington connection, by which trains arriving over the Hannibal bridge can enter the new station, involving about $350,000, and for the foundations and piers for the bridge over the Blue river on the North Side freight line, amounting to about $50,000, will be let within a week. The Burlington connection will extend from St. Louis avenue to Twenty-fourth street, and will include the excavation of about 200,000 cu. yds. of earth, the construction of a retaining wall, foundations for the subway on West Twelfth street and a viaduct at Allen avenue. The Terminal Company will lay the tracks when the grading work has been completed.

Ludlow, Ky.—The Queen & Crescent has let the contract to the American Bridge Company for an 80-ft. electric turntable, designed to turn locomotives of 180 tons weight. The electric tractor will be furnished by G. P. Nichols & Bros.

Mount Vernon, Wash.—The Bellingham & Skagit Interurban Railway, in connection with building a line into Mount Vernon, will soon start work erecting a bridge over the Skagit river.

Norfolk, Va.—The report of the Norfolk & Western for the year ended June 30, 1911, shows that land for the terminal facilities at Norfolk, Va., has been secured and contracts for putting up the station and office building have been let and work is now under way. The Norfolk Terminal Railway was organized to carry out these improvements. The Norfolk & Western, the Virginia Railway and the Norfolk Southern will jointly use the terminal facilities of the Norfolk Terminal for their passenger train business to and from Norfolk. It is expected that the terminal will be ready for use about the middle of 1912. The total cost of the work is estimated at $950,000. During the year passenger stations and freight houses were built or enlarged at Woodsdale, N. C., Thaxton, Va., Berryville, Basic, Troutville, Holland, Catawba, East Radford, Abingdon and at Plasterco, Delorme, W. Va., and at Chillicothe, Ohio. Small joint freight houses were built at Riverton, Va., and at Devon, W. Va. A three story brick office building, for the motive power department, was constructed and a brick power house, 72 ft. x 104 ft., was built at Roanoke, Va. At Bluefield, W. Va., a three story addition was built to the division office building, and the power house was extended and the boiler plant enlarged. At Norfolk, Va., a coal wharf was built. During the year, 330 lineal ft. of wooden bridges and 93 lineal ft. of iron bridges were replaced by masonry, culverts, and fill; 284 lineal ft. of wooden bridges and 2,897 lineal ft. of iron bridges were replaced by steel structures, and 896 lineal ft. of wooden bridges at branch lines were replaced by iron bridges released from the main line. New overhead steel highway bridges were built at Dwight, Va., Basic, Elmwood, Ohio, Dorney and Delano. Twelve double-track bridges, two in Virginia and 10 in Ohio, have been constructed over county roads, depressed to eliminate grade crossings. A number of water tanks, also water softening plants were constructed, and improvements were made to the water supply at various places during the year.

Pasadena, Cal.—Plans are being made by the San Pedro, Los Angeles & Salt Lake, for building an addition to the fruit packing house at Pasadena, it is said, and for building new packing houses at Fourth street and at Pacific avenue, Riverside.

Portola, Cal.—The Western Pacific has started work on a hospital at Portola, Cal., it is said, for the use of its employees.

Riverside, Cal.—See Pasadena, Cal.

Wichita, Kan.—The Midland Valley has let the contract for building a brick engine house at Wichita.

Railway Financial News.

Alabama Great Southern.—Robert Jamison has been elected a director, succeeding W. H. Woodward, deceased.

Baltimore & Ohio.—Paul M. Warburg, of Kuhn, Loeb & Co., New York, has been elected a director, succeeding J. R. Foard, deceased.

Boston & Maine.—The Concord & Montreal has applied to the Massachusetts Railroad Commission for permission to issue $400,000 new stock. This stock is to be sold at auction and the proceeds used to reimburse the Boston & Maine for expenditures under the Boston & Maine's 99-year lease.

Canadian Northern.—See Carillon & Greenville.

Carillon & Greenville.—A special meeting was held on October 18 "to authorize and confirm a sale or transfer of the company's charter and all the rights to property, land grants and franchises to the Central Railway of Canada." After the meeting no statement was given out as to what had taken place, and no explanation was offered of a rumor originating some time ago that control of this company was held by the Canadian Northern. The road runs from Carillon, northwest of Montreal, to Greenville, about 13 miles. The right of way in general lies along a part of the route that is proposed for the Central Railway between Montreal and Ottawa.

Central Railway of Canada.—See Carillon & Greenville.

Chesapeake & Ohio.—T. H. Hubbard has been elected a director succeeding F. W. Scott.

Chicago Great Western.—Stockholders of the De Kalb & Great Western are to vote on December 1 on the question of the sale of the property and franchises to the Chicago Great Western.

Cincinnati, Hamilton & Dayton.—This company has asked the Ohio State Railway Commission for authority to issue $400,000 bonds, of which $200,000 are to be used to retire outstanding securities and the remainder to be used for extensions and betterments.

De Kalb & Great Western.—See Chicago Great Western.

Denver, Northwestern & Pacific.—The Denver Railway Securities Company is offering to holders of the Colorado Utah Construction Company's $4,000,000 guaranteed 2-year 6 per cent. notes to pay $125 in cash and $875 in purchase money collateral trust 6 per cent. notes of the Denver Railway Securities Company for each $1,000 construction company note. The construction company was building the Denver, Northwestern & Pacific, and its notes were secured by D. N. W. & P. bonds and were guaranteed by the late David H. Moffat.

Denver Railway Securities Co.—See Denver, Northwestern & Pacific.

Marshall & East Texas.—J. W. Ogburn and J. E. Votaw have been elected directors, succeeding J. J. Carter and J. F. Strickland.

Mexican International.—Jaime Gurza and J. L. Moctezuma have been elected directors, succeeding G. De S. Escandon and Pablo Macedo, retired.

Missouri, Kansas & Texas.—It is understood that the sale of the Wichita Falls & Northwestern and the Wichita Falls & Southern to the Missouri, Kansas & Texas has been finally concluded.

Rutland.—The board of directors, representing the joint control of this company by the New York Central & Hudson River and the New York, New Haven & Hartford, have been elected as follows: W. C. Brown, Charles S. Mellen, Lewis Cass Ledyard, William Skinner, J. P. Morgan, William Rockefeller, James Stillman, W. H. Newman, George F. Baker, W. K. Vanderbilt, jr., W. Seward Webb, Percival W. Clement and E. R. Morse. Mr. Morse was elected as successor to the late Governor Proctor of Vermont.

Wichita Falls & Northwestern.—See Missouri, Kansas & Texas.

Wichita Falls & Southern.—See Missouri, Kansas & Texas.

ANNUAL REPORTS

FIFTY-SEVENTH ANNUAL REPORT OF THE CHICAGO, BURLINGTON & QUINCY RAILROAD COMPANY.

Chicago, July 1, 1911.

To the Stockholders of the Chicago, Burlington & Quincy Railroad Company:

The following is the report of your Board of Directors for the year ended June 30th, 1911:

CHICAGO, BURLINGTON & QUINCY RAILROAD COMPANY, YEARS ENDED JUNE 30.

Per Cent.	1911.	OPERATING REVENUES.	1910.	Per Cent.
65.74	$58,033,242.91	Freight Revenue	$58,224,537.48	66.26
25.53	22,552,567.22	Passenger Revenue	22,380,305.83	25.47
2.69	2,375,713.68	Mail Revenue	2,330,215.66	2.65
2.83	2,493,252.45	Express Revenue	2,216,049.24	2.52
2.13	1,879,628.61	Miscellaneous Transportation Revenue	1,803,949.06	2.05
.94	832,357.32	Revenue from Operations other than Transportation	812,440.69	.93
.12	105,246.08	Joint Facilities	102,019.28	.12
100.00	$88,272,208.27	Total Operating Revenue	$87,869,517.24	100.00
		OPERATING EXPENSES.		
14.05	$12,406,278.81	Maintenance of Way and Structures	$15,725,461.20	17.90
16.72	14,761,137.51	Maintenance of Equipment	15,057,165.39	17.14
1.79	1,581,805.25	Traffic Expenses	1,654,451.73	1.88
32.34	28,543,204.54	Transportation Expenses	28,340,051.74	32.25
2.55	2,249,499.55	General Expenses	2,233,834.82	2.54
67.45	$59,541,925.66	Total Operating Expenses	$63,010,964.88	71.71
32.55	$28,730,282.61	Net Operating Revenue	$24,858,552.36	28.29
	107,089.13	Net Deficit from Outside Operations	164,282.15	
	$28,623,193.48	Total Net Revenue	$24,694,270.21	
	3,049,124.17	Taxes Accrued	2,970,736.78	
	$25,574,069.31	Operating Income	$21,723,533.43	
		OTHER INCOME.		
	$676,479.42	Rents	$745,786.35	
	1,498,219.45	Miscellaneous Interest	1,777,907.46	
	$2,174,698.87	Total Other Income	$2,523,693.81	
	$27,748,768.18	Gross Corporate Income	$24,247,227.24	

	DEDUCTIONS FROM GROSS CORPORATE INCOME.	
$1,610,636.54	Rents	$1,764,512.90
3,702.07	Miscellaneous Interest	1,077.95
8,626,369.54	Interest Accrued on Funded Debt	8,506,015.82
662,310.50	Sinking Funds	666,874.39
1,986.80	Discount on Funded Debt	
$10,905,005.45	Total Deductions	$10,938,481.06
$16,843,762.73	Net Corporate Income	$13,308,746.18
$8,867,128.00	Dividends	$8,867,128.00
4,826,755.01	Appropriations for Betterments	3,329,006.47
$13,693,883.01		$12,196,134.47
$3,149,879.72	Surplus for the Year	$1,112,611.71

Charges to capital account aggregating $11,031,462.31 were made during the fiscal year for additions to the property.

The Herrin and Southern Line from Herrin to Metropolis, Ill., was opened for business on October 15th, 1910, the amount expended on it this year being $732,338.04. Arrangements have been made by which freight via this line is transferred across the Ohio River to Paducah, Ky., forming a connection with southern roads. This, in time, should lead to increased revenue.

The line from Scribner to Fromberg, Mont., where it connects with the Northern Pacific Road, was opened for traffic on April 24th, 1911. Amount expended on it during the year was $953,050.73.

On the extension from Kirby to Powder River, Wyo., $2,255,527.96 has been expended this year, and twelve miles from Kirby to Thermopolis, Wyo., are in operation. Track is laid for fourteen miles south of Thermopolis, and grading almost finished on eighty-two miles more.

Work on the Hudson-Greeley line, Colorado, has not been pushed, and the $53,104.76 expended on it during th past year was principally for right of way.

Additional land was purchased for needed facilities at St. Louis and Denver, and the improvements at Havelock Shops were completed.

New second track costing $1,312,650.16 has been laid at various points, and new freight and passenger stations rebuilt or enlarged where business required it.

Owing to changed conditions, the accommodations of the General Offices at Chicago have for some time been inadequate for the use required, and a site has been purchased on which a new building, designed to meet future expansion, is being erected.

The following statistical tables, together with the report of the General Auditor, reflect the business of the Company during the year:

TRAFFIC AND OPERATING STATISTICS.

ITEM.	1911. Dollars and Whole Numbers.	1911. Cents and Decimals.	1910. Dollars and Whole Numbers.	1910. Cents and Decimals.	Increase or Decrease.	Increase or Decrease. Dollars and Whole Numbers.	Increase or Decrease. Cents and Decimals.
PASSENGER TRAFFIC.							
Number of Passengers Carried Earning Revenue	22,014,305	.....	21,512,255	.....	Inc.	502,050	.....
Number of Passengers Carried One Mile	1,173,435,093	.....	1,189,871,613	.....	Dec.	16,436,520	.....
Number of Passengers Carried One Mile, per Mile of Road	129,350	.....	131,870	.....	Dec.	2,520	.....
Average Distance Carried, Miles	53	30	55	31	Dec.	2	01
Total Passenger Revenue	$22,552,567	22	$22,380,305	83	Inc.	172,261	39
Average Amount Received from each Passenger	$1	02445	$1	04035	Dec.	.....	01590
Average Receipt per Passenger per Mile	.....	01922	.....	01881	Inc.	.....	00041
Total Passenger Service Train Revenue	$28,112,771	17	$27,566,795	71	Inc.	$545,975	46
Passenger Service Train Revenue per Mile of Road	$3,098	92	$3,055	15	Inc.	43	77
Passenger Service Train Revenue per Train Mile	$1	54401	$1	51109	Inc.	.....	03292
FREIGHT TRAFFIC.							
Number of Tons Carried of Freight Earning Revenue	28,328,338	...	27,867,618	.....	Inc.	460,720	.....
Number of Tons Carried One Mile	7,116,005,120	...	7,435,144,216	.....	Dec.	319,130,096	.....
Number of Tons Carried One Mile per Mile of Road	784,409	....	824,016	.....	Dec.	39,607	.....
Average Distance Haul of One Ton One Mile	251	20	266	80	Dec.	15	60
Total Freight Revenue	$58,033,242	91	$58,224,537	48	Dec.	191,294	57
Average Amount Received per Ton per Mile	$	04859	$	08933	Dec.	.....	04074
Average Receipt per Ton per Mile	..	00816	..	00783	Inc.	.....	00033
Freight Revenue per Mile of Road	$6,397	10	$6,452	86	Dec.	55	76
Freight Revenue per Train Mile	$	51[illegible]	$	98566	Inc.	.....	32812
OPERATING.							
Operating Revenue	$88,272,208	27	$87,869,517	24	Inc.	$402,691	03
Operating Revenue per Mile of Road	$9,730	40	$9,738	33	Dec.	$7	93
Operating Revenues per Train Mile	$	53455	$	38445	Inc.	.....	15010
Operating Expenses	$59,541,925	66	$63,010,964	88	Dec.	$3,469,039	22
Operating Expenses per Mile of Road	$6,563	41	$6,983	33	Dec.	$419	92
Operating Expenses per Train Mile	$1	70967	$1	70988	Dec.	.....	00026
Per Cent. Operating Expenses	67	45	71	71			
Net Operating Revenue	$28,730,282	61	$24,858,552	36	Inc.	$3,871,730	25
Net Operating Revenue per Mile of Road	$3,166	99	$2,755	00	Inc.	$411	99
Average Number of Passengers per One Mile	16		16				
Average Number of Passengers per Train Mile	64		69		Dec.	1	
Average Number of Passengers Carried Each Mile	6	15	6	02	Inc.	...	13
Average Number of Tons of Freight per Ton per Mile	17	81	16	99	Inc.	...	22
Average Number of Tons of Freight per Train Mile	406	33	381	26	Inc.	25	07
Average Number of Loaded Cars per Train Mile	34	71	32	66	Inc.	2	05
Average Number of Empty Cars per Train Mile	23	61	22	44	Inc.	1	17
Average Number of Loaded Cars per Empty Car	1	19	1	28	Inc.	...	87
Percentage Loaded Miles to Total Miles	70	80	70	06	Inc.	18	74

Including tenders.

EQUIPMENT.

ITEMS.	Number on June 30, 1910.	Number Added During Year.	Number Retired During Year.	Number on June 30, 1911.	Average Tractive Power All Locomotives and Average Capacity All Freight Cars
LOCOMOTIVES—Owned.					
Passenger	466	9	40	435	.....
Freight	857	20	...	877	.....
Switching	350	16	5	361	.....
Total Locomotives	1,673	45	45	1,673	26,608 lbs.
CARS—Owned.					
Passenger Service:					
First-class Cars	625	39	...	664	.....
Combination Cars	228	5	...	233	.....
Dining Cars	32	7	...	39	.....
Baggage, Express and Postal Cars	227	32	...	259	.....
Parlor Cars	11	3	...	14	.....
Other Cars in Passenger Service	36	9	...	45	.....
Total	1,159	95	...	1,254	.....
Freight Service:					
Box Cars	26,068	1,485	...	27,553	.....
Flat Cars	1,250	86	...	1,336	.....
Stock Cars	6,984	...	619	6,365	.....
Coal Cars	13,761	...	188	13,573	.....
Tank Cars	6	...	...	6	.....
Refrigerator Cars	1,712	372	...	2,084	.....
Other Cars in Freight Service	100	...	7	93	.....
Total	49,881	1,943	814	51,010	36.33 tons
Company's Service:					
Officers' and Pay Cars	31	...	...	31	.....
Gravel Cars	483	496	...	979	.....
Derrick Cars	35	...	1	34	.....
Caboose Cars	666	4	...	670	.....
Other Road Cars	3,854	136	...	3,990	.....
Total	5,069	636	1	5,704	.....
Total Cars Owned	56,109	2,674	815	57,968	.....

MILEAGE.

MILEAGE OF ROAD OPERATED.

STATE	Line Owned.	Operated Under Lease.	Total Line Operated.
Illinois	1,672.60	59.10	1,731.70
Iowa	1,364.98	73.47	1,438.45
Missouri	1,121.64	11.63	1,133.27
Wisconsin	222.49	.53	223.02
Minnesota	23.61	14.84	38.45
Nebraska	2,850.34	22.37	2,872.71
Kansas	259.32	.82	260.14
Colorado	394.36	34.97	429.33
South Dakota	281.27	.....	281.27
Wyoming	482.75	.....	482.75
Montana	134.38	49.37	183.75
	8,807.74	267.10	9,074.84

STATE.	Single Track.	Second Track.	Third Track.	Yard Track and Sidings.	Total.
Illinois	1,672.60	273.78	23.55	842.36	2,812.29
Iowa	1,364.98	244.49	.....	315.75	1,925.22
Missouri	1,121.64	100.75	.....	413.06	1,635.45
Wisconsin	222.49	21.34	.....	70.97	314.80
Minnesota	23.61	2.25	.....	29.07	54.93
Nebraska	2,850.34	17.99	.....	654.71	3,523.04
Kansas	259.32	.....	.....	23.32	282.64
Colorado	394.36	.....	.....	133.02	527.38
South Dakota	281.27	.....	.....	66.12	347.39
Wyoming	482.75	.....	.....	154.81	637.56
Montana	134.38	.....	.....	32.70	167.08
	8,807.74	660.60	23.55	2,735.89	12,227.78

Following is the report of the General Auditor, with statements prepared by him.

By order of the Board of Directors.

DARIUS MILLER,
President.

FUNDED DEBT OF THE CHICAGO, BURLINGTON & QUINCY RAILROAD COMPANY.

Designation of Bond or Obligation.	TERM. Date of Issue.	TERM. Date of Maturity.	Total Par Value Authorized.	Total Par Value Outstanding.	Total Par Value Held by Company. In Treasury.	Total Par Value Held by Company. Pledged as Collateral.	Total Par Value not Held by Company. In Sinking Funds.	Total Par Value not Held by Company. In the Hands of the Public.	INTEREST. Rate.	When Payable.	Amount Accrued During the Year.
MORTGAGE BONDS.											
C. B. & Q. R. R.:											
General Mortgage	1908	1958	$59,723,000	$59,723,000	$8,204,000	.....	.....	$51,519,000	4	M. & S.	$2,266,253.34
Illinois Division	1899	1949	50,835,000	50,835,000	384,000	.....	.....	50,451,000	3½	J. & J.	1,779,225.00
Illinois Division	1899	1949	34,165,000	34,165,000	189,000	.....	.....	33,976,000	4	J. & J.	1,366,600.00
Iowa Division Mortgage Sinking Fund Bonds	1879	1919	3,000,000	2,275,000	.....	.....	.....	2,275,000	5	A. & O.	113,775.03
Iowa Division Mortgage Sinking Fund Bonds	1879	1919	12,502,000	5,869,000	20,000	.....	.....	5,849,000	4	A. & O.	237,050.00
Nebraska Extension Mortgage Sinking Fund Bonds	1887	1927	29,441,000	22,839,000	300,000	$31,000	.....	22,508,000	4	M. & N.	923,393.34
B. & M. R. R. in Nebraska:											
Consolidated Mortgage Sinking Fund Bonds	1878	1918	13,751,000	13,613,000	113,000	.....	$9,527,000	3,973,000	6	J. & J.	816,780.00
Republican Valley R. R.:											
Mortgage Sinking Fund Bonds	1879	1919	2,643,000	932,800	.....	.....	684,800	248,000	6	J. & J.	55,968.00
Hannibal & St. Joseph R. R.:											
Mortgage Bonds	1881	1911	8,000,000	.....	.....	.....	.....	.....	6	M. & S.	197,002.69
Tarkio Valley R. R.:											
Mortgage Bonds	1880	1920	430,000	33,000	.....	.....	.....	33,000	7	J. & D.	2,630.83
Nodaway Valley R. R.:											
Mortgage Bonds	1880	1920	388,000	37,000	.....	.....	.....	37,000	7	J. & D.	3,103.33
COLLATERAL TRUST BONDS.											
C. B. & Q. R. R.:											
Sinking Fund Bonds (Denver Extension)	1881	1921	7,968,000	7,310,200	56,200	.....	4,607,900	2,646,100	4	F. & A.	292,408.00
PLAIN BONDS.											
C. B. & Q. R. R.:											
Sinking Fund Bonds	1881	1911	4,300,000	3,667,000	52,000	.....	2,570,000	1,045,000	4	M. & N.	146,679.98
Plain Bonds	1883	1913	9,000,000	8,510,000	.....	.....	.....	8,510,000	5	M. & N.	425,500.00
Total	.....	.....	$136,146,000	$109,809,000	$9,318,200	$31,000	$17,389,700	$183,070,100			$8,626,369.54

CAPITALIZATION.

CAPITAL STOCK.

	Total Par Value Authorized and Outstanding	Dividends Declared During the Year. Rate.	Amount.
1,108,391	$110,839,100.00	8%	$8,867,128.00

FUNDED DEBT.

TOTAL PAR VALUE.

Description of Bond.	Authorized.	Outstanding.	In Treasury, in Sinking Funds or Pledged as Collateral.	In Hands of Public.	Interest Accrued During Year.
[illegible]	$ 14,878,000	$190,321,800	$19,452,800	$170,869,000	$7,761,781.56
Collateral Trust	7,968,000	7,310,200	4,664,100	2,646,100	292,408.00
[illegible]	13,866,000	12,177,000	2,622,000	9,555,000	572,179.98
[illegible]	$236,146,000	$209,809,000	$26,738,900	$183,070,100	$8,626,369.54

EXPENDITURES FOR NEW LINES AND EXTENSIONS AND EQUIPMENT, AND FOR ADDITIONS AND BETTERMENTS, DURING THE YEAR.

ACCOUNT.	New Lines and Extensions.	Additions and Betterments. Charged to Road and Equipment.	Charged to Income.	Total Expenditure.
I.—ROAD.				
[illegible]	$154,390.29	$40,686.36	$35,742.07	$230,818.72
[illegible]	66,729.17	1,863,826.74	.....	1,930,555.91
[illegible]	.....	Cr. 9,962.86	.....	Cr. 9,962.86
[illegible]	2,042,893.53	334,058.52	341,200.07	2,718,242.12
[illegible]	111,311.69	.....	.....	111,311.69
Bridges, Trestles and Culverts	377,204.05	227,107.48	617,899.71	1,222,211.24
[illegible]	285,254.98	279,587.55	3,164.31	568,006.84
[illegible]	419,520.53	542,774.40	381,812.89	1,344,107.82
Frogs and Switches	15,762.90	71,426.28	11,368.36	98,557.54
Track Fastenings and Other Material	144,804.78	107,412.04	222,228.80	474,445.62
[illegible]	173,110.78	78,719.94	85,381.35	337,212.07
Track Laying and Surfacing	115,351.87	300,632.25	78,227.22	494,211.34
Roadway Tools	309.26	1,148.90	30.15	1,488.31
Fencing Right of Way	16,677.80	10,045.15	89.56	26,812.51
Crossings and Signs	5,062.40	10,976.10	197,215.64	213,254.14
[illegible]	13,004.74	53,372.50	47,897.74	114,274.98
Telegraph and Telephone Lines	40,034.76	Cr. 10.17	33,906.97	73,931.56
[illegible]	32,600.52	124,746.54	89,235.24	246,582.30
[illegible]	921.07	316,971.01	191,902.16	509,794.24
Shop Machinery and Tools	.....	182,450.64	45,549.39	228,000.03
[illegible]	22,972.88	5,906.99	83,527.90	112,407.77
[illegible]	1,358.60	Cr. 289.83	16,381.94	17,450.71
[illegible]	113.98	.....	.....	113.98
[illegible]	.....	568.41	.....	568.41
Dock and Wharf Property	.....	2,552.88	.....	2,552.88
[illegible]	7,135.53	Cr. 2,907.95	12,318.95	15,546.53
Transportation of Men and Material	22,793.13	.....	.....	22,793.13
[illegible]	20,934.60	.....	.....	20,934.60
Repairs of Equipment	10,833.77	.....	.....	10,833.77
[illegible]	1,496.54	.....	6,227.73	7,724.27
[illegible]	$4,102,584.15	$4,540,799.87	$2,501,398.15	$11,144,782.17
II.—EQUIPMENT.				
Steam Locomotives	.....	.....	$1,680,140.79	$1,680,140.79
[illegible]	.....	$790,868.89	86,378.54	877,247.43
[illegible]	.....	1,247,982.61	502,007.27	1,749,989.88
Work Equipment	$1,020.62	317,443.08	26,308.82	344,772.52
[illegible]	$1,020.62	$2,356,294.58	$2,294,835.42	$4,652,150.62
III.—GENERAL EXPENDITURES.				
[illegible]	$1.25	.....	.....	$1.25
[illegible]	30.00	.....	.....	30.00
[illegible]	30,619.33	$105.89	$30,521.44	61,246.66
[illegible]	$30,657.20	$105.89	$30,521.44	$61,284.53
[illegible]	[illegible]	$6,897,200.34	$4,826,755.01	$15,858,217.32

[illegible]

[illegible]	1910. Miles.	1911. Miles.	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	Dec. [illegible]
[illegible]	[illegible]	[illegible]	Dec. [illegible]
[illegible]	[illegible]	[illegible]	Dec. [illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	Dec. [illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

GENERAL BALANCE SHEET.

June 30, 1911.

ASSETS.

Property Investment—Road and Equipment.		
Road	$330,972,434.23	
Equipment	58,025,703.79	
General Expenditures	1,515,827.90	$390,513,965.92
Reserve for Accrued Depreciation—Credit		14,006,026.45
Total		$376,507,939.47
Securities:		
Securities of Proprietary, Affiliated and Controlled Companies, Pledged—		
Stocks		19,344,014.38
Securities Issued or Assumed, Pledged—		
Funded Debt		31,000.00
Securities of Proprietary, Affiliated and Controlled Companies, Unpledged—		
Stocks	$7,534,861.63	
Funded Debt	704,050.00	8,238,911.63
Total		$27,613,926.01
Other Investments:		
Advances to Proprietary, Affiliated and Controlled Companies for Construction, Equipment and Betterments		402,109.77
Miscellaneous Investments—		
Physical Property	$1,472,338.25	
Securities Unpledged	1,295,285.83	2,767,624.08
Total		$3,169,733.85
Working Assets:		
Cash		10,652,950.22
Securities Issued or Assumed, Held in Treasury—		
Funded Debt		9,318,200.00
Marketable Securities—		
Stocks	$757,572.12	
Funded Debt	70,900.00	828,472.12
Loans and Bills Receivable		2,623,087.11
Traffic and Car Service Balances due from other Companies		748,879.37
Net Balance Due from Agents and Conductors		1,954,992.84
Miscellaneous Accounts Receivable		4,133,140.38
Materials and Supplies		7,812,557.87
Other Working Assets		37,343.55
Total		$38,109,623.46
Deferred Debit Items—		
Advances—		
Temporary Advances to Proprietary, Affiliated and Controlled Companies	$491,965.77	
Working Funds	196,850.16	
Other Advances	27,125.81	715,941.74
Insurance Paid in Advance		145,599.63
Cash and Securities in Sinking Funds		17,246,688.61
Securities in Provident Funds		496,538.89
Unextinguished Discount on Funded Debt		318,013.20
Other Deferred Debit Items		1,180,186.74
Total		[illegible]
Grand Total		[illegible]

LIABILITIES.

Capital Stock:		
Common Stock		$110,839,100.00
Mortgage, Bonded and Secured Debt:		
Funded Debt—		
Mortgage Bonds—		
Held by Company	$9,241,000.00	
Not held by Company	181,080,800.00	190,321,800.00
Collateral Trust Bonds—		
Held by Company	56,200.00	
Not held by Company	7,254,000.00	7,310,200.00
Plain Bonds—		
Held by Company	52,000.00	
Not held by Company	12,125,000.00	12,177,000.00
Total		$209,809,000.00
Working Liabilities—		
Traffic and Car-service Balances due to other Companies		1,285,230.76
Audited Vouchers and Wages Unpaid		6,599,261.05
Miscellaneous Accounts Payable		468,798.22
Matured Interest and Dividends Unpaid		2,150,140.00
Matured Mortgage, Bonded and Secured Debt Unpaid		59,000.00
Other Working Liabilities		62,317.06
Total		$10,624,747.09
Accrued Liabilities not Due—		
Unmatured Interest and Sinking Fund Payments		1,483,594.13
Taxes Accrued		68,400.00
Total		$1,551,994.13
Deferred Credit Items—		
Operating Reserves		1,510,448.16
Liability on Account of Provident Funds		496,538.89
Other Deferred Credit Items		202,079.07
Total		$2,209,066.12
Appropriated Surplus—		
Additions to Property since June 30, 1907, through Income		13,579,256.95
Reserves from Income or Surplus—		
Invested in Sinking Funds		29,752,509.37
Total		$43,331,766.32
Profit and Loss—		
Income Account		44,935,252.97
Profit and Loss		42,203,264.97
Total		$87,138,517.94
[illegible]		[illegible]

INCOME ACCOUNT

OPERATING INCOME.

RAIL OPERATIONS.

Operating Revenues:

Revenue from Transportation:		
Freight	[illegible]	
Passenger	[illegible]	
Excess Baggage	[illegible]	
Mail	[illegible]	
Express	[illegible]	
Milk	[illegible]	
Other Passenger Train	[illegible]	
Switching	1,090,068.46	
Special Service Train	76,429.71	
Miscellaneous Transportation	72,092.62	$87,334,604.87
Revenue from Operations [illegible]		
Station and Train Privileges	$7,976.56	
Parcel Room Receipts	7,768.78	
Storage Freight	45,410.15	
Storage Passenger	[illegible]	
Car Service	[illegible]	
Telegraph and Telephone Service	[illegible]	
Rents of Buildings and Other Property	[illegible]	
Power	[illegible]	
Miscellaneous	[illegible]	[illegible]
Joint Facilities Dr.		19,412.59
Joint Facilities Cr.		[illegible]
Total Operating Revenues		[illegible]

Operating Expenses:		
Maintenance of Way and Structures	$12,406,278.81	
Maintenance of Equipment	14,761,137.51	
Traffic Expenses	1,581,805.25	
Transportation Expenses	28,543,204.54	
General Expenses	2,249,499.55	59,541,925.66
Net Operating Revenue		$28,730,282.61

OUTSIDE OPERATIONS:

Revenue	$721,539.60	
Expenses	828,628.73	
Net Deficit from Outside Operations		107,089.13
Total Net Revenue		$28,623,193.48
Taxes Accrued		3,049,124.17
Operating Income		$25,574,069.31

OTHER INCOME.

Rents Accrued from Lease of Roads	$2,910.24	
Other Rents—Credits:		
Joint Facilities	$567,420.65	
Miscellaneous Rents	106,148.53	673,569.18
Dividends Received on Stocks Owned or Controlled		766,164.50
Interest Received on Funded Debt Owned or Controlled		564,625.86
Interest on other Securities, Loans and Accounts	167,429.09	2,174,698.87
Gross Corporate Income		$27,748,768.18

DEDUCTIONS FROM GROSS CORPORATE INCOME.

Other Rents—Debits:			
Hire of Equipment—Balance	$663,942.50		
Joint Facilities	902,894.52		
Miscellaneous Rents	43,799.52	$1,610,636.54	
Interest Accrued on Funded Debt		8,626,369.54	
Other Interest		3,702.07	
Sinking Funds Chargeable to Income		662,310.50	
Extinguishment of Discount on Securities		1,986.80	10,905,005.45
Net Corporate Income			$16,843,762.73

DISPOSITION OF NET CORPORATE INCOME.

Dividends Declared on Stock:			
2 per cent., payable October 1, 1910	$2,216,782.00		
2 per cent., payable January 1, 1911	2,216,782.00		
2 per cent., payable April 1, 1911	2,216,782.00		
2 per cent., payable June 26, 1911	2,216,782.00	$8,867,128.00	
Appropriations for Betterments:			
Expended during the year		4,826,755.01	13,693,883.01
Surplus for the year			$3,149,879.72

THE CHESAPEAKE AND OHIO RAILWAY COMPANY THIRTY-THIRD ANNUAL REPORT.

RICHMOND, VA., September 28, 1911.

The Thirty-third Annual Report of the Board of Directors, for the fiscal year ended June 30, 1911, is herewith submitted.

The average mileage operated during the year was 1,944.6 miles, an increase over the previous year of 7.7 miles; including the mileage of The Chesapeake and Ohio Railway Company of Indiana (the Chicago Line [illegible], the average mileage operated during the year was 2,229.2 miles, an increase over the previous year of 292.3 miles. The mileage at the end of the year was 1,957.2 miles, an increase as compared with June 30, 1910, of 18.4 miles; including the Chicago Line, 2,241.6 miles, an increase of 302.8 miles. See schedule on page 12.

The operations of the Chicago Line are included in this report. Its operations were restricted by reason of the lack of facilities, which are being gradually improved. In addition to the considerable traffic tributary locally to the line, there is sufficient additional traffic to insure its profitable operation to be delivered to it by the parent company as soon as adequate facilities are provided. To give stockholders an opportunity to compare the results achieved in operation during the year, there will be found in the appendix to this report separate tables of traffic statistics [illegible] combined.

[illegible] FOR THE YEAR

[illegible] $10,117,832.48

each, aggregating 3,139,625.00

(Increase $471,007.50, or 17.65%)

88,659.83

FINANCIAL.

The outstanding capital stock was reduced during the year through the conversion of $3,400 par value of First Preferred Stock and $500 par value of Second Preferred Stock into Common Stock and General Mortgage [illegible] per cent. Bonds. The changes in secured debt shown on the balance sheet of June 30, 1911, as compared with June 30, 1910, are as follows:

	Increase.	Decrease.
5 per cent. Consolidated Mortgage Bonds	$2,000,000.00	.....
4½ per cent. General Mortgage Bonds	2,600,000.00	.....
[illegible] per cent. Portsmouth Division Mortgage Bonds	..	$2,000,000.00
5 per cent. First Mortgage Greenbrier & New River Bonds	.. ..	339,000.00
4 per cent. First Mortgage Greenbrier Railway Bonds	..	20,000.00
4 per cent. First Mortgage Big Sandy Railway Bonds	.. ..	53,000.00
4 per cent. First Mortgage Coal River Railway Bonds	.. ..	29,000.00
4½ per cent. Secured Gold Notes	16,000,000.00	.....
Equipment Trust Obligation	..	2,054,000.00
Equipment Trust Obligations (The Chesapeake and Ohio R'y Co. of Ind.)	176,370.59	.....
Total	$20,776,370.59	$4,495,000.00
Net increase	$16,281,370.59	

The 5 per cent. First Consolidated Mortgage Bonds were issued and [illegible] the 6 per cent. Preferred Convertible Bonds, the 4½ per cent. General Mortgage Bonds were issued to the [illegible] of additional double [illegible] and to the Greenbrier and New River Railroad Company First Mortgage [illegible] per cent. Bonds and as collateral for [illegible] stock.

[illegible] bonds have been issued were sold to bankers on May 15, [illegible] were allotted pro rata from June 1, 1911, to June 1, 1914, the date of maturity, but are redeemable on any interest day upon sixty [illegible]. The funds realized from this sale were used to [illegible] your Company's treasury for capital expenditures theretofore [illegible] for such purposes, and will be applied [illegible] of the current year. At your special meeting [illegible] April 3, 1911, your Company was authorized to issue [illegible] First and Improvement Mortgage Bonds, maturing December 1, 1930, bearing interest not exceeding 5 per cent. [illegible] bonds have been issued.

[illegible] Company has acquired during the year additional shares of stock [illegible] Kanawha & Michigan Railway Company and of White Sulphur Springs, [illegible] Company, [illegible] at the Kanawha Bridge [illegible] bridge across the Kanawha River [illegible] West Virginia, and certain terminal properties, the bridge [illegible] connecting the lines between the lines of your Company and those of the Kanawha and Michigan Railway Company. $50,000 par amount of First Mortgage 4 per cent. Bonds of Coal River Railway Company and [illegible] per cent. Bonds of Raleigh and [illegible] Railway Company, which were in your Company's treasury, [illegible] $100,000 par amount of the [illegible].

[illegible] will be found on page 16, by reference [illegible] that expenditures and betterments were made to the [illegible] $4,826,755.01 was added to cost of road [illegible] $1,610,636.54 was added to equipment account during the year. A schedule [illegible] will be found on pages 17 and 18.

During the past two years your Company's expenditure of capital and its [illegible] for acquisition and improvement have been as follows:

Capital Obligations Issued or Assumed:	Par Value.	
General Mortgage 4½% Bonds	$3,342,000.00	
First Consolidated Mortgage 5% Bonds	2,000,000.00	
Convertible 4½% Debentures	31,390,000.00	
Three Year 4½% Collateral Trust Notes	16,000,000.00	
Coal River Railway Co. First Mortgage 4% Bonds	2,450,000.00	
Raleigh and Southwestern Railway Co. First Mortgage 4% Bonds	750,000.00	
Paint Creek Branch First Mortgage 4% Bonds	14,000.00	
	$55,946,000.00	
Realizing		$52,604,610.00
Less:		
Capital Obligations Paid:		
Peninsula Division Bonds maturing January 1, 1911	$2,000,000.00	
Greenbrier and New River Bonds redeemed February 1, 1911	339,000.00	
Equipment Trust Payments	4,086,000.00	
Through Sinking Funds:		
Greenbrier Railway Co. First Mortgage 4% Bonds	39,000.00	
Coal River Railway Co. First Mortgage 4% Bonds	29,000.00	
Big Sandy Railway Co. First Mortgage 4% Bonds	105,000.00	
	$6,598,000.00	
Costing		6,580,388.75
		$46,024,221.25
Acquisitions:		
Stocks of:		
The C. & O. Railway Co. of Indiana	$4,998,800.00	
The Hocking Valley Railway Co.	7,671,800.00	
The Kanawha & Michigan Railway Co.	4,027,100.00	
Kanawha Bridge and Terminal Co.	400,000.00	
The Levisa River R. R. Co. (of Va.)	50,000.00	
Levisa River R. R. Co. (of Ky.)	50,000.00	
White Sulphur Springs, Incorporated	477,600.00	
	$17,675,300.00	
Costing		$17,835,834.39
Bonds of:		
The C. & O. Railway Co. of Indiana First Mortgage	$5,279,000.00	
The C. & O. Railway Co. General Funding and Improvement Mortgage	6,787,000.00	
Paint Creek Branch First Mortgage	14,000.00	
Raleigh and Southwestern Railway Co. First Mortgage	186,000.00	
Coal River Railway Co. First Mortgage	140,000.00	
	$12,406,000.00	
Costing		11,788,602.09
Properties of:		
Coal River Railway Company	$2,304,359.88	
Raleigh and Southwestern Railway Company	816,562.42	
Costing		3,120,922.30
Additions and Betterments, The C. & O. R'y Co., costing	$8,965,062.95	
Additions and Betterments, The C. & O. R'y Co., of Indiana, in addition to those for which bonds have been acquired, costing	149,489.83	
		9,114,552.78
Equipment:		
Additional equipment acquired (less retirals)	$2,051,744.98	
Securities of Chesapeake and Ohio Equipment corporation, acquired at par:		
Stock	$1,350,000.00	
Notes (acquired in July, 1911, but included here because provided for in above increase in liabilities)	5,910,000.00	
	7,260,000.00	9,311,744.98
		$51,171,656.54

In connection with the expenditures for additions and betterments, attention is called to the following increases during the period in the facilities of your Company to care for increased traffic and in its gross earnings and service to the public:

	1911.	1909.	Increase.
Average miles operated	2,229.2	1,896.6	332.6
Second track mileage	[illegible]	[illegible]	[illegible]
Operating revenues	$32,583,411.24	$26,630,717.78	$5,952,693.46
Locomotives in service	780	672	108
Passenger train cars in service	342	306	36
Freight train and miscellaneous cars in service	42,868	35,198	7,670
Number of tons of freight carried one mile	6,082,682,596	5,095,552,874	987,129,722
Number of passengers carried one mile	253,262,253	217,694,041	35,568,212

GENERAL REMARKS.

The equipment inventory as of June 30, 1911, was as follows:

	C. & O. R'y Co.	C. & O. R'y Co.	C. & O. [illegible]	Increase
Locomotives owned	475	30	[illegible]	[illegible]
Locomotives leased under equipment trusts	250	5	255	60
Total	725	35	760	84
Passenger cars owned	309	3	312	46
Passenger train cars leased under equipment trusts	10		10	10
Total	319	23	342	36
Freight train and miscellaneous cars owned	18,113	285	18,398	133
Freight train cars leased under equipment trusts	23,805	665	24,470	4,575
Total	41,918	950	42,868	4,408

The changes during the year in the reserve for accrued depreciation of equipment are as follows:

Balance to credit of account June 30, 1910			$1,397,142.79
Amount credited during year ended June 30, 1911, by charges to—			
Operating expenses	$684,193.05		
Outside operations expenses	16,407.51	$700,600.56	
Charges to account for:			
Accrued depreciation on equipment retired during year—			
16 locomotives, 443 freight and work cars	$20,731.66		
Accrued depreciation on cars changed in class during year	1,560.16		
	$22,291.82		
Less:			
Adjustment account of cars replaced in service	414.64		
		21,877.18	
			678,723.38
Balance to credit of account June 30, 1911			$2,075,866.17

Extensions of 14.6 miles on Raleigh and Southwestern Railway, 11.2 miles on Coal River branch lines, 12.4 miles on Guyandotte Valley branch, and 11.5 miles on Buffalo Creek branch, are nearing completion. These extensions, some of which were referred to in the last annual report, are for the purpose of further development of timber and coal tonnage and will be in operation within a few months.

Second track referred to in last Annual Report as under construction was completed, as follows:

Walker to Elko	Richmond Division	15.8 miles
Korah to Westham	Richmond Division	3.0 miles
Gladstone to Riverville	Clifton Forge Division	3.0 miles
Fort Spring to Rockland	Hinton Division	2.1 miles
Riverton to South Portsmouth	Cincinnati Division	19.0 miles
Quick's Run to Robtown	Cincinnati Division	13.5 miles
Manchester to Crooked Creek	Cincinnati Division	3.3 miles
Carntown to Brent	Cincinnati Division	19.9 miles
		79.6 miles

Of the 67 miles of second track on the Cincinnati Division authorized in 1910, 12 miles were incomplete at the end of the fiscal year. Your Directors authorized the construction of 48 additional miles to make the double track on the Division complete, and the work is in active progress. It is expected that these uncompleted 60 miles will be in operation by December 31, 1911, as 30 miles have been finished since the close of the fiscal year.

The coal and coke tonnage of The Chesapeake and Ohio Railway Company, not including the Chesapeake and Ohio Railway of Indiana, was 15,725,031, an increase of 1.1 per cent.; other freight tonnage was 7,632,862, an increase of 4 per cent. The total tonnage was 23,357,893 tons, an increase of 2 per cent. Freight train mileage was 8,563,553 miles, a decrease of 2 per cent. Freight revenue was $24,395,288.09, a decrease of $505,911.68, or 2 per cent. The revenue ton miles were 5,852,506,320, a decrease of 4.4 per cent. The ton mile revenue was 4.17 mills, an increase of 2.5 per cent. Revenue per freight train mile was $2.849, same as last year. The revenue tonnage per train mile was 683 tons, a decrease of 2.6 per cent.; including Company's freight, the tonnage per train mile was 717 tons, a decrease of 2.2 per cent. The tonnage per locomotive, including Company's freight, was 648 tons, an increase of 1.3 per cent. The average revenue tonnage per loaded car was 29.6 tons, a decrease of 3.3 per cent. The number of tons of revenue freight carried one mile per mile of road was 3,009,620, a decrease of 4.8 per cent.

There were 5,272,931 passengers carried by The Chesapeake and Ohio Railway Company, not including the Chesapeake and Ohio Railway of Indiana, an increase of 6.1 per cent. The number carried one mile was 237,239,519, an increase of 4.6 per cent. Passenger revenue was $5,255,364.82, an increase of 5.1 per cent. Revenue per passenger per mile was 2.215 cents, an increase of 0.4 per cent. Number of passengers carried one mile per mile of road was 121,999, an increase of 4.2 per cent. Passenger train mileage was 4,430,362, an increase of 3.6 per cent. Passenger revenue per train mile was $1.186, an increase of 1.4 per cent.; including mail and express it was $1.379, an increase of 1.5 per cent.; passenger service train revenue per train mile was $1.418, an increase of 0.9 per cent.

There were 20,110 tons of new rails (6,194 tons 100-lb. and 13,916 tons 85 and 90-lb.), equal to 140 track miles, used in the renewal of existing main tracks.

At the close of the fiscal year first and second main tracks of both lines (not including trackage rights), were laid with steel rails, as follows:

100-lb	769.5 miles	Inc. 82.6 miles
90-lb	181.9 miles	Inc. 88.8 miles
85-lb	537.4 miles	Inc. 50.7 miles
80-75-70-lb	762.2 miles	Inc. 162.9 miles
62-56-50-lb (Branch Lines)	186.8 miles	Dec. 26.3 miles
	2437.8 miles	Inc. 358.7 miles

Track ballasted with stone or its equivalent, June 30, 1911, [illegible] miles

Ballast (principally stone) used in maintenance during year, on both lines 457,558 yards

Ballast used in construction work during year, on both lines 537,300 yards

Ties used in maintenance during year, on both lines 1,087,254

Ties used in construction work during year, on both lines 503,541

The average amount expended for repairs per locomotive operated by The Chesapeake and Ohio Railway Company was $2,394.79; per passenger train car $822.66; per freight train car $62.46.

January 1, 1911, Mr. C. C. Walker was promoted to position of Assistant General Manager; Mr. E. P. Goodwin to General Superintendent Transportation; Mr. J. R. Cary to General Superintendent West Virginia General Division; and Mr. J. B. Harris and Mr. H. H. Morris to Superintendents of Hinton and Huntington Divisions, respectively.

Appreciative acknowledgment is hereby made of efficient services during the year of officers and employees.

By order of the Board of Directors.

FRANK TRUMBULL, Chairman.

GEO. W. STEVENS, President.

THE CHESAPEAKE AND OHIO RAILWAY COMPANY.

(Including The Chesapeake and Ohio R'y of Indiana.)

TRAFFIC STATISTICS

TABLE I.

FREIGHT.	Year ended June 30, 1911.	Year ended June 30, 1910.	Comparison with June 30, 1910. Increase or Decrease.	Per Cent.
Average mileage operated	1,944.6	1,938.9	I. 7.7	0.4
Freight revenue	$24,295,288.09	$24,901,199.77	D. $505,911.68	2.0
Per cent. of gross revenue	78.6	79.7	D. 1.1	1.4
Revenue coal and coke carried	15,725,053	15,549,977	I. 175,054	1.1
Other revenue freight carried	7,632,862	7,342,252	I. 290,610	4.0
Number of revenue tons carried	23,357,843	22,892,229	I. 465,664	2.0
Number of revenue tons carried one mile	5,852,506,320	6,123,134,875	D. 270,628,555	4.4
Average miles each revenue ton was carried	251	267	D. 16	6.0
Number of revenue tons carried per mile of road	12,061	11,819	I. 193	1.6
Number of revenue tons carried one mile per mile of road	3,009,620	3,161,307	D. 151,687	4.8
Freight revenue per mile of road	$12,545.14	$12,856.21	D. $311.07	2.4
Average revenue per revenue ton	$1.04 4	$1.08.8	D. $0.04.4	4.0
Average revenue per ton per mile	3	3.16	I. .06	1.9
Average revenue of freight other than coal per mile (mills)	6.49	6.50	D. .01	0.2
Average revenue per mile from all revenue freight (mills)	4.17	4.07	I. .10	2.5
Average revenue tons per loaded car	29.6	30.6	D. 1.0	3.3
Average train load	683	701	D. 18	2.6
Average train load, including Company's freight	717	733	D. 16	2.2
Average revenue tons per locomotive	645	640	I. 5	0.8
Average tons per locomotive, including Company's freight	645	640	I. 8	1.3
Average number of loaded cars per eastbound freight train	24.4	25.2	D. .8	3.2
Average number of empty cars per eastbound freight train	13	11.9	I. 1.9	16.0
Average number of loaded cars per westbound freight train	21.8	20.6	I. 1.2	5.8
Average number of empty cars per westbound freight train	15	16.4	D. 1.7	10.4
Average number of loaded cars in train	23.1	22.9	I. .2	0.9
Average number of empty cars in train	14.2	14.1	I. .1	0.8
Total cars per freight train	37	37	I. .3	0.8
Miles run by freight trains	8,739,022	8,739,022	D. 175,469	2.0
Miles run by switch and construction trains	5,096,767	5,096,767	D. 12,254	0.2
Freight car mileage	111,000,000	111,000,000	D. 1,000,000	0.9
Locomotive mileage	17,000,000	17,000,000	D. 100,000	0.6
Freight train mileage	12,000,000	12,000,000	D. 108	0.9
Freight train mileage per mile of road	6,000	6,000		
Freight car mileage per freight train mile	95,000,000	95,000,201.07	I. $253,159.75	5.1
Freight car mileage per locomotive mile	15.6	15.6		
Freight car mileage per mile of road	57,000	57,000		
Freight train mileage per locomotive mile	1.4	1.4		
Freight train mileage per mile of road	6,000	6,000		
Locomotive mileage per mile of road	3,800	3,800		
Freight car mileage per freight train mile	68	68		
Freight car mileage per locomotive mile	10.6	10.6		
Freight car mileage per mile of road	57,000	57,000		
Freight train mileage per locomotive mile	1.4	1.4		
Freight train mileage per mile of road	6,000	6,000		
Locomotive mileage per mile of road	3,800	3,800		
Freight car mileage per freight train mile	68	68		
Freight car mileage per locomotive mile	10.6	10.6		

PASSENGER.	Year ended June 30, 1911.	Year ended June 30, 1910.	Comparison with June 30, 1910. Increase or Decrease.	Per Cent.
Number of passengers carried one mile per mile of road	121,999	117,051	I. 4,948	4.2
Passenger revenue per mile of road	$2,702.54	$2,582.58	I. $119.96	4.6
Average revenue from each passenger	$1.00	$1.01	D. $0.01	1.0
Average revenue per passenger per mile (cents)	2.215	2.206	I. .009	0.4
Average number of passengers per train mile	54	53	I. 1	1.9
Passenger train mileage	4,430,362	4,276,193	I. 154,169	3.6
Passenger car mileage	22,492,893	21,303,880	I. 1,189,013	5.6
Passenger train mileage per mile of road	2,278	2,207	I. 71	3.2
Passenger revenue per train mile	$1.186	$1.170	I. $.016	1.4
Revenue per passenger train mile, including mail and express	$1.379	$1.359	I. $.020	1.5
Revenue per passenger service train mile	$1.418	$1.405	I. $.013	0.9

TABLE II.

FREIGHT.	Chesapeake & Ohio R'y of Indiana. Year ended June 30, 1911.	Chesapeake & Ohio Lines. Year ended June 30, 1911.
Average mileage operated	284.6	2,229.2
Freight revenue	$1,194,738.74	$25,590,026.83
Per cent. of gross revenue	77.9	78.5
Revenue coal and coke carried (tons)	372,919	16,097,950
Other revenue freight carried (tons)	873,836	8,506,700
Number of revenue tons carried, total	1,246,757	24,604,650
Number of revenue tons carried one mile	230,176,276	6,082,682,596
Average miles each revenue ton was carried	185	247
Number of revenue tons carried per mile of road	4,381	11,037
Number of revenue tons carried one mile per mile of road	808,771	2,728,625
Freight revenue per mile of road	$4,197.96	$11,476.46
Average revenue per revenue ton	$0.95.8	$1.04.0
Average revenue per ton of revenue coal per mile (mills)	3.49	3.22
Average revenue per ton of revenue freight other than coal per mile (mills)	5.96	6.45
Average revenue per ton per mile from all revenue freight (mills)	5.19	4.21
Average number of revenue tons per loaded car	21.9	29.2
Average revenue train load (tons)	325	656
Average train load, including Company's freight (tons)	347	689
Average number tons per locomotive	289	592
Average tons per locomotive, including Company's freight	309	621
Average number of loaded cars per eastbound freight train	13.2	23.5
Average number of empty cars per eastbound freight train	8.9	13.4
Average number of loaded cars per westbound freight train	16.5	21.4
Average number of empty cars per westbound freight train	5.1	14.0
Average number of loaded cars in train	14.8	22.5
Average number of empty cars in train	7.0	13.7
Total cars per freight train	21.8	36.2
Miles run by freight trains	708,127	9,271,680
Miles run by switch and construction trains	284,693	5,369,136
Freight car mileage	15,166,533	335,288,264
Locomotive mileage	10,805,714	208,221,197
Train mileage	4,955,309	127,067,067
Freight train mileage per mile of road	2,488	4,159
Freight revenue per freight train mile	$1.68.7	$2.76.0

TABLE III.

PASSENGER.	Chesapeake & Ohio R'y of Indiana. Year ended June 30, 1911.	Chesapeake & Ohio Lines. Year ended June 30, 1911.
Number of passengers carried one mile per mile of road	384.6	2,429.1
Passenger revenue per mile of road	$1,082.61	$5,512,931.94
Per cent. of gross revenue	6.8	16.9
Passenger revenue per train mile	$1,150.72	$6,808,818.16
Passenger revenue per locomotive mile	1.1.820	5,618,791
Number of passengers carried one mile	16,0 1,134	33,6 1,083
Average miles each passenger was carried	46.33	13.07
Number of passengers carried per mile of road	1,811	2,971
Number of passengers carried one mile per mile of road	16,39	113,611
Passenger train mileage	1,000,01	$2,473.05
Passenger car mileage	$ .1	$ .98
Passenger train mileage per mile of road	1,08	2,477
Average number of passengers per train mile	36	52
Passenger car mileage per locomotive mile	1,1	4,877,145
Passenger train mileage per locomotive mile	1,1 .47	24,280,440
Passenger train mileage per mile of road	3,0	2,488
Passenger revenue per passenger train mile	$ .6	$1.130
Passenger revenue per passenger service train mile	$ .00	$1.317
Passenger revenue per passenger car mile	$ .715	$1.353

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LONDON: Queen Anne's Chambers, Westminster.

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L. B. Sherman, *Vice-President.* Henry Lee, *Sec'y & Treas.*

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THE merits of the government suit against the United States Steel Corporation involve such complex questions that certainly the judges of the Supreme Court are the only authorities competent to decide them. This refers only to the merits of the case as such. The act of the government in instituting the suit is another question. In discussing whether or not the Taft administration was "right" in bringing the suit, one must clearly distinguish between *legally* right and *economically* right. From the first standpoint, the government in its petition has made out a case which is at least a strong enough argument that the Steel Corporation may be a combination in restraint of trade, under the meaning of the Sherman law, to merit its review by a court. Also, and still from a legal viewpoint, President Taft is but doing his sworn duty in trying to enforce the law. Economically, however, the existence of the Sherman law, has, to say the least, never been justified. The government's petition does not even make a tryable case on the merits of whether or not the existence of the steel corporation is doing harm to the interests of the country as a whole, and if President Taft is to attempt to justify his action by trying to show that the suit is brought in the best interests of the country, we cannot see how he can succeed. It seems so obvious that even from a purely legal standpoint it would have been of greater advantage to have waited until the courts had finally passed on the reorganization plans of the Standard Oil Company and the American Tobacco Company before filing a petition seeking to break up the Steel Corporation, that one is driven to look for some ulterior motive for bringing the suit at this particular time. Surely, in passing on the reorganization of the Standard Oil Company and of the American Tobacco Company, the courts will give at some length their interpretation of what is meant by monopoly and by competition; interpretation which would be of value to the government in drawing up a petition against the Steel Corporation. It does not really terminate any business uncertainty to bring a suit at this time against the Steel Corporation; the suit will drag on for a couple of years at best. It does seem clear that the only interest that can particularly benefit by a suit brought now is the interest of the present administration and of the Republican party. By bringing the suit just at this time the administration lays itself open to the charge of playing politics.

IN a suit arising on the Southern Railway in Alabama, the United States Supreme Court, on Monday last, unanimously sustained the federal safety appliance laws as applying to all cars and vehicles used on an interstate line. The decision was by Judge Van Devanter. The road was prosecuted for using a defective coupler, and the defense was that the car was not being used in interstate traffic and therefore was not subject to the federal law. Judge Van Devanter holds that the safety appliance acts apply to all equipment on a highway of interstate commerce, without regard to whether the car, at the time of the occurrence on which the suit was based, was or was not carrying interstate commerce. This decision is the unanimous opinion of the court. In his decision Judge Van Devanter says:

> The several trains on the same railway are not independent in point of movement and safety, but are interdependent, for whatever brings delay or disaster to one, or results in disabling one of its operatives, is calculated to impede the progress and imperil the safety of other trains. And so the absence of appropriate safety appliances from any part of any train is a menace, not only to that train but to others. . . . The power of Congress to regulate interstate commerce is plenary and may be exerted to secure the safety of the persons and property transported therein and of those who are employed in such transportation, no matter what may be the source of the dangers which threaten it.

This attitude was plainly foreshadowed by Chief Justice Fuller's decision in the Johnson case in 1904, and in other decisions. A defective coupler or air brake, or even a loose door, or a single loose nut, on any car, may endanger lives on an interstate passenger train, especially on a double-track railway for the derailment of a freight may wreck a passenger train. Moreover, the principle that the lesser must yield to the greater justifies *general rules* regarding safety ap-

pliances; and infractions of a rule must be penalized even if a particular infraction be proved wholly harmless. Take, for example, the proposed federal block system law; the block signals would often, perhaps for a whole day, protect only trains doing intrastate business; but if the system is required for a part of the trains of a line there is good reason for requiring it to be maintained continuously, instead of intermittently, in order to insure its efficiency and to prevent lapses from good discipline. The decision seems to mean that the Federal government is the only authority that can regulate the physical equipment of a railway; it also implies that the Federal government is the only authority that can, in the interests of safety and social welfare, regulate relations between railways handling interstate business and employees. "Cars are seldom set apart for exclusive use in moving either class of traffic," said Judge Van Devanter, "but generally are used interchangeably in moving both, and the situation is much the same with trainmen, switchmen and like employees; for they usually, if not necessarily, have to do with both classes of traffic." The reference to employees is *obiter dicta*, but it shows plainly how the court's mind was working. It seems plain that under this decision every state law which conflicts with the Federal safety appliance law is invalid, if, indeed, every state law which regulates safety appliances at all is not by the decision rendered invalid. The court, reasoning along the same line, must necessarily hold that any state regulation of rates which conflicts with Federal regulation of them is an unconstitutional interference with interstate commerce. It does not, however, necessarily follow that the court will hold that state regulation which does not necessarily interfere with interstate commerce is unconstitutional, although certainly the decision looks that way. As Commissioner Lane indicated in an interview regarding this decision which he gave the press, states in some cases have so regulated rates as to raise what amounts to protective tariff walls at their boundaries. Now, this method of making rates may not directly interfere with interstate rates, and yet it may seriously, although indirectly, interfere with interstate commerce. Of course, the only way that this kind of indirect state interference with interstate commerce can be stopped is by entirely abolishing state regulation of interstate carriers. It looks very much as if this is the result which the decisions of the Federal courts ultimately are going to bring about.

THE PARCELS POST.

THE parcels post question will be before Congress this winter in a more acute form than heretofore. The senate committee on post offices and post roads, of which Senator Jonathan Bourne, Jr., of Oregon, is chairman, already has sent out blanks to the express companies and other interested concerns seeking information which will be amplified later at public hearings. The subject has never yet been fully discussed on its merits. The arguments advanced for parcels post legislation have been superficial and inconclusive. It is to be hoped that the investigations now being made and the later public hearings will bring out the facts and the arguments which really tell both for and against the project. If they do not the proposed legislation will be passed [illegible]. The facts are that unless it is thoroughly discussed it will be passed in such form that it will lead to [illegible].

[illegible] second arguments for creating a parcels post. It would be a great convenience to the farmers of the country to be able to mail their orders to the large mail order houses and have packages weighing up to 11 lbs. delivered at their doors by rural free delivery. There are many outlying districts of cities and towns to which the express companies do not make delivery, and a parcels post would be a great convenience to these people. The express companies by failing to extend their delivery service have helped to create the parcels post sentiment. Perhaps the returns from extension of it would not have equaled the cost, but they have not made any [illegible] the statement that failure to do so has made advocates of a parcels post. Again, it is undoubtedly true that if the government should make a flat rate for the transportation of parcels, regardless of distance, those sending them long distances at least would get them carried at a lower cost than they do now by express. The service rendered by the government would very probably, as we shall see, cost it more than the recipient would pay for it. But this fact probably would not make so deep an impression on the person who received the service as it would on the minds of the taxpayers who had to meet the resulting deficit, if the facts could be brought forcibly home to them.

Several arguments are advanced for parcels post legislation which are either not pertinent or not valid. It is said, for example, that the government should render a parcels post service generally because under agreements with foreign countries it handles in the mails parcels which are imported or exported. If a general parcels post would not be a good thing it is no argument for it to say that there already has been made the mistake of handling parcels between this and foreign countries.

That parcels posts are conducted by foreign governments is another argument advanced for establishing one here. But the conditions here and abroad are so different that this alone proves nothing. In European countries density of population is great and area is small. Therefore, the average distances that goods of all kinds are shipped are much less than here. The average length of haul of freight on the railways of the United Kingdom is estimated at 25 miles. In France it is 80 miles, and in Germany 85 miles. On the other hand, in the United States the area is great and the density of population is small. In consequence the average haul of freight is 251 miles, and the average haul per parcel would doubtless be as much greater in proportion here than abroad as the average haul of freight is greater. It is proposed to fix a flat rate for carrying parcels for all distances. Now, obviously, the average cost of handling each parcel would be greater in the United States than abroad. The cost of collection and delivery at terminals might be the same, but, as the average distance that parcels would be hauled would be from three to ten times what it is in Europe, the expense of transportation would be much greater. Therefore, parcels may be carried in foreign countries for a flat rate that would cause heavy loss to the postal department of the United States.

It follows, then, that if the proposed parcels post is to earn its expenses of operation its rate would have to be much higher than is necessary in smaller and more populous countries. But if the rate should be fixed high it would discourage the sending of parcels for short distances, and if the government did not get the short haul traffic, the cost of handling which would be relatively small, its loss from the business in the aggregate might be, and probably would be, even greater than if it made the average rate low enough to get both short haul and long haul business. Conditions in the United States are such that it may be predicted with much assurance that if a parcels post with a flat rate for the carrying of parcels for all distances and for all weights up to 11 lbs. be established it will be operated at a heavy loss to the government no matter what the rate may be.

These losses will have to be made good by taxation. To levy taxes in order that certain classes of the community may get transportation of parcels for less than cost is equivalent to levying taxes and paying a cash subsidy to these classes equal to the difference between what the transportation rendered for them costs and what they pay for it.

Whom would the proposed subsidy benefit? The chief pecuniary backers of the movement for a parcels post are the large mail order houses. They must anticipate, and no doubt correctly, that they will be its main beneficiaries. They expect that the effect of the legislation will be to so reduce the cost of shipping their goods as to give them an advantage over the jobbers who sell to the retail merchants and over the retail merchants who sell to the consumer. The consumers of the

goods that the mail order houses sell will also be benefited by being enabled to get their goods somewhat more cheaply than they could get them from the retail merchants. The advantage of the legislation would be divided mainly between the mail order houses and their customers, and the taxpayers as a whole would be disadvantaged by having to make up the deficit from the operation of the service, and the jobbers and retail merchants by being undersold by the mail order houses.

One argument that has been used against a parcels post is that it would injure the country towns. The advocates of it have controverted this. But one of two things is true: Either the parcels post would not handle a large amount of business, in which case it would be a failure, or it would handle a large business, in which case it would divert business from the jobber and the country merchant to the mail order houses. The country store is the industrial heart of most country towns. Whatever tended seriously to injure its business would affect every other part of the community. For example, it would materially reduce the amount of advertising that the stores would give the country newspapers; and the prosperous country newspaper is an institution of very great importance to the intellectual and moral welfare of the rural communities and of the nation as a whole. The undermining of the country town would make its stores, its churches and its theaters less of a gathering place for the people of the surrounding country and, to a greater or less extent, destroy the community feeling. Whatever destroys community feeling will make the country town and the farm less attractive and cause further concentration of population in large cities. These developments would not be in the interest of the social welfare.

It has been suggested that a parcels post, by giving the rural free delivery service more business, would increase postal earnings on rural routes without increasing expenses. The rural carriers could handle much more matter than they do now without any addition to their numbers, their salaries or, perhaps, their facilities. This is a good argument for establishing parcels posts on rural delivery routes—that is, to carry parcels between the towns and the farms. It is not a valid argument for establishing a parcels post that would carry goods between all points in the country. A post which carried goods merely between the towns and the farms would not hurt the jobbers and the country towns and might earn more than it would cost. If, however, such a post were created it probably would increase rather than reduce the demand for the establishment of a general parcels post.

One point to which adequate consideration has not been given is that the establishment of a general parcels post would interfere with or increase the cost of the proper handling of the mails The postal service was created for the transmission of written correspondence and printed matter. The speedy movement of such matter in a country so large as this is of such importance that, except on great consideration, nothing should be done that may interfere with it. The success that has been attained in the handling of the mails in the United States has been largely due to the use of post office cars for its distribution en route and to the receiving and delivery of light mail pouches at high speed. It is a common practice for trains to pick up and drop pouches while running 50 to 60 miles an hour. Mail bags filled with heavy packages can never be picked up or dropped at such speeds. Consequently, either the handling of the first and second class mail would have to be slowed up or these classes of mail would have to be sent not only in different cars but in different trains from parcels. If the first alternative were adopted the efficiency of the mail service would be reduced; if the second, the cost of the mail service would be increased.

It is an interesting and important question as to what effect the establishment of a parcels post would have on the express companies and railways. As already indicated, if a relatively high flat rate were established it would attract the long haul business from the express companies, but not the short haul business. But the express companies make their profit from the long haul business. It is doubtful, therefore, if they would or could long compete against a parcels post. If not, the parcel business would be speedily transferred from express to mail cars. The revenue *per ton mile* the railways get for hauling mail is greater than for hauling express; but their mail revenue *per car foot mile* is less, because under regulations of the Post Office Department they cannot load nearly as many tons of mail as of express per car. Consequently, if parcels were transferred to the mails, and mail loading per car and rates for handling the mails remained unchanged, the railways would get less revenue in proportion than they now get from handling express and mail. On the other hand, if the transfer of parcels to the mail cars led to a heavier mail loading per car the result might be an increase in railway revenues. In view of recent experience with the Post Office Department, however, it does not seem probable that if loading per car were increased mail rates would remain unchanged if the department had its way. As we have seen, it is most unlikely that any flat parcel rate could be fixed which would be remunerative. Confronted with a deficit from the parcels post business, the department would be apt to demand wholesale reductions in railway mail pay rates; and, if we may judge by the experience of the last four or five years, unless some new method of fixing mail rates were adopted the reductions demanded by the department would come and would be so drastic as to make the revenues of the roads from the transportation of mail—including parcels—less in proportion than they are now from mail and express. The department under the administration of Postmaster-Generals Cortelyou, Meyer and Hitchcock has been as unfair and arbitrary in dealing with the railway mail pay as the most accomplished and irresponsible of Russian bureaucrats could have been. They have tried to make records for efficiency, which is very commendable, but their efforts to make them at the minimum cost to those having the maximum political influence and at the maximum cost to those having the minimum political influence are not so commendable. It is very popular to attack the railways. Consequently, their mail compensation was the first point of attack in the department's efficiency campaign; and the investigation of the mail pay committee of the railways indicated that, however the case may have been before the reductions in mail pay in 1907, the mail compensation since they were made is smaller in proportion than the receipts from any other railway traffic whatever.

While railway men as citizens have the same right as other citizens to have and to voice their opinions on the parcels post question, as officers of the railways they have, of course, no right in their premises except to demand and use every proper means to obtain for the roads reasonable compensation for the services they render or may be required to render. It is quite probable that if the railways did oppose parcels post legislation they would simply increase the chances of its passage. On the other hand, it is hard to see how any reasonable man could object to their insisting that if any such legislation be passed it shall provide for the adjustment of railway mail pay on an equitable basis.

The government's attitude at present is inconsistent and unfair. It has established the Interstate Commerce Commission to arbitrate differences between shippers and travelers and railways regarding the reasonableness of freight and passenger rates; but it has made no similar provision for the investigation and determination of the reasonableness of the mail rates that the government itself pays. Congress fixes part of the rates by its fiat; the Postmaster-General fixes the rest according to his arbitrary will. The government is simply a big shipper that, under this arrangement, fixes its own rates; and, like other big shippers powerful enough to dictate to railways, it has been fixing them without proper regard to the rights and interests either of the railways or of others that they serve. Whether parcels post legislation is or is not passed—and especially if it is passed—there ought to be a thorough scientific investigation of

the entire subject of mail compensation by some impartial and expert body.

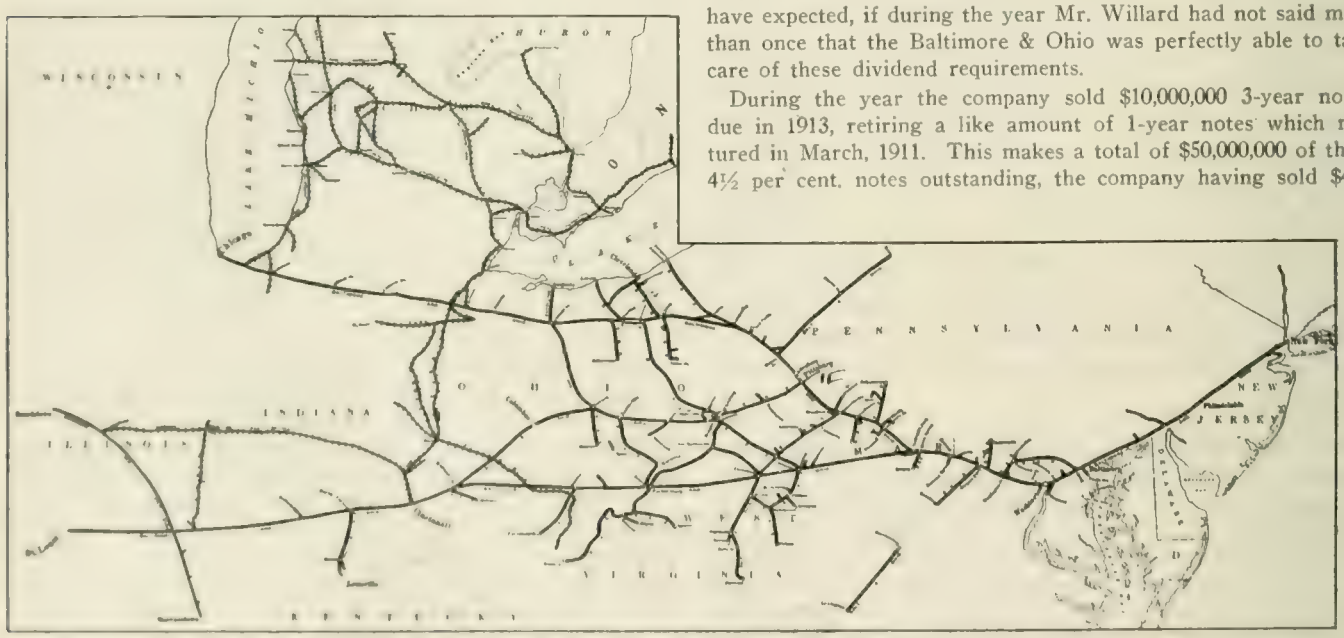
As already indicated, the mail pay committee of the railways found that the compensation of railways for handling the mails is, on the present basis, unremunerative. On the other hand, Postmaster-General Hitchcock has announced that the Post Office Department's analysis of the figures collected by it indicates that the mail rates can be further reduced and yet yield a profit to the roads. In such circumstances the need for a study of the question by a body able to command public confidence and competent to arrive at just conclusions seems manifest. The investigation might very properly relate not only to the question of what is reasonable compensation for the railways now, but also to what would be reasonable compensation for them for handling both mail and parcels, and to what effect on the total earnings and expenses of the Post Office Department the establishment of a parcels post would have if the mail pay of the railways were put and kept on a reasonable basis. To establish a parcels post without such investigation would be to take a plunge in the dark, the result of which to the railways, to the taxpayers and to all who are concerned would be entirely a matter of conjecture; and there is too much government by conjecture in the United States already.

BALTIMORE & OHIO.

IT takes unusual courage, and a firm belief in a railway property's earning power, to go ahead with extensive and very expensive improvements at a time when operating costs are rapidly increasing and the prospects of a prosperous business expansion are bad. Nearly three years ago, when Mr. Willard came to the Baltimore & Ohio, it was decided that the property needed a great number of additional facilities, and the subsequent story of the Baltimore & Ohio has been one of improvement and betterment regardless of business uncertainties that might well have made a less pure management hesitate. In the year ended June 30, 1910, the programme was only begun. In that year $[illegible] was spent for "new construction", all of this new construction being improvement to the existing property, the addition of second track, etc. In 1911 the Baltimore & Ohio spent $[illegible] additions and betterments, and spent $15,430,000 for new equipment, retiring equipment with a book value of $[illegible]. Details of the new construction work are given in our Construction News columns. Certain developments, however, are of especial interest. For instance, 130 miles of new sidings were built in 1911, as compared with 47 miles built in 1910 and 47 miles built in 1909. Automatic block signals have been put in on 105 additional miles of main double track. The company is at work on a 4,000-ft. double track tunnel through the Allegheny mountains between Sand Patch and Manila, and it is estimated that this work will be done by about January, 1913. Of all of the extensive improvements President Willard in his annual report says: "It is proper to state that as yet little benefit has been realized from the use of the additional capital, but with the completion of the additions and betterments the road will not only be in a position to care for a very largely increased business but will also be enabled to handle more effectively and economically the present volume of traffic." And in addition to not as yet benefiting by the improvements that are under way, the cost of conducting transportation is increased because of the betterment work going on under traffic.

In the fiscal year ended June 30, 1911, the tonnage of freight carried by the Baltimore & Ohio amounted to 60,548,000, a decrease of 3.58 per cent., and freight revenue decreased by 2.56 per cent., the main losses in tonnage being in coke, ores, lumber and iron products, due to less active general business. Notwithstanding this loss in freight revenue and a seriously large increase in the cost of conducting transportation, the company was able to earn a net operating income, after the payment of taxes, of $22,634,000. This compares with $24,498,000 earned in 1910. After the payment of interest, rentals and other fixed charges, the company had $12,820,000 available for dividends, and the 4 per cent. dividends on the preferred stock and 6 per cent. on the common stock called for $11,476,000, leaving a surplus of $1,344,000. This is a good deal better showing than one might have expected, if during the year Mr. Willard had not said more than once that the Baltimore & Ohio was perfectly able to take care of these dividend requirements.

During the year the company sold $10,000,000 3-year notes, due in 1913, retiring a like amount of 1-year notes which matured in March, 1911. This makes a total of $50,000,000 of these 4½ per cent. notes outstanding, the company having sold $40,000,000 the year before. There was a reduction of $4,217,000 in cash on hand, leaving at the end of 1911 $7,539,000 cash; and a reduction during the year of $20,879,000 in loans and bills receivable, leaving $18,751,000 loans and bills receivable at the end of 1911. These reductions in working assets were due, of course, to the expenditures for additions and betterments and new equipment paid for during the year. The $10,000,000 1-year notes which matured in March last, referred to above, were carried as a working liability, while the 3-year notes which were sold to provide for their retirement are carried as a capital liability; so that total working liabilities are less—by $10,335,000—at the end of 1911 than they were at the end of 1910 and amount to $9,774,000. It is proper to point out in discussing the company's financial position that it has free in its treasury $28,000,000 Baltimore & Ohio Chicago Terminal first mortgage bonds,



Baltimore & Ohio and Cincinnati, Hamilton & Dayton.

in addition to stocks and bonds of other companies, of which the stocks have a total par value of $59,922,000, carried at a book value of $32,675,000, and the bonds, including the Baltimore Ohio Terminal mentioned above, a par value of $38,074,000, carried at a book value of $33,986,000.

Sixty-five per cent. of the Baltimore & Ohio's total tonnage is furnished by products of mines, and the greater part of this is bituminous coal. Of the total 60,548,000 tons of revenue freight carried in 1911, 27,297,000 tons were bituminous coal. Naturally the Baltimore & Ohio gets a low ton mile rate, its average earnings per ton per mile on soft coal being 4.11 mills, while the average revenue on other commodities per ton per mile is 7.26 mills, making the average for all traffic 5.78 mills. There is a very interesting comparative statement of freight and passenger movement from 1888 to 1911 which shows, among other things, that the average rate per ton per mile has steadily decreased from 1888, when it was 6.56 mills to 5.78 mills in 1911. The average haul during these years has fluctuated from year to year, but has shown no definite movement either way. In 1888 it was 195 miles; in 1895 it was 154 miles; in 1901 it was 213 miles; in 1911, 193 miles.

The average rate per passenger per mile was 1.861 cents in 1888; it got as high as 2.016 cents in 1906, and was 1.911 cents in 1911. The average distance each passenger traveled varied from year to year without any marked tendency in either direction. The average journey in 1888 was 32 miles and in 1911 it was 36 miles. Freight density on the B. & O. is very heavy. The tons one mile per mile of road in 1911 totaled 2,640,000; the passengers carried one mile per mile of road totaled 180,000 in 1911.

The large increase in cost of conducting transportation in 1911 as compared with 1910 amounted to $3,080,000, making the total cost of transportation $32,818,000. This is very largely accounted for by increases in the cost of labor. For instance, station employees cost $3,886,000, an increase of $307,000 over 1910; yard conductors and their brakemen, $2,341,000, an increase of $301,000; road enginemen, $4,952,000, an increase of $514,000; and so on. To partly offset this increase in transportation expenses, there is a decrease of $1,382,000 in the cost of maintenance of way and structures, the cost in 1911 being $10,280,000. This decrease in maintenance of way cost was made possible by the very liberal expenditures that have been made in the past on upkeep and on betterment.

There was also a decrease in the cost of maintenance of equipment. The decrease amounted to $492,000, the total cost of maintenance of equipment in 1911 being $15,882,000. It will be recalled that last year the management, after a thorough appraisal of their equipment, charged off over $8,000,000 as the difference between the appraisal value and the book value of equipment. In 1911, $623,000 was charged for depreciation of steam locomotives, an increase of $122,000 over the charge for depreciation in 1910; and $1,518,000 was charged for depreciation of freight train cars, an increase of $227,000 over 1910. This is very decidedly a step in the right direction, for if an account for depreciation is to be set up and a charge made, it ought to be one that is figured on an actual basis of the rate at which equipment is becoming worn out and should not be varied accordingly as the company desires to make a good showing under adverse conditions. The charges made in the past for depreciation by the Baltimore & Ohio were probably not adequate. The wisdom of the new policy in regard to equipment is shown by a decrease of $712,000 in the cost of repair of freight train cars despite higher labor costs, the total in 1911 for this account being $5,250,000. During the year 187 locomotives, 8,272 freight cars and 26 passenger cars were added to the company's rolling stock, while 37 locomotives, 10 passenger cars, 3,202 freight cars and 335 work cars were condemned, destroyed or sold; and in addition, the Baltimore & Ohio Equipment Company received 177 new locomotives and 8,000 new freight cars which the Baltimore & Ohio rents.

The following table compares the principal figures of operation for the Baltimore & Ohio in 1911 and 1910:

	1911.	1910.
Mileage operated	4,434	4,434
Freight revenue	$67,629,937	$69,408,113
Passenger revenue	15,208,432	14,485,585
Total operating revenue	88,145,004	88,901,252
Maint. of way and structures	10,279,616	11,661,410
Maint. of equipment	15,881,620	16,373,776
Traffic	1,948,966	1,877,204
Transportation	32,818,500	29,738,992
Total operating expenses	62,766,067	61,333,801
Taxes	2,596,250	2,469,964
Net operating income	22,634,375	24,497,854
Gross corporate income	27,530,973	28,715,752
Net corporate income	12,819,991	16,247,587
Additions and betterments through income	.....	415,761
Dividends	11,476,145	11,474,213
Surplus	1,343,846	4,357,614

WABASH.

MR. DELANO, in a thoughtful, frank statement, in the annual report, discussing the management of the Wabash Railroad, says: "Speaking in general terms of the company's present condition and future prospects, it is gratifying to point out that it has reached an earning capacity of practically $30,000,000 gross, or approximately $12,000 per mile, being about double the figure 12 years ago, and this has been accomplished with only a moderate increase in facilities . . . Every investigation of Wabash conditions—and there have been many, both by interested and disinterested parties—confirms the statement that the property as it stands has been well maintained, but that it might, if cash were available for needed betterments and improvements, greatly increase its earning capacity and decrease its operating ratio. The Wabash, with its short lines between St. Louis and Kansas City, St. Louis and Omaha, St. Louis and Chicago, St. Louis and Detroit, Chicago and Detroit, Chicago and Toledo, and Kansas City and Detroit, lags behind its competitors both in volume of business and in cost of doing it because it has not the adequate facilities. The difficulty is a financial one and has been beyond the power of the management to remedy."

It is first of interest to see whether railway investors and owners of railway securities agree with Mr. Delano in his estimation of the intrinsic value of the property. Taking the market price of Wabash securities that are quoted on the New York Stock Exchange as of Friday, October 20, and adding thereto the par value of equipment trust certificates and minor obligations which are not quoted on the Stock Exchange and which latter only total $300,000, we find that the total market value of the Wabash is about $115,350,000. This compares roughly with a book value of $209,470,000, as carried on the balance sheet of the company itself.*

In the fiscal year ended June 30, 1911, the Wabash earned $4,450,000 net revenue applicable to interest. This is 3.87 per cent. on the market value of the property; in other words, the market value of the property is very considerably higher than the earnings in 1911 available for interest payment would in themselves justify. This, at a time when standard railway securities are not quoted at high prices on the New York Stock Exchange, strongly tends to show that investors in general agree with President Delano in believing the property to be worth more than it is now earning.

The other statement of President Delano, that the property had been well maintained, would appear to need interpretation "in the light of reason," and apparently cannot be taken as meaning as well maintained as its competitors. The Cleveland, Cincinnati, Chicago & St. Louis operates through much

*This figure ($209,470,000) is arrived at by adding together the capital obligations carried on the liability side of the balance sheet. Current liabilities and current assets are disregarded, the difference between them being discounted in the market valuation of securities.

of the same territory that is covered by the Wabash. The Big Four has a very large proportion, however, of branch line mileage on which traffic is light and which does not require by any means as much maintenance work as main line mileage to keep in fit condition to economically handle traffic. In the last two years the Wabash has relaid 164 miles of line with new steel rails (80-lb. rail). This is one-fifteenth of its total mileage. During the same two years the Big Four has relaid one-tenth of its total mileage, nearly all of which has been relaid with 85-lb. rail. In the case of both companies, this excludes second-hand rail relaid. In the last two years the Wabash has placed in main track an aggregate of 787 ties per mile of main track. During the same two years the Big Four has placed in main track 1,110 ties per mile. This would indicate that the Wabash has been maintained as well as it was possible under the circumstances."

The fact is that, as time goes on, the results of operation of the property only tend to show more strongly that the operating management is making an up-hill fight against dishearteningly difficult financial restrictions imposed by gross financial mismanagement in the past; and, to add to its own financial difficulties, the Wabash is still involved in the difficulties of the Wheeling & Lake Erie and the Wabash-Pittsburgh Terminal —difficulties which were imposed by the ill-fated attempt to gain an entrance into Pittsburgh.

On the balance sheet this year there is shown as an asset $9,816,211 Wheeling & Lake Erie 3-year notes with interest thereon, which notes are guaranteed by the Wabash and which fell due in 1908, but which the W. & L. E. are unable to take up. As an offsetting liability on the Wabash balance sheet there is $9,808,000 obligations to bankers in connection with the W. & L. E. notes.

Here certainly is presented a financial problem of a road which in the best interests of the shipping and traffic public should be maintained and improved to the fullest extent, a problem which might well form a special study for the Hadley Securities Commission before any rigid law were recommended for the regulation or restriction of the issuance of railway securities. This study might be of equal profit both as to the mistakes of the past and as showing what problems must be solved for the future.

The Wabash operates through very highly competitive territory. In 1911 it handled 14,140,000 tons of revenue freight, with an average haul of 237 miles and an average ton mile revenue of 6.03 miles; in 1910 the total tonnage was 14,000,000 tons, the average haul the same as in 1911, and the average ton mile rate 5.86 mills.

The average train load of revenue freight was 344 tons last year, as against 353 tons the year before and 352 tons in 1909. And the smaller train load is not due to any fault of the operating department; it is due to the lack of sufficient equipment, as well as an increase in high grade traffic and a decrease in slow moving business, such as coal. The extraordinarily high figure of $1,024,000 debit balance of hired equipment is in itself a striking illustration of how badly the Wabash needs new equipment. President Delano says that during the entire year there was a large surplus of coal equipment, the coal business being stagnant, but during most of the time the company was short of other classes of equipment and was therefore forced to use foreign cars.

In 1911, of the total tonnage carried, 18.66 per cent. was furnished by products of agriculture, 8.63 per cent. by animal products, 31.77 per cent. by products of mines, 7.69 per cent. by products of forests and 22.92 per cent. by manufactures. The principal gain during the past three years has been in the tonnage of manufactures carried. In 1909, 19.20 per cent. of the total tonnage was manufactures, as against 22.92 per cent. in 1911, while in the other food products of mines furnished 36.18 per cent. in 1909, as against 31.77 per cent. during the year 1911.

The following table shows the results of operation of the Wabash in 1911, compared with 1910:

	1911.	1910.
Average mileage operated	2,515	2,515
Freight revenue	$20,160,877	$19,473,373
Passenger revenue	7,400,934	7,075,314
Total operating revenue	29,884,037	28,886,056
Maint. of way and structures	3,629,763	3,600,739
Maint. of equipment	4,868,474	4,117,109
Traffic	919,043	928,784
Transportation	12,052,964	11,056,061
Total operating expenses	22,366,183	20,536,223
Taxes	920,873	851,324
Operating income	6,596,982	7,498,510
Gross corporate income	7,228,997	8,190,331
Net corporate income	601,579	1,815,719
Interest on debenture A bonds	210,000	210,000
Interest on debenture B bonds	795,000	1,060,000
Surplus	*403,421	545,719

*Deficit in 1911.

CHICAGO, ROCK ISLAND & PACIFIC.

THE Chicago, Rock Island & Pacific Railway—the company which owns and operates the railway lines and whose stock is held by the Rock Island Company—made an all-around good showing in the year ended June 30, 1911, that is really refreshing to study in the present times of uncertainty and threatened

The Chicago, Rock Island & Pacific.

business depression. The company's gross earnings were $68,040,000, or 3.46 per cent. more than in 1910; its operating income was $16,723,000, or 9.48 per cent. better than in 1910; and after the payment of 5¼ per cent. dividends (¼ per cent. more than in pervious year) to the holding company, it had a surplus of $1,512,000, as compared with a surplus the year before of $1,005,000. The company was able to make a saving of 8.86 per cent. in maintenance of way and structures, its transportation expenses only costing 3.87 per cent. more in 1911 than in 1910; and with all this it is in first class physical condition and its motive power during the year was kept in very good shape.

Conditions were favorable for a good showing. The weather was far more favorable last year than the year before; the corn crop especially was a record one, and the Rock Island benefited accordingly. The credit, however, for putting the property, especially the roadbed, in as good condition as it was kept last winter is due not to any fortunate outside circumstances, but to

the policy of the management of the road and to its officers.

The Chicago, Rock Island & Pacific operates 8,026 miles of line, and because of the smallness of the scale of the accompanying map, one has to study it with some care to appreciate how large and how spread out a system the C. R. I. & P. really is. It was probably in consequence of the difficulties of operating such a property as this as a single unit that led to the adoption of a considerably changed organization during the past year. The road was divided into three districts, and a general manager and a general superintendent and superintendent of motive power was appointed for each one of these districts. The new organization was described in the *Railway Age Gazette* of February 3, page 189, and it is generally believed that this new organization is working very well indeed.

Naturally with lines in Minnesota and Iowa, and also in Texas, Louisiana and Arkansas, the traffic as a whole is quite diversified. The most important tonnage is that furnished by products of agriculture, and in 1911, of the total 19,118,000 tons of freight carried, 4,949,000 tons, or 25.88 per cent., was products of agriculture. This is an increase in the tonnage of such products of 706,000 tons, or 16.66 per cent. Products of mines furnished 5,632,000 tons of traffic, or 29.46 per cent. of the total traffic, and the tonnage carried in 1911 was less by 488,000 tons, or 7.98 per cent., than in 1910.

With the decrease in low grade traffic we expect to find an increase in the ton mile rate received, but as a matter of fact, the revenue per ton per mile was just the same in 1911 as in 1910, namely, 9.2 mills; and despite less low grade tonnage, the average revenue train load was 270 tons in 1911, as against 257 tons the year before. There was also a large increase in the number of tons of company freight per train. This company freight averaged 50 tons per train in 1911, as compared with 40 tons in 1910, so that there was an improvement in total train loading of 23 tons. The total number of tons of freight carried one mile in 1911 was 4,718,000,000, an increase of 151,000,000 ton miles. This increase in ton mileage was due entirely to an increase in the average haul, the average haul of revenue freight in 1911 being 247 miles, as against 238 miles the year before. Of course, the average freight density on a property with as widely different conditions on different parts of the system as the Rock Island, does not tell much as to condition of operation on any given line. The average density in 1911 was 588,000 ton miles, as against 568,000 ton miles the year before, showing an increase of 20,000 ton miles during the year.

In regard to the ton-mile rate received and the fact that it was no higher last year, despite the smaller amount of low-grade traffic, it may be safely said that multitude of decisions of the Interstate Commerce Commission making small reductions in rates, unimportant in themselves but surprisingly large in the aggregate, is in part responsible. The Rock Island also, with its lines extending from Texas to Wisconsin, gets into all varieties of classification territories, and so it is sure to be hit by every change of classification.

On the Rock Island, passenger revenue is about 29 per cent. of total operating revenues. Last year the revenue from passengers amounted to $20,241,000, an increase of 4.45 per cent. over 1910; the total number of passengers carried was 19,842,000, a decrease of 295,000, and the passenger mileage was 1,010,000,000, a decrease of 6,000,000. The revenue per passenger mile was 2 cents in 1911 and 1.91 cents in 1910. The average haul is quite short and totaled only 51 miles in 1911 and 50 miles in 1910.

During the year the Chicago, Rock Island & Pacific increased its funded debt outstanding by $2,160,000. The company spent $3,511,000 for additions and betterments, of which but $86,000 was for equipment and the remainder for improvements to the right of way and buildings. Included in these expenditures for additions and betterments is $604,000 for ballast, $357,000 for terminal yards, $218,000 for block and other signal apparatus. Automatic block signals were installed on the line from Eldon, Iowa, to Cameron Junction, Mo.; from Linn Junction, Iowa, to Vinton, and from Neola to Council Bluffs; and from Irving, Tex., to Fort Worth, a total of 229 miles. This makes a total of 963 miles of automatic signals now in operation on the Rock Island lines.

The balance sheet shows cash on hand at the end of 1911 of $3,242,000, which is a decrease of $1,299,000 during the year. Working liabilities totaled $9,258,000, a decrease of $747,000 during the year. There are no loans and bills payable and but $240,000 miscellaneous accounts payable.

As has been mentioned, the Chicago, Rock Island & Pacific did comparatively little new financing on its own account, but during the year there were sold $10,000,000 first mortgage bonds of the St. Paul & Kansas City Short Line, which bonds are guaranteed principal and interest by the Chicago, Rock Island & Pacific. These bonds were issued to the C. R. I. & P. in exchange for the stock and bonds and other indebtedness of the St. Paul & Des Moines, which operates the line from Des Moines, Iowa, to Mason City, 121 miles, and for an advance of $4,000,000 to the St. P. & K. C. S. L. to build a line from Allerton, Iowa, to Carlisle. This line will be finished about September 1, 1912, and when it is completed the Rock Island will have the shortest route by 43 miles between St. Paul and Kansas City, the distance by the Rock Island being 489 miles. There are quite extensive coal mines now being developed which will be tributary to the new line between Carlisle and Allerton, and it is expected that this new line will put the Rock Island in a considerably better position to compete for north and southbound traffic.

One trouble that the Rock Island has in competing for traffic is the lack of terminal facilities of its own in some of the more important cities which are tributary to its lines. The Rock Island taps nearly all of the most important cities in the Middle West and Southwest.

Its service is fully up to that of its competitors and its physical condition is as good as most of its competitors, but the traffic officers of the road are hampered because of lack of facilities belonging to the Rock Island and actually lying within some of the big cities. On the other hand at Chicago the C., R. I. & P. enters the city in such a way that it can deliver freight to all of the eastern roads, an advantage held by no other western road. During the year 150 new industries, estimated to cost nearly $12,000,000 and to furnish 46,000 carloads of revenue freight, were located on the Rock Island lines, and during the year industrial side tracks were built to six great mines and to private industries.

The prosperity of the country lying along the Rock Island's line from Kansas City southwest to a connection with the El Paso & Southwestern has been very great in the last few years. Country that made only fair grazing land has been put under cultivation and is proving to be highly valuable agricultural land. Farmers are becoming well-to-do; labor is in good demand and commands high prices at harvest time and fairly good prices at other times, and in this prosperity the Rock Island is now sharing.

The following table gives the principal figures for operation in 1911 and 1910:

	1911.	1910.
Average mileage operated	8,026	8,044
Freight revenue	$43,368,396	$42,218,881
Passenger revenue	20,240,528	19,378,174
Total operating revenue	68,487,473	66,220,579
Maint. of way and structures	9,738,016	10,673,387
Maint. of equipment	9,359,749	8,455,746
Traffic	2,007,150	1,795,262
Transportation	26,171,419	25,195,579
Total operating expenses	19,431,790	18,151,210
Taxes	2,708,651	2,876,701
Operating income	16,723,139	15,274,509
Gross corporate income	16,908,616	15,497,741
Net corporate income	5,442,714	4,747,881
Dividends	3,930,948	3,743,272
Surplus	1,511,766	1,004,609

NEW BOOKS.

Railway and Navigation. By Edwin A. Pratt. *The Railway Gazette*, London. 455 pages. Price 2s. 6d.

By railway nationalization Mr. Pratt means both government ownership and government operation of railways, and he discusses the merits of both from a strictly English point of view. The chief interest, therefore, to an American lies in the comparison that he can himself make while reading the book between this English point of view and what he knows of conditions in the United States. The book is an argument in a controversy and the tone is often quite controversal. At times one is inclined to wish that Mr. Pratt had examined his subject from a somewhat more judicial standpoint, not, of course, but what he is right in the conclusions that he draws, and we would not doubt his facts, but he has a tendency to quote from authorities or observers who tell only one side of the case. For this reason his conclusions that government ownership and operation are detrimental to the best interests, both of shippers and of the public at large, lose some of the force that they would have had if both sides of the controversy had been somewhat more fully presented. The work was originally published in 1908, but the present edition amplifies and brings down to date the entire discussion. Mr. Pratt first shows the difficulties that other countries have had in financing state railways and shows to what extent railway management has suffered from being mixed with politics. In England the labor party has been an advocate of government ownership, and Mr. Pratt discusses quite fully and in a practical way the effect that government ownership would have on railway labor. He points out the great danger that lies in a general strike when the government itself is one of the interested parties, and shows in a very convincing way that such a strike puts the government in a very embarrassing position and yet leaves no disinterested party to turn to who can act as an arbitrator. In the discussion of state vs. company management and "traders" and their grievances, it is rather interesting to note how often such catch words used in this country as "watered stock" are also used in England without any real knowledge of actual conditions. Of course, a great number of traders' grievances are based on entirely different conditions than exist in the United States, and for this very reason the discussion on that subject should be particularly interesting to both shippers and railway men in this country. It often illustrates how much in the way of service for the small shipper is demanded from railways in England, and is a good object-lesson in how cheap American railways are performing the business of transportation. A considerable discussion is devoted to the working of state railways now being operated by the governments of foreign countries, and here again, while the conclusions are correct, we believe the quotations are largely drawn from authorities opposed to government ownership. Mr. Pratt takes a quite different view of the British railway position today from that taken by Mr. Acworth in his paper written for the International Railway Congress bulletin. It is, however, an interesting point of view and one worth understanding. To any student of the general subject of government ownership, regardless of whether it is to be applied in the United States or not, the book should prove of great value, especially as a source of suggestions for further investigation from original sources.

Heavy rains were responsible for the blocking of the Cairns Railway, in Queensland, in 36 places, some of them being half a mile in length. Traffic was interrupted from March 31 to April 28, and during that time an immense amount of work was accomplished in rendering the lines fit for operation. The line was blocked by earth, rock and logs, by washaways and landslips, by tunnels caved in and by streams being diverted across the railroad. For a distance of 500 yds the road subsided from 10 to 15 ft except for about 40 yds., where it was covered by earth and large boulders to a depth of from 15 to 30 ft.

THE PROSPECTS OF STATE OWNERSHIP OF RAILWAYS IN ENGLAND AND IN THE UNITED STATES.*

BY W. M. ACWORTH.

Two or three years ago, I was discussing railway questions with one of the most distinguished professors of economics in the United States, and the professor, who has paid special attention to railway matters, said to me: "National ownership will not be a live question in the United States for fifty years to come, unless, indeed, England should nationalize her railways. In that case, I admit that the question might at once become urgent with us." I am persuaded that my friend would not repeat his statement today. I have recently spent some time in the United States and have had considerable opportunity of learning what leaders of public opinion are saying, and still more thinking, at this moment. Having regard not only to the actual situation in the two countries, but also to the very different temperaments of the two peoples, it appears to me more than possible that the United States will lead England in adopting a policy of railway nationalization; and this not after a lapse of fifty years, but in the near future. I recognize that in the United States there are obstacles to nationalism that do not exist in England. The instinct against government management and in favor of private enterprise is much stronger there than it is here nowadays. And the instinct is based on concrete facts; for it would, I think, be generally admitted that government agencies in America are on the whole less efficient than in England, and that a smaller proportion of the best brains of the country are enlisted in America in government service. Moreover, in America there would be greater danger—I almost feel tempted to write "greater certainty"— that, in the words of President Hadley, "politics would corrupt the railway management, and the railway management would corrupt politics." Further, there is in America the certainty that nationalization of railways would raise in an acute form the question, sometimes dormant but never dead, of state rights.

For all these reasons it would seem that, if railway nationalization is to come in a great Anglo-Saxon community, England and not America would surely lead the way. But there are causes, and they may turn out to be very potent causes, working in the other direction. In England our railway system is practically complete; there is very little necessity for the expenditure of new capital. Indeed, with the increased attention that has been paid in recent years to economical operation, it has been found in some instances that accommodation has already been provided out of capital in excess of the requirements of existing traffic, and that there is a comfortable margin of accommodation available to meet the steady but comparatively slow growth of new traffic. Moreover, English conditions of business, whether it be the business of railway companies themselves or of their customers, are comparatively stable. We never see in England the tremendous increase of traffic such as the American railways had to face in the years 1906 and 1907; nor do we see such sudden collapses as the American roads had to face at the end of 1907, when the traffic of some companies shrank within a few months, if I remember right, by something like 25 per cent. We are not in England, as it seems to me, likely to be confronted with a sudden crisis in railway affairs. Such a crisis not only may come, but quite likely may overtake American railways ere long. And if the outcome of that crisis were the nationalization of American railways, I do not think anyone would be entitled to feel that the unexpected had happened. I am not attempting to prophesy. In a subject complicated by so many varying and conflicting conditions, economic, financial, personal, political and racial, it would be absurd for anybody to prophesy. If I have an individual belief, it is that the United States will get much nearer to the brink of nationalization than they have come at present, and will then start back on the edge of the precipice and escape by

*From the *Bulletin of the International Railway Congress Association* (English Edition) issue of August, 1911.

some road not yet discernible. Refraining from prophecy, I only desire to sketch the forces at present at work and to call attention to their apparent tendency.

We have been accustomed to regard America as pre-eminently the country of unrestricted private enterprise in railway matters. Speaking broadly, this was undoubtedly true till comparatively recently. It is certainly not true any longer. At the present moment American railways are distinctly more closely controlled by government authority than are the railways in England. So far as concerns traffic within the limits of a single state, government control has been both stringent and minute in some states for many years. For twenty years past within the great state of Texas, which is as large as France, no railway company has had power either to vary an old rate or to introduce a new one. The authority to make rates has been vested in the state railway commission, and without the sanction of that commission no railway company can raise a single dollar of new capital. Texas led the way in this direction, and for a good many years Texas stood alone. But recently Texan precedents have been followed pretty widely, and it is substantially true to say today that, over a considerable portion of the Union, the individual states have taken away from the railway companies control of their own business, whether it concerns rates, services, or the raising of capital and the amount of its remuneration.

But the railway business of the United States is in the main done, not by small companies confining their operations within the limits of a single state, but by great corporations ramifying in some cases over ten or twenty states. An overwhelming proportion of the business of these companies is interstate, and, as such, escapes the jurisdiction of any individual state, and is subject only to the control of the federal government.

Federal control of railways is comparatively new—its history only begins in 1887—and has only become serious within the last few years, but nowadays, it is serious enough in all conscience. American railways have led the world in the introduction of economies the control of operation expenses by means of scientific accounts and comparative statistics. But, unfortunately, American accounts of receipts have not always been as admirable as their accounts of expenditure. In the bad old days, gone, one cannot but believe, forever, and gone not in consequence of government action, but almost wholly as the result of reforms made from the inside by the companies themselves, it was not uncommon that one set of books showed what the trader ought to have paid, but did not, for the carriage of his traffic; and another set showed what he actually paid when the secret rebates were deducted. Nowadays the government has intervened with the heavy hand the crude methods common where governments interfere, and laid down that every railway company engaged in interstate commerce shall keep the accounts prescribed by the Interstate Commerce Commission, and these accounts only; that these accounts shall be at all times open to government inspection and that, if any railway officer keep any account not expressly authorized by the commission, he shall incontinently be sent to prison.

But this is not by any means the most serious interference of the American government with private railway enterprise. In the words of Mr. Prouty, one of the ablest and most experienced members of the Interstate Commerce Commission: "Its rates are a most vital thing to the railway. It is for the sole purpose of charging these rates that the railway is built and operated. Whatever affects the amount of these charges touches in its tenderest point the welfare of the railway corporation. From the standpoint of the railway itself, this matter is of supreme consequence." The rates of the railway, "this most vital thing," "this matter of supreme consequence," have nowadays passed from the control of the railways themselves and are subjected to the authority of the Interstate Commerce Commission. In England, a railway company can not put in force an increase of rate to which any trader objects without the sanction of the Railway Commission; but in America the Interstate Commerce Commission, either on the complaint of a trader or on its own motion, can enquire into the reasonableness of any rate actually charged, and can, if it thinks fit, substitute a new and lower rate in place of it.

Nor is this all. A few of the great trunk lines of the states, which occupied at the outset the main strategic routes are now, especially, where they have been honestly and conservatively financed all through their history, in a position of great prosperity. Public opinion and the Interstate Commerce Commission agree in questioning their right to the dividends they are at present earning. Mr. Prouty, from whom I have already quoted, has publicly stated that "only in extreme cases would a larger dividend than 7 per cent. upon the capital stock be justified." And the commission—and that they have public opinion behind them no one who knows the United States can doubt—have gone even further than this. The Pennsylvania system is not only the greatest private undertaking in the world—its annual revenue exceeds $350,000,000—but its financial standing is second to none. No one has ever suggested that one single dollar of its capitalization represents anything but honest money put into the road; no one doubts that the undertaking today is worth vastly more than the price at which it stands in the company's books. For a generation past the shareholders have been content with very moderate dividends, averaging less than 6 per cent., and have spent the balance of net revenue on capital improvements. The president of the company stated recently before the Interstate Commerce Commission that since 1887 "his company had put into the Pennsylvania lines east of Pittsburgh" (which are only one portion of the entire Pennsylvania system) "$262,000,000 from earnings." That the Pennsylvania shareholders were entitled both morally and legally to put every dollar of these millions into their own pockets as dividends is unquestionable. One might even have imagined that their self-restraint, which resulted in keeping down the capital on which the customers had to supply a dividend, was deserving of encomium. That, however, is not the view of the commission, whose decision says: "During all that time this company has always paid to its stockholders munificent dividends. Now to whom belongs this $262,000,000? . . . There is the gravest doubt upon this point. . . . Whatever is invested in these properties from earnings *may belong*, not to the public which has paid for it, but *to the stockholders* who have already received a full return for their investment in the way of a dividend." [The italics are mine.]

To complete the outline of the story, it should be added that state and federal interference with the actual daily operation of the railways has already gone far and is steadily increasing. Peremptory orders to run such and such trains, to provide such and such accommodation on them, to build new stations here, to reconstruct lines there, so as to avoid crossing streets on the level, are increasing every year both in number and severity. Laws dealing with the provision of safety appliances, regulating the number of employees on a train, or the number of hours these employees are to work, have been turned out by the hundred within the last decade. In this respect also the railways of the United States are subjected to interference more drastic and much more detailed than anything to which the English roads are subjected. And, whereas government regulation in England dates back to the beginning of railways, and has only been strengthened gradually and at considerable intervals, this whole mass of government regulation in the States has been piled in the course of quite a few years upon the backs of officers brought up under a system of almost entire freedom from exterior restraint.

Not unnaturally the American railway men, buffeted by such fierce and frequent storms coming on them from every direction at the same time, have lost their bearings. Government control, they say, they could live with, if it were steady and uniform and consistent. But government interference that is often self-contradictory, that never helps or guides or supports, that only objects and obstructs and forbids, in the end becomes impossible for all private initiative is paralyzed. And to say that this is the position in the United States today, is only to state what is obvious.

Twenty-five years ago President Hadley in his well-known book, "Railroad Transportation," wrote as follows:

"There is a strong popular feeling, to a large extent unsuspected by those in authority, in favor of government ownership of railways as a system. No one can have much to do with the more thoughtful workingmen without finding how strong that feeling is, and what hopes are based upon it. The fact that the question is not now under discussion must not blind us to the fact that forces are at work which may prove all but revolutionary when the question actually does come under discussion."

Government ownership did come under discussion in 1905 when Mr. Bryan, who had twice been candidate for the Presidency and was about to be renominated by his party for the third time, startled the American public by declaring himself in its favor. At that date, as I well remember, for I was myself in America at the time, Mr. Bryan appeared to be in a minority of one. The democrats were hardly less unanimous than the republicans in disavowing all sympathy with his ideas. But things change fast in America, and here are one or two quotations to show what typical public men in the states are saying today, now that the question is once more under discussion.

Mr. Finley, president of the Southern Railway, with more than 10,000 miles of line, says:

"I do not believe that the sentiment of the majority of the people of the United States is favorable to government ownership, nor do I believe that congress and our state legislatures are consciously moving in that direction, but I do believe that, if some of the more extreme legislation already enacted is supplemented along the lines now proposed, the ultimate result must be to break down the system of private ownership."

Mr. Olney, a democrat and ex-secretary of state, says:

"The situation is this. As a matter of theory, Bryan favors government ownership of railways on the anticipated failure of government regulation. As a matter of practice, Roosevelt and his disciple, Taft, are favoring a kind and degree of government regulation of railways which makes the government ownership of railways both logical and imperative."

Senator Lodge says: "The curse of government ownership may be forced on us." Senator Clay, that "public sentiment in favor of government ownership is growing every day."

The situation as I see it is this. A mass of public opinion growing larger day by day is crystalizing in favor of government ownership. Even among those who believe this to be undesirable, there are many who have become convinced that it is inevitable. And this view they hold not without good reason, for the railways of the country must be managed by some one; if the companies cannot, the government must. And, as I have said, as the result of the tempest of drastic and even hostile legislation that has raged round them within the last few years, the railway men no longer know where they stand. The cost of operation has been going up against them by leaps and bounds. The wages of railway employees have not only gone up, but have gone up out of all proportion to the wages of any other comparable employment. In the deep depression of 1908 the companies attempted to reduce their expenditure by cutting down wages. The whole force of the federal government was instantly brought to bear upon them and they were compelled to abandon the attempt. Foiled in this direction, they tried to increase their receipts by raising rates. They were promptly confronted with an injunction moved for by the government, and were compelled to postpone their proposed increases till legislation could be passed through Congress giving the Interstate Commerce Commission jurisdiction to decide as to their reasonableness. And now after exhaustive inquiry, the commission has within the last few months unanimously decided that no increase shall be granted.

To justify the proposed increase, the railway companies naturally painted in dark colors the prospects of the future. The surplus over dividends which they had been accustomed to devote to betterments and improvements had, they said, almost vanished. The dividends themselves were in danger. The security on which new and urgently needed capital must be raised was gravely imperilled. The commission, it is true, refused to take them at their word, and declined to admit that the gloomy prognostications of the companies were justified by the facts. But it is no part of the duty of the commission to find capital for the companies, and there is no denying that, on the one hand, the companies are hesitating to incur new liabilities, and that, on the other, the public are less ready to purchase railway securities than they were. Securities of the great companies can, of course, be sold, and are constnatly being sold; but they are only sold at a price that a few years ago would have been regarded as prohibitive.

Now the need of American railways for new capital is almost limitless. The volume of traffic in the Uited States increases at a rate of which older countries have no idea. Roughly speaking, the volume doubles every ten or twelve years. This of itself implies vast capital expenditure. But this is not all. During the period extending roughly from 1895 to 1905, the railways restricted their capital expenditure within the narrowest possible limits, and the arrears of these years have by no means been caught up yet. Moreover, it is not merely a question of enlarging the plant to meet a growing demand: it is also a question of raising the whole standard of accommodation to a higher plane. The railways of a few great companies along the Atlantic coast are constructed and equipped up to a standard of perfection that is surpassed nowhere in the world; but over the larger part of the continent the railways have still in very many cases not yet emerged from the condition of what the Australians call "pioneer lines." There is, indeed, always, or almost always, a track with heavy rails, well built and well maintained. But the track, even through the streets of great towns, runs on the level down the middle of the street, the stations are often mere shanties; signals are non-existent, and all the accessories that go to make up a railway, according to Continental and still more English ideas, are plentifully lacking. The money needed to bring up the railways of the West to the standard set in the East is quite incalculable. But that it will have to be found, and that the American public will vent their wrath upon the railway companies, if it is not found, seems to me certain. The results may well be that the government will have to undertake a work that the companies find too heavy for them. And it is not probable that the government will undertake to finance railways which it does not own. As I have said, I do not care to prophesy. Factors that at present seem unimportant may turn out to be preponderating. But at this moment it looks as though before long the history of 1906-1907 would repeat itself. In these years trade was booming, and the railways found their resources quite inadequate to cope with the rush of traffic with which they were confronted. All the signs at present point to a similar sudden outburst of activity in the near future. If it comes, and if the resources of the railways are overpowered by it as they were five years ago, it is quite conceivable that private ownership in the States may be submerged by a great wave of popular indignation.

History shows not a few instances in which the railway policy of a country has been reversed within a very brief period. In the year 1879, the Prussian Landtag rejected Bismarck's system of state purchase by an almost unanimous vote, and six months afterwards in a new Landtag the purchase of the first great block of what is now the Prussian state railway system was carried by a large majority. In 1891, the Swiss people on a referendum rejected the purchase of the Swiss Central Railway by a two to one majority. And in 1898, also by a referendum, and also with a two to one majority, they voted for the purchase of all the main lines of the country. In June, 1903, the Italian Chamber of Deputies accepted, almost without hesitation, the report of a railway commission advising against state purchase. And in June, 1905, by an act passed almost without discussion, the Italian government took over the railways. In France, too

the Chambers of Commerce were practically unanimous in opposing the purchase of the Western Railway by the state. Their opposition was supported by a very great majority of the deputies and senators representing the district which that railway serves. But Mr. Clemenceau passed his bill and the "Compagnie de l'Ouest" is now "l'Ouest-Etat."

To turn from the stormy strife of American railway politics to the drowsy atmosphere which surrounds similar questions in England is like passing from a stinging North Seat gale into some land-locked Norwegian fiord. Some two years ago I wrote in the *Bulletin**: "The old edifice of the English railway system is tottering to its fall, and no one yet knows what will take its place." I ought, perhaps, to have added that the public and Parliament are entirely unaware that there was a system, and that it is tottering; and that none of the leaders of public opinion have as yet addressed their minds to the question of what is to take the place of the system, of whose existence and of whose disappearance they are still unconscious. I remain, however, of opinion that my diagnosis of two years ago was correct. The old system is dead. Even in a rule-of-thumb country like England it must be replaced by some other system; and no serious attention has yet been given to the question what that system is to be.

In my article of two years ago, I was attempting to summarize the report of a board of trade conference. Within the last few weeks the board of trade has published a new report: the report this time of a departmental committee on railway agreements and amalgamation.† The committee was apointed in June, 1909. It consisted of ten members, of whom six were members of the legislature, three were lawyers with experience in railway matters, and one was apparently selected as a representative trader.

The committee were appointed to "consider and report as soon as practicable what changes, if any, are excellent in the law relating to agreements among railway companies, and what, if any, general provisions ought to be embodied for the purpose of safeguarding the various interests affected in future acts of parliament authorizing railway amalgamations or working unions." The report of the committee is a very interesting document. It covers 50 large and closely printed pages. It may be divided (though it is not so divided by the committee), apart from the usual narrative and historical introduction, into three main heads. These may be described as:

1. Should railway co-operation be encouraged?
2. If so, what steps should be taken for this purpose?
3. What consequential changes in the public regulation of railways will be required?

With past history we need not concern ourselves here. The committee discuss it under the various heads of competition in rates, in subsidiary charges, in facilities, in new lines, and miscellaneous. They come to the conclusion that competition as a regulative force is dead or dying, that effects produced by competition in the past still to some extent persist and will persist though the cause has ceased, but that it is not safe to rely upon their persistence for the protection of the public.

But they also report that they "have come to the further and unanimous conclusion that the natural lines of development of an improved and more economical railway system lie in the direction of more perfect understandings and co-operation between the various railway companies." This natural development cannot, the committee think, be prevented by legislative or administrative action. They, therefore, on all grounds consider that the public authority should encourage and not attempt to hinder it. They recommend accordingly that every opportunity should be given to railway companies to enter into public and binding agreements, whether for amalgamation, or division of territory, for pooling of traffic, or whatever it may be. The detailed changes, whether in statute law, or in the traditional procedure of parliamentary committees, which the committee consequentially recommend have no interest except for English readers, and may be passed by here.

The third head, which I have defined as "what consequential changes in the public regulation of railways will be required" under a non-competitive system, is naturally much the most important. And here, as it seems to me, the report takes a narrower view than we might have loked for. Broadly, the situation is this: A country must entrust its railways either to government management or to private enterprise. If the latter system be chosen, there are again two alternatives; the private railway system may be based either on competition or on monopoly. England and Holland (and, until recently, Italy) have deliberately adopted the competitive basis. France has, equally deliberately, adopted the opposite system, and has given to each company, as far as possible, a carefully protected monopoly within its own district. Each system can claim both theoretical and historical justification. But they are diametrically opposed; and each system *ipso facto* excludes certain advantages which the other confers. The French system avoids the waste of capital implied in the unnecessary duplication of lines, and of income in the unnecessary duplication of services. But, on the other hand, it confers on a company the opportunity of going to sleep with comparative impunity, and it necessitates the constant and persistent interference of the state to secure that the company shall give to the public accommodation that its own self-interest might often lead it to refuse.

Under a competitive system, on the other hand, even if a certain amount of so-called waste is inevitable, competition itself is the main regulative force. To order a railway company to build a new line required in the public interest, but not likely to be profitable directly or indirectly to the company that builds it, to run a new train that will hardly do more than pay working expenses, to reduce rates, to build better rolling stock, and so forth—all these are matters of such administrative difficulty that a government may well shrink from taking them in hand. Competition does the work automatically. Under a competitive system a company will probably build new lines, put on new trains, improve its rolling stock at an earlier stage than a government would under a non-competitive system have ventured to order them. Such at least would seem the natural expectation *a priori*, and it is an expectation that, I venture to say, finds strong confirmation in railway history.

The board of trade committee does not appear to perceive that a competitive system is one thing, and a non-competitive system another. They recognize that the English railway system has hitherto been based on competition; that the system of the future will have to be based on non-competition, and they apparently think that, with a certain limited amount of dotting of i's and crossing of t's, the regulation that was adequate under the one system will suffice in the other. At present, for instance, a railway company cannot increase rates without the permission of the Railway Commission Court. The committee recommend that in future the same permission shall be required in the matter of decrease of accommodation, and of some twenty different recommendations made by the committee, this is probably the most important. How it is to be carried out in practice one has difficulty in imagining. An express train, let us say, runs through between two important termini, A and B, a distance of 100 miles. It takes two and a half hours on the journey, and makes three stops at unimportant stations *en route*. The train is re-timed. The local stops are cut out. It does the 100 miles in two hours, but the passengers from the intermediate stations have to travel by a slow train. A hundred through passengers *per diem* save half an hour, but six local passengers lose a whole hour apiece. Has the railway company increased or diminished its facilities? To enter upon an elaborate lawsuit, with all the paraphernalia of counsel and witnesses, to prove by sworn testimony to the satisfaction of a law court that the inconvenience of the six ought to be regarded rather than the convenience of the hundred, is surely impossible. You can regu-

Bulletin of the Railway Congress, number of February, 1910, p. 985.
†Cd 5631.

late railways by act of parliament and by lawsuits, provided parliament and the courts are only to interfere in important cases where great interests are involved. But to tell a suburban passenger that he must apply to a law court for redress, if a company bent on economy postpones heating the local trains from November 1 to 15, is merely laughable.

And this is not all. A system of regulation that confined itself to preserving the *status quo* might have been justifiable in China in the last century. But England is a progressive country, and we want something better than the *status quo*. We want progressive improvement. Hitherto our railway companies have given it to us in ample measure. Fifty years of competition over the 400 miles from London to Edinburgh have brought down the length of the journey from eighteen hours to seven and a half hours. No one will say that the service of today falls short of the reasonable standard of today. But the resources of civilization are not yet exhausted, and there are no grounds for supposing that fifty years hence fifty miles an hour will be a reasonable speed for a through express. Yet, if competition is abolished, and the companies which at present compete agree to pool their traffic, there is no power to constrain them to accelerate. And the board of trade committee is content to leave it so. They discuss the question of "extension of the rights of the public to compel the railway companies to grant increased facilities and reduced charges where such a course could be proved to be reasonable," and they deliberately refuse to recommend any change in this direction.

And herein lies, as I think the future will show, the crux of the question. Of course, if we are to continue to rely on law courts and legal procedure for protection of the public, the committee is right. But to administer through the machinery of a law court the complicated affairs of a great business undertaking like that of a railway company is obviously out of the question. If control in this direction is to be exercised by public authority, it can only be by the administrative action of a department of the executive government, armed with powers similar to those possessed by the French ministry of public works. And, though the growth of the powers of our executive government in recent years is sufficiently conspicuous, it is very questionable whether English public opinion is ripe for so great a change as this. With railway matters so far, public attention has concerned itself but little. When, however, the public begin to pay attention and to understand the new situation; when they appreciate that the country has been divided up into districts, settled not according to the convenience of the public, but according to that of the railway companies; that the condition of things in the year 1911 is to be taken as the standard of reasonableness for all time, and that any further improvements and concessions are only to be obtained at the good pleasure of the railway companies, and only so far as it suits the convenience of the companies to concede them—then, as it seems to me, the recommendations of the board of trade committee will not command any general acqui-

The conclusion may be put very shortly thus. Competition is dead. It might have been possible to substitute for it a carefully thought out system of state regulation. No attempt is being made to provide such a substitute. The present position can accordingly only be very temporary, and the ultimate outcome can hardly be other than nationalization.

The Russian government proposes to build a new railway in West Siberia. The line will begin at Uralsk, on the Ural river, and proceed via Orenburg and Akmolinsk to Semipolatinsk; thence to Barnaul; from this point it will go due north to join the Siberian railway, probably at Ob, an important grain centre. The line is of great strategic and commercial importance, the reason for the sparse population of the district traversed being the [illegible] of means of transportation. The new line will be more than 1,360 miles long, and its construction is expected to begin [illegible] It should be open to traffic in about five years.

LESS RAILWAY LEGISLATION.

The Railway Business Association, in a pamphlet entitled "Constructive Railway Policies in Many States in 1911," has made an abstract of all of the general laws affecting railways which have been passed by state legislatures during the current year; and the officers of the association conclude that antagonism has diminished and that "the era of conciliation, conference and co-operation which this association was formed to promote, is manifestly dawning." Mr. Noxon, secretary of the association, has made a personal study of all of the laws, railway and other, passed by all of the 40 legislatures which have been in session, and concludes that the law-makers have definitely turned to "a period of legislative rest." He also quotes from the messages and other utterances of the governors of numerous states, to show that the importance of pursuing a reasonable policy toward the railways is now well understood. He says, further:

"Reports from the 40 states whose legislatures met in 1911 show that a marked tendency, already widespread, has developed in the direction of a constructive policy affecting railways, and in many instances affecting industry and business as well.

"A number of states not hitherto active in adopting railway restrictions enacted this year regulatory statutes, notably California, Illinois, New Jersey, Connecticut and New Hampshire. Several which already had many such laws passed additional provisions, evidently with the purpose of bringing their regulations into line with what had been tried elsewhere. But viewing the whole country the most far-reaching tendency is a diminution or complete cessation of law-making affecting the carriers. No less than 24 states passed little or nothing. Most striking of all, the states which have been pioneers in regulation and have up to a recent period done most in that direction seem to have nearly or quite given up the quest for further restrictions, and are now evincing anxiety to attract capital for the development of transportation and business.

"The laws passed directly dealing with the carriers were cut down in two years 58 per cent., or from 664 in 1909, when 41 legislatures were in session, to 276 in 1911, with 40 legislatures.

"Candidates for governor in Texas, Oklahoma, Alabama and Iowa went to the people on platforms promising to treat business and transportation enterprises fairly and constructively. All four were elected.

"Alabama, proclaiming formally a policy of protection to investments, repealed the law providing for the forfeiture of its franchise by any foreign railway corporation which carried to the federal courts an appeal made from a state-made rate.

"The states which passed many railway laws, mainly restrictive, are Arkansas, California, Indiana, Minnesota, North Dakota, Oregon, South Dakota and Wisconsin; and of these Arkansas reduced the number from 32 in 1909 to nine in 1911; Minnesota from 31 to 17; North Carolina from 50 to 8; Oregon from 20 to 10; South Dakota from 37 to nine; Wisconsin from 34 to 17. Michigan, although reducing the number of railway enactments from 32 in 1909 to six in 1911, passed mainly new restrictions, including reduction of freights and fares and the taxation of securities in the hands of holders. New Jersey, in enlarging the power of the Public Utilities Commission, enacted certain novel restrictions, though passing but seven railway laws as against 11 in 1909. Connecticut passed 8 laws, the most important creating a Public Utilities Commission with plenary powers.

"At the conference of Governors at Spring Lake, N. J., in September, Governor F. C. McGovern, of Wisconsin, testified that the public service corporations in that state are absolutely out of politics, and that there are now better and friendlier relations between the utilities and the public.

"At the present moment political leaders who advocate a far-sighted policy toward railways do receive the support of the voters. The railways and cognate industries have assiduously conciliated the public, and toward the railways the growth of public friendliness is now shown."

COLORADO & SOUTHERN EXTENSION TO CHEYENNE.

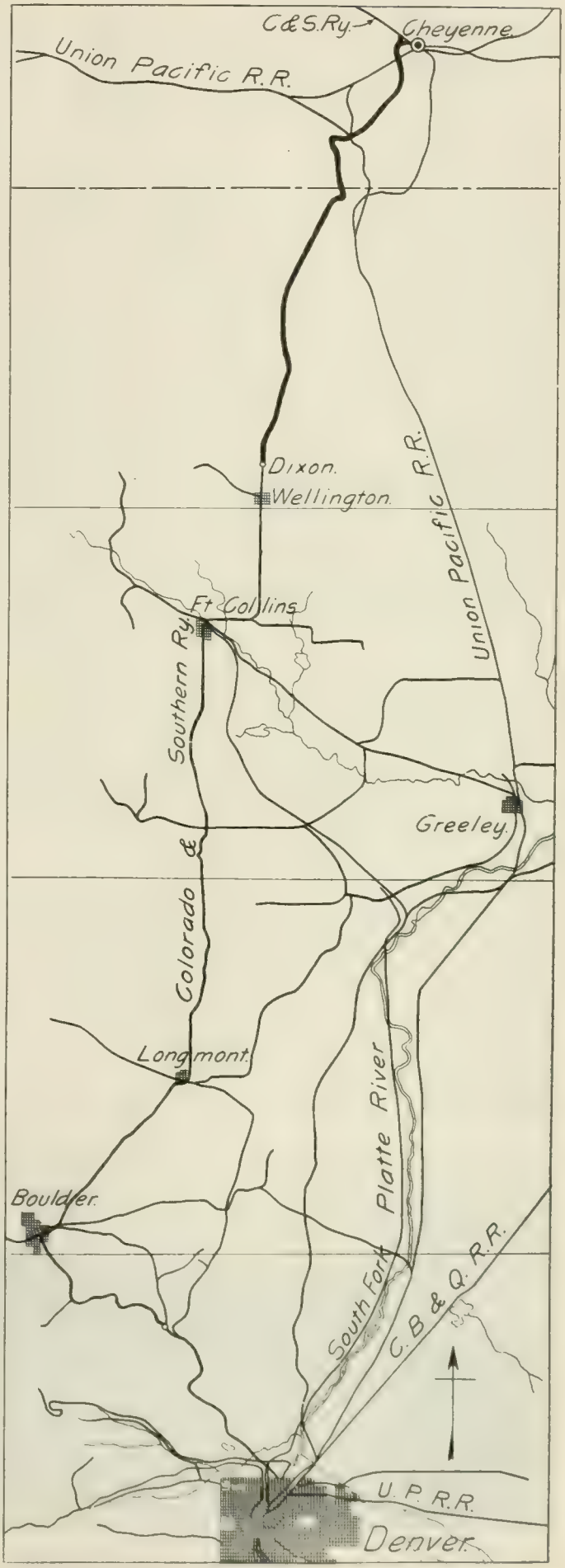
The Colorado Central was built from Denver, Colo., into Cheyenne, Wyo., about 1879, connecting with the Union Pacific main line some three miles west of Cheyenne. At about the same time the Denver Pacific was constructed from Denver to Cheyenne by way of Greeley, this being the line now operated by the Union Pacific. This line was 19 miles shorter and had easier grades than the Colorado Central line by way of Ft. Collins into Cheyenne. In 1888 the Union Pacific, owning both the Colorado Central and the Denver Pacific, took up the tracks of the former road from Ft. Collins to Cheyenne and operated entirely over the Denver Pacific.

Following the receivership of the Union Pacific in 1893, the Colorado Central was segregated from the Union Pacific, and Mr. Trumbull was appointed receiver for the Union Pacific, Denver & Gulf, which included the Colorado Central. At the time the receiver was appointed for the Union Pacific, the company also owned a line extending from Cheyenne north to Orin Junction, where it connected with the Chicago & North Western. This road was also segregated as a part of the Union Pacific, Denver & Gulf. This arrangement left Mr. Trumbull, as receiver, with a line from Cheyenne north to Orin Junction, and a line from Denver to Ft. Collins, but with no connection between Ft. Collins and Cheyenne. As receiver, he made a contract with the receiver of the Union Pacific to operate over the Union Pacific tracks from Denver to Cheyenne. This contract expired in December, 1910, and the Colorado & Southern, successor to the Union Pacific, Denver & Gulf, decided to build a line from Ft. Collins to Cheyenne, thus connecting up the two lines.

In 1902 the Colorado & Southern built an extension about 12 miles long from Ft. Collins to Dixon, Colo., and in December, 1910, a contract was let to extend this line from Dixon north 32 miles to Cheyenne. This line is now practically completed and will be put in service in a short time. The distance from Cheyenne by way of Ft. Collins and the new line is 119 miles, compared with 106 miles by way of the Union Pacific. The principal commodities that will be handled over the new line will be iron ore, coal and live stock. The iron ore comes from the Colorado Fuel & Iron Company's mine at Hartville Junction, Wyo., and the live stock, principally sheep, comes from the large ranches in Wyoming tributary to the Colorado & Southern line.

The new line rises from an elevation of 5,280 ft. at Dixon to 6,345 ft. at Athol Hill, 26 miles from Dixon, and then descends to an elevation of 6,088 ft. at Cheyenne. The maximum grade against northbound business is 1 per cent., while the grade against southbound business from Cheyenne to Athol Hill is 0.8 per cent. From Athol Hill to Dixon the grade is 0.3 per cent. against southbound traffic, the bulk of the loads moving in that direction. The maximum curvature is 2 degrees, with the exception of one 6-degree curve. All curves are spiralled and the grades are compensated for curvature. The construction of this line required the removal of about 2,700,000 cu. yds. of material, and the placing of about 12,500 yds. of concrete in bridge structures. The roadbed is 20 ft. wide on fills, except where special allowance is made for shrinkage proportionate to the height of the fill; 24 ft. wide in earth cuts and 22 ft. wide in rock cuts. Side ditches are 3½ ft. wide on top and 1½ ft. deep.

Heavy cuts and fills were necessary in three locations, and a method of payment was adopted differing from the usual procedure. The excavation or embankment within a certain territory, called an exception, was paid for at a special price per cubic yard, differing from the price mentioned in the contract for the other parts of the grading. This price covered all the work necessary to complete the excavation or embankment, or both, within the exception by any method the contractor might select. Within the limits of the exception no payment was made for



Dixon-Cheyenne Extension; Colorado & Southern.

over haul or classification of material. On one of the exceptions on mile 12 there was a cut about 2,000 ft. long, with a maximum depth of 50 ft., and a fill of about the same length averaging 40 to 45 ft. high. The largest fill handled under this arrangement was near Cheyenne; it covered a distance of over two miles, with a maximum height of 45 ft. and a maximum haul of 3 miles.

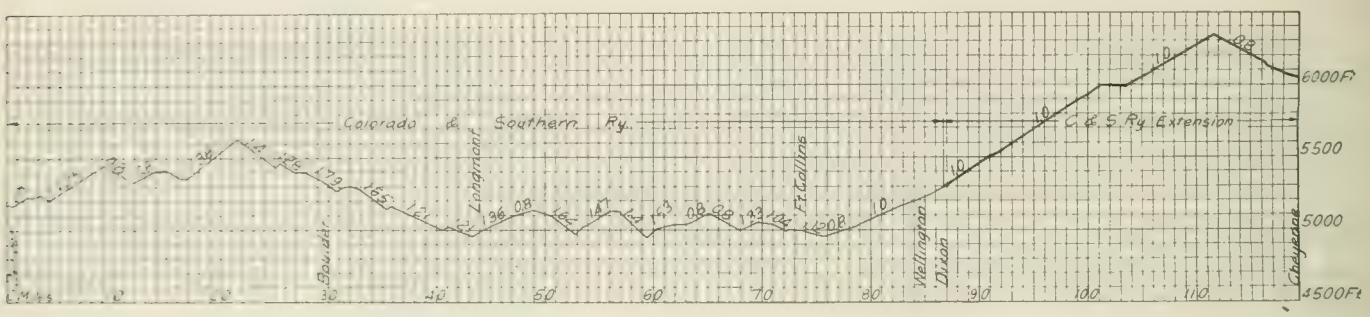
The larger part of the earth was handled with steam shovels and trains, and an average of 4 steam shovels, 15 grading machines and 500 men were employed. The large fills were made from temporary timber trestles. The openings under the track were in most cases taken care of by large cast iron pipes ranging from 24 in. to 52 in. in diameter. Provision was made for the large openings and under crossings by pile bridges. In addition to the wooden bridging, there are two 50-ft. deck spans resting on concrete abutments and piers at the crossing of Crow Creek in Cheyenne, one 126-ft. truss span on concrete abutments over the Union Pacific main line near Cheyenne, one 12-ft. arch over Clear Creek, and one 40-ft. deck girder on concrete abutments at the under crossing of the Union Pacific's Denver line at Speer. The abutments for the 126-ft. span over the Union Pacific main line are 30 ft. high from foundation to top of parapet wall, and provide a clearance of 26 ft. for the bridge above the top of the rail. One part Portland cement to eight parts sand and gravel was used in the concrete work.

Eighty-five-pound rail, with 4-hole Continuous joints and oval-headed bolts, were used. Six in. by 8 in. by 8 ft. Texas shortleaf yellow pine, treated with 8 lbs. of creosote per cubic foot, were used on plates throughout. Gravel secured from a pit on the new line near Dixon was placed under the track to a depth of 10 in. below the bottom of the ties. This ballast was loaded by steam shovel under contract, about 90 cars being loaded daily. All track was laid by hand, and the track laying gang averaged about one mile of track per day.

Three passing tracks were provided on the new line, each 2,000 ft. long and arranged where possible as lap sidings. No 11 frogs were used in these passing tracks. A new water supply for engines was provided by digging a well about two miles from Crouse Station, the water being piped from the well to the station through a wooden pipe line.

In connection with the construction of this new line, 85-lb. rail, with Continuous joints, and treated ties, were used to replace lighter material on the Wellington branch from Ft. Collins to Dixon. The banks on this line were also widened with the stripping secured from the gravel pit at Dixon.

This work has all been carried out under the direction of H. W. Cowan, chief engineer of the Colorado & Southern. D. S. Hooker was engineer in charge of construction of the new line, with headquarters at Cheyenne, with four resident engineers stationed at various points along the line. The concrete structures were designed by the company engineers. The grading was done by contract by Kilpatrick Bros., Beatrice, Neb., while the concrete was done by the Hinchman-Renton Fireproofing Co., Denver. Although the contract called for completion of the work by October 1, the work was finished in advance of this time.



Profile of Colorado & Southern Denver-Cheyenne Line.

The estimates by the minister of ways of communication for the Russian railway service in 1912 were submitted to the Imperial Council and the Imperial Duma on October 7. The receipts are put at $381,528,000, or $19,752,000 more than those for 1911. Almost the entire increase, or $19,662,000, is anticipated from the operation of the treasury railways. The expenditures are estimated at $317,800,753, or $9,318,028 more than in 1911. The greatest increase in the gross earnings is expected from the expenditure for additions and betterments of the treasury railways, namely, $6,705,845. The increase in the operating expenses of the lines is estimated at $2,888,802. On the other hand, the expenditures for the acquisition of rolling stock and accessories for the treasury railways is reduced, as compared with 1911 by $3,290,614. The net receipts from the operation of the treasury railways for 1912 are estimated at $100,455,035, or $16,543,672 more than the estimates for 1911.

Abutments at Union Pacific Main Line Undercrossing at Cheyenne.

FOREIGN CAPITAL IN AMERICAN RAILWAYS.

BY WILLIAM Z. RIPLEY,
Professor of Economics, Harvard University.

The distribution of ownership of railway securities is a matter of great public importance. It concerns a multitude of investors individually; and indirectly through the medium of beneficial corporations touches the welfare of a still greater number. As for the first class, the individual investors, it is impossible to ascertain the distribution of unregistered certificates of indebtedness; but accurate data concerning the number of shareholders has been compiled. The extravagant estimate of the late George R. Blanchard in 1897, that there were 950,000 stockholders, and 300,000 bondholders, was certainly wide of the mark. By direction of Congress in 1904, the Interstate Commerce Commission reported 327,851 as the number of shareholders of record. This figure, however, did not take account of duplications, due to ownership in several different roads by the same person, nor did it analyze with any care the holdings of trustees and banking houses. As for the magnitude of holdings by beneficial corporations, it has been estimated by competent authority, that railway securities constitute not less than one-fifth of the investments of savings banks, about one-third of those of colleges and other educational institutions, and approximately 30 per cent. of the reserves of the substantial fire and life insurance companies. Through these agencies, the number of persons indirectly interested in the welfare of the railways is greatly increased. By this same authority it was estimated that in 1905, about one-seventh of the stock and bond issues of transportation companies were thus lodged in the hands of semi-public institutions of this class.

The wide dissemination of railway securities is of interest because of its bearing upon the question of concentration of ownership or control within relatively few hands, especially as incidental to the growth of great railway systems. Scattered holdings are in this regard, a source both of strength and of weakness. Certainly a road like the Pennsylvania company with upwards of 50,000 shareholders, is too large an enterprise to be readily passed about from hand to hand. Mere size thus carries an implication of stability. In this regard, the difference between the Pennsylvania and the New York Central is significant. The latter road has only about one-fourth as many separate shareholders of record. Despite their equality in size, the ease with which the late Mr. Harriman in 1908 secured a substantial proportion of New York Central shares, could not conceivably take place on the other road. Yet on the other hand, scattered holdings in the case of smaller companies render continued control relatively easy in normal times, because of the inertia and lack of interest of the small invetsor. The greater the concentration of investment the greater is the need of actual majority ownership of stock in order to insure control. Moreover roads of a speculative sort, not on a permanent dividend basis, like the Erie the Southern Railway or the Wabash, are peculiarly exposed to centralization of control. Their securities sell for a low price, and moreover the market is always an open one. Transfer of a considerable number of shares in such roads would not attract attention, and thereby defeat the purpose of those interested in securing control.

Indications are not wanting that the general public is more alert than formerly, as to opportunities for investment in times of sudden depression. Both the panics of 1903 and of 1907 have witnessed large increases in the number of small investors. Roads like the Atchison and Union Pacific gained more than a thousand shareholders apiece within the short period of six months to August, 1903. The Pennsylvania added 15,000 new shareholders—an increment two and one-half times greater than for the four preceding years. It was not until the next period of low prices in 1907, that the number of stockholders attained so large a total gain. A goodly part of the gain in 1903-4 was from European sources, from causes shortly to be explained. The increase in the number of shareholders in 1907 was almost spectacular. The total for 25 large companies rose by upwards of 41,000 within the year—an augmentation of almost one-fifth. The Great Northern more than doubled its quota; the Southern Pacific increased by nearly one-half, and the Union Pacific by almost one-third. A peculiarity of these recent rapid expansions of railway ownership in periods of financial depression has been their permanent character. Such purchases are usually made for investment and may become a great source of financial strength to the companies concerned. And it is not unlikely that such investments in small lots by a wider, and especially a local constituency, may become a factor of some moment politically.

European capital has been of the utmost importance in the creation of the American railway net.* The dearth of funds in the early days and the phenomenally rapid growth of our transportation system rendered us peculiarly dependent upon foreign financial markets for many years. Until the panic of 1873 European investors bought our railway securities eagerly. The Illinois Central is unique perhaps in its continued interest of foreign capitalists. While many Erie bonds were held in Europe, the Illinois Central from its inception was actually controlled through its share capital from abroad; and in 1876, not less than 86 per cent. of its stock was thus held. It has been estimated that $375,000,000 of American railway stocks and bonds were held in Europe at that date. But the excesses of Jay Gould and his followers in the Erie, and the panic of 1873 put a sharp check upon investment from abroad. After the panic foreign investment gradually revived; and was not again seriously interrupted for twenty years. During this period, not only our stock exchanges, but bankers in general were peculiarly sensitive to European conditions. The Baring Brothers collapse in 1890, largely concerned with the Atchison road among American enterprises was a case in point. A chairman of the London & Westminster bank has stated at one of its annual meetings that one-third of the advance made by his institution in that year were based upon American railway securities. It is certain that a large part of the phenomenal expansion of our transportation system during the decade 1880-90 was financed abroad. As indicating the predominance of European capital at this time, the following table is significant. From this it will appear that an absolute majority of stock in at least five large American roads was held outside the country; and of course, the bond holdings, especially in England, were even heavier in proportion, although there is no way of ascertaining their exact amount.

	Per Cent. of Foreign Stock.	
	1890-96	1905.
Illinois Central	65	21
Pennsylvania	52	19
Louisville & Nashville	75	7
New York, Ontario and Western	58	12
New York Central & Hudson River	37	9
Reading	52	3
Great Northern	33	2
Baltimore & Ohio	21	17
Chicago, Milwaukee & St. Paul	21	6

The acuteness of the panic of 1893 and its protracted after effects were considerably accentuated by these foreign investments in American railways. Liquidation from abroad, both of stocks and bonds assumed enormous proportions during 1893. Hundreds of millions of securities were returned to New York; at a time when we were too financially embarrassed otherwise to repurchase them. An utter collapse of prices was the result. Matters improved, however, in 1895 with the reappearance of more normal conditions; and a renewed cutflow of railway securities followed. A goodly proportion of our heavy excess of imports of merchandise over exports in that year was met by sales of large blocks of railway stocks and bonds. Many of these, however, were not permanently held, but were returned within a few months. Nevertheless their usefulness as a means

*Careful studies of European investment in America and elsewhere will be found in the following references: Journal of the Royal Statistical Society, September, 1909; Le Rentier, Paris, 1905, summarized in U. S. Consular Reports, March 23, 1905; Journal de la Societe de Statistique de Paris, April, 1891; Yale Review, November, 1900; Annals American Academy of Political Science, November, 1903; World's Work, December, 1903.

of preserving the so-called balance of trade was amply demonstrated. How great was the magnitude of foreign investment, even after the liquidation of 1893-4, is shown by the following table. The total holdings of leading foreign countries in American securities of all sorts on January 1, 1899, appeared to be as follows:

England	$2,500,000,000
Holland	240,000,000
Germany	200,000,000
Switzerland	75,000,000
France	50,000,000
Rest of Europe	35,000,000

A total of over three billions of dollars appears, mainly consisting of railway stocks and bonds. German holdings, administered by Frankfort bankers at this time have been analyzed even more in detail; as is shown by the next set of figures.

ESTIMATES OF GERMAN HOLDINGS OF AMERICAN SECURITIES.

	Market Value.
Central Pacific	$12,000,000 to $15,000,000
Southern Pacific	15,000,000 17,000,000
Northern Pacific	20,000,000 25,000,000
Missouri Pacific	2,000,000 3,000,000
Union Pacific	2,000,000 3,000,000
California Pacific	3,000,000 4,000,000
Oregon Railroad and Navigation	1,000,000 2,000,000
Erie	2,000,000 3,000,000
Pennsylvania Railroad and Baltimore & Ohio Railroad	1,000,000
Louisville & Nashville	1,000,000
Chicago, Milwaukee & St. Paul	7,000,000 8,000,000
Chicago, Burlington & Quincy	2,000,000 3,000,000
Illinois Central	7,000,000 8,000,000
Rock Island	1,000,000
Denver & Rio Grande	3,000,000 4,000,000
Houston & Texas Central	2,000,000
Pittsburgh, Cincinnati, Chicago & St. Louis	2,000,000
Western New York & Pennsylvania	1,000,000
Total	105,000,000

The phenomenal outbreak of prosperity in the United States in 1898 marks a turning point both in our financial and our transportation history. Within a comparatively few years, a large proportion of our American railway securities were repurchased from abroad. So abruptly in fact was this effected in 1899-1900 that the foreign markets were all but drained dry. The trade balance with Europe was so enormously in our favor, than even by the aid of this expedient, the year 1901 began with a European credit balance in our favor of $200,000,000. Within ten years to 1906, it has been estimated that for nine roads alone not less than $250,000,000 of railway stocks were permanently returned from Europe. How profoundly this change has affected the control of leading systems is shown by the second column of percentages in our preceding table. For each of the five large companies actually controlled abroad in 1890-6, the later proportion of foreign ownership declined to less than 20 per cent.; and in some cases became almost a negligible quantity. Such railways as the Northern and Union Pacific, once largely owned abroad are now entirely domestic corporations. Only a very few, like the Chicago Great Western, are still foreign owned enterprises. The causes of this profoundly important change are several. The predominant one of course was the abounding prosperity of the United States, which so far strengthened us financially and added to our store of capital available for investment, as to render us for the time at least independent of Europe. Another reason probably was the pronounced movement toward consolidation which set in about 1899. Many railways like the Lake Shore and the Burlington were merged in larger systems through exchange of their share capital for collateral trust bonds of the parent companies. These exchanges were offered at most attractive prices for the most part, so that European investors were tempted to part with their bond holdings. Whether as bond holders instead of share holders, they have continued their investments in this country can only be conjectured. But certain movements of foreign exchange, and particularly our somewhat lessened sensitiveness to financial conditions would appear to denote an actually lessened proportional investment even in bonds and other evidences of indebtedness. One point is clear, namely that if it had not been for the opportune reduction of European interest in American railways, many of the consolidations since 1900 could never have been effected. That intimate co-operation of banking houses, insurance companies and railway managers, necessary to the prompt success of such operations would have been impossible prior to 1898.

One of the problems of American bankers of late, has been to stimulate a revival of European investment in our railway securities. The heavy participation of foreigners in the new Pennsylvania issues of 1904 was indicative of a reappearance of interest; but it was mainly confined to already well-established connections. The Harriman boom of 1906, to be sure, witnessed heavy borrowings from Europe in order to finance our speculations, but this was largely done through the creation of floating rather than permanent indebtedness.

A continuance of unfavorable trade balances appears by 1910 to be tending to bring about a recurrence of our financial dependence upon Europe. Such dependence is bound for the most part to assume the form of lodgment of American railway securities in the hands of foreign investors. Failure to interest them in our newer forms of industrial securities has impelled American bankers to turn again to the sale of railway stocks and bonds for relief. In this connection the appeal to the conservative French banking community in 1910 is worth noting. This constituency, traditionally one of the richest in Europe, as appears from our preceding table of international investments, has never been largely interested in the United States as a field for exploitation. Never entirely absorbed in its own local enterprises, it has turned mainly to Russia, Spain, Africa and the Orient for investment of its surplus funds. Conditions, as of 1899, show how ridiculously small, by contrast with its lesser neighbors—Holland and Switzerland—are French holdings of American securities. In 1902 Neymarck in *Le Rentier* estimated that the foreign interests of France aggregated about $5,790,000,000—an amount singularly equal to the national debt at that time. With upwards of four billion dollars placed in other countries of Europe, and $712,000,000 invested in Africa, all the capital lodged in all sorts of North American enterprises amounted to only about $204,000,000. This was less than half the aggregate investment in South America. Tardy recognition by our American financiers of the value of stimulating French interest has at last come. Beside the new Pennsylvania bonds and about $30,000,000 of New York, New Haven & Hartford debentures, successfully placed in Paris, little has been accomplished until 1910. But the chain of French credit banks, rather disheartened perhaps at the course of events in Russia since the Japanese war, has apparently been willing to consider the propositions of our American bankers. And the marked success of the St. Paul road in placing its Pacific coast extension bonds in Paris, is bound to find imitation. The recent placing of $7,500,000 Union Pacific 4's, and also a good sized block of Chesapeake & Ohio bonds still further accentuates the tendency. As yet this interest is mainly confined to bonds, but it is not impossible that French investors may in time learn the lesson, so thoroughly demonstrated to the British, that first class American railway shares, are more secure, and offer greater opportunities for enhancement in value with the course of time, than the bonds of second or third rate, speculative or heavily over-capitalized enterprises. With the heavy excess of our imports over exports, as compared with the period when we were enabled to buy back our railway securities held in Europe, a return to former conditions seems to promise some measure of relief. The trend for the time being at all events is in that direction.

The Public Works Committee of New South Wales has furnished its report on the proposals to construct lines from Forbes to Stockinbingal, from Parkes to Peak hill, and from Tullamore to Tottenham. In each case recommendations were made that it was expedient that the lines should be built

Shop Section.

REMEMBER the Paint Shop Practice competition which closes November 15. We should like to have every paint shop foreman who reads the *Railway Age Gazette*, whether he is a subscriber or not, participate in this competition. An extended announcement of it will be found in the issue of October 6, page 641. A prize of $35 will be given for the best article and one of $20 for the second best. Articles not awarded prizes but accepted for publication will be paid for at our regular rates.

JUDGING from the make-up of the committees which have been appointed to prepare reports for the 1912 convention of the American Railway Tool Foremen's Association, it will prove an even greater success than this year's convention. Reports are being prepared on the following subjects: Milling Cutters and Reamers; Care of Shop Tools; Checking Systems; Treatment of Steel, and Electric Furnaces. Tool room foremen generally should co-operate with the various committees in the preparation of their reports.

ANY one who has ever tried to keep a file of railway supply catalogs will heartily agree with Mr. Maier's communication in this issue. In 1894 the Master Car Builders' Association suggested three standard sizes for pamphlets and trade catalogs. These are: 3½ in. x 6 in.; 6 in. x 9 in. and 9 in. x 12 in. These standards have been adopted by some of the railway supply manufacturers and by the various railway associations who publish their proceedings either in pamphlet or book form. It is necessary to have a catalog file in most of the mechanical department offices of the railways, but it is very doubtful if many of them attempt to keep catalogs which are not of a convenient size; in many cases they are probably consigned to the waste basket. While the railway men will undoubtedly be greatly benefited by the use of standard sizes, the manufacturer and dealer will be benefited far more, and it is strange that they do not realize the importance of conforming to these standards.

NOWHERE are systematic and efficient methods of greater value than in the engine house. The work is so complex, and it is so important that it be handled thoroughly and yet with the least possible delay, that any method which may tend to cut out lost motion or reduce the confusion is worthy of the most careful consideration. Last month we published an article on Systematized Clerical Work at the Engine House, by Charles Maier, in which he presented certain forms or reports which, with a minimum amount of clerical work, would place a large amount of important data in such shape that it could be quickly and conveniently referred to whenever necessary. This month we are fortunate in being able to present an article by Mr. Sheafe, which describes in detail an effective arrangement for an engine house bulletin board and a simple but efficient method of handling the work reports. These methods, which were devised by H. B. Brown, master mechanic of the Illinois Central at Memphis, Tenn., are giving excellent results in the engine house at that place.

THE executive committee of the International Railway General Foremen's Association is hard at work preparing for the 1912 convention. The subject of How Shop Foremen Can Best Promote Efficiency, around which most of the discussion at the 1911 convention centered, but which even then was not exhausted, has been continued. In addition to this, reports are being prepared on Shop Supervision and Local Conditions; Shop Specialization, Work and Tools; Roundhouse Efficiency; The Relation of Tests to Shop Efficiency; The Reclaiming of Scrap, and Shop Arrangement. A determined effort is being made to get all of the reports in hand before the first of the year. This will give the executive committee an opportunity of going over them carefully and publishing them in pamphlet form, so that they will reach the members at least three months in advance of the convention, thus giving them the opportunity of carefully digesting the reports and preparing their discussions. The General Foremen's Association has done good work, but if this plan of the executive committee can be fulfilled and the members will buckle down and work hard to do their part it will do much to enlarge the scope of the association and place it where it rightfully belongs, considering the importance of the field which it covers.

WHEN the strike of the shop employees on the Southern Pacific was called the heads of the Federation had the arrogance to order out the foremen in the motive power and the car departments. The foremen at Los Angeles, Cal., refused to strike, and sent a communication to the local advisory board of the Federation in that city setting forth their reasons. We publish their statement in full on another page, with the names of those who signed it. The loyalty to the company's interest which the foremen displayed, and the spirited, clear and forceful way in which they set forth their reasons for the course they took are deserving of the warmest commendation. At the same time, the attempt made by the leaders of the Federation to cause railway officers to disregard their duty to their superior officers and the company was as deserving of condemnation as were the original demands they made on the roads, the rejection of which led to the strike. At a time when employees will strike and attempt to destroy the public service of the railways because such unreasonable demands as those the shop employees made are rejected, the roads need the greatest loyalty and the best support that their officers in all capacities can give, and the joint letter sent by the shop foremen on the Southern Pacific shows that the road has in them the kind of men who give this sort of loyalty and support. It is largely owing to the fact that the Harriman Lines and the Illinois Central have had subordinate officers in the motive power department who were able clearly to see their duty and were courageous and loyal enough to do it that the shop strike is already practically a thing of the past.

THE first prize of $35 in the competition on the Benefits Derived from Convention Attendance has been awarded to William G. Reyer, general foreman of the Nashville, Chattanooga & St. Louis, Nashville, Tenn. Mr. Reyer is also a member of the executive committee of the International Railway General Foremen's Association. The second prize of $20 was awarded to William Hall, general foreman of the Chicago & Northwestern at Escanaba, Mich., and also a member of the executive committee of the International Railway General Foremen's Association. There were eight other contestants, including C. E. Copp master painter of the Boston & Maine, Lawrence, Mass., who has served four terms as president of the Master Car and Locomotive Painters' Association, and has been very active in the work of its various committees; W. T. Gale, demonstrator, Chicago & Northwestern, Chicago, Ill., and a member of the executive committee of the International Railway General Foremen's Association; H. E. Gamble, smith shop foreman, Pennsylvania Railroad Jumata shops, Altoona, Pa., and second vice-president of the International Railroad Master Blacksmiths' Association; C. C. Leech, foreman of the Pennsylvania Railroad, Buffalo, N. Y.; E. J. McKernan, supervisor of tools, Atchison, Topeka & Santa Fe, Topeka, Kan., and also president of the American Railway Tool Foremen's Association; L. A. North, general foreman locomotive department, Illinois Central, Burnside shops, Chicago, Ill., and fourth vice-president of the International Railway General Foremen's Association; George H. Roberts, machine foreman, Long

Island Railroad, Morris Park, N. Y., and W. W. Scott, general foreman, Cincinnati, Hamilton & Dayton, Indianapolis, Ind., and also a member of the executive committee of the International Railway General Foremen's Association. One other contribution was received from a member of the general manager's staff on an eastern road, who does not wish to have his name used.

THE bulletin boards in engine houses and shops are supposed to be used for advising employees of important matters to which their attention should be drawn. In some cases, as where engine performance sheets are bulletined, it is expected that the information or data will spur the men to make better records. The average report or bulletin which is to be found upon these boards on many roads is so poorly printed that it is hard to see where good results can be obtained. It is not unusual to find carbon copies of reports or instructions posted, which are so indistinct as to be readable only upon the very closest inspection. In many cases mimeograph copies are used which are hardly readable. If the information is worth posting at all it should be prepared neatly and legibly, so as not only to attract the attention of the men, but to set before them an example of neatness and orderliness. How can we expect the workmen to keep their tools or work in a clean and orderly condition with such examples on the part of the management before them? A certain road is spending a large amount of money to properly develop and educate its apprentices. Great care is given in the preparation of the material in the lesson and instruction sheets, but they are printed by such cheap methods that even an editor is sometimes confused as to what is really intended, because of the poor printing. Can this be regarded as a good investment?

ONE of the competitors in the competition on Benefits Derived from Convention Attendance, closes his article with the statement that he cannot understand why we recognize the possibility for a discussion on this subject. Apparently he has not attended many conventions of the foremen, including, for instance, such associations as the General Foremen's, Tool Foremen's, Blacksmith Foremen's and Master Painters'. Foremen, who ordinarily spend all their time in the shop in which they are employed and who more than any others need the experience of visiting other shops and getting in touch with men who hold similar positions on other roads, are usually not encouraged by their superiors to attend conventions. In fact the only way that many of them ever get there is by paying all their own expenses, and, where they work on a day rate basis, losing their wages. Fortunately there are only a few cases in which this latter condition exists. Our purpose in trying to stir up a discussion on the subject was to convince the higher officials of the importance of the conventions and of their value to the railways who have representatives present. One of the most successful mechanical department executives sees to it that each of his foremen are sent once a year, at least, to visit other shops. He has a shrewd way when a foreman or shop superintendent under him puffs up and imagines that he is getting exceptional results of sending him to a larger and more important shop where he [illegible] alizes the motive back of it, but usually comes back to his job feeling that he has still plenty of room in which to make improvements. Nothing is as helpful in spurring a man on and [illegible]

D[illegible] the past year the railways have found it [illegible] to make as possible. The criticism of them by the efficiency engineers and the attention that has been [illegible] the discussion of scientific management has also [illegible] the officers and men in all departments to look more [illegible] into the possibilities of eliminating lost motion and of improving their efficiency. As we near the close of the year 1911 it might be profitable to stop a moment and look backward over some of the accomplishments of the year. Surely there is not a foreman who cannot point to some important improvement which has been made in his department during the year. A prize of $35 will be given for the best article received before December 15 telling of some such improvement which has been made during 1911. It is not necessary that the person who submits the article should have devised the method or scheme which is described, but wherever possible we would suggest that the author try to give full credit to the parties who are responsible for the scheme. In some cases two or three foremen may collaborate in the preparation of an article. It will, of course, be of more value if some concrete idea is given of the results which have been obtained. It may include the description of any improvement that has been made in the shops, engine houses, or repair yards, whether in the organization, in the methods of operation, the rearrangement of equipment, a new device or shop kink, the reclaiming of scrap material, or, in fact, anything which has increased the efficiency or the capacity of the department under consideration. A prize of $20 will be given for the second best article, and such other articles as may be accepted for publication will be paid for at our regular space rates.

EFFICIENT MANAGEMENT.

THE efficiency engineers who attended the meeting at the Franklin Institute, at which Wilson E. Symons presented his paper on The Practical Application of Scientific Management to Railway Operation, could not have been very wide awake or they would have criticized it far more severely. Very few efficiency engineers could agree with Mr. Symons as to his understanding of the term scientific management, for he apparently restricted it to the stop watch, time study, planning department methods, which have been used by Fred W. Taylor and others. There is undoubtedly little question in the minds of many of the efficiency engineers that conditions are such that these methods must be very greatly modified if they are ever successfully to be used in railway work. However, the betterment work on the Santa Fe, which was so severely criticized by Mr. Symons, was based on a far broader conception of scientific management and included not only a detailed study of the various operations and the application of the bonus system, but also investigations into every phase of the work of the mechanical department, including, for instance, the reduction of engine failures, increased efficiency of locomotive service, the re-claiming of scrap, and the more efficient use of materials, as well as of labor. It is a waste of time to discuss the results on the Santa Fe by means of the figures shown in the annual reports, without thoroughly studying all of the conditions on the road during the time that the figures cover. There is a question as to whether any very important gains were made, and many consider that there was a real loss.

One thing, however, must not be lost sight of, and that is that the work on the Santa Fe did much to stir up the mechanical department officers of most of the roads in this country to studying the principles of efficiency. There were many good things in the betterment work. Hundreds of representatives from other roads visited the Santa Fe and went back home and made recommendations as to how certain features might be applied to advantage to their conditions. Whether the Santa Fe lost or gained by the application of the betterment methods there can be no question but what it spurred other roads on to make improvement, the result of which it is impossible to estimate.

Considerable discussion was caused some time ago by data, which was collected by the Interstate Commerce Commission, showing the cost of turning tires in different railway shops. In discussing Mr. Symon's paper Mr. Milner directed attention to the fact that such comparative cost data does not mean much unless it is accompanied by a careful statement of the conditions under which the work is done in each of the shops. He brought out the fact that the labor cost of such operations involves and

is dependent on the volume and regularity of the work which is to be done; the facilities for doing it, including the tool equipment, appliances, etc.; the local wage scale; the class of labor used; the amount of assistance given to the workman in charge, and other conditions under which the operation is performed.

MECHANICAL ARTICLES DURING OCTOBER.

ARTICLES of special interest to our mechanical department readers that have appeared in the weekly issues of the *Railway Age Gazette* since that of October 6, and to which Shop Section readers may wish to refer, are as follows:

Electric Railway Convention. The American Electric Railway Association met at Atlantic City, October 10 to 13. Questions which were discussed, and which are of interest to mechanical department men on steam roads, were, the cost of unloading coal and delivering it to the boiler at stationary plants; the frictional resistance of center plates; the removing of wheels from axles and the mileage of wheels; the education of apprentices; and, standard couplers for interurban service. October 13, page 715.

Electric Lamp Testing Device. A device used on the Western Railway of France for giving electric lamps repeated shocks to test the strength of the metallic filament. October 20, page 774.

Car Heating by Air Pump Exhaust Steam. Description of a device which allows the exhaust steam to be used for heating purposes. It automatically prevents the back pressure in the pump from becoming excessive. October 20, page 776.

A New Journal Box. Description of a box which is practically dust proof and has a new type of cover and dust guard and also an attachment for controlling the lateral motion. October 20, page 777.

The Arrogance of Grand Chief Stone. A secret communication was sent to the members of the Brotherhood of Locomotive Engineers who hold official positions, such as traveling engineers, road foremen of engines, etc., in which they were instructed to perform their usual duties but under no circumstances to take the place or do the work of the strikers. October 27, page 827.

Locomotive Efficiency and Condition Reports. Article by N. D. Ballantine, superintendent of car service, Rock Island Lines, outlining in detail a method for checking the locomotive efficiency and condition by which it should be possible to greatly improve the efficiency of locomotive operation. October 27, page 830.

Swedish Steel. Extract of a paper presented before the New York Railroad Club by A. R. Roy, in which the reasons for the superiority of the Swedish steel are discussed. October 27, page 837.

Improved Smoke Chart. M. E. Wells, assistant master mechanic, Wheeling & Lake Erie, has devised a smoke chart which makes it possible to easily and quickly make locomotive smoke observations and with more accurate results than can be obtained with a Ringleman chart. The way in which the smoke prevention problem is being handled in Cleveland is also described. October 27, page 838.

Automatic Car and Air Coupler. Description of a device which automatically connects both the draw bars and air connections of two cars, and which has been extensively adopted by the Interborough Rapid Transit Company of New York. October 27, page 847.

NEW BOOKS.

Proceedings of the International Railway General Foremen's Association. 125 pages, exclusive of advertising; 6 in. x 9 in. Paper bound. Secretary, L. H. Bryan, Two Harbors, Minn.

The secretary is to be congratulated on the short time which has elapsed between the 6th annual convention, which was held in Chicago the latter part of July, and the publication of the proceedings. The entire time of the convention was given over to the presentation and discussion of a report on How Can Shop Foremen Best Promote Efficiency and the proceedings should be studied by every shop foreman. On account of the convention will be found in the *Railway Age Gazette* of August 4, 1911.

Proceedings of the American Railway Tool Foremen's Association. 108 pages, exclusive of advertising; 6 in. x 9 in. Paper bound. Secretary, M. H. Bray, N. Y. N. H. & H., New Haven, Conn.

Mr. Bray has made a splendid job in getting the proceedings of the third annual convention out so promptly and in a specially neat and attractive form. The most important papers which were presented were, The Equipment of the Railway Tool Room; The Economical Use and Care of Grinding Wheels; Standardization of Steel; Pneumatic Tools and Appliances; The Use of Templets, and Dies for Forging Machines. An account of the convention appeared in the *Railway Age Gazette* of August 4, 1911.

Letters to the Editor.

A LITTLE MORE ON THE SCRAP PROPOSITION.

Buffalo, N. Y., September 15, 1911.

To the Editor of the Railway Age Gazette:

The articles on the reclaiming of scrap material, published in the September Shop Number, were very interesting, some of the results obtained being truly astonishing. The magnitude of the saving to a great system, as described by Mr. Burkhard, had not been thought possible. It is an important and refreshing sample of conservation. We like his way of putting it: "Disposition of everything is made at the scrap platform. It is either *scrap*, or it is *good*." That is the keynote of the problem! We have an iron rack, similar to the one he described, which was constructed entirely of old car sills and round iron rods. It presents a neat appearance and is fully as good as if made of new material. It accommodates sixty varieties of iron and occupies a ground space of 18 ft. x 12 ft.

It is surprising that more papers were not submitted on this subject, which is so full of great possibilities. Perhaps few have any systematic plan for utilizing scrap material, without which the saving is lost in the extra time and labor required. Often when certain kinds of scrap are reported on monthly storehouse lists to be disposed of and the amount reported is for some reason greater than the immediate supply, good material, that would otherwise be reclaimed, is allowed to go into the scrap in order to fill out the desired quantity.

On one occasion an officer at a large division shop would not allow any small pieces of iron to be kept at the iron rack because they spoiled its general appearance; consequently much good iron, in lengths varying from 1 to 2 ft., found its way to the scrap bin. Blacksmiths and iron workers are usually very glad to get hold of short pieces for small jobs, especially where the piece-work system is in operation, as much time is saved by not having to carry in and cut off a long bar. While we would not advocate turning the iron rack and its surroundings into a small edition of the scrap yard, it is certainly advisable, and in the interests of economy, to discriminate in favor of the short pieces and not arbitrarily send all to the scrap.

There are some shops that have a system of handling material whereby if it remains unused or uncalled for, or if a certain percentage of it is not used in a fixed time, it must be eliminated from the stock, either by sending it to other division points where there may be a call for it, which is not often the case, or by consigning it to the scrap. The latter expedient is probably more often resorted to. Often this material is wanted soon after it is disposed of and has to be ordered to fill immediate demands.

Mr. Wolfgang strikes the target square in the centre when he says: "The foreman should know to what series of cars the castings and forgings belong and should have the good scrap sorted out and properly distributed. There will probably be considerable scrap from foreign roads. This should be sorted and all the castings and forgings of the same class should be kept together." An enterprising car repair foreman instituted a small scrap yard and shed on his own account for the care of all good scrap material, especially that of foreign cars, at a convenient point in the repair yard. The result was that repairs were expedited and a foreign car was seldom delayed because of waiting for repair parts. Under our modern system of storeroom accounting and methods of handling and reclaiming scrap material it would be easy to demonstrate the immense saving to the company that undoubtedly resulted from this man's enterprise and foresight.

Mr. Snyder mentions a specially good point—a supervising committee that visits the scrap yard once a week and sorts out and recommends certain material for use. This is more than ever along the line of efficiency, and has been adopted to a certain extent at other shops.

In his explanation of the reclaiming of paint residuum, Mr.

Sheafe gives us something really startling. Who would think that those old paint cans we so often see decorating a pile of tin scrap held such valuable possibilities, and that when submitted to proper treatment and their contents combined with raw oil could be coaxed to give a saving of 39½ cents a gallon over the cost of new paint—and have a much better article at that. These articles have brought out a great many valuable suggestions and methods and should be the means of great saving if put in practice either entire or in part.

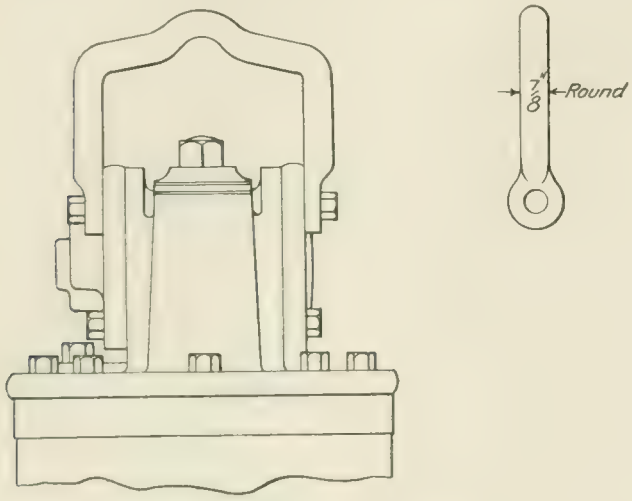
C. C. LEECH,
Foreman, Pennsylvania Railroad.

YOKE FOR LIFTING AIR PUMPS.

Corbin, Ky., October 10, 1911.

To the Editor of the Railway Age Gazette:

In reading over the description of the yoke for lifting air pumps, in your October 6 issue, I thought you might be interested in a yoke we use for the same purpose. It is made of ⅞-in. round iron, which is flattened at the ends for the bolt



Yoke for Lifting Air Pumps.

holes and is bent at the top to receive the hoisting hook. It is attached to the upper front main valve cylinder head bolts, the nuts being left loose so as to relieve any strain while lifting. The weight is well balanced and the device has given splendid results.

J. A. JESSON,
Louisville & Nashville.

TRADE CATALOGS.

Atlantic City, N. J., October 13, 1911.

To the Editor of the Railway Age Gazette:

There is one part of the railway supply business that is open to improvement, and when the improvement is made both the buyer and seller will be benefited. When a new machine or tool is needed, unless there is some special reason for getting a particular make, it is generally necessary to study over the [illegible] catalogs. Or, on the other hand, a catalog may suggest the necessity of a tool. However, to cover the field of railway [illegible] properly a large number of catalogs and descriptive pamphlets must be kept on hand. As [illegible] each concern seems to aim to have a size of its own and anyone that has tried to keep a file of catalogs realizes what an inconvenience it is. To illustrate: We have 175 catalogs and pamphlets on file ranging in size from 3 in. x 4½ in. to 10½ in. x 14½ in. There are 40 different sizes, and only 67 of the catalogs are of the M. C. B. standard size. I suppose it would be impossible to get the various railway supply concerns to get together and agree on certain standard sizes for their catalogs and pamphlets. However, if the various associations of railway officers adopted the M. C. B. standard size of catalog and then requested the members to refuse to keep on file any catalog that was not a standard size, it would probably have the desired effect. By allowing a suitable length of time to pass before this was put into effect, there would be no injustice done to anyone, and in the end all would be benefited.

CHAS. MAIER,
Engine House Foreman, West Jersey & Seashore.

BENEFITS DERIVED FROM THE GENERAL FOREMEN'S CONVENTION.*

BY WM. G. REYER,†
General Foreman, Nashville, Chattanooga & St. Louis, Nashville, Tenn.

In the Spring of 1909 a supplyman visited our shops and inquired if I expected to attend the General Foremen's convention at Chicago in June. He was a good talker and soon proved to me that it would be to the company's interest, as well as my own, to attend. The management of the road kindly allowed me to go. That convention was an eye-opener to me; it was a great privilege to get in touch with other men's ideas and methods, some of which proved a great help to me. I thought that I would like to tell them of some of the things we were doing in our shops, but after hearing what they had to say, I felt so insignificant that I would have liked to have crawled off into a hole. It set me to thinking, for I felt that I was a back number.

I confess that I came away from the convention with a determination to wake up and see if I could not get the same results that the other foremen were getting, and during the next year I made some changes which helped in the output. Our next convention was held in Cincinnati; I was a good listener and noted what the others had to say. One speaker in particular explained how he handled his department and the number of engines it turned out monthly. At the time it seemed impossible to me, and I arose and said: "I'm from Missouri; you will have to show me." His answer was: "Come up and see me and I will take pleasure in doing so." I went and found conditions just as he had explained; he certainly was pushing things. I made notes of such improvements as would benefit our shops.

On my way home I stopped at another thoroughly up-to-date railway shop and gained additional information. I saw so many good things that I hardly knew where to start taking notes. I worked early and late and it was a splendid schooling for me. On my return home I reported what I had seen to my superintendent and asked to be allowed another and more extended trip, which was cheerfully granted. This eagerness to see and ambition to learn of the improvements of others was the result of attending the General Foremen's conventions. I am sure that if other general foremen could personally see and know of the important changes I have made, they would not hesitate, but would be eager to attend the next convention, and it will surely wake them up.

At our last convention the subjects discussed were of interest to all foremen, and I not only listened, but had something to say. I was anxious to have the large assembly know of the benefits I had derived from the former meetings and of the improvements I had made, which had resulted in a large increase in shop output. A good friend of mine, a supplyman, overheard a conversation between two foremen, who seemed to doubt my figures. He entered into the conversation and told them that the figures were correct, as he had recently visited our shops and that "seeing was believing."

I am sure that anyone who attends the conventions and takes the proper interest cannot fail to be greatly benefited. He must be in the convention hall on time, listen attentively to what is said, make notes, and after the meetings take in the exhibits. I find there are many valuable points to be had from the supply men, and they are given willingly and cheerfully. Of course we all enjoy the social side of the conventions, but we should not neglect the business side, and must keep in mind that business comes before pleasure.

* Awarded the first prize of $50 in the competition which closed October 15, 1911.

† Mr. Reyer is a member of the executive committee of the International Railway General Foremen's Association.

I have been benefited by attending the conventions in the following ways: The handling and treatment of men; the different ways of doing machine work; how to handle engines at terminals; and by the addresses we have the pleasure of listening to. We have increased our output about 33⅓ per cent.

These are the things that make a man think, and when you get men to think you are sure to get results. I firmly believe that if every railway in the country would send representatives to the different conventions and demand written reports from them, they would soon see the benefit. A foreman may make a statement before the convention that he can do a certain piece of work in a given time; you may find that he is doing better than you are, and my plan is to ask just how he handles the work. If you get into conversation with him afterward and keep drawing him out, you will often be well paid. There are many men who are backward on the floor, but who have splendid ideas and ways of doing things. I only wish that there had been a General Foremen's convention twenty years ago, and hope this may lead some who have not as yet attended a convention to go to the next one.

EFFICIENT ENGINE HOUSE METHODS.

BY J. S. SHEAFE,

Engineer of Tests, Illinois Central.

Engine house work is so complex and so much depends on its being handled promptly that to secure the greatest efficiency it is necessary to thoroughly systematize and simplify the methods

Fig. 1—Engine House Bulletin Board.

which are used. H. B. Brown, master mechanic of the Illinois Central at Memphis, Tenn., has perfected a simple and effective system which differs greatly from the methods ordinarily used. It has resulted in a great saving of time, the easy placing of responsibility and has also eliminated a certain amount of confusion which is found in the average engine house.

Bulletin Board.—The first step was to replace the ordinary bulletin board, whose chalk marks are not always legible, by a rack arranged to show the same and considerable additional information in a clear and comprehensive manner. A general view of this bulletin board, or rack, is shown in Fig. 1, and a small portion of it is shown in detail in Fig. 2. The rack is about 6

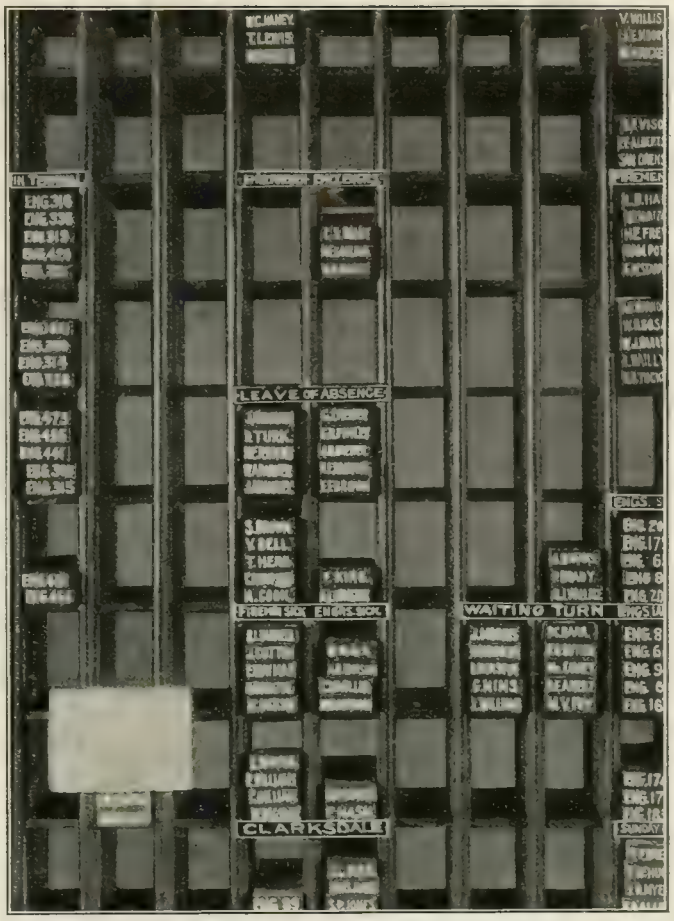


Fig. 2—Partial View of the Bulletin Board.

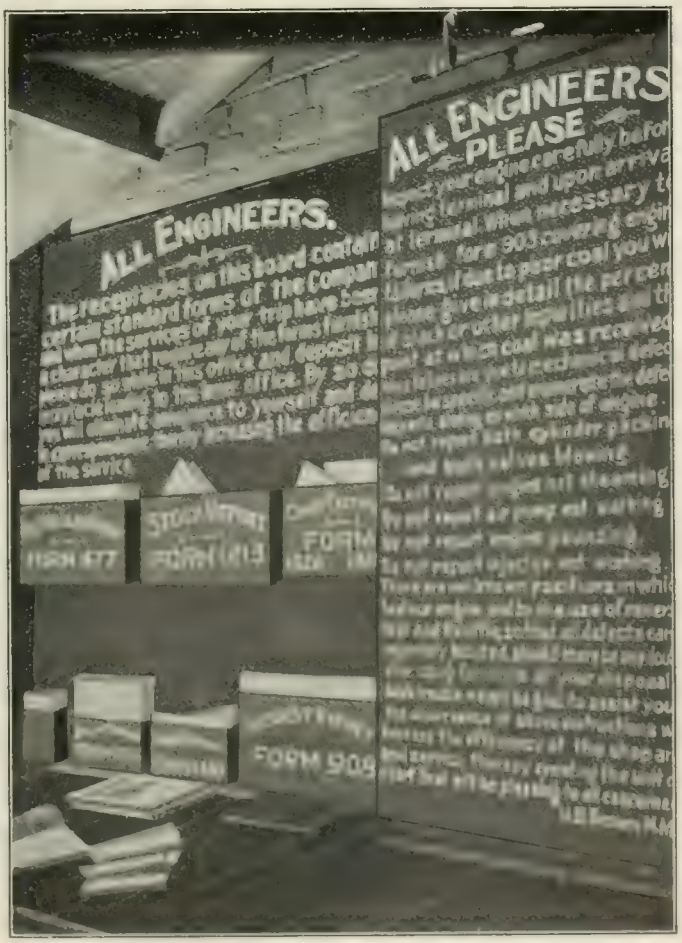


Fig. 3—A Corner of the Engineers' Room in the Engine House.

ft. high and 4 ft. wide, and takes the place of a portion of the wall between the foreman's office and the outer room. It is fitted against a large plate glass which prevents any tampering from the outside. The engine numbers, run numbers, times and the names of the engineers and fireman are placed on the ends of ¼ in. x 1½ in. x 4 in. blocks as shown, the same information appearing on both ends. On the sides of the engineers' and firemen's blocks are shown their addresses, phone numbers, promotions, discipline, etc. In the same way data for each engine is shown on the body of the block containing its number. The rack is divided into different divisions or districts, and each of these is subdivided into sections to show the names of the engineers on the road, engineers waiting turn, engineers off duty, extra engineers, and engineers in the terminal; similar subdivisions are provided for the firemen.

In making up a train the foreman places the blocks in the proper pigeon hole in the subdivision of the rack for the district upon which the run is to be made, showing the train number, time, engine, engineer and fireman. The board can, of course, be read from either side, and it is interesting to watch the smooth and quiet way in which it is operated. Other important advantages are its orderliness and cleanliness. The enginemen can easily note their calls, and after consulting the post office pass on without confusion. Twenty-six pigeon holes at the lower left-hand corner of the board are marked with the letters of the alphabet, and are used as a post office.

Engineers' Report Desk.—The arrangement of the desk in the engineers' room is worthy of notice, and is shown in Fig. 3. Here may be found all of the standard forms which are required for reporting a trip, and also instructions for making out the work reports. Mr. Brown believes in constantly reminding the engineers that it is important that the work should be properly reported and that they should accurately locate the trouble and not leave it to be determined by a hurried engine house force. With this in mind he has had a number of "reminders" neatly printed and prominently posted, so that they will be read and followed. The engineer after making out his work report on an individual sheet folds it and drops it through a slot in the partition; it is deposited on a desk in a part of the foreman's office which is used for the handling of work reports and is in charge of a clerk.

Work Reports.—The engineer's report is dropped through a slot, which is shown at the right in Fig. 4. The clerk classifies the work, using separate slips for each job and drops them into the proper slots at his left. When no work is reported, an O. K. slip is handled in the same manner. At the extreme left in the illustration is a rack in which a space is provided for each engine. The work reports are filed in this case and are held for a time, after which they are filed for permanent record. The boxes into which the work slips fall, after they are dropped into the slots, are shown in Fig. 5. They are so arranged that the man in charge of each class of work can readily get the work slips and see just what work is to be done on each of the engines in the house. When the work is completed the slips are promptly

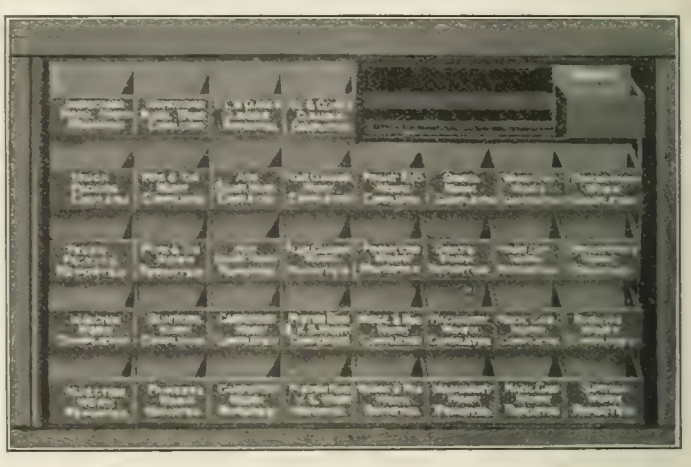


Fig. 5—Rack for Distribution of Engine House Work Reports.

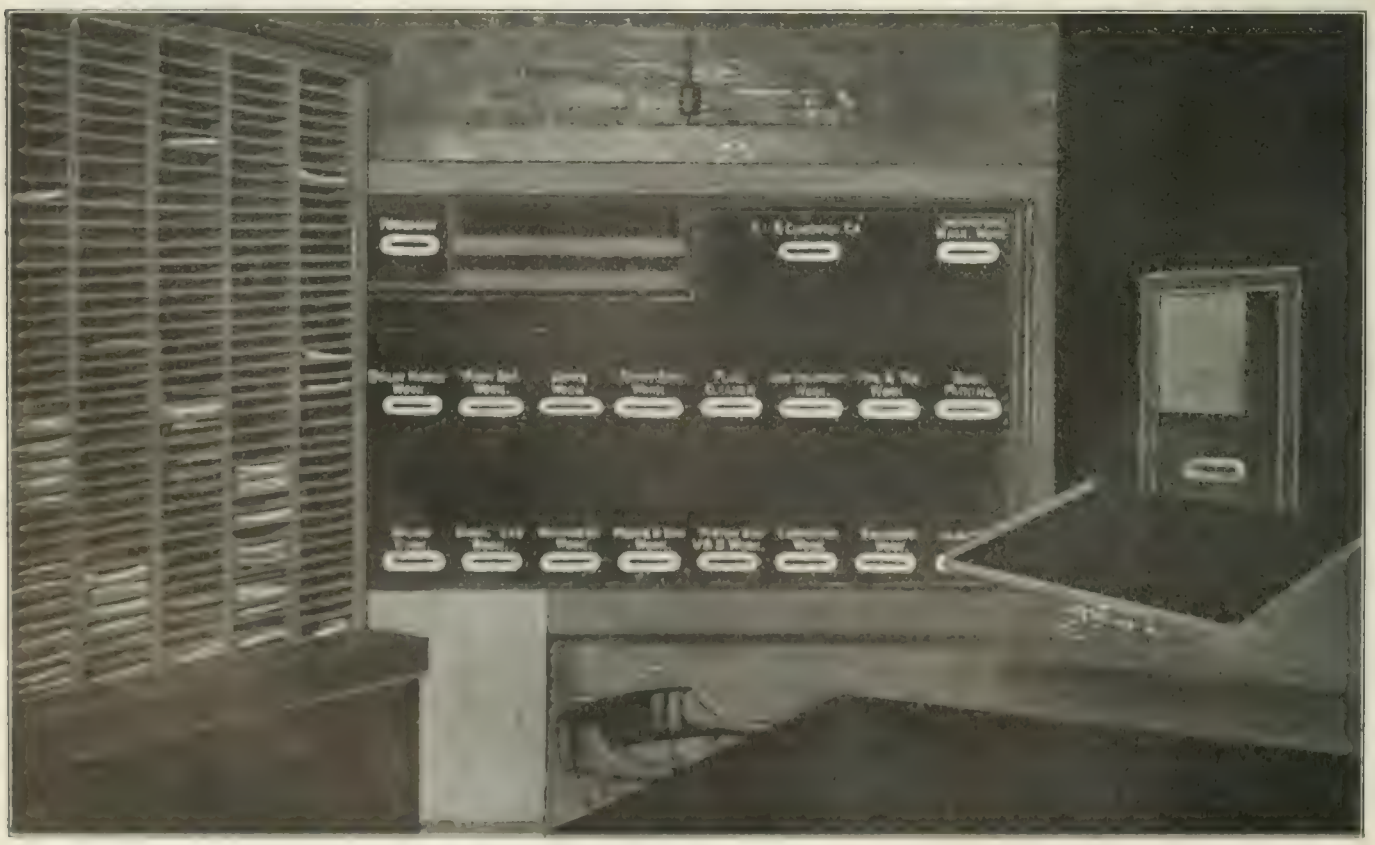


Fig. 4—Office Where Work Reports Are Handled.

signed and slipped back through a slot into the office, where they are recorded.

To the right of the boxes, which are shown in Fig. 5, is a blackboard, Fig. 6, which shows at a glance the progress of the work on all engines, the location of the engines, etc. The following symbols are used in recording information on this board:

O means no work reported.
/ means work underway.
X means work completed.

For instance, engine 701 is on pit 6 and came in at 5.05. No work was reported on the front end or air equipment. The

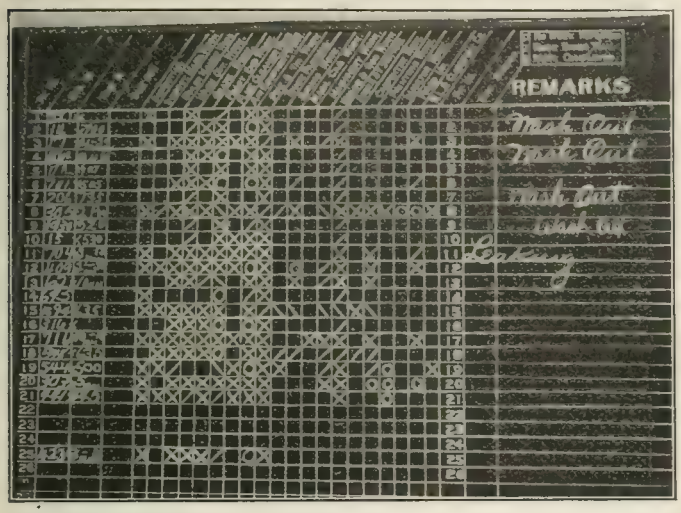


Fig. 6—Bulletin Board Showing the Condition of All Engines in the Engine House.

spring work, wedge and rod work are under way and the locomotive is also being fired up.

Since the installation of this system at Memphis there is less confusion and no difficulty has been found in quickly locating any information which may be required. Not only has it met with the approval of the officers, but the men also like it. The initial cost of the equipment is trifling as compared with the benefits which have resulted from its use.

BENEFITS DERIVED FROM THE GENERAL FOREMEN'S CONVENTION.*

BY L. A. NORTH,†

General Foreman Locomotive Department, Illinois Central, Burnside Shops, Chicago, Ill.

In the first place, a great deal of practical knowledge may be obtained by the interchange of ideas with the men with whom you come in contact at a meeting of this kind, where a large number of roads are represented. Few men have the same opinions or the same methods of handling either labor or material. Difficulties can be talked over and remedies suggested for the various troubles that are a part of any shop organization. Good is bound to come from this interchange of ideas.

Where men are pinned down to one shop day in and day out, unless they are very progressive and ambitious, it has a tendency to make them get in a rut. In order to handle the work properly and keep the expense down as low as possible, or in other words get the best results for the money expended, it is necessary for them to know of the latest, most modern and most up-to-date methods. While the mechanical papers are a great benefit, I believe that with the aid of the conventions there is a stronger tendency to improve the capacity and to broaden the ideas of the members. The exhibits offer an excellent opportunity to learn of the improvements in tool equipment, which are demonstrated by the actual machine. With the machine in operation the men are better able to judge what class of work it is best adapted for in their shops. It also has a tendency to suggest ways in which old machines may be changed to handle the work to a better advantage. Working models of various devices also demonstrate their operation and advantages more clearly than is possible by any catalog or printed matter.

*Entered in the competition which closed October 15, 1911.

†Mr. North is fourth vice-president of the International Railway General Foremen's Association.

THE BRICK ARCH AND THE MALLET LOCOMOTIVE.

In August and September, 1910, an extensive series of tests was made on the New York Central & Hudson River of a 2-6-6-2 type superheater Mallet locomotive equipped both with and without a fire brick arch. The locomotive, which was described in the *Railway Age Gazette* of April 1, 1910, page 889, has 57 in. drivers, 20½ in. and 33 in. x 32 in. cylinders and carries 210 lbs. boiler pressure. It has a total heating surface, including the superheater, of 3,953.7 sq. ft., and a grate area of 56.5 sq. ft.

The tests were made between Tobert, Pa., and Stokesdale Junction, a distance of 59.83 miles and were confined to the north bound movement. There is an ascending grade, with the exception of 4½ miles of level track distributed over six places, and 1.19 miles of descending grade, which occurs at two points. The tests were operated under the personal direction of a committee of three, composed of one representative each from the New York Central & Hudson River, Pennsylvania Railroad, and the American Locomotive Company.

Conclusion No. 5 in the committee's report reads as follows: "The data in reference to the performance of the boiler with and without fire brick warrants the conclusion that the application of fire brick to this type of locomotive, using this grade of fuel, might be expected to result in a saving of about 11 per cent. Against this it should be borne in mind that the superheater flues must be blown out at regular intervals and that the brick arch interferes to some extent with this operation. Also, that boiler repairs to all tubes are to some extent interfered with by the brick arch." These objections, however, are not at all serious, for with the Security type of brick arch, which was used, it is a comparatively simple matter to remove and replace any part of the arch in order to work on the ends of the flues or the flue sheet.

Six tests were made with the brick arch in place, an average of 25,595-ton miles being obtained per ton of coal. In five tests without the brick arch an average of 21,899-ton miles were obtained per ton of coal, or, in other words, there was an increase of 16.8 per cent. in ton miles per ton of coal due to the installation of the brick arch. This percentage should have been somewhat greater, because in the test without the brick arch the two arch tubes were in place, thus adding to the heating surface of the boiler and improving the circulation.

The average equivalent evaporation per pound of dry coal for the six tests with the brick arch was 9.65 as compared to 8.47 for the five tests without the brick arch. The installation of the brick arch, therefore, resulted in an improvement of 13.9 per cent. in this respect. The average thermal efficiency without the brick arch was 58.56 per cent., as compared to 67.66 per cent. with the brick arch, an increase in efficiency due to the brick arch of about 15.5 per cent. The greater percentage of increase of the thermal efficiency as compared with the equivalent evaporation per pound of dry coal is doubtless due to the fact that the brick arch is responsible for a higher degree of superheat.

The electrical power developed at Niagara Falls, according to a paper read before the American Electrochemical Society by A. J. Jones, is estimated at 275,000 h. p., or about 5.5 per cent. of the available power of the cataract. The seven hydro-electro stations furnish 128,000 h. p. for hydrochemical purposes; 56,000 h. p. for railway service; 36,000 h. p. for lighting and 55,000 h. p. for various industrial purposes.

CARE OF BELTS.

BY C. J. MORRISON.*

One of the large items of expense in a shop receives, as a rule, very little attention and that attention is usually given by an unskilled laborer. This item is the belting. The expense is caused not only by the outlay for belting and supplies, but also by the delays caused by belt failures. It is a common sight in many shops to see high priced mechanics standing idle waiting for a belt to be repaired. As any waste is contrary to the principles of effective organization it is essential that the belting be given proper attention. One of the first requirements is to secure the best quality of belting. A few years ago it was necessary to purchase belting according to rigid specifications, but the manufacturers have recently adopted standard specifications, and belting of the best brand, made by any of the reputable manufac-

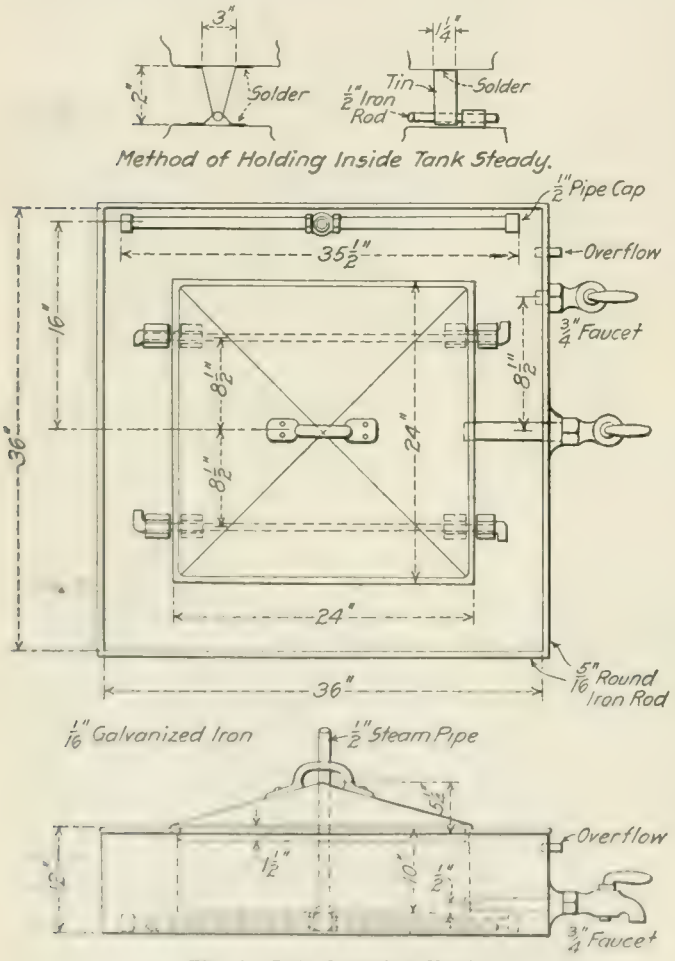


Fig. 1—Belt Greasing Tank.

turers, may be depended upon. Under no circumstances should a riveted belt be used. Exhaustive tests have proved that the rivet holes simply weaken the belt. Rivets may therefore be taken as a sign of poor belting.

BELT REPAIR EQUIPMENT.

The following methods apply to shops having between 1,000 and 3,000 belts. For other conditions the plans will have to be modified. There should be a regular belt repair room, fitted up with a complete outfit for caring for and repairing belts. This room should be about 13 ft. x 50 ft., centrally located, well lighted and locked at all times to prevent the belting from being stolen. The width of the room may vary considerably, but the length is important as it is necessary to be able to stretch out the belts. At one corner of the room a rack 3 ft. wide and 6 ft. high should be built for storing second-hand belting after it is repaired. A regular work bench 18 in. x 33 ft. should run along the side of the room which has the better light. Opposite this table, about 10 ft. from the belt rack and 6 ft. from the table a belt lacing machine should be located. Just back of the machine, and within easy reach of the operator, should be placed a rack with six spaces for the wire and twelve boxes for the needles. Each space for wire should be partitioned into two divisions; one for right hand coiled and one for left hand coiled wire. On the far

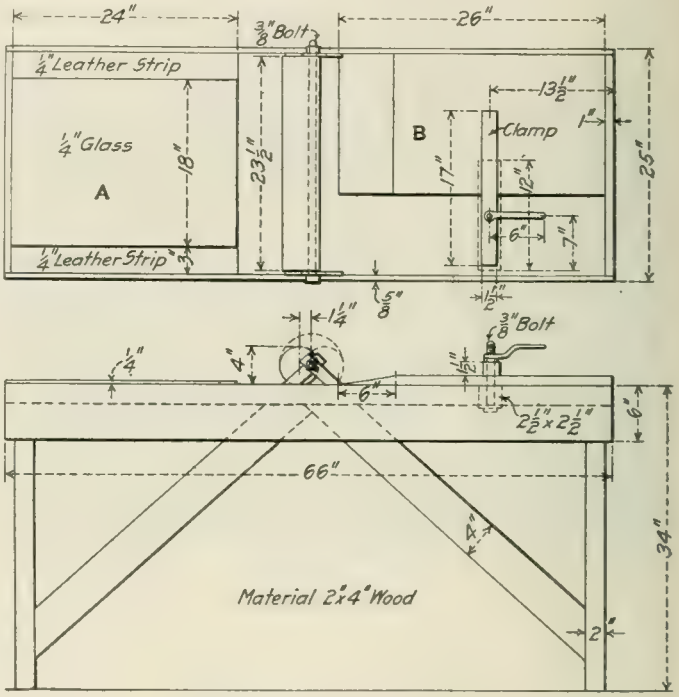


Fig. 2—Belt Repair Bench.

end of the bench a heavy letter press should be fastened, and just beyond the bench, on supports to bring it up to the height of the bench, should be located a double tank for the belt dressing and for heating the glue, Fig. 1. This tank should be connected with a steam line for heating the water. At the far end of the room the gasoline tank for cleaning the belts should be placed. Opposite the press and about in the center of the room a belt repair table, 2 ft. x 5½ ft., Fig. 2, should be placed. A rack, 16 in. x 7 ft., for holding inserts or take-up pieces should

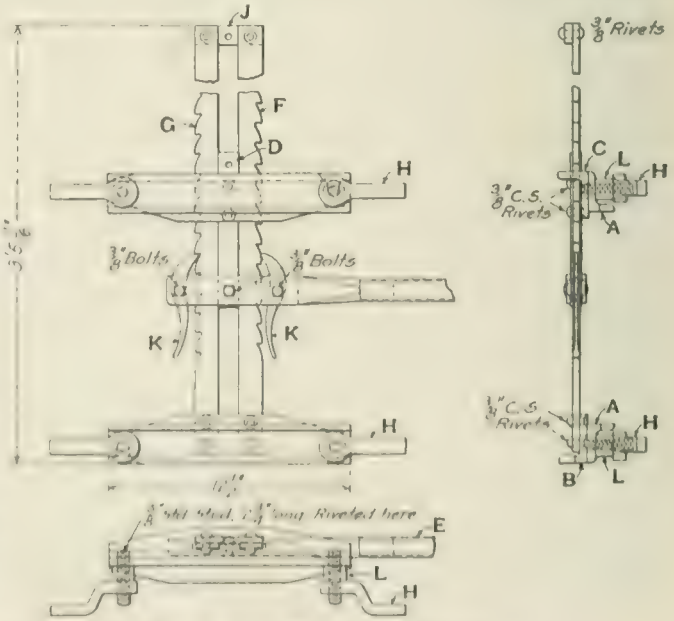


Fig. 3—Belt Clamp and Stretcher.

*Manager Department of Efficiency Organization, Sullens & Son, New York.

stand near the door. This rack should be divided into pigeon holes 1 in., 2 in., 3 in., 4 in., 5 in., and 6 in. deep respectively, and 1½ in. to 8 in. wide to hold the different size inserts. The remaining spaces along the sides of the room may be used for storing clamps and tools and belts waiting for repairs. Following is a complete list of the necessary tools:

1—12-in. Jackson belt lacing-machine.
6—Boxes of each size of wire.
1000—Rawhide pins, assorted sizes, Nos. 3, 4, 5, and 6. Use nothing else in lace.
6—Doz. of each size of needle.
2—No. 3 Bailey smoothing planers, 1¾-in. cutter.
1—Half moon harness knife.
1—Carpenters' marking gage.
1—One hundred ft. steel tape.
2—Pair Bernards 6-in. cutting pliers.
3—Pair 5-in. flat nose pliers. These pliers are used for turning under the ends of the wire.
1—Oil stone, 1 in. x 2 in. x 8 in.
2—7-in. carpenter's try squares.
1—14-in. carpenter's try squares.
3—Three cornered belt scrapers (Home made).
3—Flat cornered belt scrapers (Home made).
2—Hand belt punchers, 3/32-in. tube.
2—Sets Kerr's belt lacing outfit.
6—Boxes Kerr's metallic lacing outfit, No. 1.
6—Boxes Kerr's metallic lacing outfit, No. 2.
6—Boxes Kerr's metallic lacing outfit, No. 0.
2—6-in. scratch alls.
1—Large book press, 18 in. x 24 in.
12—14-in. hand clamps.
6—6-in. hand clamps.
1—Gal. glue bucket. Double-water outside and glue inside.
3—Sets of clamps and rods for pulling on belts. 10-in., 16-in., 24-in.
1—Gasoline tank, 3 ft. x 3 ft. x 1 ft.
1—Hot water tank, 3 ft. x 3 ft. x 1 ft.
1—Oil tank, 2 ft. x 2 ft. x 10 in. (To set inside water tank.)
1—Dietz inspector's lantern.
2—12-in. monkey wrenches.
2—14-in. alligator wrenches.
3—Wood straight edges. 3 ft., 6 ft. and 12 in. long x 3 in. wide and ½-in. thick.
1—Belt bench,* 5 ft. x 2 ft. 8 in. (Fig. 2.)
1—Wheelbarrow.
3—Oval punches, No. 10.
1—Shoe maker's hammer.
2—Belt stretchers,† one 5-in. and one 10-in. (Figs. 3 and 4.)
6—Belt clamps for holding splices, two 4-in., two 7-in., two 10-in. (Fig. 5.)

Belt Dressing.—The belt dressing should contain equal parts by weight of a good quality of fish oil and tallow. It is mixed hot in the double tank and a belt is either immersed in the tank, or the dressing is applied with a brush. All surplus dressing, which does not go into the belt, must be carefully wiped off, otherwise it will cause the belt to slip. A belt that is kept pliable and soft with this dressing will give the maximum pull without slip.

Glue.—After many experiments with all kinds of glue the following has been found to be the strongest, most reliable, and the easiest to use. To one gallon of melted cabinet glue, add one pint of the best gasoline. Mix while the glue is hot and apply to the belts while hot and at the consistency of a thin syrup.

BELT RECORDS.

The total cost of maintaining belts, including labor, supplies, and belting should be between 10 and 25 per cent. per year of the

*This table is very useful in repairing second-hand and damaged belting. The cylinder in the center is of hard wood and as it is pivoted 1¼ in. off center, all that is necessary is to shove the belt under it and the pull on the belt tightens it. *A* is a piece of glass inserted in the table to make a smooth working surface, and something that will not be cut up with a scraper. This end of the table is used principally for scraping off old glue and for trimming the ends of the belts. *B* on the other side of the roller is a piece of hard wood, raised about 1¼ in. above the table in order to permit the operator to use a plane without striking his elbow on the roller. This end of the table is used for dressing down splices preparatory to gluing. The roller will clamp a belt for either end of the table by simply reversing it over the center.

†This is the best device of the kind. With one of these stretchers one man can stretch an 8-in. double belt on the pulleys in ten minutes.

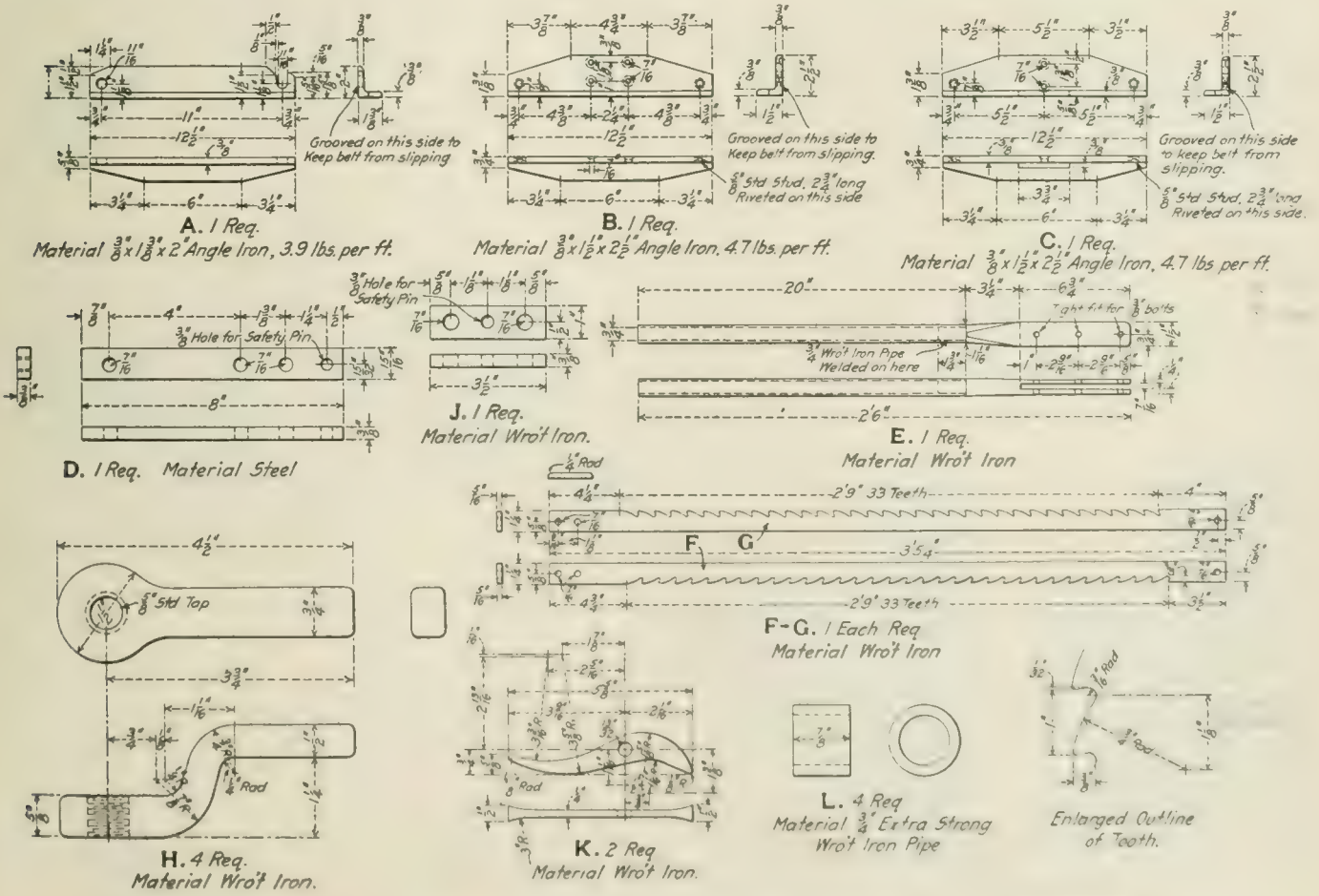

A. 1 Req.
Material ⅜"x1⅜"x2" Angle Iron, 3.9 lbs. per ft.
Grooved on this side to Keep belt from slipping
B. 1 Req.
Material ⅜"x1½"x2½" Angle Iron, 4.7 lbs. per ft.
⅝" Std Stud, 2¾" long Riveted on this side
C. 1 Req.
Material ⅜"x1½"x2½" Angle Iron, 4.7 lbs. per ft.
D. 1 Req. Material Steel
J. 1 Req.
Material Wro't Iron.
E. 1 Req.
Material Wro't Iron
F-G. 1 Each Req
Material Wro't Iron
H. 4 Req.
Material Wro't Iron.
K. 2 Req
Material Wro't Iron.
L. 4 Req
Material ¾" Extra Strong Wro't Iron Pipe
Enlarged Outline of Tooth.

Fig. 4—Details of Belt Clamp and Stretcher.

inventoried value of the belting when new. The belt failures should not be more than two to every 100 belts per month; no main drive belt should ever be allowed to fail, and no delay of over 10 minutes due to any failure should be tolerated. These results cannot be obtained by haphazard methods. In a shop running 1,000 or more belts there should be a regular foreman to keep the records and direct the work. He can also take charge of the oiling and abrasive wheels, and, in some instances, can also supervise the sweepers. A record should be kept of every belt on a card similar to the one shown in Fig. 6, and, in addition, a tickler should be maintained to show when certain

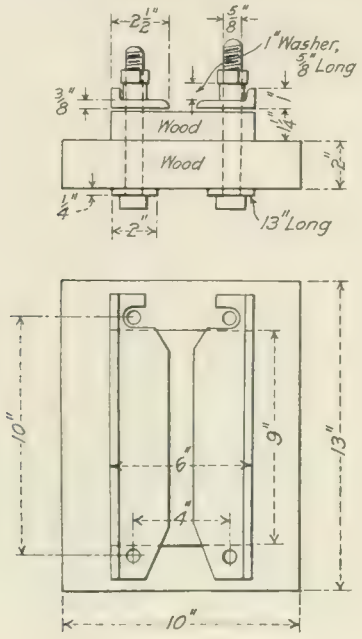


Fig. 5—Belt Splicer.

belts will probably need attention. However, the workmen must be encouraged to report the condition of belts; a daily round should be made to receive such reports, and, in addition, a pad and pencil should be hung at the belt room door where reports on belt conditions may be recorded. All regular repair work should be done at night.

MISCELLANEOUS RULES.

It would not be practical to change over the entire belting equipment in a plant at one time to bring it in accord with the most effective methods, but as belts are repaired and renewed they should be made to conform to the standard practice. When belts are taken down they must be measured and the exact length for a fit recorded on the cards. New belts should be ordered 6 in. shorter than the length for a fit and be put up with a 6 in. take-up piece in them. When ordering a belt for which the taped length, but not the length for a fit, is known, make the belt 1 in. shorter for each 10 ft. of length than the tape measured length over the pulleys. A steel tape should always be used. The proper initial tension for a belt at rest is 100 lbs. per sq. in. of cross section, but it is seldom practical to measure this tension. No belt should be run tighter than is necessary to pull the maximum load imposed upon it.

In figuring the size of belt allow 80 sq. ft. of double belt, or 160 sq. ft. of single belt, to pass over the pulleys per minute. This figure is more liberal than is often allowed, but has been found to be the best when viewed from all standpoints. Belts should not be run over 5,000 ft. per minute. The most effective speed is about 3,000 ft. per minute. Use pulleys 25 per cent. wider than the belts. Pulleys should be crowned for belts that do not shift upon their face, and straight for shifting belts. That is, in the case of a drive from a line-shaft to a countershaft with a tight and a loose pulley, the pulley on the line-shaft should have a straight face, while the tight and loose pulleys should have crown faces.

Belts which have become greasy and dirty should be cleaned with gasoline; then scraped, wiped with waste, and treated with the mixture of fish oil and tallow. No other dressing, rosin, or dope of any sort should be used on the belts. Belts running in dusty places should be occasionally brushed off.

Double belts should not be run on pulleys less than 6 in. in diameter and triple belts on pulleys less than 20 in. in diameter. Very short drives should be avoided. Wherever possible run belts so that they will sag on to and not away from the pulleys. Run single belts with the hair side (dressed side) next to the pulley. The feather edge of the splice should be away from pulley towards which it runs.

All machines furnished with any means of taking up the stretch should have endless belts. Large overhead drive belts (over 6 in. wide) should be made endless as soon as the stretch is taken out. It is not advisable to make new belts endless at the installation because of the stretching. Wood-working machinery having belts which do not require too frequent tightening will run better with endless than laced belts; side and bottom head belts on planers, matchers, etc., should be run endless. Belts should never be run twisted or cross-stepped on cones.

No mineral oil should be allowed to come in contact with the belts. New belts should be treated with the dressing of fish oil and tallow before using, and any belt which becomes dry, hard and glossy in service should have an application of the dressing. Belts in blacksmith shops should be closely watched. The dressing will check, to a large extent, the evil effects of the smoke, sulphurous gases, and dirt, and the life of the belt will thereby

BELT RECORD CARD

Width: _____
Thickness: _____
Length: _____

Shop: _____
Machine: _____
Position: _____

Requisition issued: _____
Requisition filled: _____

Purchased from: _____
Cost: _____

Scrapped: _____
Scrap value: _____

Max. Speed: _____
Max. Power: _____
Max. Tension: _____
Splices _____

INTERRUPTIONS

REMARKS

DATES	MAINTENANCE	DATES	CAUSE	
	Put on by			
	Tightened, ins. taken up			
	" "			
	" "			

Fig. 6—Belt Record Card.

be lengthened. Keep pulleys clean and avoid having mineral oil or grease come in contact with the belts. If hard grease or dirt is allowed to pile up in the corners of the cones so as to form a fillet, the belt will be very likely to climb, turn over or twist. In turning faces of cones a clearance should be cut in the corners.

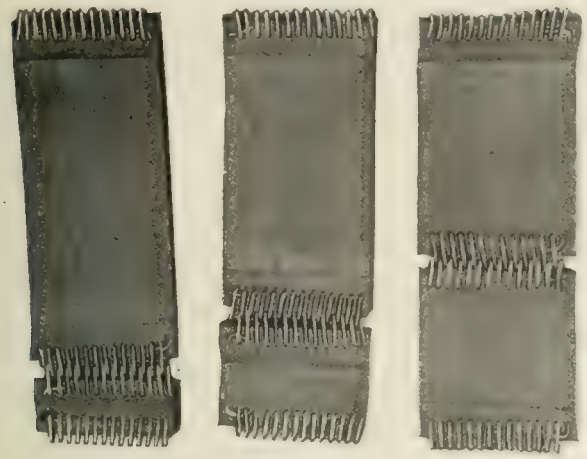


Fig. 7—A Series of Take-up Pieces.

In throwing belts onto pulleys, first put the belt on the driven pulley (loose if there is one) and then run it onto the driving pulley. Avoid accidents by stopping the motor or engine and then run the belt on while starting slowly. Care should be taken never to run a belt off a moving pulley onto some part of the shafting or the machinery on which it may catch. If it is necessary to cut a belt down, care should be taken not to waste the leather.

A belt should never be dampened in order to open a splice. An awl should be used, gradually scratching or ripping the splice apart. It is good practice to remove the tension from belts by lifting idlers, running off of pulleys, or removing from the machine when convenient at quitting time. All cone and other machine belts should be run off of pulleys at quitting time on Saturdays.

KIND OF LACE TO USE.

For general service, the machine lace should be used and new belts should have a 6-in. take-up piece put in them to permit

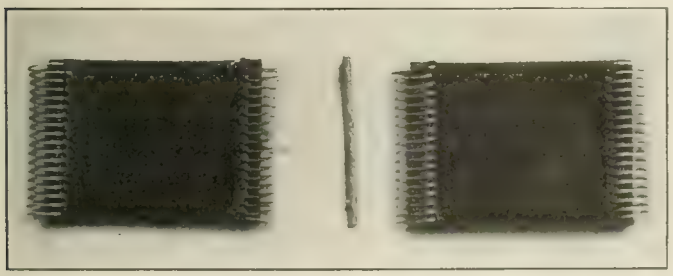


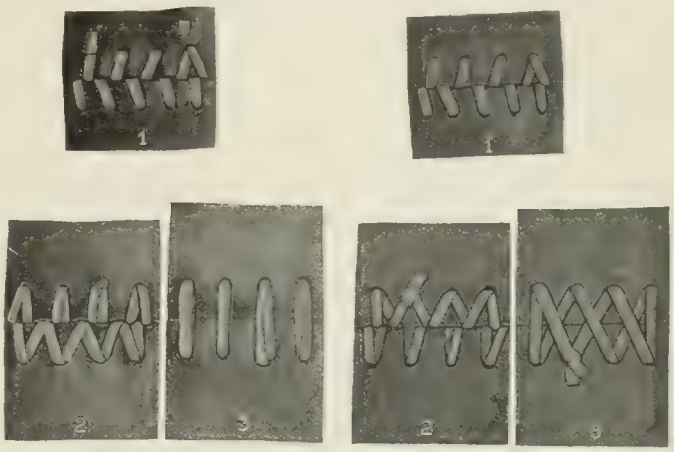
Fig. 8—Two Take-up Pieces and Rawhide Connection Pin.

tightening of the belt by putting in a shorter piece and thus avoiding the need of taking the entire belt down. Belts with the machine lace should have a take-up piece in them at all times. Pieces should be kept in stock in sufficient numbers to avoid the necessity of making one in an emergency.

The lengths should be 6 in., 5 in., 4 in., 3 in., 2 in., and 1 in. (Figs. 7 and 8). The hand-wire lace may be used to hold very thick belts and small feed belts which the machine lace will not accommodate. The rawhide lace may be found by trial to give better service on some wood-working machines than either the Jackson or Kerr laces, but it is generally best to make the belt endless if neither the hand wire nor the machine laces give satisfaction.

MACHINE LACE.

Follow instructions accompanying the machine carefully. Be sure to use a needle of the size specified for the belt which is to be laced. Too small a needle will stall while too large a one will be spoiled by forcing through the rolls. Clamp the belt lightly at first and tighter if the needle sticks. Under no circumstances should the two set blocks in front of the roll be set tight against the rolls. They are merely a steady rest and will bend the roll if set tight. After lacing, the wire should be flattened into the belt by squeezing and hammering. Fasten the ends of the wire by cutting the coil about ⅛ in. from the belt, bending into a semi-circle and driving into the leather. Use as large a rawhide pin as will go through the lacing. Cut off the ends a little inside of the edge of the belt in order that the pin will not catch the hands when the belt is thrown or shifted. A right and



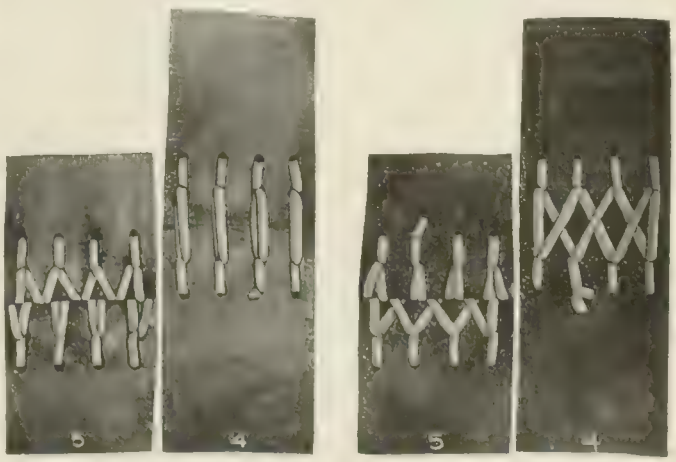
Corresponding numbers show the two sides of the same lace.

Fig. 9—Rawhide Laces.

left hand lace should always be mated together. Material should be used with an eye to economy. Rawhide pins can often be used again when removed. Blunt needles can be repointed with a file and coils of wire should be cut close to the belt.

RAWHIDE LACES.

Single Hole, Single Hinge Lace (No. 1, Fig. 9).—Use for light grade single belts running over small pulleys (6 in. diameter or under) at high speed and transmitting light power. In making this lace it is necessary to have an even number of holes in one end of the belt and an odd number in the other end so that the holes in one will come opposite the spaces in the other end. Bevel off the edges of the belt on both sides. The holes should be evenly spaced on a center line square with the side edge of the belt and not less than ¾ in. from the end. Use a No. 6 oval punch. Place the long diameter of the oval lengthwise of the belt. Begin at the center hole and draw the lace through until



Corresponding numbers show the two sides of the same lace.

Fig. 10—Rawhide Laces.

half is on each side of belt. Then pass one end down through between the ends of the belt and up through the next hole towards edge. Repeat until the edge is reached with both ends of the lace. Cut a slit back of the last hole with a knife and fasten the lace by passing it through this slit and into another slit back of first slit and cut back into the belt. Pull the laces as tight as possible. Either side of the lace will run next to the pulley.

Single Hole, Double Hinge Lace (No. 2, Fig. 8).—Used for medium and heavy grade single belts running over small pulleys (6 in. diameter or under) at high speed and transmitting heavy power. In making this lace the same number of holes should be punched in each end of the belt and they should be evenly spaced on a center line square with the edge of the belt and not less than ¾ in. from the end. Use a No. 6 oval punch. Place the long diameter of the oval lengthwise with the belt. Bevel off the edges of the belt on both sides. Begin at the center and double lace. Pull the lace through until half is on each side of the belt. Pass the lace through between the belt ends and back through the opposite hole repeating this operation until the edge is reached, then back to the starting point in the same manner. Fasten by doubling one end back through the last hole and catching the other end in a loop. Cut off the lace ¼ in. from the belt and notch. Pull the laces as tight as possible. Run either side of the lace next to the pulley.

Single Hole, Double Straight Lace (No. 3, Fig. 9).—Use for light and medium grade double belts for running over large pulleys (16 in. diameter or over) and transmitting light power. In making this lace the same number of holes is punched in each end of the belt and they should be evenly spaced on a center line square with the edge of the belt and not less than ¾ in. from the end. Use a No. 6 oval punch. Place the long diameter of the oval lengthwise of the belt. Begin at the center and double-lace, pulling the lace through until half is on each side; then on the pulley side go straight to the opposite hole, through this and across to the hole next towards the edge of the other side. Repeat until the edge is reached then lace back to the starting hole in the same manner and leave the ends as with the double hole, double straight lace. Pull the laces as tight as possible and run the straight laced side next to the pulley.

Double Hole, Double Straight Lace (No. 4, Fig. 10).—Use for light, medium and heavy grade double belts running over large pulleys (10 in. diameter or over) and transmitting heavy power. This lace can also be used to advantage in a belt when the single hole lace has pulled out the holes. In making this lace the same number of holes is punched in each end of the belt. The holes are evenly spaced on center lines square with the edge of the belt, the first one not less than ¾ in. from the end and the second one not less than ¾ in. from the first one. Use a No. 6 oval punch. Place the long diameter of the oval lengthwise of the belt. Begin at the center and double-lace as with the single hole, double straight lace, except to pass every other time through the second line of holes. Pull the laces as tight as possible. Run the straight side next to the pulley.

Double Hole, Double Hinge Lace (No. 5, Fig. 10).—Use for medium and heavy grade single belts, and in light grade belts running over small pulleys (10 in. diameter or under), at high speed and transmitting heavy power. This lace can also be used to advantage in a belt where the single-hole lace has pulled out the holes. In making this lace the same number of holes is punched in each end of the belt. The holes should be evenly spaced on center lines square with the edge of the belt, the first one not less than ¾ in. from the end and the second not less than ¾ in. from the first. Use a No. 6 oval punch and place the long diameter of the oval lengthwise of the belt. Bevel off the edges of the belt on both sides. Begin at the center and double lace the same as with the double hole, double straight lace, except to pass every other time through the second line of holes. Pull the laces as tight as possible and run either side of the belt next to the pulley.

[illegible] necessitate a lacing machine; also to be used on small feed or pump belts or on belts over ½ in. thick which cannot be handled in the machine. Follow directions on box. Groove the belt for the straight side of the lace which should be run next to the pulley. Care should be taken not to cross the wires.

CEMENT SPLICES.

The first thing to be done in making a cement splice is to see that the pieces to be put together are of about the same grade, width and thickness. See that the splices lie in the same direction in the same belt. Splices should be made the length given in following table:

Width of Belt.	Length of Splice.
1-in.	5-in.
2-in.	5-in.
3-in.	6-in.
4-in.	6-in.
5-in.	7-in.
6-in.	8-in.
7-in.	8-in.
8-in.	9-in.
9-in. to 18-in.	Same length as width.
over 18-in.	18-in.

The splices should be worked down to a perfectly smooth even surface, square with the edge of the belt, both at the point and back. Care should be taken that the splice is no thicker than the rest of the belt. If the splice is thicker, the belt will not run even. Square both ends of the splice from the same edge of the belt. Work on a perfectly smooth flat surface. After dressing the ends for the splice, place them together on a board 1 in. longer and ½ in. wider than the splice. Place the edge from which the splices are squared in a perfectly straight line. Tack the belt to the board just back of the splice. Open the splice and spread on the hot glue; place another board on top of the splice and clamp tightly with hand clamps or in a press (an old letter press makes an excellent belt press). If the press is used, ten minutes is long enough to keep the pressure on the belt, but if hand clamps are used they must be left on for three or four hours. In either case, the belt should not be put under tension for at least five hours after gluing. Paper placed between the boards and the belt will prevent the belt from becoming glued to the board.

Greasy belts should be cleaned in gasoline before attempting to cement them. Any grease in the belts or glue is liable to cause the splice to fail. No rivets, wire, pegs, or any other fastenings aside from cement should be used in splicing belts. When a repair man becomes expert he will find that it is not necessary to clamp the spices after they have been glued. All that is necessary is to peen the splices with a flat faced hammer working from the center towards the edges and being careful to work out all irregularities and air bubbles. The methods described above have been used in several large and a number of small shops with great success.

An electric locomotive (4-4-2) for express-train service on the Dessau-Bitterfeld Railway, Germany, is driven by an alternating-current commutator motor of 1,000 h. p., designed to give a traveling speed of about 68 miles an hour. The current is taken at a pressure of 10,000 v. from the overhead contact line by two current collectors, and is led through a choking coil, serving as a protection against excess pressures, to the main oil switch. The latter is provided with auxiliary and main contacts, an equalizing resistance being placed behind the auxiliary contacts in order to reduce the shock on switching in. From the oil switch the current passes to the high-tension winding of a main transformer of which the low-tension winding is provided with a number of tappings to enable the motor voltage to be varied according to the required tractive effort and speed. In addition a static balancer is provided, which also has a number of tappings, by means of which the armature winding may be adjusted to a special voltage. The motor is mounted high in the frame and drives the four coupled driving wheels through an intermediate crank shaft at about 400 revolutions per minute at the highest speed. According to tests made in Bitterfeld the locomotive developed a tractive effort of 19,000 lbs. when starting

BENEFITS DERIVED FROM THE MASTER PAINTERS' CONVENTIONS.*

BY C. E. COPP,†
Master Painter, Boston & Maine, Lawrence, Mass.

Travel Broadening to the Mind.—To get out of one's own town and state occasionally is a great help educationally. It has been justly said that "the intellectual and physical benefits derived from traveling are manifold. Nothing tends so much to enlarge the mind." "The traveled mind," says Mrs. Alcott, "is the catholic mind educated from exclusiveness and egotism." To be narrow in anything—politics, religion or one's business pursuit—is to stay at home in one's limited sphere imagining that all the world is contained within the surrounding horizon. When a mechanic begins to go abroad in the world to see how others do things, if he is teachable by observation, he will soon realize how little he knows and how much he wants to know. In this way he becomes a broad and efficient servant of the company that employs him. Some convention trips will have a marked effect in the development of any man who is susceptible of improvement. His diffidence will give way to confidence and ability.

Benefits the Health.—Whatever improves the mind has a corresponding benefit to the body. There is a physical benefit to be derived in the release from the daily care and grind at home and coming in contact with others who are perhaps as badly off, if not worse, than one thinks he is. He feels rested and sharpened by this experience for his home duties as he can be in no other way. He goes at his own tasks with greater avidity than ever, with a view to excel in them. A vacation in the country to visit, hunt, fish and rusticate is good, but it will not sharpen one's wits for his work like the contact with his fellow-workmen. "Iron sharpeneth iron," says an old adage. So men's minds are sharpened by contact, and their sluggish blood seems to circulate the better. Of course, conventions have their temptations to over-indulgence upon weak-minded men, but these men are not without temptations in their home towns. They must learn to withstand these, and conventions are as good places to practise virtues as elsewhere. Man is a probationer everywhere. Here is an enlarged sphere to put himself into action and on record. If he succeeds he will strengthen himself for home duties. If he fails he still has a future to recover himself in. There is good fighting ahead for us all, with some defeats but many victories. When some men learn that the conventions are not places for the free rein to indulgence they will have learned a great lesson.

Benefits of Social Intercourse.—Men will "talk shop" out of meeting, and some of the personal interviews with a distant co-worker are more valuable than even a convention discussion. Many a man has gotten hold of a kink in this way that he would not have known of otherwise. The good things in a convention are by no means all reported in the proceedings. The cold type cannot convey the warmth of personal contact in look and action. It does not, of course, carry to the stay-at-home reader what the attendant learned there out of meeting, and it hardly conveys all he learned in the meeting.

There is an aversion among some to "talking shop" at these places, it is true, as they seem to think they are off for a good time. But without being bored there are many opportunities for interchange of ideas. Two will be seat-companions for a time in the hotel lobby, or on an afternoon ride, or before the meeting opens, and what has been a burden to one's mind is no offense to the other when information is asked. Then the large attendance of the ladies lends a helpful tone to the social intercourse and a moral tone to a convention of men that would be hard to overestimate. My wife has accompanied me at sixteen of the conventions I have attended, and some of my daughters have been with me at others.

Educational Value of Conventions.—The convention is an annual interchange and clearing house of ideas. The exhibits are also instructive. Thoughtful minds are at work the year around to devise topics for discussion. Things of national importance and world-wide interest are constantly coming up. The colleges do not contain all the faculty and students in the world's work. All who deserve them do not have B. A. or A. M. after their names. Some of the most studious men are at the bench, lathe, forge and vise and have not been graduated yet, though well past three score years. They are rich in experience and are at problems whose deductions are seldom seen and heard in college halls, but are no less important. Some of the most alert and astute minds can be found in mechanical offices early and late struggling with problems much harder to solve than any they found at school. Their school days opened their minds to grasp them. The fruit of their thoughts shows itself in successful railway maintenance and in our convention halls. What is thought of the work of the conventions may be learned of our secretaries, who frequently receive requests for copies of the proceedings for libraries and reading rooms the country over. This should stimulate every thoughtful contributor to our conventions to do his best work. These things are not confined to such a limited sphere as some are apt to think.

The successful operation and maintenance of the railways today is very largely the result of convention deliberations. If men had stayed at home with an imaginary "Chinese wall" around them this country would be as far back as is the Chinese Empire instead of in the forefront of progress and invention. And the end is not yet. There is still room for progress and improvement, and our railway clubs and conventions will bring it out. It is a case where Mahomet had better "come to the mountain," pay his dues and get it, rather than stay at home and expect the mountain to come to him.

*Entered in the competition which closed October 15, 1911.

†Mr. Copp has attended nineteen consecutive conventions of the Master Car and Locomotive Painters' Association, in at least fifteen cities of the United States, and has presided over four of them.

PATTERN SHOP KINKS.

BY A. G. PANCOST,
Elkhart, Ind.

BENCH MORTISE BLOCK.

The mortise block shown in Fig. 1 is simple and is useful for small work. It consists of a wooden block cut with a lip to fit over the edge of the bench, the other end being left about twice as thick as the body. Forty-five deg. slots are cut on both sides of the straight slot. The illustration shows a molding in position for cutting.

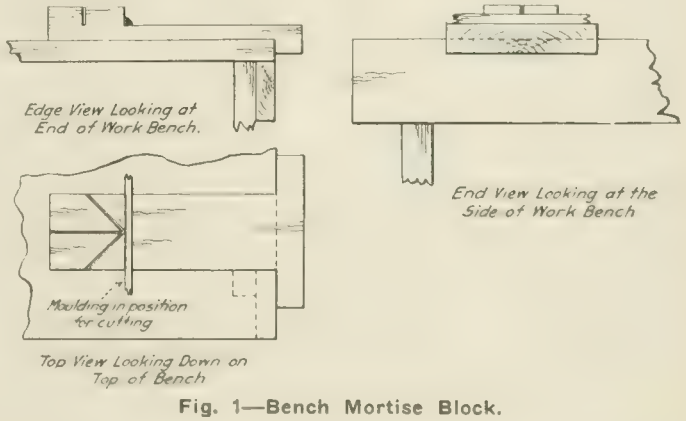

Edge View Looking at End of Work Bench.
End View Looking at the Side of Work Bench
Molding in position for cutting
Top View Looking Down on Top of Bench

Fig. 1—Bench Mortise Block.

PATTERN MAKERS' PAINT POT.

The pattern makers' paint pot shown in Fig. 2 is made by covering a 6 in. x 8 in. glass battery jar with a funnel shaped copper or galvanized iron cover, as shown. This cover is tight fitting and allows the handle of the brush to extend through the top. This prevents the paint, which usually con-

sists of lampblack and alcohol from evaporating rapidly and drying up. A ½-in. strip of galvanized iron is placed across the pot near the top for wiping the brushes.

MOLDS FOR FIGURES AND LETTERS.

A method of making figures and letters from ¼ in. to 1¼ in. high for use on patterns is shown in Figs. 3 and 4. In order

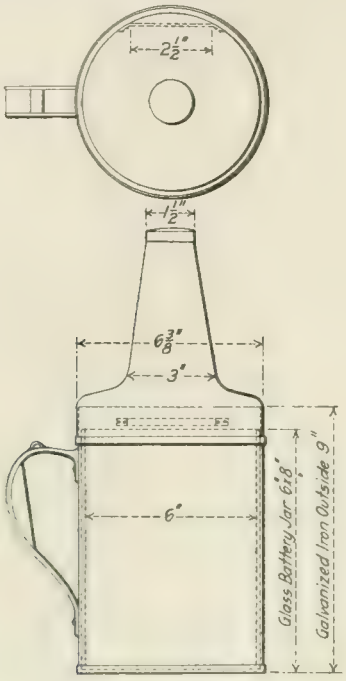


Fig. 2—Pattern Maker's Paint Pot.

to get the first impression it is necessary to purchase two sets of each kind of letters or figures desired. The larger ones may be cut from ⅛ in. fiber with good results. These are then carefully tacked to a bottom board *C* and are covered by a top board *D* which is cut out over the letters, as shown. The board *D* is held to the board *C* by wooden pins glued in both ends of *C*. Plaster of paris is poured over the letters and is allowed to harden, thus making a negative cast of them. This cast is cut with a pocket knife, as shown in Fig. 3, which,

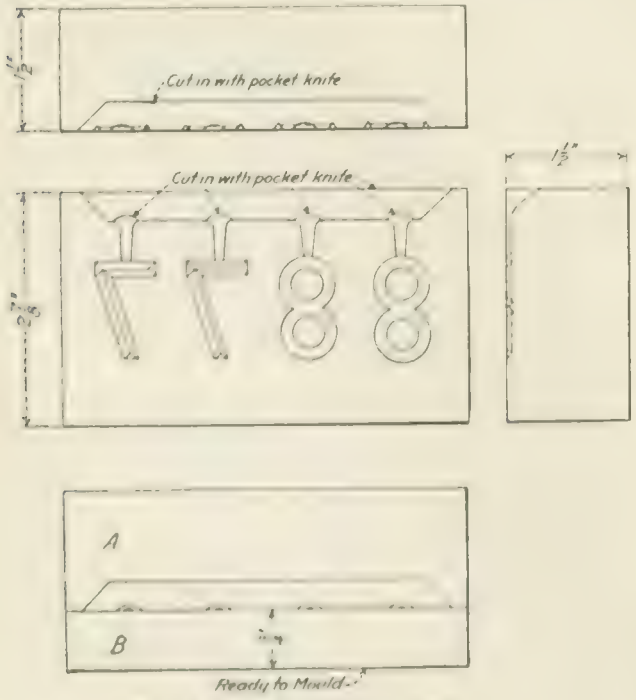


Fig. 3—Mold for Pattern Figures.

when the mold is clamped to a plain block of plaster of paris, allows the metal to be poured, forming the figures. In making the plaster molds the plaster of paris and water should be mixed quite thin and the mixture should be stirred freely with

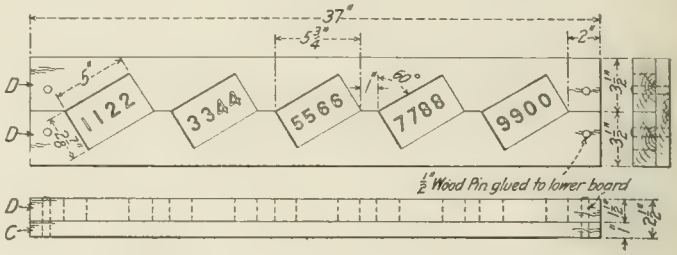


Fig. 4—Patterns for Molding Figures.

a stick to remove all air bubbles. For the letters or numbers themselves use equal parts of solder and lead; the solder makes the figures more firm and gives them a glossy finish, to which the molding sand is less liable to stick.

BENEFITS DERIVED FROM THE TOOL FOREMEN'S ASSOCIATION.*

BY E. J. M'KERNAN,†
Supervisor of Tools, Atchison, Topeka & Santa Fe, Topeka, Kan.

At our last convention the making of large frame reamers from high speed steel was discussed. The general opinion was that it was not economical for railway shops to manufacture such reamers from high speed steel as the service which they gave did not pay for the labor and material which was necessary to make them; also they would not stand the severe shocks which they are liable to receive when used by unskilled mechanics who do the heavy reaming with air drills. The ordinary carbon steel reamers will stand more severe shocks and will bend before breaking. It may be possible that they will require grinding more often than high speed steel reamers, but this is of minor importance.

It seemed to be the unanimous opinion of the members that all threads for locomotive boilers, such as for washout plugs, boiler checks, blowoff cocks and all boiler cab fittings, should be 12 thread and have a taper ¾ in. in 12 in.; this reduces the number of taps to be carried in the tool room, thereby materially reducing the cost of maintainance.

The general practices of treating and tempering both high speed and carbon steels are becoming more thoroughly understood. At the convention each member freely imparts his knowledge and experiences, and there is practically no excuse for a tool room foreman mishandling the steel after hearing the expressions by the different members. I have tried out different things which were mentioned at these meetings, and have found them to be very satisfactory.

The discussion of the proper steels for making dies for bolt and forging machines was also helpful. These dies are generally complicated and require a large amount of steel. It was found that several shops secured very good results from dies made of alloy steel. While the first cost is more than the dies made from low carbon steel, their performance is better and the output is from three to four times greater than from dies made of other grades of steel, they withstand the action of the intense heat and the water.

It will be impossible for the tool foremen to have the advantage of participating in the different discussions, as well as personally seeing the demonstrations which are generally given at the conventions of this kind, if they are not permitted to attend the meetings and visit other shops. In order to broaden out and increase the output, the foreman should be permitted to attend the convention and exchange ideas with other foremen.

*Entered in the competition which closed October 15, 1911.

†Mr. McKernan is president of the American Railway Tool Foremen's Association.

OXY-ACETYLENE WELDING.*

BY H. T. BENTLEY,

Assistant Superintendent Motive Power, Chicago & North Western.

There will be lots of disappointment in store for the man who thinks he can get immediate results, especially if you are making your own operator. We began in a humble way about 18 months ago and thought that inside of a week or two we would be welding up flue sheets, putting patches in fire boxes, repairing castings and a hundred other things our friends had told us could be done so easily. Nothing went right; a crack would be welded in one place only to open up again or start another in a different place. We had some comfort from the fact that even the so-called experts fell down. A casting was broken which we desired to have repaired at once, and, having oxygen and acetylene on the ground, we thought it would be a good opportunity to let some of the people who were so anxious to show us how it could be done, have a chance at it. This we did, and with miserable results, the operator claiming the iron was so poor that he could not get anything suitable to work on. After this some of our men felt very discouraged at the results obtained, but others were nearly as optimistic as I was, although after four months of trials and tribulations, if a vote had been taken, it would have been overwhelmingly in favor of dropping the whole thing. Finally we were able to weld up some unimportant castings which gave us fresh courage. We were having considerable trouble with cracked flue sheet bridges on certain engines and tried to weld them. Before trying it on a flue sheet in place, we got an old one and experimented for days with it, sometimes having more cracks at night than when we started in the morning. At last we appeared to have solved the difficulty and started on a flue sheet in a boiler; all we had learned on the flue sheet that could expand and contract without having anything to prevent it, had to be learned over again when the sheet was held rigidly in place without an opportunity to move in any direction. We were, however, after considerable experimenting, able to handle this kind of work in a satisfactory manner. Those having experience with boiler work will appreciate what it means to be able to do a job of this kind on a flue sheet that is otherwise in good condition.

One morning we were confronted with a rush job which, if successful, would mean a great deal to us. A superheater locomotive was in the shops with a cast iron steam pipe cracked for a distance of 14 ins. Unfortunately, as it appeared at the time, we did not have a new steam pipe, nor a pattern to make one and the engine was needed badly. Fortunately, we had the oxy-acetylene apparatus, and after a council of war, it was decided to try to weld up the steam pipe, although most of our men thought it could not be done satisfactorily. The attempt was made, and much to our surprise a first-class job was the result, which tested out O. K. This gave us confidence and other jobs were undertaken, some of which turned out well and others were failures. At about this time we got hold of an operator who used his head while doing his work, and after that it was comparatively easy; nothing was too complicated to tackle, and we are able to successfully weld cracks in fireboxes, apply patches, weld in half side sheets, repair broken cylinders, weld broken driving wheel spokes, build up worn parts on castings, air reservoirs, etc., and repair broken castings of all kinds; now we cannot keep house without it. A saving of from $1,200 to $1,500 can easily be effected per month in a shop like ours by repairing parts that otherwise would find their way into the scrap; this amount simply covers the actual saving, and does not in any way take into consideration the value of the time an engine or machine may be out of service.

The government railways of Russia have had a record year in the matter of prosperity. The gross revenue for the fiscal year of 1910 was $577,171,982, as against expenditures of $314,800,000.

*From a paper read at the October meeting of the Western Railway Club.

PRACTICAL APPLICATION OF SCIENTIFIC MANAGEMENT TO RAILWAYS.

Wilson E. Symons of Chicago, formerly superintendent of motive power and equipment of the Plant System, and later mechanical superintendent of the Gulf, Colorado and Santa Fe, and superintendent of machinery of the Kansas City Southern, presented a paper on the above subject at a joint meeting of the Franklin Institute* and the American Society of Mechanical Engineers at Philadelphia, Pa., October 18, 1911, in which he presented statistics as to the mileage, equipment, capitalization, officers and employees, volume of business handled, and the income and expenses of the railways of the United States. Referring to scientific management and the proposed saving of one million dollars a day by its application to the railways he said: "Although it is claimed that this new plan or system is applicable to most all items of expense (material and labor) on a railway, the estimated probable economies will, in this treatment of the question, be confined to such branches of the work, or classes of employment, as in my judgment are susceptible of being placed on a comparative basis with large manufacturers of standard articles."

Mr. Symons did not define just what he meant by the expression scientific management. That he considered it in a narrow sense is indicated by the fact that although the railways employed 1,502,823 persons in 1909, whose wages amounted to $988,323,694, Mr. Symons by a process of elimination concluded that the principles of scientific management were applicable to the machinists and other shop men only. This includes only 243,347, or 16 per cent. of the total number of employees.

After drawing attention to the fact that "repairs to the equipment are of such a character that they are not susceptible of predetermination as to methods of operation or cost and cannot, therefore, be reduced to writing, blue print or graph, but must be handled by experienced, practical men, who, usually, like the skilled surgeon, decide on the exact method or details of procedure while gathering instruments, tools and material to perform an operation," Mr. Symons concludes that it might be possible to make a saving of $78,242 per day. This, "on the assumption, however, that additional tools, shops, supervision, etc., be provided to enable the officers in charge to secure a greater output on the same expenditure, or the same output at a less expense and that the organization of the department should be on lines calculated to strengthen the hands of the line officers in charge who, in the last analysis, are always held responsible for results."

An analysis is made of the results that have been obtained on the Santa Fe and a comparison is made with other roads in the same territory, and also with the average results which are obtained throughout the United States, from which the conclusion is drawn that the Santa Fe, which is now and has for six years been under heavy expense maintaining the betterment plan, "has a maintenance of equipment cost of over five million dollars per year above an average for the United States and is far in excess of most of the other lines similarly situated."

Two examples are then cited of roads on which the efficiency of the mechanical department was very greatly increased by reorganizing it. Efficiency engineers were not used to bring this about, but unfortunately Mr. Symons does not go into the methods which were used, but simply presents a statement of the results which were accomplished.

The necessity of having additional supervision in the way of staff officers is emphasized and the following are laid down as the qualifications for an officer who is in charge of men or of any work involving contact with them:

First, As a fundamental principle, a man who cannot handle himself cannot handle others, although it is a notorious fact that

*It is the intention of the Franklin Institute of Philadelphia, Pa., to issue a special number of its Proceedings which will contain Mr. Symons' paper, and not only the discussion which took place on the evening of the meeting but written discussions from several members who found it impossible to attend and take part.

men who have little or no control of themselves actually believe that they have great ability to handle or control others.

Second, No man who is not well within self-control should ever be placed in charge of others. Disregard of these two cardinal principles in the selection of railway officers has driven more men into labor unions, and created more anarchists, than any other influence, and in addition has cost the railways untold millions of dollars that should have gone to employees and shareholders.

Third, No man should be placed in charge of men who is not personally familiar, from practical experience, with the work, or that of a corelative character, so as to enable him to intelligently direct others, and with a sufficiently liberal education to enable him to transact business with his colleagues, superiors, and the public, in a gentlemanly, business-like manner, and with capacity for increased responsibility.

A large part of the remainder of the paper is devoted to replying to an article in *Hampton's* for March, in which the statement was made that two million dollars a year were wasted on lubricating oil. Considerable attention was also given to refuting a statement in one of the popular magazines that the railways were run by "rule of thumb."

DISCUSSION.

The discussion of the paper was lengthy and was participated in by representatives of manufacturing establishments, efficiency engineers and railway men, although only one of the latter went into the question exhaustively.

S. M. Vauclain, of the Baldwin Locomotive Works, emphasized the fact that the comparison of locomotive maintenance on the cost per locomotive basis was unsatisfactory because of the steady increase in the size of locomotives during recent years. This expense is also increased at this time because of the number of devices which are being experimented with and applied in the effort to improve the efficiency of the locomotives. It is also necessary to operate the trains at higher speeds than formerly, and this adds to the expense of operation. He concluded with this sentence: "I believe in scientific management and in economic management, but I do not believe in espionage over human beings that grinds them down and makes them feel that they are owned body and soul by the men who control them."

Frank B. Gilbreth, who has achieved wonderful results in the application of motion study to the laying of bricks said: "So far as the railways are concerned I agree with the railway men. I do not see how they can put in scientific management immediately; it will take a long time to instal it. If it has taken a long time to build up these principles here; if it has taken a long time to convert the neighbors of Mr. Taylor right here in this city, what do you expect elsewhere?"

The following extracts are taken at random from Harrington Emersons' remarks, which were quite lengthy: "I know that the expenses of operating and maintaining the railways in the United States could be reduced several hundred million dollars a year. This reduction could not be effected without the earnest, patient and wise co-operation of railway owners, railway employees, the public—both individually, corporately and represented by its state and national governments—and by a body of competent, efficient councilors and scientific managers. This reduction in expense can be brought about with great gain to each of the four classes and not at the expense of any class for the profit of any other class."

"My test theory is that the railways, to a higher degree than industrial plants, apply scientific management, . . . the railway with very fast trains run in all weathers over long distances is one of the best examples the world has ever seen of the accurate and perfect results resulting from scientific management."

"The aims of scientific management applied to railways are not to ask for the discharge of a single man on account of the introduction of efficient methods. They are to lessen the toil, hardship, danger, friction and fluctuation of employment, to a less or greater degree affecting every railway employee. Also to increase the pay of those who are carrying on railway work and to increase the security of values in railway investments and ultimately to lessen the cost of railways to the public."

"Since the famous rate era, I have been obliged to revise my estimate of the million dollars a day. I have put in the good part of last year going over the different items of railway expense, and, with due deliberation, I place the ultimate waste at two million dollars a day." The remaining part of his discussion was largely given over to a criticism of the various parts of Mr. Symons' paper and in commenting on some of the ways in which the large saving above-mentioned might be accomplished.

B. B. Milner of the Pennsylvania said that he had visited the Santa Fe a number of times looking into the betterment work on that system. While the bonus system was enthusiastically carried on and was far ahead of the day work system, the improvements were those which would be expected from the substitution of any reasonable, well administered reward system of labor payment, free from hindrances on the part of the labor organizations. Special attention was also paid to the tool equipment and other conditions affecting the efficient operation of the shop. While great improvements were made as compared to former practices the shop methods were apparently no more efficient nor economical than those in other well regulated shops.

"Very glowing statements were made of the improvements effected, supported by various statements and graphical data. In some instances, deductions were made therefrom which the data could not support before one familiar with railway operations. In some cases, data submitted for the support of conclusions seemed to be at variance with actual facts. This is very naturally a result of pressure brought to bear upon specialists for results, and it very frequently happens that specialists themselves are mislead, having every confidence in data which does not, upon careful analysis, support their conclusions."

"Various meanings have evidently been applied to the term scientific management, and many differences in opinion might easily be reconciled by the adoption of a common definition of the term. If scientific management means that which appeals to many upon casually reading Mr. Taylor's paper on Shop Management, or upon the first visit to a plant such as the Tabor Manufacturing Company's, in Philadelphia, where the so-called scientific management is in operation, then the term is a misnomer so far as railway operation is concerned, and Mr. Symons must be very liberal in restricting its possible application to as much as 16 per cent. of the carrier's employees. But if the term is given the broader definition evidently attached to it by Mr. Emerson, and is understood to cover the whole field of human endeavor and to involve the elimination of every waste as soon after its development and isolation as practicable, then Mr. Symons must remove the restrictions imposed upon its application until every phase of railway operation is covered. It then becomes applicable to the labor and material expenses, at each desk of each office, of every department, and to all phases of operations involving expense or efficiency of service.

"The economical repair of rolling equipment involves the proper location, installation, maintenance and efficient operation of the railway shops, their component departments and the tools therein, with the economical purchase of all materials required in connection therewith. But, the economical operation of the railway involves not only the economical maintenance of its rolling equipment (costing only about 20 per cent. of the total operating expenses) but also the efficient use of that equipment. Cars must be loaded to the maximum consistent with the service rendered; trains must also be so loaded, speeds must be those most economical, light car and locomotive mileage must be avoided, and cars and locomotives of ever increasing efficiency from service and maintenance standpoints must be developed, etc. In so far as the efficiency of all these elements of operations is improved, by so much the items of labor cost, mentioned by Mr. Symons as being excluded from the application of scientific management will certainly be lowered. The carriers have spe-

cialists, inside and outside the ranks of their own employees, engaged upon the study of direct and indirect means of furthering economy in most every item of expense mentioned."

"In conclusion let the term scientific management be defined and understood in the broadest sense, remove the restrictions popularly imposed upon its application, eliminate the idea that the means of its application consists so largely of spectacular elements to which such strenuous objection is frequently unreasonably raised, and that efficiency is so largely evidenced by the spectacular results of which so much has been heard, and let the means of permanently instilling principles of broad scientific management into the minds of individuals composing the masses, as well as others employed by the carriers, be pushed persistently and consistently along broad lines, that results may be obtained that are permanent and real. The possibilities of such procedure cannot be accurately estimated."

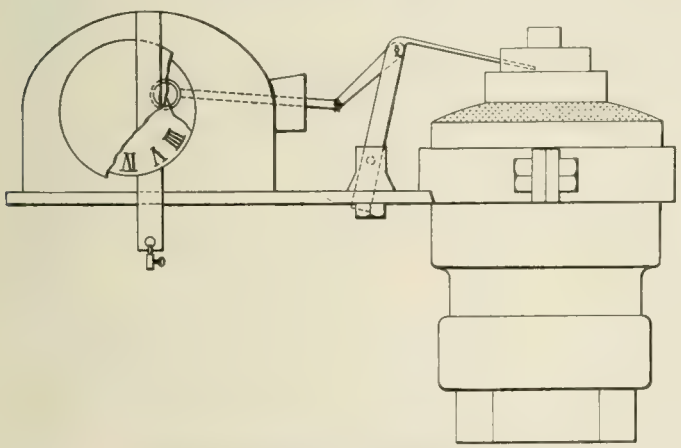
SAFETY VALVE DISCHARGE RECORDER.

BY F. J. ZERBEE,

Master Mechanic, C. C. C. & St. L., Bellefontaine, Ohio.

The fact that a 3¼-in. safety valve when blowing off wastes coal at a rate of about 975 lbs. per hour is not always fully appreciated by the enginemen and firemen running the locomotive. Usually their desire is to have as much steam as possible and little attention is given the safety valve. To find out just how much steam is wasted on a trip, and also to accurately show the engine crews the amount of money they waste by allowing the safety valves to blow, the device shown in the accompanying illustration was made.

It consists of a clock whose balance wheel is held in check while the engine is not blowing off. When the steam raises the valve



Recording Device for Safety Valves.

it also raises the arm extending over the valve, which, through a system of levers, removes the obstruction from the balance wheel of the clock allowing it to operate. The difference in the readings at the beginning and end of a run give the time the valve has been blowing-off. Forms are provided on which is recorded the engine number, the names of the engineer and firemen, and the readings of the clock at the beginning and end of the run. From the latter data the amount of coal wasted and its cost can readily be calculated. This report is turned in to the master mechanic's office, and if the waste is excessive the road foremen of engines makes an investigation.

The United States Geological Survey has published statistics on the recovery of copper, lead, zinc, tin and antimony from scrap metal, sweepings, etc., which show that the value of the metal thus recovered for 1910 was $44,150,000. The quantity of copper recovered was 51,000 tons; brass, 62,000 tons; lead, 55,323 tons; spelter or zinc, including alloys other than brass, 43,932 tons; tin and alloys, 13,903 tons, and antimony, 2,779 tons.

CAR DEPARTMENT AND PAINT SHOP KINKS.*

BY W. H. WOLFGANG,

Draftsman, Wheeling & Lake Erie, Toledo, O.

TIMBER TONGS.

A convenient timber tongs for handling lumber with a crane is shown in Fig. 1. It may be made of either wrought iron or

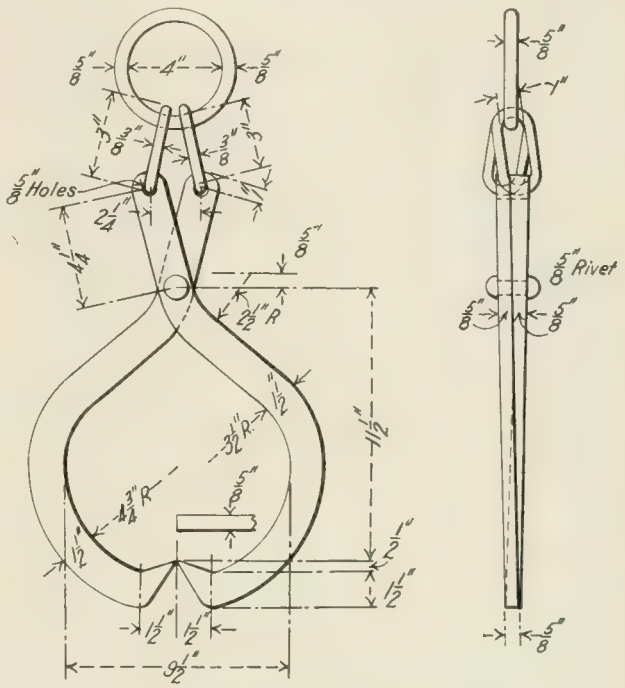


Fig. 1—Tongs for Handling Timber.

soft steel. Each half of the tongs is forged from a piece of ⅝ in. x 1½ in. stock.

TRESTLE FOR CAR REPAIRS.

A trestle for use in the car repair shop or yard should be rigid and substantial, with a large enough base for stability and

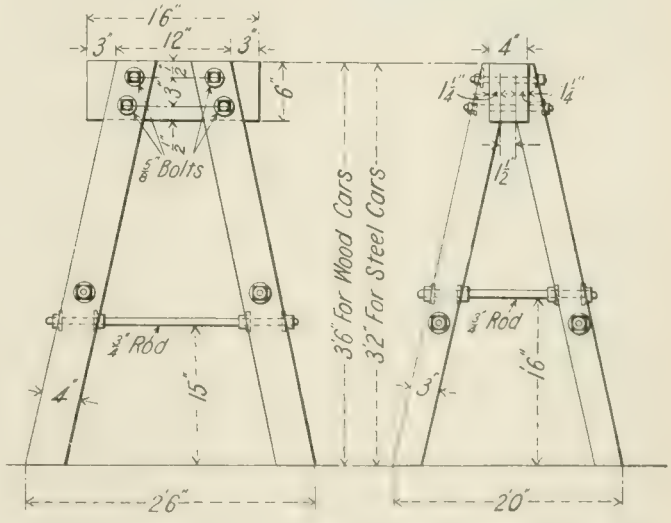


Fig. 2—Trestle for Use in Car Repair Shops and Yards.

yet arranged so that a truck can easily be taken out from under the car without interfering with it. Such a trestle, which has given good results and is not too heavy to be easily handled, is shown in Fig. 2. It has legs of 3 in. x 4 in. oak and a top cross piece 4 in. x 6 in. x 18 in. long. The legs are tied together by

*This collection of kinks was submitted in a competition which closed May 15, 1911. It is the second collection which has been submitted by Mr. Wolfgang, the first one having been published in the *Railway Age Gazette* of May 5, 1911, page 1068.

the ¾ in. rods. For use under steel freight cars the trestles are made 3 ft. 2 in. high and for wooden cars 3 ft. 6 in. high. The construction is very different from that of the trestle in use at the Delaware, Lackawanna & Western car shops at East Buffalo, as described in the *Railway Age Gazette* of June 3, 1910, page 1358, but it will undoubtedly give equally as good results, although it may not allow quite as much clearance between the lower part of the legs of the trestle and the truck.

MONO-RAIL CRANE FOR HANDLING LUMBER.

Where a crane is not available for unloading and piling timber the labor cost for performing the work is very high. For instance, it takes six men about two days to unload and pile a car of sills (about 100), and it is necessary to shift the car to the point near where they are to be piled. With the mono-rail crane shown in Figs. 3, 4 and 5 it is possible to do the same work with three men in about three hours and the car need not necessarily be placed near where the sills are to be piled; it is only necessary to place it underneath the crane runway on a track

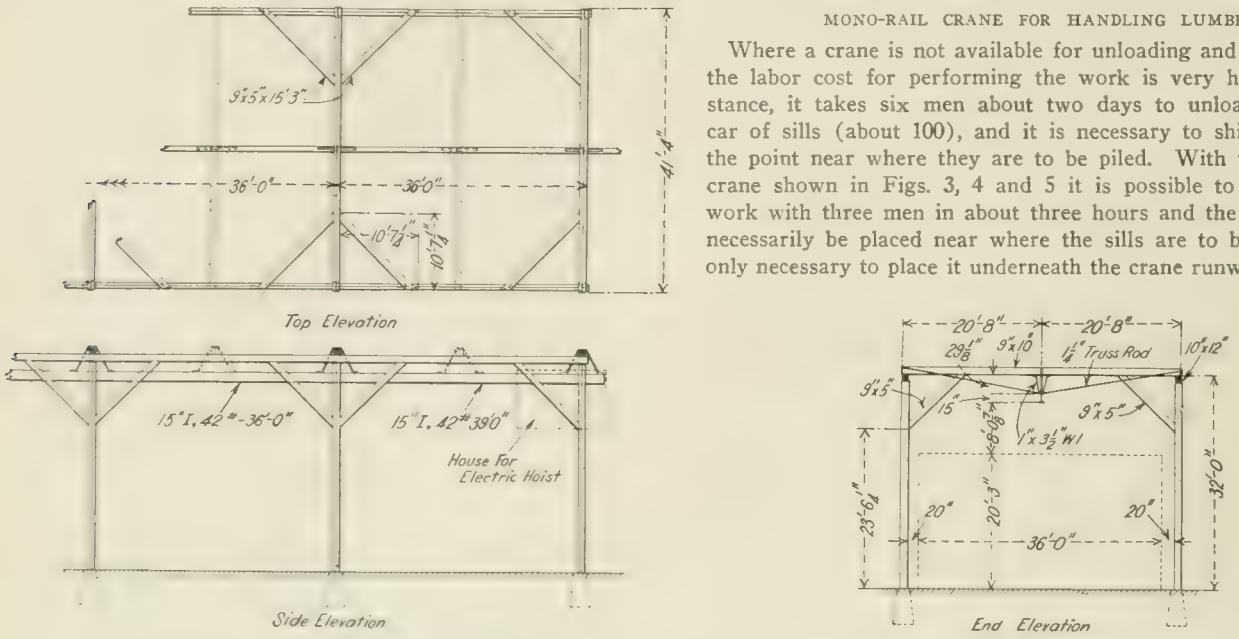


Fig. 3—General View of the Runway for the Mono-rail Crane.

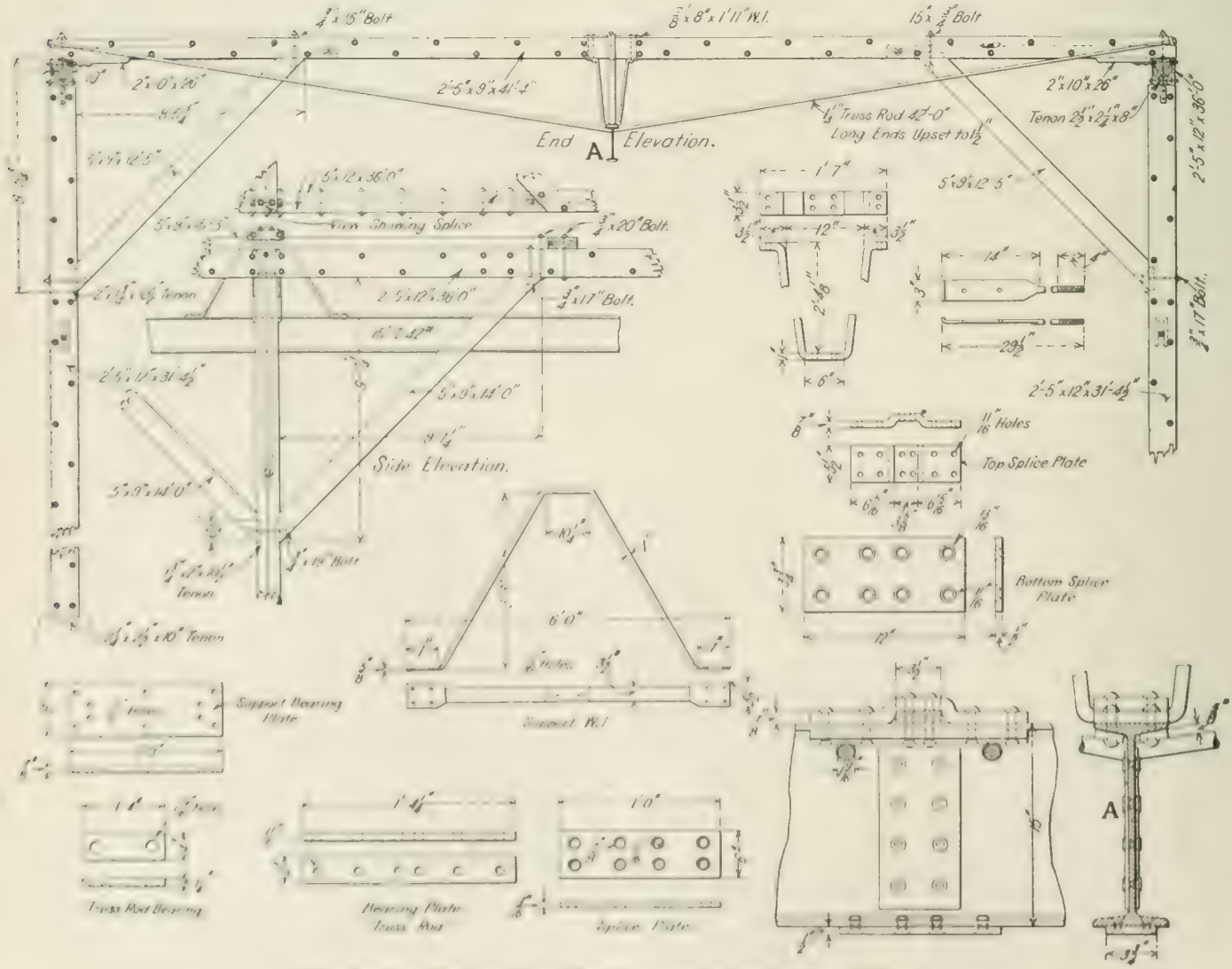


Fig. 4—Details of the Trestle or Runway for the Mono-rail Crane.

which is at right angles to it. The general arrangement of the trestle or crane runway supports is shown in Fig. 3, while the design of the details is shown in Fig. 4. The crane runway should extend the full length of the lumber yard and the uprights

Fig. 5—Application of the Hoist to the Mono-rail Crane.

which support it should be spaced far enough apart so that the longest sill will not strike them as it is being conveyed from one place to another. The photograph, Fig. 5, shows the application of the crane to the 15 in. I-beam *A*. The crane has a capacity of 2 tons and is electrically operated, the current being supplied by two wires which run parallel to the I-beam. The substantial way in which the I-beam is attached to the trestle is shown in the detail in the lower right hand corner of Fig. 4.

ADJUSTABLE SCAFFOLD FOR CAR AND PAINT SHOPS.

An adjustable scaffold is very necessary in a car repair shop or paint shop. Many varieties of such scaffolds will be found in the different shops, but many of them are cumbersome and hard to operate. The scaffold, which is shown in Figs. 6, 7 and 8, may be easily and quickly raised or lowered to any position by one man and without much exertion on his part. A considerable saving of time is thus possible, as compared to cases where two men are required for performing the operation. The 2½ in.

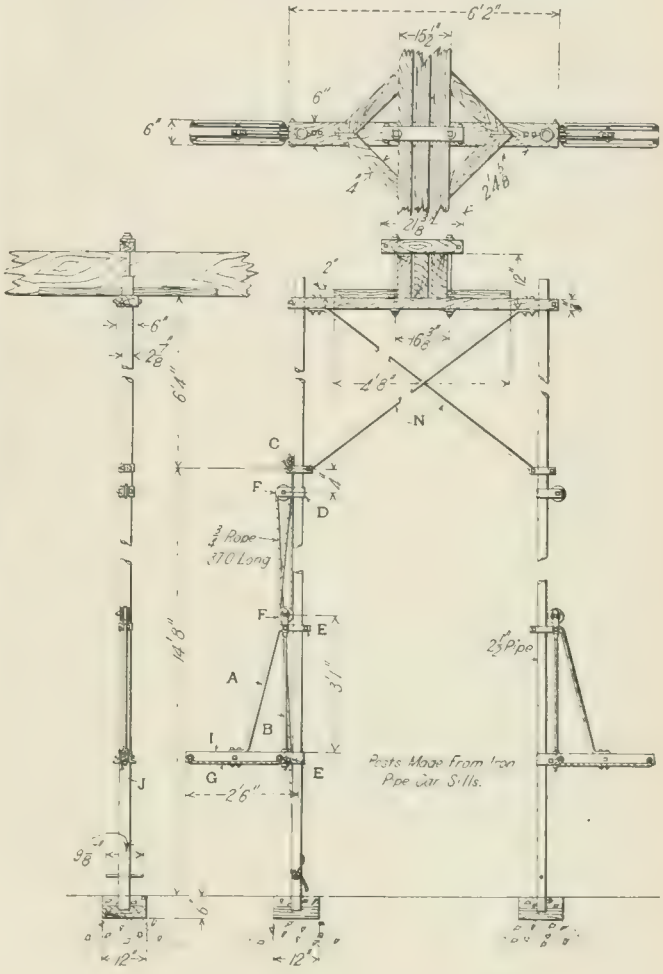


Fig. 6—Section of Adjustable Scaffold.

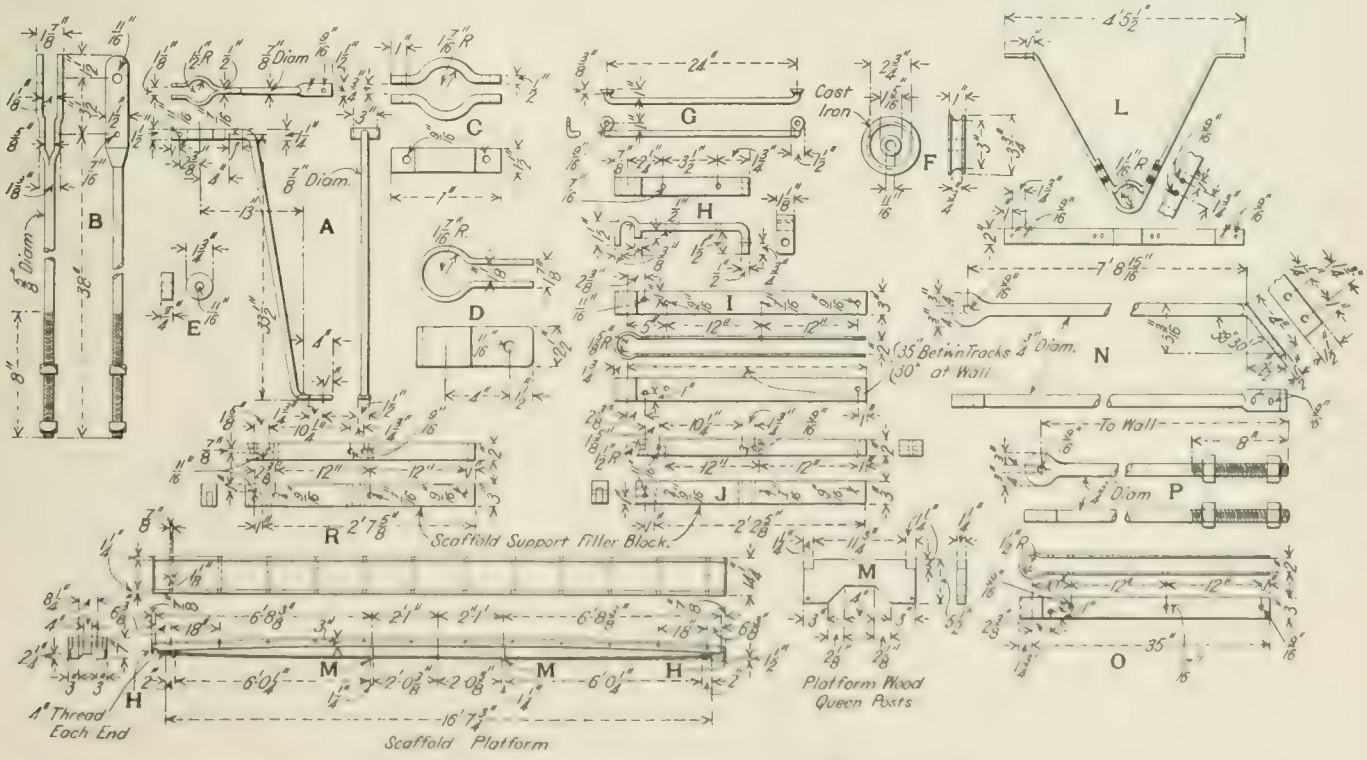


Fig. 7—Details of Adjustable Scaffold.

pipes that are used as uprights are anchored to the floor by wooden blocks set in concrete, as shown in Fig. 6. The tops of the uprights are rigidly secured to the roof trusses and are braced with the ¾ in. iron rods *N*, as shown. Where the scaffold is close to the wall, brace *L* (Fig. 7) should be used for securing the upper part of the upright to it, instead of to the roof truss. A ¾ in. manila rope is used for raising and lowering the platform. This is secured to the upright near its upper end at *C* and passes around the pulleys *F*, as shown; when the platform has been adjusted to the proper height the rope is secured to the ½ in. pin near the bottom of the upright.

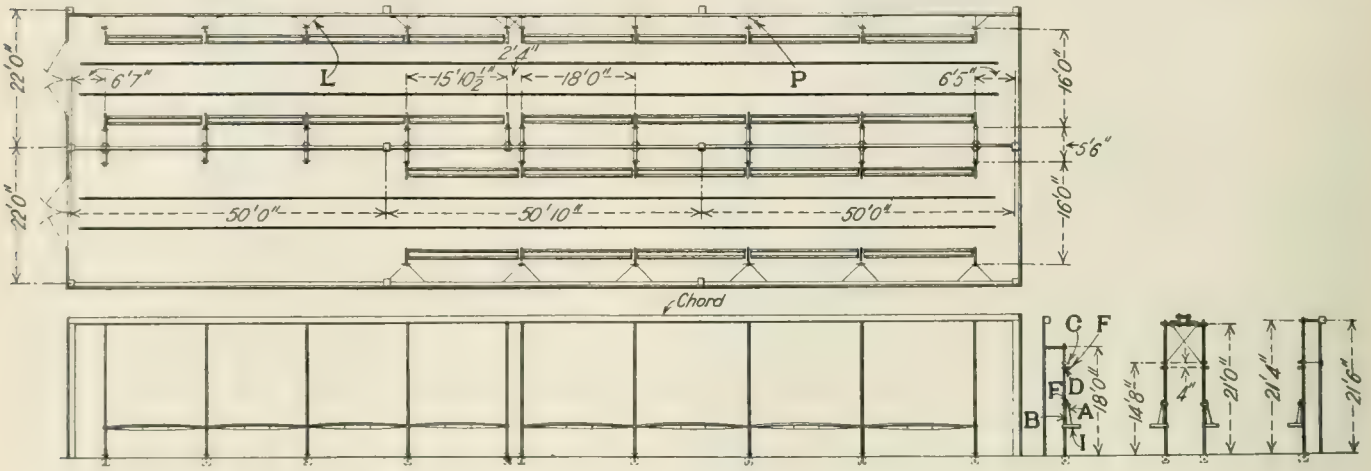


Fig. 8—General Arrangement of Adjustable Scaffold.

The framework of the scaffold platform is similar to an ordinary ladder, as shown in Fig. 7, and is covered with ¾ in. flooring. It is stiffened by the ½ in. truss rods on the underside. Platforms more than 20 ft. in length are liable to warp or twist out of shape and ordinarily should not exceed that length. To raise or lower the platform it is only necessary to loosen the manila rope at its lower end and to refasten it after the platform has been adjusted. This operation requires only a small amount of time. The best results may, of course, be obtained by having each platform supplied with its own posts or uprights, instead of having a common upright and bracket for the adjacent ends of two platforms. In the former case the platforms can be operated independently, making it a little more convenient for certain classes of work.

This scaffold is quite different from any of those which have thus far been described in the *Railway Age Gazette*, including the ones in the Elizabethport coach shop of the Central Railroad of New Jersey, April 1, 1910, page 875; in the Sayre coach shop of the Lehigh Valley, December 2, 1910, page 1062; or the Morris

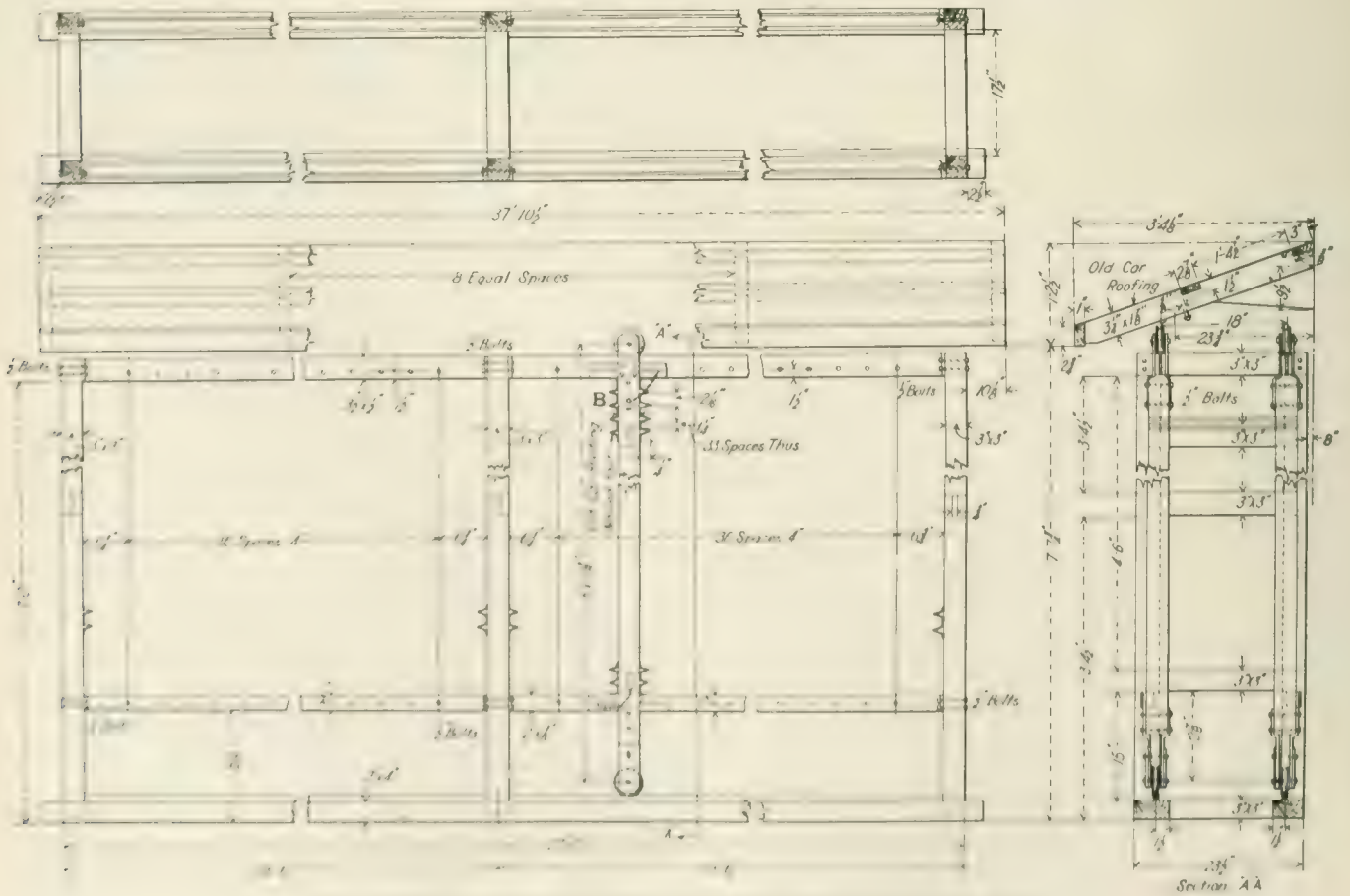


Fig. 9—Rack for Storing Freshly Varnished Sash in the Paint Shop.

Park coach shop of the Long Island, November 4, 1910, page 866. Both the Central of New Jersey and the Lehigh Valley scaffolds have wooden uprights, while the Long Island scaffold operates on strips of ¾ in. x 4 in. iron, which are bolted to the wooden posts or columns.

ADJUSTABLE SASH RACK.

A convenient and adjustable sash rack for storing passenger car sash after it has been varnished is comparatively easy to devise, and it is strange that so many inconvenient arrangements for this purpose are to be found in railway paint shops. The one shown in Figs. 9 and 10 is of simple construction and may easily be adjusted. The frame-work may be made from old car sills. Each movable section of the rack has two wheels at the top and two at the bottom. The lower wheels operate on the ⅝ in. round iron rails that are fastened to the wooden timbers, which form the base of the rack, by No. 1⅔ in. wood screws. The wheels at the top operate on the 3½ in. x ½ in. iron bars. In case the wheels or the rail become worn the height of the rack may be adjusted vertically to distribute the load on the four wheels properly by means of the set screws and the iron plates *A* at the lower ends of the vertical members of the rack. When the movable part of the rack has been properly adjusted to receive the sash, it is held in place by passing a ⅜ in. pin through the plate near the bottom and a 2 in. x ⅜ in. horizontal plate about a foot from the bottom of the rack, and also by passing a similar pin through one of the holes in the top plate and the rail on which the rack operates. The tin slides (*B*) on which the sashes rest are made from old car roofing and are nailed fast to the racks. If the rack is placed near the wall of the shop a roof or top may be built over it, as shown in Fig. 9, thus preventing the dust and dirt from falling on the sash. Usually there are springs on the sash, but the tin slides, having no projections on them for the springs to catch in, allow the sash to slide easily into place.

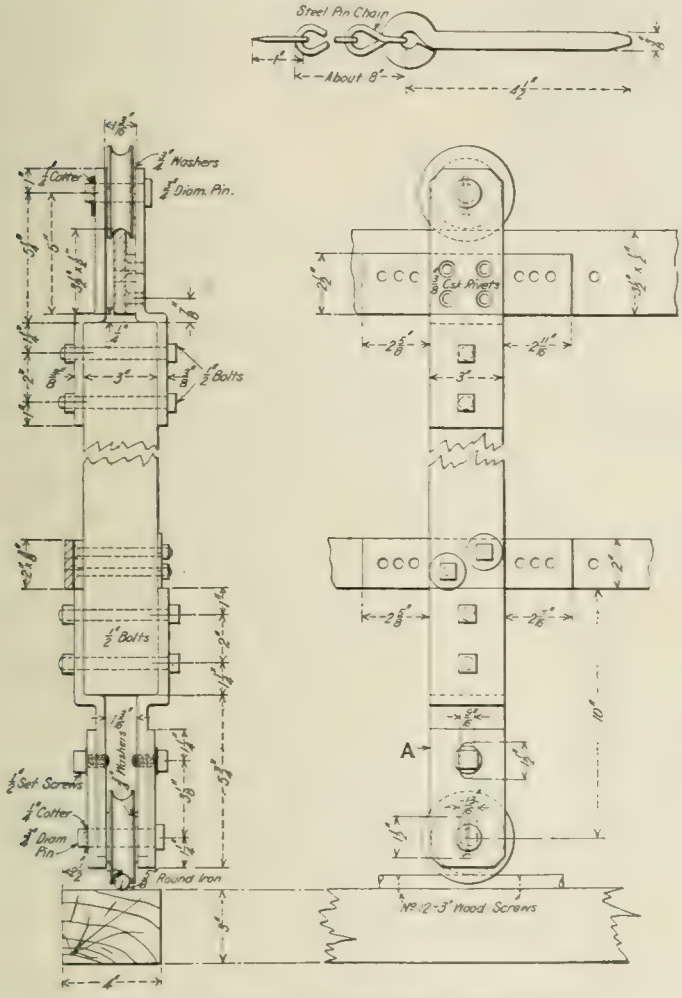


Fig. 10—Details of Adjustable Sash Rack.

TRUCK FOR HANDLING AXLES.

With the truck shown in Fig. 11 one man can handle and transport the heaviest car axles without over-exerting himself. The truck is pushed over the axle and the slip ring *A*, which can easily be moved along the rod, is slipped over the journal at one end of the axle. The other end of the axle is gripped by the tongs, which are operated by the lever *B* near the handle of the truck. The wheels of the truck are of large diameter and are fitted with steel hubs and tires and wooden spokes and rims. The other parts of the truck may be easily forged of wrought iron. A truck for this purpose, constructed largely of 1½ in. iron pipe and used on the Atchison, Topeka & Santa Fe, was described by E. J. McKernan in the *Railway Age Gazette* of March 4, 1910, page 495.

TRUCK FOR HANDLING MOUNTED WHEELS.

The truck for handling mounted wheels shown in Fig. 12 is quite similar to the one which was described in the *Railway Age Gazette* of January 7, 1910, page 33, by F. C. Pickard, master mechanic, Cincinnati, Hamilton & Dayton, Indianapolis, Ind., except that it is possibly simpler in construction and cheaper to make than the one proposed by Mr. Pickard. It has an advantage over the one used by the Delaware, Lackawanna & Western at East Buffalo, N. Y., *Railway Age Gazette,* June 3, 1910, page 1359, in that it provides a means for swiveling the wheels, thus making it easier to transport the truck about the yard. As is the case with the two above mentioned types of truck, it is necessary to use one at each end of the axle. It is

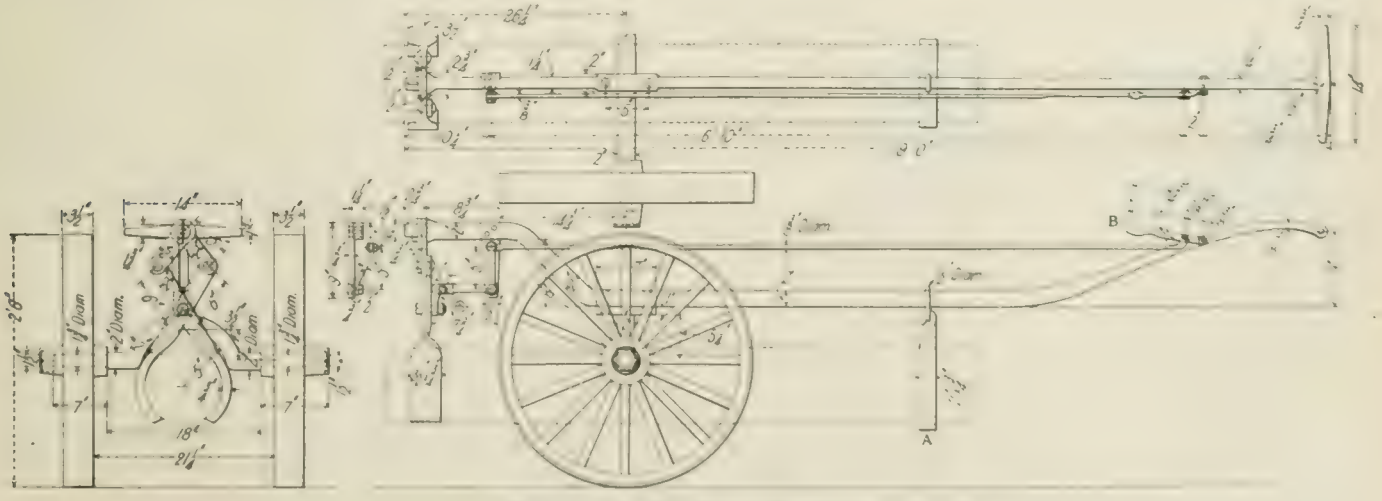


Fig. 11—Truck for Handling Axles.

only necessary to raise the handle of the truck and push the fork directly under the journal and then to bear down on the handles of both trucks until the mounted wheels are lifted clear of the floor. With one man pulling and the other pushing, the wheels may be easily transported about the yard. The truck wheels are 14 in. in diameter with 3 in. treads and may be made of either cast or malleable iron. The axle may be forged from old car axles.

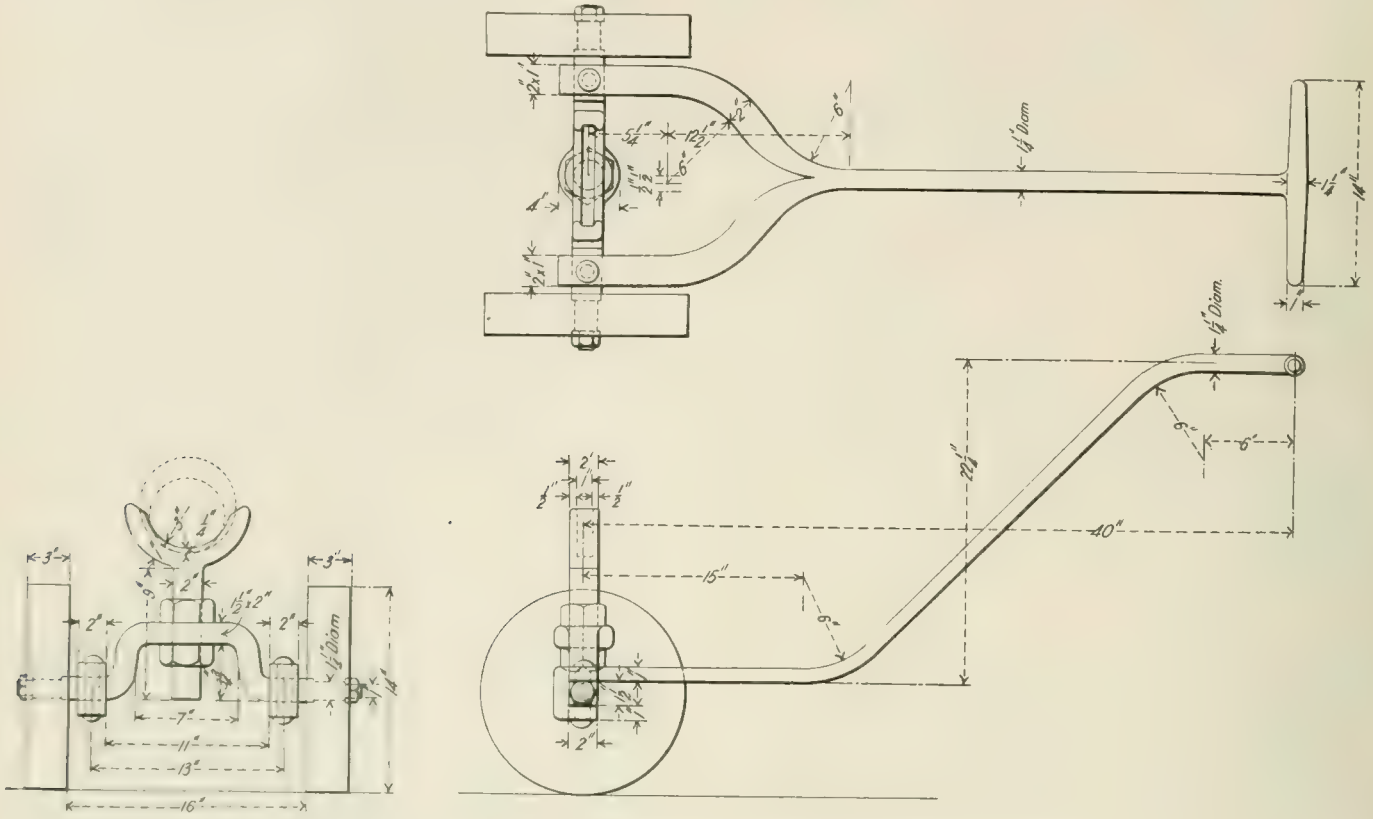


Fig. 12—One of a Pair of Trucks for Handling Mounted Car Wheels.

PORTABLE RIVET HEATER.

A portable rivet heater, which is made largely of second-hand material, is shown in Figs. 13 and 14. The oil tank, which also forms the base of the heater, is an old Westinghouse reservoir, bolted to the truck frame and furnace, as shown. The furnace is lined with fire brick, the top being bolted on so that it may easily be removed and the fire brick replaced, when necessary. The piping and other fittings were made of second-hand material.

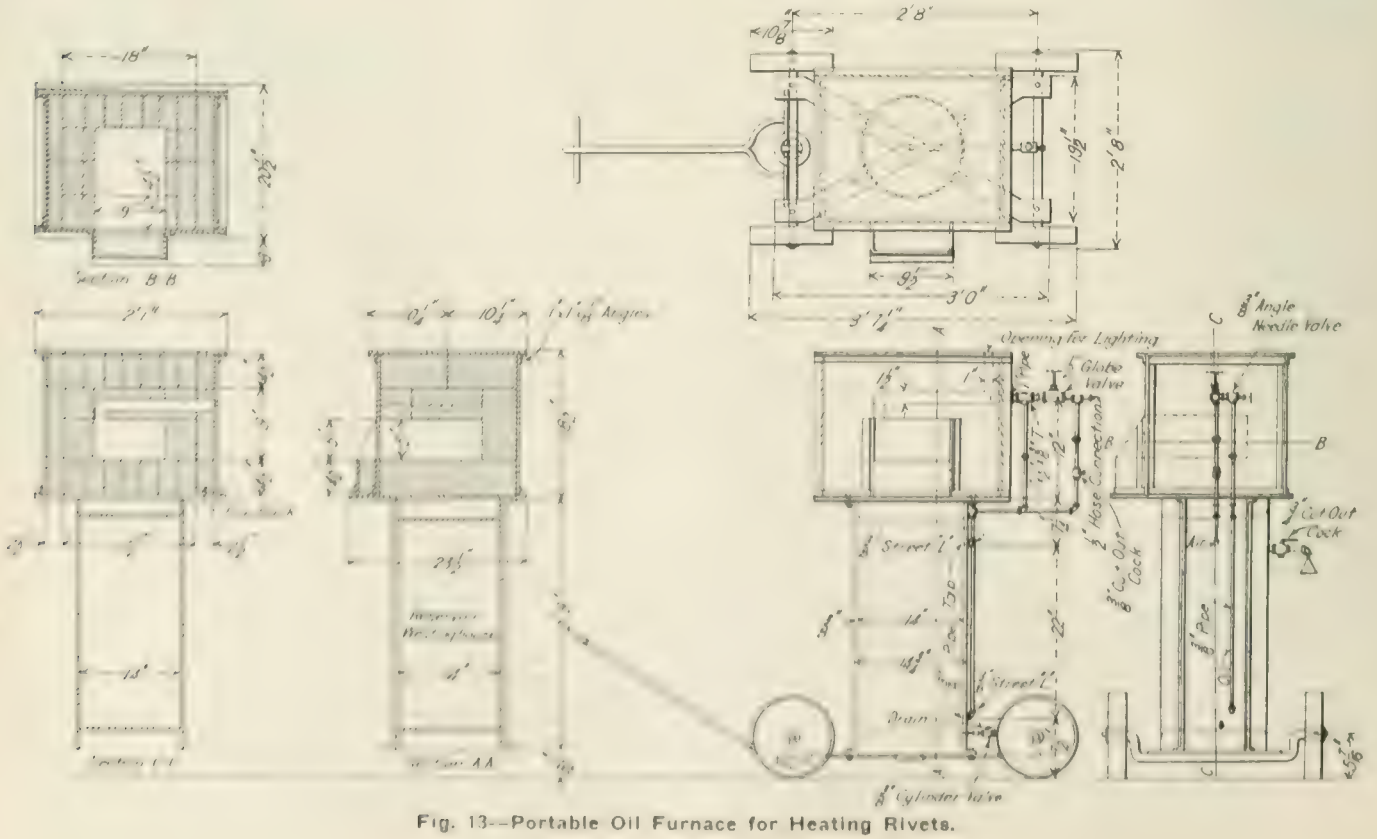


Fig. 13—Portable Oil Furnace for Heating Rivets.

The arrangement of the air connections is clearly shown. By opening the ⅜ in. cut-out cock air is admitted to the oil tank. The oil is thus forced up into the mixing chamber, the flow being controlled by the ⅜ in. needle valve. By adjusting this and the ½ in. globe valve, which controls the air supply to the mixing chamber, perfect combustion may be obtained. After the furnace becomes heated very little fuel is required to keep the temperature at a high point. The general construction of the furnace is

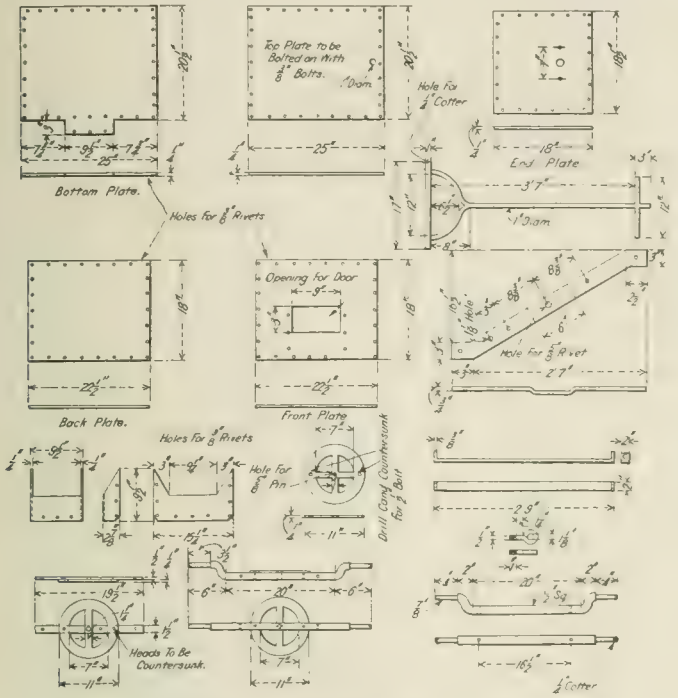


Fig. 14—Details of Portable Rivet Heating Furnace.

shown in Fig. 13 and the details of the various parts in Fig. 14. I believe that thus far no oil rivet heating furnace has been described in the *Railway Age Gazette*.. The furnace described by W. H. Snyder, assistant general foreman, New York, Susquehanna & Western, in the *Railway Age Gazette* of January 6, 1911, page 21, and the one used in the New York Central & Hudson River car shops at East Buffalo, as described in the issue of August 5, 1910, page 234, both use coal.

WORK BENCH FOR DRILL PRESS OPERATORS.

A convenient work bench for the use of drill press operators in a machine shop is shown in Fig. 15. To keep the top, which measures 2 ft. x 4 ft. 6 in., in good condition, it is covered with a ¼ in. iron plate. The 3 in. timbers underneath this plate are securely fastened to the substantial framework by ⅜ in. x 1½

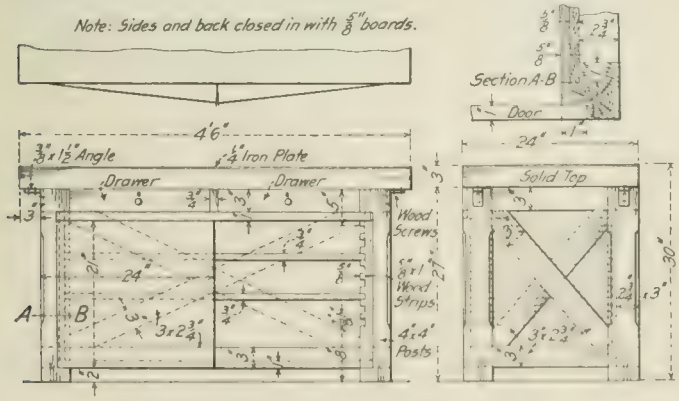


Fig. 15—Bench for Drill Press Operators.

in. angles. The tools that are used on the drill press may be kept in the two drawers and such templets as are used may be stored on the adjustable shelves underneath. The bench does not take up much room; its construction is clearly shown.

STEEL PAINT TESTS.

Three years ago the Paint Manufacturers' Association of the United States provided 500 steel plates, 24 in. x 36 in. x ⅛ in., which were covered with different paints and exposed to the atmosphere on fences erected at Atlantic City, N. J. These test panels have been inspected from time to time by a committee of the American Society for Testing Materials, and have created considerable interest, since the life of any steel structure or equipment depends in a large measure upon the way in which it is protected from the corroding effects of the atmosphere.

A second inspection of these panels was made on Wednesday, June 28, 1911, by sub-committee D of Committee D-1 of the American Society for Testing Materials, who reported on the condition of the painted surfaces, leaving the report of the comparative corrosion of the various types of metal used in the tests to committee A-5 on the corrosion of iron and steel. Ratings were given each panel according to the amount of rust apparent on the painted surfaces of the panels, as well as the degree of checking, chalking, scaling, cracking, peeling, loss of color, and other signs of paint failure shown. The system of rating, which took into consideration all of the above conditions, was similar to the system used at the first inspection during 1910, when zero recorded the worst results and 10 the best results. In Table 1 is shown the rating accorded by each inspector to each panel, as well as an average for each panel.

Table 1.—Second Inspection of Paint-Test Steel Panels.

Panel.	Pigment.	W. H. Walker.	P. H. Walker.	Gardner, Chairman.	Chapman.	Average.
1	Dutch process white lead	2	3	3	5	3.7
2	Quick process white lead	4	4	3	6	4.2
3	Zinc oxide (xx)	1	1.5	1	2.5	1.5
4	Sublimed white lead	9	9.5	9	8.5	9.0
5	Sublimed blue lead	9	9.5	9.5	7.5	8.8
6	Lithopone	2	1.5	2	3.5	2.2
7	Zinc white lead	3	4	5	7	4.7
9	Orange mineral (American)	9	9	9	6.5	8.3
10	Red lead	9	9	9	6.5	8.3
12	Bright red oxide	8.5	9	8	7	8.1
14	Venetian red	7	9	7	9	8.0
15	Prince metallic brown	5	7.5	6	8	6.3
16	Natural graphite	6	8	4	9.5	6.8
17	Artificial graphite	5	7.5	4	7	5.9
19	Lamp black	5	7.5	5	8	6.3
20	Willow charcoal	9	8.5	9	9	8.8
21	Carbon black (gas)	7	8.5	5	8.5	7.2
24	Yellow ochre (French)	5	7	2	8	5.5
27	Barytes (natural)	1	1	1	0	0.7
28	Barytes (precipitated)	2	1.5	2	2	1.8
29	Calcium carbonate (whiting)	0	0	0	0	0.0
30	Calcium carbonate (precipitated)	0	0	0	0	0.0
31	Calcium sulphate (gypsum)	1	1	2	3	1.7
32	China clay (kaolin)	6	6	7	6.5	6.3
33	Abestine (magnesium silicate)	5	4.5	6	5	5.1
34	American vermilion (chrome scarlet)	10	10	10	10	10.0
36	Lead chromate	7	7.5	8.5	8	7.7
39	Zinc chromate	9	9.5	10	9.5	9.5
40	Zinc and barium chromate	9	9.5	10	9.5	9.5
41	Chrome green (blue tone)	10	10	10	9.5	9.8
44	Prussian blue (water stimulative)	9	9.5	8.5	9	9.0
45	Prussian blue (water inhibitive)	8	9.5	8	8.5	8.5
48	Ultramarine blue	0	0	0	0	0.0
49	Zinc and lead chromate	10	9.5	10	9.5	9.7
51	Magnetic black oxide	9	9.5	10	9.5	9.5
111	Brown (composite paint)	7	9	9	9	8.5
222	Black (composite paint)	9	9	9	8.5	8.8
333	White (composite paint)	4	4	7	3	4.5
444	Green (composite paint)	5	7	7	8	6.7
555	Black (composite paint)	9	9	6	9	8.2
666	Brown (composite paint)	8	8	6	9	7.7
777	White (composite paint)	7	10	5	7	7.2
888	Green (composite paint)	7	8	8	9	8.0
2000	1 coat zinc chromate, 1 coat iron oxide excluder	8	8.5	8	8	8.1
3000	1 coat lead chromate, 1 coat iron oxide excluder	7	8	7	7.5	7.3
4000	1 coat red lead, 1 coat iron oxide excluder	7	8.5	8	7.5	7.7
100	Straight carbon black paint with turps and drier	5	8.5	4	8.5	6.5
90	Straight lamp black paint with turps and drier	5	7	3	8	5.7
5555	Coal tar paint (over red lead)	4	8	2	7	5.2
1000	Chrome resinate in oil, 1 coat	1	0	0	2	0.7
1 (plate)	Boiled (linseed) oil, 3 coats	1	0	1	4	1.5

Panels 111, 222, 333 and 444 are covered with composite paints made from pigments that were inhibitive in the water test, and the panels 555, 666, 777, and 888 are covered with composite paints

made from pigments that were stimulative in the water test. All the pigments shown in Table 1 were ground in two-thirds of a gallon of raw linseed oil, and one-third of a gallon of boiled linseed oil, without regard to consistency. The plates to which the pigments 1 to 51 inclusive were applied were pickled in sulphuric acid, then neutralized with soda ash, and after being thoroughly washed were preserved from future oxidation in dry lime until needed for the test. The paint was applied by painters representing the committee and the Master Painters' Association, three coats being applied on the cleaned plates.

Table 2 shows the rating of those panels which were considered by the sub-committee as meriting the rating of from 8 to 10 and as having given the best all-round service.

Table 2.—Analysis of Averages. Grade of Excellence from 8 to 10.

Panel.	Pigment.	Wt. of Pigment per gal. of oil-lbs.	Sp. Gr. of Paint as received.	Grams of Paint to the Panel.	Average.
34	American vermilion (chrome scarlet)	20.49	....	64.5	10.0
41	Chrome green (blue tone)	13.32	1.94	49.0	9.8
49	Zinc and lead chromate	14.28	1.92	48.3	9.7
39	Zinc chromate	10.71	1.75	39.2	9.5
40	Zinc and barium chromate	10.35	1.58	40.	9.5
51	Magnetic black oxide	15.	1.92	48.3	9.5
4	Sublimed white lead	19.17	2.36	59.	9.0
44	Prussian blue (water stimulative)	5.88	....	30.	9.0
5	Sublimed blue lead	19.17	2.42	61.	8.8
20	Willow charcoal	4.47	1.08	27.0	8.8
222	Black (composite paint)	10.86	1.30	32.8	8.8
45	Prussian blue (water inhibitive)	5.79	....	*34.5	8.5
111	Brown (composite paint)	10.82	1.30	32.7	8.5
9	Orange mineral (American)	26.91	2.97	74.7	8.3
10	Red lead	26.10	2.93	73.6	8.3
555	Black (composite paint)	9.37	1.125	28.0	8.2
12	Bright red oxide	15.78	2.05	†60.0	8.1
2000	1 coat zinc chromate, 1 coat iron oxide excluder	.....	....	....	8.1
14	Venetian red	9.30	1.52	38.0	8.0
888	Green (composite paint)	14.57	1.75	44.0	8.0

*29.5 + 5 (1,000 grams paste required 163 grams turpentine).
†51.5 + 8.5 (1,000 grams paste required 166 grams turpentine).

All the paints were applied at the spreading rate of 900 sq. ft. per gal., and two of the pigments in Table 2 had to be thinned with turpentine, as shown by the foot notes, before being applied. A description of the pigments shown in Table 2 follows:

American Vermilion:—This was made by boiling white lead and chromate of soda, to which was added a small quantity of sulphuric acid in order to brighten the shade. This color consists of basic chromate of lead in large crystallized form. It is liable to contain free chromate, small quantities of white lead and sulphate of lead, also small quantities of sulphate of soda.

Chrome Green, Blue Tone:—This was made from nitrate of lead, bichromate of soda and oil of vitriol, precipitated on white lead and Chinese blue. Besides chromate of lead, the resultant product contains sulphate of lead, Chinese blue, and white lead. It it also liable to contain nitrate of lead salts and nitrate of soda.

Zinc and Lead Chromate:—This was made from zinc and lead acetates and chromate of soda. It contains small quantities of zinc and lead acetates, chromates and acetate of soda.

Zinc Chromate:—This was made from a zinc salt and bichromate of potash. Owing to its solubility, it is impossible to be washed perfectly and, therefore, it usually contains a considerable amount of soluble matter, sulphate of potash, chromate and zinc oxide.

Zinc and Barium Chromate:—This was made by precipitating a mixture of zinc chloride and barium chloride with chromate of soda. The product contains considerable soluble matter, consisting of zinc chloride, barium chloride, sodium chloride and chromates.

Magnetic Black Oxide:—This was made by neutralizing acid ferrous sulphate liquors with an alkali and blowing air through the mixture.

Orange Mineral (American):—This was made from white lead by the usual method.

Red Lead:—This was made by oxidizing litharge in reverberatory furnaces.

Black (composite paint:)—This paint is made up of 8.18 per cent. lamp black, 8.18 per cent. natural graphite, 4.09 per cent. barytes, 8.33 per cent. japan and 71.22 per cent. raw oil.

Bright Red Oxide:—This is 98 per cent. oxide of iron (copperas red).

Venetian Red:—This was made by calcining a mixture of copperas and terre alba.

Green (composite paint):—This is made up of 4.32 per cent. Chinese blue S, 18.94 per cent. lemon chrome yellow, 16.23 per cent. sublimed white lead, 21.35 per cent. barytes, 2.35 per cent japan and 38.51 per cent. raw oil.

The full details of the tests, as well as an outline of former reports, is contained in the report of the first inspection, which is included in the report of committee A-5 in the 1910 Proceedings of the American Society for Testing Materials, page 73.

SHOP FLOORS.

In a paper on Factory Construction and Arrangement, presented before the New York meeting of the American Society of Mechanical Engineers, October 9, 1911, by L. P. Alford and H. C. Farrell, in which the arrangement and construction of the reinforced concrete buildings of the United Shoe Machinery Company at Beverly, Mass., were described, the concrete floors were discussed as follows:

"When these buildings were developed, the use of reinforced concrete as a material of construction was new and much of the work that was done had no foundation in precedent. The authors can recall with some amusement discussions over points considered of major importance, for which an easy solution was later found. One of these was the floors. A lengthy discussion took place as to whether or not a concrete floor was suitable for machine-shop purposes. It was finally determined that concrete floors should be used with the single exception of the stair treads, which were to be of wood. These concrete floors have been found to be so satisfactory that they were continued in the additions of 1906-1907, and will be used in the additions now in progress.

"One of the arguments against a concrete floor upon which persons must work is its hardness, but our experience shows this to be unfounded. The real objection to a concrete floor lies in its coldness. Concrete is a much better conductor of heat than wood, and for that reason, a cold concrete floor will rapidly withdraw bodily heat from the feet of anyone standing on it. Therefore, the only floors which need special attention are those which are in contact with the ground. The lower floors of these buildings are of concrete some 12 in. thick, and between the under floor and the upper floor are three thicknesses of waterproofing felt mopped in with asphalt. When the employees were transferred from the old factories with wooden floors to the new, some complaints were heard for the first few weeks, or until the men had become accustomed to the change. Thereafter, there has been no difficulty except on the part of a new man, who has to go through his own period of becoming wonted to the new conditions. Further objections raised to the use of these floors were those of wear due to the grinding action of the wheels of trucks, the chipping action of the ends of pinch bars used for moving heavy machines, the scouring action of metal boxes dragged over it, and, by far the most important, the difficulty of making floor repairs. On the first floor of one building, a floor devoted to the heaviest work done in the plant, requiring the largest machine tools and receiving the largest and heaviest castings, the floor of the center bay has been refinished by adding 1½ in. of a one-to-two granolithic mixture. This, of course, covers the area that has received the greatest amount of wear, as in all of the buildings a central passageway 8 ft. wide was left between the machine tools and other permanent fixtures.

"The greatest difficulty in maintaining these floors has been found to be in the making of minor repairs, namely, those

necessitated by the crumbling away of the edges of the grooves with which the original floors were marked out, or the edges of cracks and repairs to small depressions caused by the wearing away of soft spots in the surface. Repairs made with any cement mixture have been uniformly unsuccessful, provided the area repaired was comparatively small. At present, such repairs are being made by using an asphalt mixture which is applied to the surface in a plastic condition and then bonded to the concrete by the application of heat from gasoline blow torches. This method is much more successful than the use of cement mixture, although it does not entirely prevent the crumbling of the edge of the concrete where the concrete and asphalt join. It was also feared that the oil required in an automatic screw machine department would penetrate the concrete and tend to disintegrate it, but it has been proved that this fear was unfounded. Repeated investigations throughout the past six years have failed to show that there is penetration through the glaze of the finish even in departments where the floor is constantly wet with oil. Where cracks are present the oil will find an entrance; its penetration beyond the limits of the crack is very little, and is not the cause of any apprehension whatever. With regard to the possible injury from dust due to wear on the floors, there is no reason to believe that there has been any greater wear on the moving and sliding members of the machine tools than would have been the case in any other type of building."

SHOP KINKS.*

BY H. L. BURRHUS,
Assistant to General Foreman, Erie Railroad, Susquehanna, Pa.

CUTTING OFF AND SQUARING STAYBOLTS.

The dies shown in Fig. 1 are used for cutting off and at the same time squaring two sides of the end of a staybolt. They are used in a shear, such as is ordinarily used for cutting bar

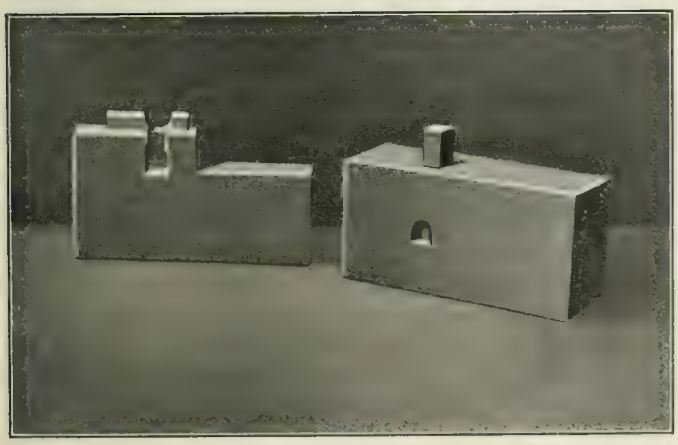


Fig. 1—Dies for Forming Square Ends on Staybolts.

iron; the staybolt iron is not heated. The projecting part in the die at the right, which is the bottom one, acts as a shear blade in cutting the iron off and at the same time assists in shearing the two sides of the end of the bolt. This projecting part or blade is removable, as shown in Fig. 2. This view also shows how the cutter blade is applied to the left hand or top die. It is this blade acting in conjunction with the one on the other die which cuts off the staybolt. Before the bolt has been entirely sheared off the projecting part on the right hand die starts to force the staybolt iron into the cavity in the left hand die, thus cutting off the material on the two sides of the bolt. The wearing parts of the dies may easily be replaced when they have become worn or are broken. The cutter in the right hand die is 13/16 in. x 1⅛ in. in section, thus making the flattened portion on the end of the staybolt of the same longitudinal section. The half round hole in the side of the right hand die is used for removing the cutter. When the cutter becomes too short because of wear and resharpening, a wedge can be driven in through the round hole and under the end of the die, thus raising it to the proper height. By using a special socket in the air motor it is only

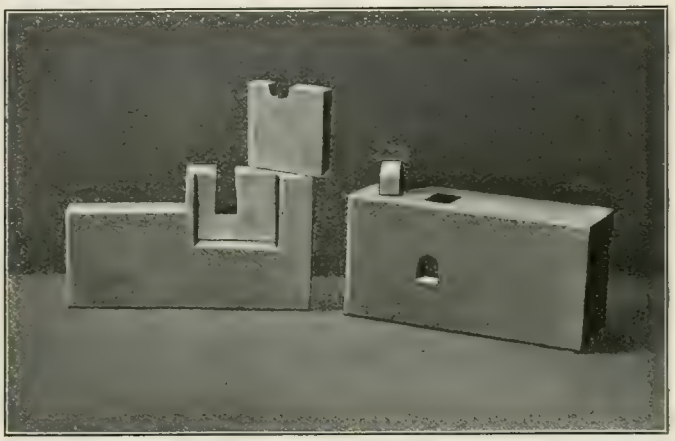


Fig. 2—Another View of the Dies for Forming Square Ends on Staybolts.

necessary to shear the staybolt ends off on two sides; if it is desired to make a square head the bolt will have to be turned 90 deg., allowing the dies to shear off the other two sides at right angles to the first two.

AIR MOTOR TESTING MACHINE.

Good tools are as important as kinks, and means should be provided to test the air motors to be sure that they are kept in good condition and operate at maximum capacity. The machine shown in Fig. 3 has been devised for this purpose. The motor is applied to a shank on the end of the shaft and is kept from turning by the arm *A*. The number of revolutions at which the motor operates is governed by tightening

Fig. 3—Machine for Testing Air Motors.

the prony brake and the pull is measured by the scale *B*, which is attached at its upper end to the arm of the prony brake, and at its lower end to an arm which is riveted to the base

*This collection of kinks was submitted in the competition which closed May 15, 1911. Mr. Burrhus entered a collection of shop kinks in the competition which closed January 15, 1911, the collection appearing in the issue of March 3, 1911, page 406. He was also awarded second prize in the competition on engine house kirks, which closed on March 15, 1911, the kinks appearing in the issue of May 5, 1911, page 1049.

of the machine, or it may be fastened directly to the floor. When a new motor is received it is tested and a record is kept of the pull on the scale for each of the different speeds at which it is operated. When there is any question as to the results which a motor is giving in service it is placed on the testing machine to see how it compares with its original condition. It is also tested whenever repairs are made.

The body or sides of the testing machine are made of ⅜ in. boiler steel plates flanged at the bottom so that they can

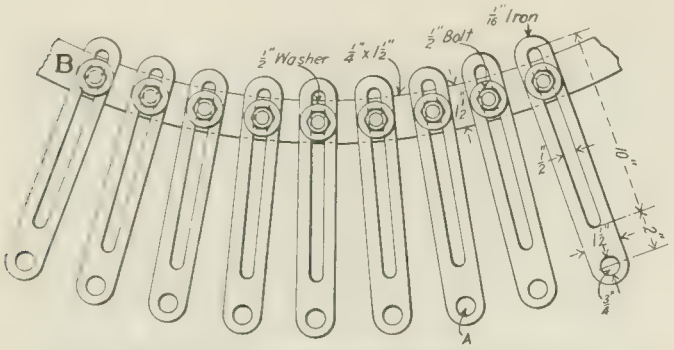


Fig. 4—Jig for Laying Out Smokebox Fronts.

be bolted to the floor. The bearings for the two shafts are pressed into drilled holes near the tops of the sides. The motor fits on the shank at the end of one of the shafts, which is connected by gearing to a second shaft that has the prony brake wheel mounted on its outer end. The plates are only placed far enough apart to clear the two gears. The machine is 30 in. high and is 18 in. long and 6 in. wide at the base.

LAYING OUT SMOKEBOX FRONTS.

A portion of a jig for laying out smokebox fronts to fit the studs or bolts in the smokebox ring is shown in Fig. 8. The frame *B* should be made a true circle. The number of fingers or gages must, of course, be governed by the greatest number of studs or bolts in the smokebox rings of the locomotives on the road where the jig is to be used. The 10 in. slot in each finger allows an adjustment of 20 in. in diameter. The diameter of the frame will, of course, depend on the range of diameters of the smokeboxes. The jig is applied to the smokebox ring by fitting the holes *A* in each finger over the studs or bolts. When adjusted the fingers are tightened to the frame by the ½ in. bolts. After all the fingers have been tightened the jig can be removed and placed on the smokebox front, making it possible to scribe all the holes accurately. The fingers may be adjusted to suit any variation in the ring, so that after the front is laid out and drilled it should fit perfectly. The frame is made of ¼ in. x 1½ in. iron and the fingers are made of 1/16 in. iron, 1½ in. wide.

TIMBER TONGS.

The timber tongs shown in Fig. 5 has proved very convenient in the planing mill and carpenter department. As may be seen, the design is such that the heavier the timber the tighter the tongs will grasp it. Without these tongs it is a difficult job to lift a beam off the floor in order to slip a chain around it, so that it may be handled by a crane. The beam shown in the illustration is 12 in. x 12 in. in section. The tongs can also be used to lift several boards at one time by gripping the lower one.

PLANING SHOES AND WEDGES.

The jig for holding shoes and wedges while planing the outside of the flanges and the inside for the frame fit, which is shown in Fig. 6, is simple and inexpensive. It also has the advantage of allowing the entire shoe or wedge, with the exception of the driving box face to be machined at one setting. Very little time is required to set up and clamp the work. The view at the left shows one of the clamps in detail, and the two views at the right show the application of the device. The clamps have T's which fit in the grooves in the planer bed. To hold the work rigidly and to prevent any possibility of its buckling up, due to the breakage of the T's on the bottom of the clamps, the small 1 in. x 2½ in. clamps, which are held by the ⅞ in. bolts, are used. Each large clamp has a 1 9/16 in. hole through it to take the 1½ in. rod. The number of shoes which can be planed at one time is governed by the

Fig. 5—Timber Tongs.

length of the planer bed. The shoes are placed on the jigs, and the nuts on the 1½ in. rod are tightened, gripping the work at each end. When planing wedges, or work that is tapered, it is necessary to provide the jigs in two heights, using a short one at one end of the wedge and a long one at the other. A combination tool holder having four small cutting tools may be used, allowing the outside and the inside of the flanges to be machined at one time. The 1½ in. clamping rod is threaded on both ends, thus making it possible to tighten the nut on the end which is most convenient

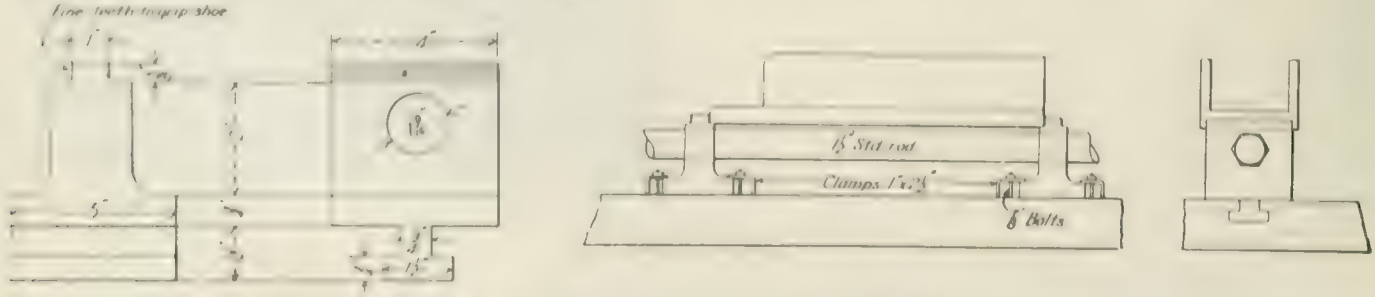


Fig. 6—Jig for Clamping Shoes and Wedges on Planer.

PLANING ENGINE AND TENDER TRUCK BRASSES.

The tool shown in Fig. 7 is used for planning the journal fit of engine and tender truck brasses. Its construction is simple and the radius of the cutting edge should be slightly larger than the radius of the journal, on which the brass is to be used, to insure a good fit. For instance, the tool for planing a brass to fit a 5 in. journal should have a radius of at least

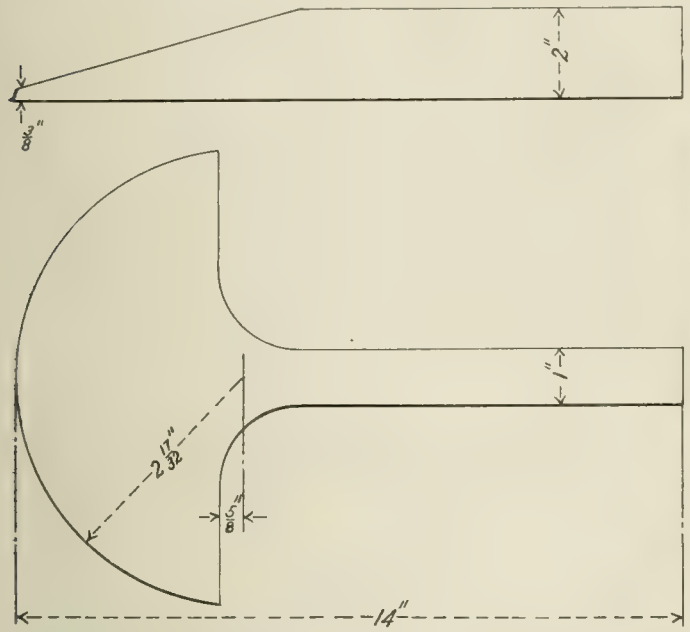


Fig. 7—Tool for Planing the Journal Fit of Engine and Tender Truck Brasses.

2 17/32 in. The tools may be made from soft steel and case hardened; tools should be provided for each of the standard size bearings and should vary by 1/16 in. in radius. In planing a brass the tool is fed down until it is the proper thickness at the crown.

TOOL FOR PLANING CROSSHEADS.

A cutter and tool-holder for planing crossheads to fit the guides is shown in Fig. 8. A number of cutters are provided to suit the different widths of guides. To change them it is only necessary to remove the nuts on the three 5/8 in. bolts and reapply them after the cutters have been changed. The

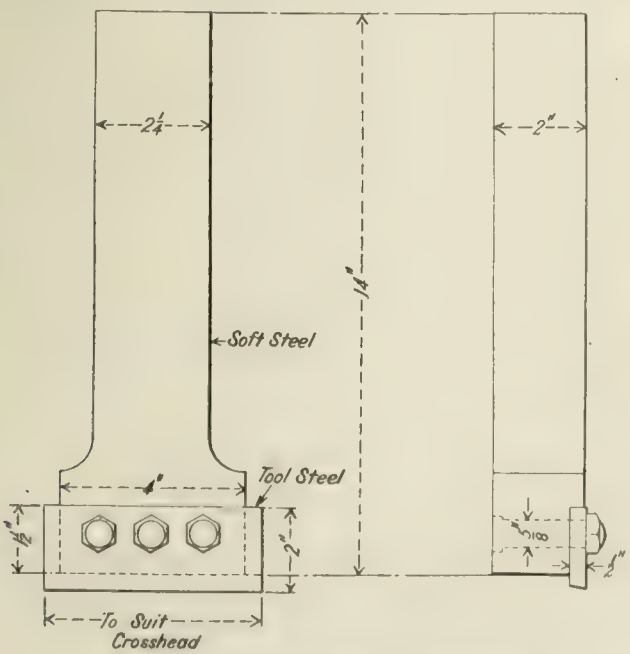


Fig. 8—Tool for Planing Crossheads.

holder is made of soft steel and will last indefinitely, as it has no parts that are subjected to wear. The cutters are made of pieces of ½ x 2 in. high speed steel.

MILLING THE FORKED ENDS OF SIDE RODS.

A simple method of milling out the forked ends of side rods is shown in the photograph, Fig. 9. A spiral cutter is fitted to the boring bar of a horizontal boring machine and

Fig. 9—Milling Out the Forked End of a Side Rod.

operates as shown in the illustration. This method is far more satisfactory than the slower one of drilling and cutting.* As the cutter wears and the diameter becomes less than the width of the opening, it is necessary to take two cuts, but the second one will be so light that it may be done quickly. This scheme may also be used in connection with a vertical milling

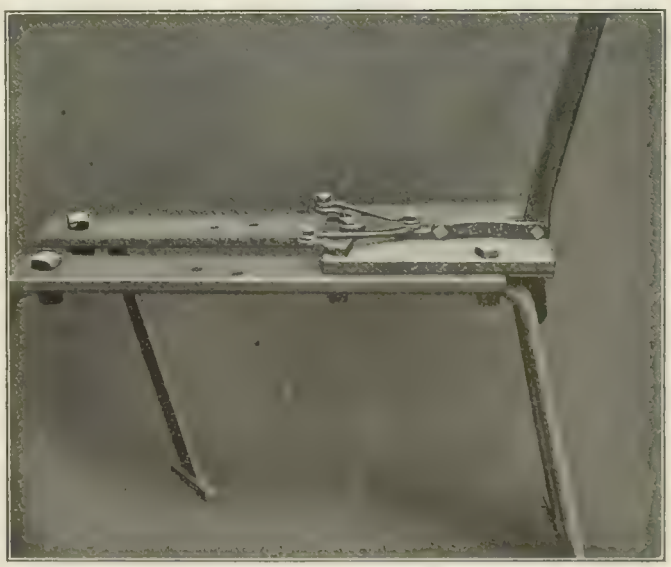


Fig. 10—Device for Bending Cotter Pins.

machine, but the work is easier to handle on a horizontal boring or milling machine.

BENDING COTTER PINS.

A device for bending cellar or cotter pins is shown in Fig. 10, and the die which forms the head of the cotter is shown in the sketch, Fig. 11. The device is operated by a hand lever,

*A tool for forking rods on a slotter which does not require the preliminary use of a drill or saw was described by F. Rattek in the *Railway Age Gazette* of October 1, 1909, page 597.

but in case the cotters should have to be made in large quantities it can be fitted with an air cylinder, which may be placed on the bed of the machine and be connected to the lever. The iron is belt cold. The pin *A*, Fig. 11, is made only long enough

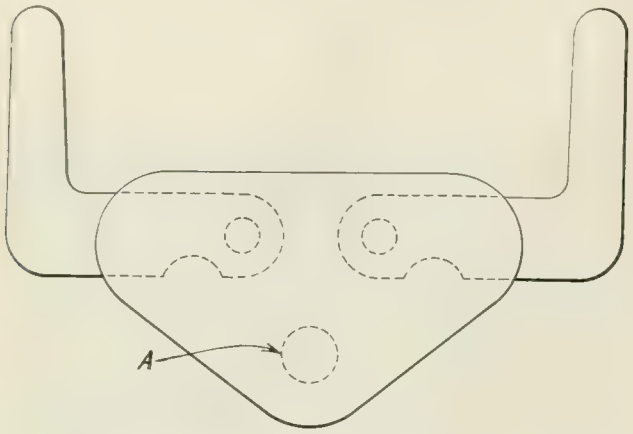


Fig. 11—Dies Which Form the Head of the Cotter Pin.

to hold the pin in place while it is being bent. When the operation is finished the cotter can be lifted up over the pin *A* and be slipped out.

THE SHOP KINK COMPETITIONS.

BY A CONTRIBUTOR.

In looking through some back numbers of the *Railway Age Gazette*, I came across the following on the editorial page of the Shop Section, May 6, 1910: "There are indications that some shop foremen regard their own kinks and labor saving devices as trade secrets of more value if kept to themselves than if published. The contrary is true. We have received letters from the general officers of ninety-two railway companies urging and encouraging us in the undertaking to educate foremen and saying in various ways that they will recognize any of their men who make good suggestions in our Shop Edition. Five of them say they will duplicate any prizes won by their men in our shop competitions. A much larger number ask us to especially call their attention to foremen who send in good suggestions. The foreman who thinks and devises ways of saving time has now a fine chance to improve his condition. The prize money is the smallest element in it."

This is certainly a most gratifying state of affairs, and is evidence to foremen that their movements are closely watched. But, if, on the other hand, all these letters of encouragement, that are no doubt models of rhetoric, correct in form and phrasing and withal business-like, have gone no further and produced no tangible results it would be most disappointing. It would be exceedingly interesting to know how many of the contributors to the shop kink competitions have really received encouraging notice and recognition from their superior officers. How many of the general officers of the ninety-two railway companies have recognized their men, if any of them have sent in contributions? No doubt many have and others have not. It is well known that some officers, not alone in railway circles but in industrial establishments also, withold the word of praise, no matter how deserving the case, and maintain a cold exterior to all beneath them in authority. How these men can forget their own early struggles and ambitions is one of the mysteries of the human makeup that has never been satisfactorily explained. Happily the condition is now more the exception than the rule.

Probably no competitions of this character, or any other series of mechanical articles, have brought out a more splendid and astonishing array of original, useful, practical and labor saving devices than has the *Railway Age Gazette* shop kink competitions, which began in October 1909. In the Railway Shop Kink book, recently published, and now no doubt familiar to many, there has been compiled the cream of all the kinks published in the *Railway Age Gazette* during the past two years.

It would be an interesting mathematical problem, if it were possible to compute the actual saving in the cost of material and labor due to the introduction of these kinks, as compared to methods in use before they were invented and put in service. A few definite statements of increased efficiency have been noted from time to time that serve as examples of the whole. From the Topeka shops of the Atchison, Topeka and Santa Fe we have a babbitting device for lining crosshead shoes, which reduces the time 75 per cent., and results in a saving of $1.13 per shoe, the total saving in one year amounting to $2,191.55. From another shop comes a similar device reducing the time 50 per cent., and saving 40 cents per shoe over the former methods. A jig for holding driving box shells on the slotting machine, which allows the shell to be finished to fit the box in one chucking, reduces the time and labor 25 per cent. The pneumatic ash pit hoist is another long step in advance and easily represents the saving in labor of six men every twenty-four hours. Consider the great saving there is in the improved methods of welding locomotive frames without removing them from the engine, by means of crude oil burners and other methods which have been described. Go into the passenger cars at the terminal and note the workmen cleaning the car seats with a pneumatic suction cleaner, completing an entire car of forty-four seats in an hour. And they are clean too! The dust and dirt is drawn out and not scattered all through the car, as it is when an air blowing method is used; it is carried off and blown away outside of the car. It is also much better than the old way of taking the seats out of the car and pounding them with a carpet beater, destroying the expensive plush covering and making the operator black in the face from his exertions. What is it costing you to do this work per car? Are you following the old method or profiting by the newer and more efficient way?

Again some genius has shown us how to load scrap car wheels economically with a pneumatic platform hoist; it holds sixteen wheels at a time; they are rolled on it at the ground level and raised to the level of the floor of the car by the powerful air jacks underneath.

The development of the oxy-acetylene cutting and welding process has also been shown in considerable detail. In the *Railway Age Gazette* of May 6, 1910, splendid illustrations and examples are shown of the successful application of this method at the Buffalo shops on the Erie. Quoting from this article: "In looking over the plant in search of labor and time saving devices the most striking feature encountered was the use of oxy-acetylene cutting apparatus in connection with the repairs of steel cars and the cutting off of the rivets connecting the coupler and coupler yoke. As far as we have been able to find this is the first place where the oxy-acetylene apparatus has been used for steel car repairs, if, indeed, it is not the only place where it is used for the purpose at the present time. The results that are being gained from its use are so important that it will undoubtedly soon be used extensively at points where considerable repairs are made to either steel or steel underframe cars." Rivet heads melt and vanish under the flame; steel center sills are cut through in from two to two and a half minutes and at a cost of about one-sixth of what it would be by the old method of drilling holes and cutting off by a pneumatic hammer.

Another writer says: "For cutting purposes in the boiler shop it is invaluable. I have often sent the operator in on a big job, and in three hours or less he has done as much work as would have been done by three or four boilermakers and helpers in several days of hard work." Patches are applied successfully to firebox side sheets and stand the highest pressures. Oxy-acetylene welding is also being used extensively in the construction of steel passenger cars for making joints that are strong and durable, having from 80 to 85 per cent. efficiency.

Note particularly the following from another writer: "It was discovered that there was little expert knowledge that could be obtained referring to oxy-acetylene processes, and the development was carried on by shop employees." We have dwelt at some length on these several examples of shop kinks contributed to the *Railway Age Gazette,* not alone to show their efficiency, but to call attention to and bring out the facts as to the real source of this array of splendid and successful ideas, all of demonstrated and practical utility. It is then the workmen, shop foremen, master mechanics, and shop superintendents who have developed these ideas and have given to us these improved methods of production.

Who can measure the hard work and patient toil, the thought and brain power expended by these men down on the firing line? We, therefore, again ask the question: To what extent have they been rewarded and advanced? One writer has said: "A great many more shop kinks would be designed and used were it not for the prejudices of some men in authority, and this same prejudice has hobbled the ambition and aspiration of many a good man. Probably we should have used the term selfishness, the terms are synonymous. A man may be intensely earnest in endeavoring to produce something very practical and very efficient, but if his efforts are not appreciated and he receives no encouragement they count for nothing. The practice of devising shop kinks and methods should be fostered and encouraged to its fullest extent, for it will be to the best interests of all concerned."

It would also be interesting to know how far these various kinks have been of use to other shops, and we would suggest that no doubt the editor would be glad to hear from readers as to the benefits they have received. We recently received a communication from a tool foreman in a large western shop, inquiring for some further information about one of our kinks that he wished to reproduce in his shop.

President Bentley of the Master Mechanics' Association struck the right note when, in a recent address at the convention of the General Foremen's Association he said: "I want to talk to you particularly about getting results. What are general foremen for? What are master mechanics for? What are roundhouse foremen for? What are assistant superintendents of motive power for? They are here to get results, as a business proposition. The companies pay the men a certain compensation for doing certain things. Are we earning the money that is paid us? Are we getting the results that we ought to get? I believe that by your attendance at this meeting you are doing more to earn your salary than you would sitting in your shop for six months. We do too much staying in our own shops."

Truly this is sound advice, right along the line of shop kink work and self improvement. And there is too much staying at home. How pleasant and how encouraging it is, only the shop foreman or superintendent knows who is requested by his superior to spend a week or two, or a month, visiting other shops in search of new kinks and better ways of doing work. It has a broadening effect upon the men. He expands and warms up all through as he feels the honor and trust conferred upon him. It is only one of the ways of rewarding him, and is of just as great benefit to the company as to the man himself.

All honor to the men who are working faithfully along the lines of greatest efficiency and producing really wonderful results. In closing this article let me sound a warning note. Be not too modest, remember that:

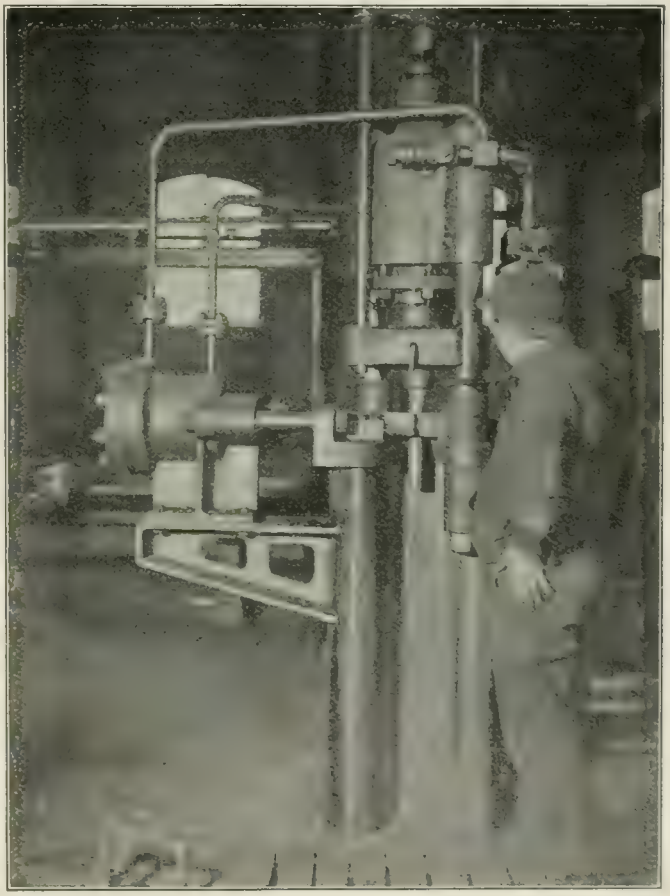
> "Many a gem of rarest ray serene the dark unfathomed coves of Ocean bear.
>
> Full many a flower is born to blush unseen and waste its sweetness on the dense air."

Value yourself and your own attainments at a good stiff premium. Let those higher up hear of you and what you are doing and accomplishing. Make a noise! Toot a little on your own horn. Remember that the soundless horn is of no more use than the sword or pen without a handle

RECENT DEVELOPMENTS IN TESTING BOILER TUBES.*

BY F. N. SPELLER.

A variety of tube specifications has been drawn up, with that of the American Railway Master Mechanics' Association as a basis, to regulate the quality of the material and the manufacture of locomotive boiler tubes. At the present time each road has a specification of its own, usually differing in some points from the others, but in general requiring a flanging, flattening or crushing down test on one out of each lot of 100 or 250 tubes. In the manufacture of lap welded tubes it has been found necessary, in order that the tubes will be as far as possible uniformly satisfactory, to make such tests on each end of every tube, and a special machine has been made to make these tests on the crop ends as they are cut off. This machine is



Testing Machine for Boiler Tubes.

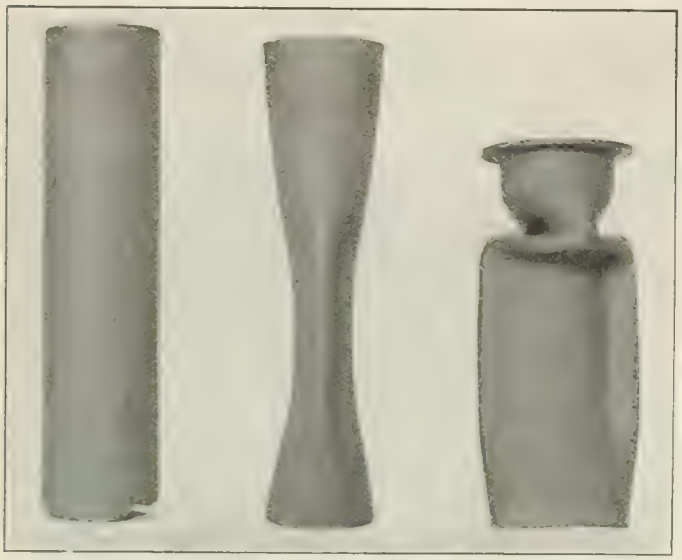
shown herewith and the crop end or a short piece from a tube is being flattened down in the horizontal grips, which hold the piece while a flange is turned by a die. At the same time the sample is crushed down in the direction of the axis of the tube by a ram at the top.

The machine is operated by hydraulic power, both horizontal and vertical cylinders being controlled by the same lever. The flanging die is preferably magnetized by a coil so as to keep the sample in place until the grips take hold. By placing the machine in a convenient position, it may be quickly operated by the man who cuts off the crop end, thereby enabling him to lay aside the tubes which are not welded or which show other defects. This test, made on every tube, makes it almost certain that the weld is as strong as other parts of the tube, and that the physical properties are uniformly up to the required standard.

Among the various requirements in the different specifications for locomotive boiler tubes, there are naturally many excellent

*Presented before the American Society for Testing Materials at the Atlantic City Convention, June 27 — July 1

provisions, some of doubtful value, and a few clauses which tend to produce the opposite result from that for which the specification was written. Locomotive tubes, whether seamless or lap welded, must sooner or later be safe ended, hence the welding quality of the metal should be one of the first considerations in manufacture. Some specifications now written restrict the chemical composition in some particulars, so as to hamper the manufacturer in making a good welding steel. There is no difficulty in making steel with a maximum of .03 per cent. phosphorus if necessary, but there is reason to believe that .05 per



Crop Ends of Boiler Tubes as They Are Tested.

cent. phosphorus is a more reasonable maximum limit which does no harm, and with other conditions the same, will give a tube better adapted to service and much more easily welded.

Another restriction, which experience teaches is operating against the best quality in locomotive tubes, is the unreasonable sulphur requirements. The highest sulphur allowed in samples taken from individual tubes is, in some cases, .035 per cent., which means that the ladle test must not exceed .030 per cent. With producer gas this means that the heat must often be held and a heavier burden of lime carried which tends to render the steel "dry" in welding and more liable to be crystallized or burned. Personally, I have not found a case of failure which could be attributed to the sulphur being as high as .05 per cent.; on the other hand, there are undoubtedly countless numbers of tubes giving good service which carry close to that amount of sulphur.

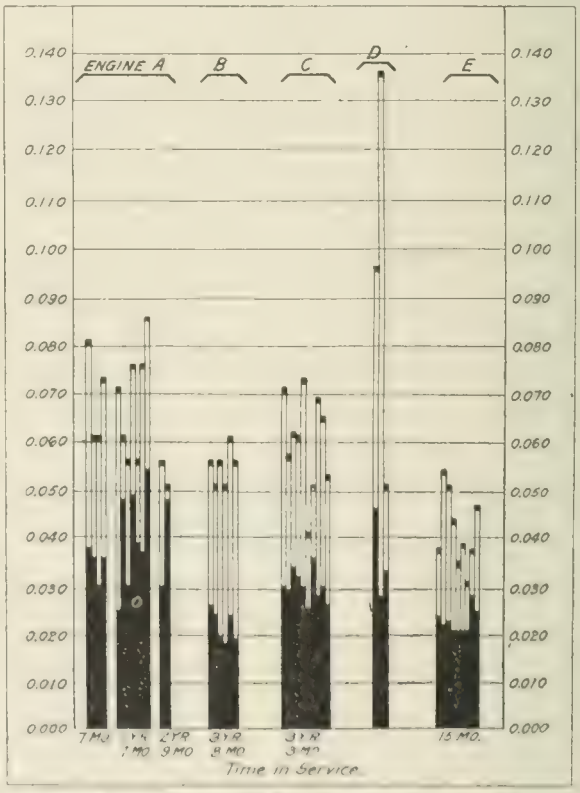
Analysis of the surface of beads taken from tubes after being in the boiler some time, show that sulphur is absorbed from the hot flue gases, so that if there is any advantage in using steel of .030 per cent. sulphur, it would appear to be only temporary. The [illegible] shown in the diagram. The locomotives from which these tubes were taken had been operating on different roads under widely different conditions, but in each case the tubes had all been equally good service and were being removed for [illegible]. It also appears from a comparison of the sulphur taken up by individual tubes under the same conditions, that there is no consistent relation between the original sulphur and the amount absorbed, so that it does not follow because the tube was originally low in sulphur, that it would therefore show comparatively low sulphur after being subjected to the action of the hot flue gases; the results rather suggest that the sulphur taken up is [illegible] to sulphurizing by the hot flue gases.

A study of records in lap welding may throw some light on the relative influence of variations in sulphur contents. For example, two heats which had been [illegible] gave the following welding records, each piece being tested in the flanging machine after the first run through the welding furnace and rejected if there was any indication of an opening at the seam:

Heat No.	No. of Pieces.	Chemical Analyses—Per Cent. S.	P.	Mn.	C.	Per Cent. Not Welded.
3432	1272	.045	.036	.43	.105	14.7
30522	1401	.027	.037	.47	.113	20.2

The average of nine heats of steel which ran .03 per cent. sulphur or less showed 20 per cent. more rejections on account of bad welds, than eight heats where the sulphur ran over .04 per cent., these heats being nearly the same in other respects. As to the effect of foreign elements in these amounts on the corrosion of steel under ordinary conditions, we have no evidence that their presence has any decided effect one way or the other in well made steel, and the grade of soft steel made exclusively for the manufacture of pipe certainly belongs to this class. The degree of uniformity obtained, even between individual Bessemer heats made for this purpose, is, it is safe to say, as good as that shown in the records of the most highly refined product of the open hearth furnace and uniformity, both physical and chemical, is undoubtedly a large factor both in welding and in corrosion.

The supposed beneficial effect of great purity, has, I believe, been greatly over-estimated. Some time ago the writer found by using the sensitive ferroxyl test that cross sections of steel



Lower Shaded Portion—Original Sulphur (per cent.).
Upper Open Portion—Increase in Sulphur (per cent.).

Amount of Sulphur Absorbed by Tube Ends from Flue Gases in a Locomotive Firebox.

which had all the variations due to segregation would not show a regular difference of polarity under repeated tests made on the same section, the explanation evidently being that external influences, such as finish and accidental irregularities in oxidation, predominated and overpowered the much smaller differences in potential, due to irregularities in the metal itself. It is believed that it would be to the advantage of all concerned if a standard specification were agreed upon for boiler tubes, in which there could be no objection to a test on the ends of each tube along the lines described above, provided the chemical requirements were not unnecessarily restrictive.

BENEFITS DERIVED FROM CONVENTION ATTENDANCE.*

BY "W."

To enumerate, or to dwell at length on the exhibits which have interested and educated all of us would be justifiable, but an adequate account of even the least wonderful of the recent developments, which have been so thoroughly illustrated at the conventions, would be out of place in this article because of the large space such an account would occupy, and because the critics have but to see, to be converted, provided their souls are not ossified. However, the value of the exhibits must not be passed carelessly, for what has inspired the inventive geniuses to whom we are largely indebted for the developments in transportation facilities? Certainly nothing more than the accomplishments of others, and what if our transportation facilities had not been developed? And what if this development should cease?

Embryo artists study the masterpieces and seek the association and counsel of the masters. Every one knows that they should do so, and yet some would practically bury the mechanic and inventor whose work is of inestimable value to humanity, and they would also isolate the executive officer, making improbable, if not impossible, the development of plans and practices, the best of which must be adopted if our railways are to continue to exist.

Before attending my first convention I had been an apprentice and machinist, a fireman and locomotive engineer, a roundhouse foreman, a general foreman, and had just been given the title of master mechanic. Perhaps I should have had a fine opinion of myself and a poorer opinion of the rest of the mechanical fraternity, but I had been squelched by those whom long experience should have broadened and made considerate of a young enthusiast; I had been bitten by a snake in man's clothing and had become so depressed that I had developed a lack of confidence in myself and in others. I can only say that I am unable to measure the benefits derived from the council and encouragement given by Robert Quayle in his addresses at various conventions.

I knew something about the detrimental effects of cylinder condensation and my recommendations to apply superheating apparatus had been ignored by my superior officers. Can you not appreciate the satisfaction with which I have listened to H. H. Vaughan and Prof. Endsley? I have wondered whether Mr. Seley, Prof. Goss and others whom we juniors so admire, wasted as much time in their youth as I have wasted, and if it is possible for me to acquire such a fund of valuable theory, backed by practical experience or experiment, as they possess. My attendence at conventions is responsible for my determination to attempt such heights.

I had studied air brake construction and manipulation, and felt that I had a good working knowledge of that art until I heard Walter V. Turner, T. L. Burton and several others, after which I realized how little I knew and how intricate the problems were. I appreciated more fully what a charming study it is, and I was made proud of my profession and determined to get out of the rear ranks if possible. No one can listen to our "Traveling Engineers" without admiration and appreciation of their sterling worth. Do not ask the fossil who is kept from drowning by being stuck in a rock; ask the man who does things—the road foreman—whether conventions pay. You may not hear his answer, but you'll get a look that will reply in full to your inquiry.

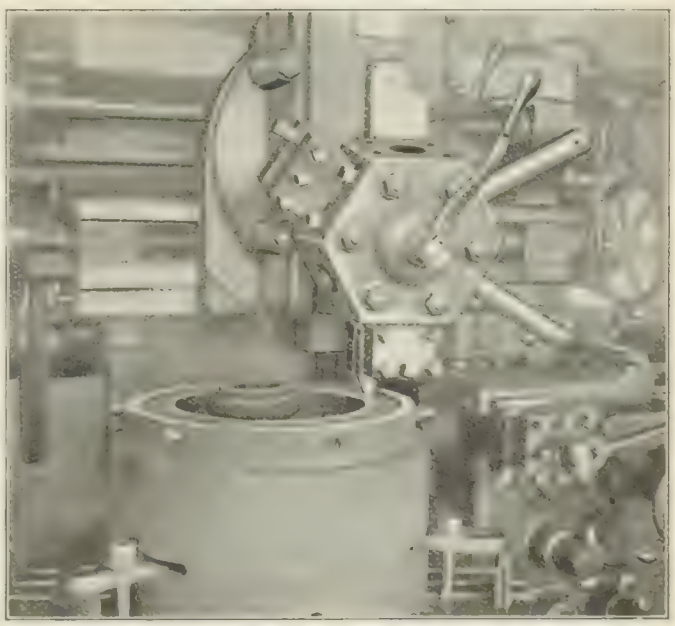
Can anyone read the address made by J. F. Deems at the Master Mechanics' convention in June, 1907, while he was president of that association, without emotion which enobles, or without appreciating the necessity for the most thorough team work? I quote from that address: "Throughout all time, all great works have been effected by earnest men, few or many, brought together by a common object or a common impulse," and later in the same address: "We may reach perfection in all these, in mechanism, structure and method, and yet our bequest be a failure and itself a burden unless we provide that which is paramount, which is over and above the sum total of all this, and for which even today events throughout the world are crying aloud—*the man.*" Mr. Deems placed great emphasis on the need for the man who is prepared. I believe that even the critics appreciate that need; their superior officers certainly do, and so let us continue to exchange our views and generously share the results of our experience, for such practice has increased our value to our employers and to the public and has assisted largely in making possible our present civilization. To discontinue the conventions would have the same detrimental effect on the transportation business as a discontinuance of church services would have on religion. Besides, the old adage about "all work and no play" is quite true still, and many a mechanical department man is busy every long day, including Sundays, with the never ceasing grind, except during convention week. Some fun and relaxation are to be had there, and even in the pleasure there is much profit. Can anyone listen to Eugene Chamberlain without being made glad; and during his exquisite references to the ladies, do we not down deep in our hearts make resolutions to be more considerate of the good wife or mother to whom we owe so much? I cannot understand why you recognize a possibility for a discussion on this subject.

*Submitted in the competition which closed October 15, 1911.

MACHINING TANK WELL CASTINGS.

BY C. E. PADDACH.

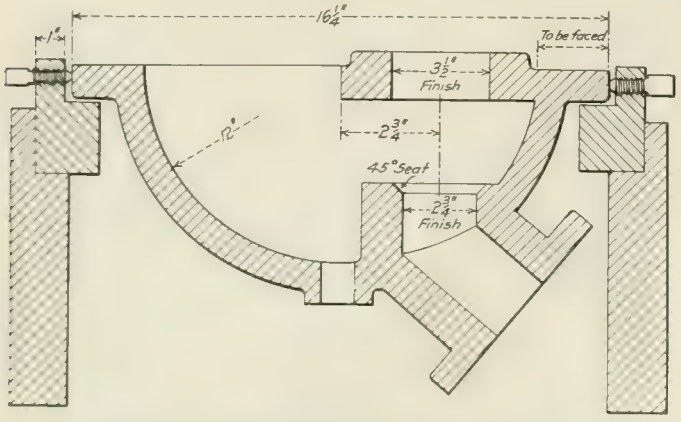
Although a tank well requires little machine work, it being only necessary to face the joint and bore the hole for the valve and face the valve seat, yet it requires two settings and is such an awkward shape that in doing this work on the ordinary lathe considerable time must be spent in adjusting it properly. The accompanying illustrations show a good method for machining tank wells on a turret head boring mill. A master chuck is made of a hard cast iron cylinder, which is cut away at the top, as shown in the illustration, for a ring of the same material that is pressed in. This ring is provided with set screws for holding the tank well. The chuck is made in this way to prevent the head of the set screws from extend-



Finishing Tank Well Castings on Turret Head Boring Mill.

ing too far beyond the circumference of the chuck, thus reducing the liability of their catching in the clothing of the workmen. The chuck is also provided with slots in its sides, so that it may be rigidly clamped to the table of the boring mill.

The chuck is first clamped firmly in the centre of the table The casting is placed in the chuck and is adjusted centrally by the set screws. Two cutting tools are used for facing the casting, one for roughing and the other for finishing. The second operation is that of boring out the casting for the tank



Chuck for Machining Tank Well Castings.

valve; as the hole is located off the centre of the casting the chuck will have to be readjusted. A boring tool and a valve seating tool are used for the operation. The four tools for the different operations are placed in the turret head, and when once adjusted can be used for a number of castings. Where several castings are to be machined it will be quicker to face the joints of all them first, thus taking advantage of the correct setting of the chuck, and then bore out all the valve seats at the second setting.

COPPER IN ENGLISH LOCOMOTIVES.*

About 13 per cent. of the total weight of the 4-cylinder passenger engines of the Lancashire & Yorkshire consists of brass and copper. These locomotives are made with copper fireboxes, copper tubes and copper staybolts, the total weight of the copper being 25,300 lbs. The copper fireboxes have a life of 10 to 16½ years; the fireboxes of the older engines with 140 lbs. boiler pressure gave a mileage as high as 500,000 miles; however, an average figure for seventy engines was found to be 310,000 miles. On six-wheel freight engines working at 160 lbs. the average life of the copper firebox is eleven years with an average mileage of 235,000 to 272,000 miles. These figures are based on records of 120 locomotives. The copper tube sheets usually require renewing once during the life of the firebox. An average of tests shows the strength of the copper staybolt to be about 33,200 lbs. per square inch, and it has an elongation of 40 per cent. in 8 in.

The staybolts are made 1 in. in diameter and have eleven threads to the inch, the center being turned down below the bottom of the thread to about ⅞ in. diameter. A comparison of the life of copper and steel tubes is given for a period of eight years. New copper tubes are credited with 110,000 miles, while new steel tubes will run between 70,000 and 80,000 miles. While the copper tube is used extensively in England, the mild steel tube is the standard practice. The tests included in the specifications of copper boiler tubes require a tensile strength of 30,100 lbs. per sq. in., and an elongation of 25 per cent. in 8 in.

*Paper read before the Institution of Mechanical Engineers, London, by George Hughes, Chief Locomotive Engineer, Lancashire & Yorkshire.

BENEFITS DERIVED FROM ATTENDING CONVENTIONS.*

BY GEO. H. ROBERTS,

Machine Foreman, Long Island, Morris Park Shops, N. Y.

Shop foremen, until within the last few years, have seldom had an opportunity of getting out to see what others are doing. Things have changed and now he may attend the conventions and meet men in his own line of work from all over the country. He can remain at home and read the proceedings of the conventions in the technical papers, but it is impossible for him to take the interest in them or receive the benefits that he would by attendance at the conventions. If a man does not read or come in contact with other men in his line of work he is liable to become set and labor under the impression that he is accomplishing the best that can be done.

In these days of progress one must be constantly on the alert or find himself left behind, for practices and methods considered good today are discarded tomorrow for something better. The conventions offer the foreman a solution for many of his troubles; he meets other men holding similar positions, and an exchange of ideas is possible, from which much benefit may be derived. By becoming a member of one or more of the associations it will awaken a desire to accomplish something himself and not merely to hear what others are doing.

Merely leaving his troubles at the shop and attending the convention will do him more good than all the medicine in the country; in fact, a little trip as a rule does any one a great deal of good; a change of scene will do wonders towards health and happiness to persons confined to the same scenes day in and day out. A farmer whose wife had been taken to an asylum was questioned as to the reason and replied: "I don't see why she should have gone crazy, for she hasn't been out of that kitchen for nigh on twenty years."

There is a general feeling of good fellowship at the conventions, all being ready to discuss a point or something new in the shape of a machine or appliance. The exhibits, especially at the Master Mechanics' and Master Car Builders' conventions, are very instructive, as practically all the latest developments in machines and railway appliances are exhibited, with able men to explain and demonstrate them. The work accomplished by the Master Car Builders' Association is world renowned. By having M. C. B. standards, it is possible for a New England freight car to travel all the way to the Pacific coast and return without being held up for a journal box, brass, drawbar or a pair of wheels. A few years ago this was impossible.

The large railway systems have adopted standard locomotives to permit of equalizing the power from one line to another; this would be practically impossible if each line had its own designs regardless of the other parts of the system. If this has paid, it certainly must pay to have the various foremen and higher officers meet to discuss and decide on the best methods for important operations in the shop.

The social side must not be overlooked, for at most of the conventions delightful programs are prepared for the entertainment of the members and their families, making it a pleasant event to look forward to each year. The conventions broaden a man socially and mentally, keep him up to date, and are an incentive for him to achieve greater things.

An Atlantic type locomotive has been designed by Dugal Drummond, chief locomotive engineer of the London & Northwestern, which is capable of hauling a heavy passenger train of 13 coaches at a rate of over 60 miles an hour. Five of these engines are being built at the Eastleigh works. They are intended for fast passenger traffic between Waterloo, England, and Bournemouth.

*Entered in the competition which closed October 15, 1911.

BENEFITS DERIVED FROM THE GENERAL FOREMEN'S CONVENTIONS.*

BY WM. HALL,†
General Foreman, Chicago & North Western, Escanaba, Mich.

I look on the annual conventions as a purely business proposition. I expect to attend the meetings and to be just as faithful as if I were in the shop. Attendance at the conventions has broadened my sphere of usefulness to my company and myself. Too many men look upon the annual convention as a holiday, or a chance to have a good time; such men had better stay at home. In fact, if the plans proposed by the executive committee for next year are carried out, each one who leaves his home shop, ostensibly to attend the convention, had better put in an appearance at each session, for his superior officer will be in a position to know of his attendance or non-attendance.

The General Foremen's Association is looked upon by some as somewhat of a labor organization, and they are afraid that if they join they will jeopardize their positions. At least, I judge this from some replies I have received from foremen who have been invited to join the association. If these men will attend one of the conventions, they will soon find out that it is an organization of wide-awake men who are seeking to further the interests of the companies employing them; their own interests are of a secondary consideration. Again, some are egotistical and have an idea that they have nothing to learn by attending the conventions, or visiting other shops. Let these men come to the conventions and learn how little they do know.

Attendance at the annual conventions, and the opportunity of viewing the exhibits is a first-class school of instruction for the foremen. Here they will see things and hear views expressed that they never dreamed of, nor in a great many instances would see or hear of by staying at home a lifetime. Nothing tends to depreciate a man's worth, both to himself and the company employing him, more than being compelled to stay in his home shop and not come in contact with those engaged in the same or similar pursuits in other shops. I feel better in every respect after each convention, and I return to my shop with more vim and vigor, and with a firm determination to improve upon some one thing, at least. I cannot always do as my inclinations would lead me, but I do the best I can under existing conditions, and my company is the gainer; I lose nothing, for my mind is broadened.

The daily grind sometimes becomes monotonous, but these yearly visits to the conventions, with an opportunity of visiting different manufacturing establishments, is an inspiration. If it does not have this effect, the foreman is a dead letter, and is in the wrong place. A great many people, unable to travel but anxious to know more of what this world of ours contains, and what it is doing outside of their own contracted sphere, consider the next best thing for them to do is to attend lectures given by Burton Holmes and others. Those who are unable to visit other shops should at least attend the annual conventions; and not only learn what others are doing, but tell what they are doing themselves. If a foreman intends to be a live wire, and keep abreast of the times, he should attend the conventions. The next best thing to do is to subscribe for good technical papers, and keep in touch with what is going on around him.

When I was employed in Chicago, I attended the weekly meetings of our foremen, and it was always my ambition to be a little ahead of the game. Attendance at the General Foremen's conventions acts as a great inspiration and a desire to be doing as good as, if not better than, the other fellow. By making a visit to another shop, I accidentally learned of the idea of welding locomotive frames with oil without removing the frame; on my return home, I reported my find to my superior, and we put the new scheme into practice at the first opportunity we had, and with good results. At my first attendance at the General Foremen's convention, I saw frames welded by thermit, and at once realized how far ahead this process was. We adopted the thermit welding with excellent results.

The more remote a man's shop is from headquarters, the more good the attendance at the convention will do him. I have learned of various shop kinks that have not been published so far, and which I intend to install at the earliest opportunity. My knowledge of shop methods has also been increased since the last convention. It has taught me to take a more active interest in devising means of arriving at the daily cost for repairs. I have gained new ideas of specializing work. I also learned how to increase the efficiency of the shop by the introduction of good shop kinks and the adoption of the best methods of handling the work.

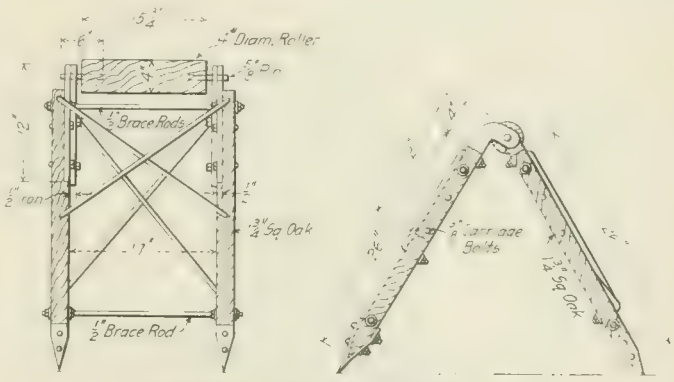
*Entered in the competition on Benefits Derived from Convention Attendance, which closed October 15, 1911.

†Mr. Hall is secretary of the executive committee of the International Railway General Foremen's Association.

ADJUSTABLE HORSE FOR PLANING MILL.

BY F. W. BENTLEY, JR.,
Chicago & North Western, Huron, S. Dak.

An adjustable horse for use in a planing mill should be easy of adjustment and at the same time stiff and rigid. In most cases one of these qualities is sacrificed to secure the other. The accompanying drawing and photograph illustrate a device that



Adjustable Horse for Planing Mill.

possesses both of these requirements and has given good satisfaction. The legs are made of oak and each pair is rigidly tied together by the ½-in. horizontal rods and by the diagonal braces, as shown. The lower ends of the legs are fitted with sharp iron

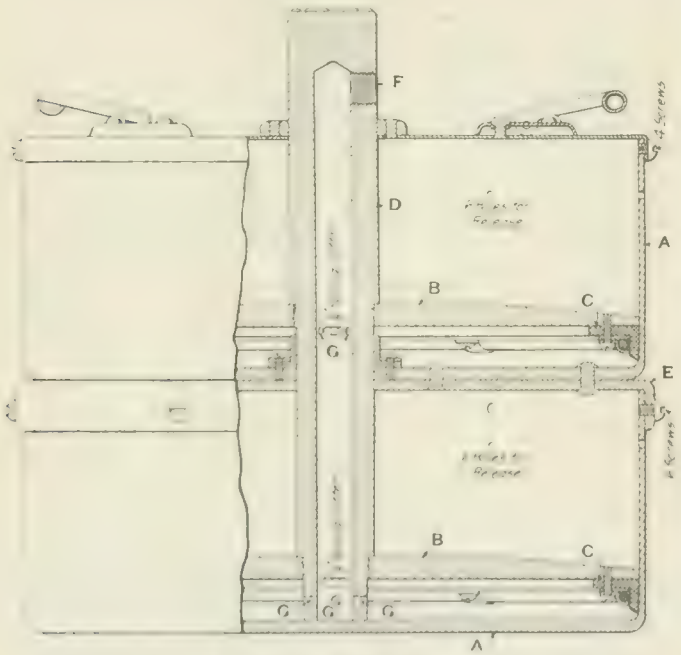
Adjustable Horse for Planing Mill.

points, so that there will be no danger of slipping. The 4-in. wooden roller is held in place by the 5/8-in. pins. There are no set screws to work loose and no unreliable dogs to unlock and allow the load to drop. It may be instantly set up and because of the extent of its base remains rigid under the load, regardless of any tendency to tip as the load is pulled forward or backwards over the roller.

TANDEM CYLINDER PENUMATIC JACK.

A new type of pneumatic jack shown in the accompanying illustration is made by the Pneumatic Jack Company, Louisville, Ky. It is of unique construction, in that it has a tandem cylinder arrangement, which provides double lifting power. It is designed in a compact manner, which makes it convenient to handle.

The construction is simple and may be readily understood by referring to the illustration. The parts *A* are pressed steel cylinders into which the boiler steel pistons *B* fit. The pistons are screwed to the same piston rod or plunger *D*, which is made of cold rolled steel shafting, and are locked to it by 1/8 in. spring cotter pins. The center of this rod has a 1/4 in. hole running part way through it, which conducts the air from the hose connection *F* to the underside of the pistons through the ports *G*. Leather washers *C*, of the Westinghouse standard, are fastened to each of the piston heads, and are forced against the sides of



Tandem Pneumatic Jack.

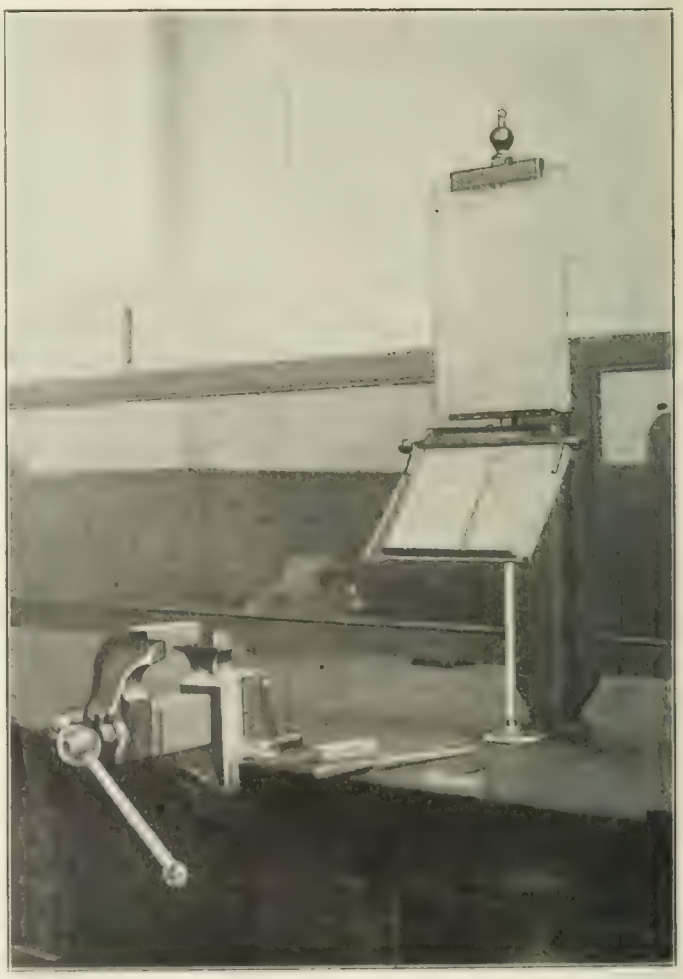
the cylinders by expansion rings, forming air tight joint. A cover *E* is placed over the lower cylinder and gives additional stiffness to both the walls of that cylinder and the base of the upper cylinder. The six holes shown near the top of each cylinder are for the purpose of releasing the air when the piston has traveled above them, thus preventing the rupturing of the cylinders.

These jacks are made in 12 in. and 18 in. sizes. The 12 in. jack, weighing 58 lbs., is used for raising cars when renewing the journal brasses, for pressing in side rod bushings with the rods in place, and is also of value in general shop work. The 18 in. jack is built for work in the car shop, engine-house and general yard work. It weighs 250 lbs., and is provided with a detachable truck, which permits it being handled by one man. The jacks may be handled by inexperienced workmen and their parts are standardized so that any broken part may readily be replaced.

BLUE PRINT AND BOOK HOLDER.

The machinist is often handicapped by having to use crumpled and dirty blue prints. Where prints are used repeatedly they soon become too soiled to read, especially where they are handled by the workman and laid down with his oily tools. To overcome this a blue print holder has been designed and patented by R. H. Smith, instructor in the mechanical laboratories of the Massachusetts Institute of Technology. It consists of a rod which holds the brackets for the blue print, and also, as shown in the illustration, a bracket for a book. The lower bracket for the blue print is held to the rod by a thumb screw and the top bracket is free to move up or down. The illustration shows the way in which a mounted print is held. When the print is not mounted the bottom bracket is raised and the top of the sheet is held between the upper and lower brackets, the upper one holding the print by the pressure exerted by its weight.

The book holder is adjustable on the rod and is made with the customary shelf, having a lip on the bottom edge to hold the book. To prevent the book from becoming soiled and also to keep it open, a celluloid cover, fixed in a weighted hinge, is swung down over the pages, the weight of the hinge being sufficient to keep the pages flat. About 75 of these combination



Blue Print and Book Holder.

blue print and book holders have been installed in the mechanical laboratories of the Massachusetts Institute of Technology. In cases where it is inconvenient to fasten the rod to a bench it may be held in an arm extending out from the bed of a machine. The device keeps the blue print or book always open before the operator, out of his way, and always ready for reference in a place where it may easily be read. It is sold by the Industrial Education Book Company, Boston, Mass.

General News Section.

The Southern Railway is to introduce telephones for train despatching on its line between Chattanooga and Knoxville, 111 miles.

Uniformed maids are now employed on the ferry steamers of the Southern Pacific crossing San Francisco Bay. Many of the principal stations of the Southern Pacific have maids in attendance.

The Atlantic Coast Line and the Charleston & Western Carolina on November 1 began using their new freight yard in the eastern part of Augusta, Ga. About $80,000 has been spent in the building and fitting of this yard.

The Lake Shore & Michigan Southern has ordered from the Western Electric Company telephone and selector equipment for five new train despatching circuits. These installations will increase the mileage of telephone train wires on that road from 1,100 miles to 1,850 miles.

There are now enrolled in the educational bureau of the Illinois Central 3,200 employees of that road, and 9,000 lessons and pamphlets have been sent out to students since the bureau was started. Besides this number over 500 students in the station and traffic courses have received their first lesson.

The government of Canada, under the new ministers, is expected to provide for two railway commissions, dividing the dominion into two districts—an eastern and a western. The headquarters of the new board will probably be at Winnipeg, while the commission for the eastern district will be at Ottawa, as now.

Members of the boilermakers' and sheet-ironworkers' unions at the Schenectady shops of the American Locomotiye Company went out on strike last week Thursday, because the company called upon them to work on 30 engines, ordered about two months ago, for the New York Central, the reason being that the boilermakers of the Central are on strike. An officer of the works said that other men would be secured to take up the work which the strikers dropped.

Striking car men on the Missouri, Kansas & Texas who were to return to work on October 25 or consider themselves permanently out of the service of the road have not returned. Representatives of the federation of shop employees on that road say their members will strike unless their demands are settled through the system federation and the company has refused to deal with the federation. Shop employees on the Texas & Pacific have asked officers of the road for a conference with representatives of the federation, but it has not been granted. Shopmen on the Rock Island have rejected the offer of the company to make certain changes in working conditions without any wage concessions.

Steps are being taken by the Chicago Great Western to organize a safety bureau which will provide for systematic watchfulness in all departments of the road to prevent accidental personal injuries to employees and patrons. A managing or central committee, composed of the following officers of the road, has been appointed: Hiram J. Slifer, general manager; J. G. Neuffer, superintendent of motive power; L. C. Fritch, chief engineer; G. O. Perkins, superintendent of telegraph; Dr. G. N. Wassom, surgeon, and J. H. Ambruster, chairman educational committee.

The Chesapeake & Ohio is making plans, it is said, to make a model railway employees' town at Silver Grove, on the line of its road, 13 miles east of Cincinnati. The Silver Grove Land & Building Co. has been chartered in Kentucky, with a capital of $100,000, to carry out the work. The directors of the new company include the following Chesapeake & Ohio officers: G. W. Stevens, president; D. Axtell, first vice-president; E. W. Grice, general manager; G. B. Wall, assistant to the president, and J. P. Stevens, general superintendent. E. G. Finnall and M. Galvin, real estate dealers of Covington, Ky., are also directors.

The suit of the Pennsylvania Railroad to test the constitutionality of the "full-crew" law of the State of Pennsylvania, was heard by the county court at Harrisburg October 27-28. Trainmasters and other officers of the road testified that the law was unnecessary and unduly expensive. The brotherhoods brought to the court 25 of their members, ten of whom gave testimony as to the situation on four of the principal roads of the State, some of the men being employees of the Pennsylvania. They told what various duties were required of trainmen, and claimed that because of the requirements, the full crew law was just and necessary. It was said that the Pennsylvania had reduced the size of certain train crews when the law went into effect.

The first meeting of the Chicago Great Western Station Agents' Association, which was organized last June for the purpose of bringing local agents nearer together, was held at St. Paul, on the Northern division, September 23, when 32 officers and agents were present. Agents of the Western division met on October 14 at Clarion, Iowa, 42 agents being present, and the third meeting was held at Des Moines, Iowa, on October 21, when agents of the Southern division met to organize their local association. Bi-monthly meetings are to be held on each division with occasional general meetings. At the gatherings on the three divisions mentioned, after the conclusion of the business meeting, the agents were met by train and yard employees of the division and all joined in a dinner and entertainment provided by the superintendent.

M. C. B. Temporary Car Coupler.

The secretary of the Master Car Builders' Association announces that the temporary car coupler, which was submitted to letter ballot, has been approved by a large majority of the members of the association. At the convention, in June, the committee on coupler and draft equipment was instructed to prepare a design for a temporary coupler to provide the necessary end clearance required by the new safety appliance standards. This was to be referred to the executive committee as soon as possible, and if it met with the approval of that committee was to be submitted to letter ballot. An abstract of the report of the coupler and draft committee, which was approved by the executive committee, and which has been acted upon favorably by the members of the association, is as follows:

The committee has carefully considered the data and recommendations received in reply to a circular which was sent to the members of the association, and after a thorough discussion has unanimously agreed that it would be inadvisable to establish more than one M. C. B. temporary coupler to take care of the additional end clearance required by law on existing cars. The amount the head should be lengthened between the coupling face and striking horn was considered both from the standpoint of the number of cars to be taken care of and the amount the head could be lengthened without materially impairing the strength of the present design of coupler, as well as the effect on the car construction. The committee recommends that the head be lengthened 3 in. between the coupling face of the knuckle and the striking horn of the coupler, making this dimension 12¼ in. for the temporary coupler. This will take care of 82.5 per cent. of the number of cars reported requiring additional end clearance, and covers 80.1 per cent. of the recommendations submitted by the members of the association replying to the circular.

As the present M. C. B. standards do not cover the detail design of the coupler head, it will only be necessary to add a note to Sheet M. C. B. 23, reading as follows: "12¼ in. for M. C. B. temporary coupler"; this note to be placed above the present note shown on the plan view of the coupler heads, reading as follows: "9¼ in. on all new types after January, 1909," and suitable reference made in text.

It should be understood that if the temporary coupler, which provides 3 in. additional end clearance, is adopted, cars used in interchange which cannot be made to conform to the required end clearance by applying this temporary coupler must be changed, for if railways would purchase temporary couplers of different lengths than that recommended a chaotic

condition would result in repairs, and the end clearance required by law could not be maintained by the foreign railways on the cars in question, which would not be true if all roads owning cars requiring additional end clearance would confine themselves to the one temporary standard, which it will be necessary for all roads to carry in stock in order to make proper repairs to foreign cars while on their lines. For this reason the committee recommends that the letters "T. S." (standing for Temporary Standard), in addition to the letters "M. C. B.," be stamped on the slightly raised plate or flat surface now cast on the head. It is understood that the temporary coupler must comply with all the specifications and tests of the M. C. B. Association.

With the view of avoiding an increased number of new designs of couplers and thus increasing the number of parts, such as knuckles, locks, etc., that must be carried in stock for repairs, the committee feels that the parts of the standard couplers now in use on the various roads should be maintained interchangeable in the new temporary coupler. The committee on coupler and draft equipment was instructed to design one standard coupler, and it is now engaged upon this work, and until such time as the committee is able to report to the convention it is inadvisable to make any changes in the present designs of couplers, with the exception of strengthening parts that can be done without affecting interchangeability.

Loyal Foremen on the Southern Pacific.

When the strike of shop employees on the Southern Pacific was called, the foremen of the motive power and the car shops were ordered to go out. Those at Los Angeles, Cal., showed their loyalty to the company by refusing to do so, and on October 15 sent the following communication to the local advisory board of the Federation of shop employees at Los Angeles:

We, the undersigned foremen of the motive power and the car department, make reply to your letter of October 14, addressed to the foremen of the Harriman lines, calling us out on that date, received by special messenger. We were, to say the least, surprised to receive this summons. We were surprised because your officers presumed to dictate our policy, although we are not members of your association, and therefore cannot be expected to show allegiance. We have had no hand in forming your association, and have never been invited to participate in your counsels and were denied the privilege of voting. This is, therefore, "taxation without representation." As men of honor and having been chosen foremen, and thus accepted official positions, we are in duty bound to support the company as officers, the same as we would be bound by the laws of nations and humanity, were we officers of a ship disabled. This would be our duty no matter what our sentiments might be, or where our sympathies might lie. You expect and urge loyalty; we would be remiss in the loyalty we owe the company we are serving as officers were we to leave our posts. That being our conclusion, we are firm in our determination to continue in the service. We hope this will clearly define our duty as we see it, and that it will be accepted in the spirit in which it is given. Yours truly, W. F. Merry, general foreman of the locomotive department; G. A. Reichert, general boilermaker foreman; E. R. Winnett, assistant general boilermaker foreman; R. Enright, foreman pipe fitter; A. Whitaker, carpenter foreman; John H. Crawford, air brake foreman; James F. Nolan, roundhouse foreman; S. S. Huntley, foreman copper shop; A. P. Neff, machine foreman; F. E. Cowan, foreman blacksmith; G. E. Avan, foreman bricklayer; E. K. Sergel, chief electrician; H. B. Wilson, foreman of the truck builders in the general shop; G. E. Carpenter, foreman of the truck builders in the roundhouse; Thomas Neal, outside foreman; H. Neville, toolroom foreman; D. Adamson, gang foreman; H. R. Dixon, night roundhouse foreman; C. C. Ream, [illegible]; George H. Goodhem, general gang foreman; James Burchill, gang foreman; C. B. Felt, air brake foreman; [illegible]; George J. Humphreys, [illegible]; [illegible], general foreman of the car department; A. G. Chandler, assistant general foreman of the car department; C. M. Littleton, mill foreman; Ernest A. Hammond, assistant car foreman; H. A. Nelson, assistant car foreman; M. F. Nightingall, assistant foreman; A. H. Seevers, assistant foreman; John A. Parkhurst, assistant foreman; Berry L. Isbell, assistant painter foreman; James Humphreys, car foreman; F. H. Oldenburg, assistant car foreman; J. R. Dwyer, upholsterer foreman; Alfred Way, foreman of air brake repairs; M. W. McClean, foreman of the plating department; Robert Dreaper, foreman of the car department tin shop; W. D. Zietz, foreman of steel car repairs; J. B. Augustus, foreman of freight car repairs; John Kaler, foreman of air brakes; S. S. Washburn, assistant foreman of the car shop; William Leffert, foreman of the trimmers; J. H. Cooke, foreman of the coach shop; G. Mortensen, foreman cabinet maker; C. H. Marshall, foreman painter; S. A. Crumrine, foreman of sand car repairs; William O. White, traveling car inspector; A. R. Valentine, car foreman; H. S. Papenfuss, assistant foreman; W. F. Phillips, assistant foreman; W. B. Johnson, foreman; D. R. Murray, foreman; N. Freeman, assistant foreman; C. F. Allen, wrecking foreman; H. W. Sherlock, assistant foreman; A. Cross, foreman; A. M. Foster, assistant foreman; W. H. McPherson, foreman; E. P. Howe, foreman.

"The Transportation Tax."

We have of late heard a good deal referring to the railway earnings of the country as a tax on the people. Taking the total earnings for the year ending June 30, 1911 ($2,700,232,308), it is claimed that such was a tax of $35 on each individual; $140 per family, and an impost, or tax, of $5 per acre on all the improved land in the United States.

To speak of the cost of transportation as a tax is as ridiculous as to speak of the cost of food or clothing, or the rental cost of a house as a tax on the people. In the complex organization of modern society every person contributes to the welfare of practically every other person. It would be as sane to speak of the farmer levying a tax on each American family for the food he furnished them. The farmer and the railway each perform a service of value to the consumer; the one in producing, the other in bringing to him the articles required by him; and they are equally worthy of compensation for the service performed.

The report of the operations of the railways of the United States for the year ending June 30, 1909, shows:

Total Earnings	$2,419,299,638
Number of Employees	1,502,823
Total Wages Paid	$988,323,694
Average per Employee	$657

The census report just published on the manufacturing industries of the United States, for the year 1909, is as follows:

Total Value of Products	$20,672,052,000
Number of Employees	7,405,313
Total Wages Paid	$4,365,613,000
Average per Employee	$590

The Year Book of the Department of Agriculture, just published, shows the value of all farm products for the year 1910 to be $8,926,000,000.

If the allegation of the writers and public speakers referred to is correct, it would be fair to assume that the value of farm products and the value of manufactured goods is also a tax on the people, and the statement would read as follows:

		Tax Per Family.	Tax Per Improved Acre.
Railroad Earnings	$2,419,299,638	$124	$5.07
Value of Manufactured Products.	20,672,052,000	1,056	43.30
Value of Farm Products	8,926,000,000	456	18.70

A great part of the tonnage carried by the railways went into the manufacturing industries and building trades, benefiting millions of people, who could not have made their living without the aid of the railway, which institution is entitled to compensation for doing its part in the social and industrial fabric.—*From a circular issued by J. L. Holden, vice president of the Kansas City Southern.*

The Southern Pacific Train de Luxe.

The Southern Pacific announces that its fast excess-fare train between New Orleans and San Francisco will make its first trip from New Orleans December 4, and from San Francisco December 5. It will make close connections with the fastest eastern trains at New Orleans, and also with Southern Pacific steamships in both directions between New Orleans and New York. It will be run twice a week. The cars will be new all steel Pullmans. They will be named after the steamships of the Southern Pacific. There will be six cars in each train,

a dynamo baggage car, a diner, three sleeping cars, each containing ten sections, two compartments and one drawing room, and one observation-smoking car. The trains will have stenographer, barber shop, shower bath, ladies' maid, etc. They will have electric lights and fans throughout. Telephone connection will be established with the trains at the stations in New Orleans and San Francisco. The schedules will be approximately as follows: Leave New Orleans, 12:30 p. m. Mondays and Thursdays; arrive at Los Angeles 9:15 p. m. Wednesdays and Saturdays, and San Francisco at 11:00 a. m. Thursdays and Sundays. The run to Los Angeles will be made in 58 hours 45 minutes, and to San Francisco in 72 hours 30 minutes. The train will leave San Francisco at 6:30 p. m. Tuesdays and Saturdays, arrive at Los Angeles at 8:30 a. m. Wednesdays and Sundays, and arrive at New Orleans at 7:20 p. m. Fridays and Tuesdays. The run from San Francisco to New Orleans will be made in 70 hours and 50 minutes, and from Los Angeles to New Orleans in 56 hours and 50 minutes. This will effect a saving to passengers of over 24 hours in each direction, as compared with other trains. The extra fare will be ten dollars. Stops for passengers will be made at Houston, San Antonio, El Paso, Tucson, Maricopa, Phoenix, Yuma, Colton (for Riverside, San Bernardino, etc.), Los Angeles, Santa Barbara, Paso Robles, Castroville (for Del Monte), Pajaro (for Santa Cruz), San Jose and San Francisco.

The railway commission of Texas has raised objection to the charging of extra fares on these trains in Texas. It is understood that to meet this condition passengers desiring to use the trains locally in Texas will be required to buy a certificate authorizing them to ride on them.

Chicago Subway Commission's Report.

The Chicago Subway Commission appointed about three months ago by Mayor Harrison to investigate feasible plans for building passenger subways in Chicago, presented a report to the committee on local transportation of the city council on Tuesday morning last, October 31. It was not thought advisable to prepare detailed working plans of the subway before authorization is secured from the council, and the present reports included only such estimates of costs as were necessary to determine the feasibility of various routes proposed. The commission reported that of all the plans presented by former investigating bodies and engineers who have worked on this problem there are none which seem to fill the conditions, and it was thought necessary to disregard practically all data gathered in the past and begin another complete investigation. Considerable data has been secured concerning the capacities of existing local transportation lines and the members of the commission have visited other cities to study the building and operation of subways. The routes proposed are two to connect with the present elevated roads and two for surface street cars. One double track subway is proposed to connect the Northwestern and Metropolitan elevated lines, beginning at Wells and North Water streets, running east in North Water, south in State and west in Harrison, to a connection with the Metropolitan near Halsted and Pearce avenue. A second subway would connect the South Side and Oak Park elevated lines, beginning near Fourteenth street, between State and Wabash, running north in State, west in Randolph and north in Green, to a connection with the Oak Park line. These two routes would occupy a four-track subway in State street, allowing space for transfer stations. It is the intention of the commission that express elevated trains should be operated through these subways, the local trains either continuing to use the present union loop, or the present stub terminals, or modified loops joining the present stub terminals. The present capacity of the elevated lines is estimated at 622 cars an hour on the loop and 293 in the stub terminals, a total of 915 cars. The commission estimates that in the subways 1,600 express cars could be run per hour, and the modified stub terminals an equal number of local cars, a total of 3,200 cars an hour. The estimated cost of these two subways with the necessary changes to existing elevated structures and all incidental expenses is given as $9,812,000. The first subway for surface cars would form a connection between the north and southwest sides of the city, beginning at the north portal of the present La Salle street river tunnel and running south in La Salle, east in Adams, south in Dearborn, and west in Jackson, to a point near Des Plaines street, where it would rise to the surface. The second surface-car subway would connect the south and northwest sides of the city by a line beginning near Sixteenth street and running north in Dearborn, west in Washington, under the river in the present Washington street tunnel, and terminating at the Clinton street portal of that tunnel. These two routes are parallel in a four-track subway for one block on Dearborn street between Adams and Jackson, where transfer stations could be provided. The present capacity of surface car loops in the business district is estimated at 1,037 cars an hour, and of the subway 720 cars an hour. The cost of these two routes is given as $9,328,000. The commission doubts the wisdom of building a subway for surface cars which would cost practically the same amount as the routes proposed for elevated cars, and would have a very much smaller capacity. It is pointed out, however, that the plans made are so arranged that if this subway were built for surface cars, it could be used later for additional elevated cars or as a link in future through rapid transit subways. The plans outlined involve the building of 3.93 miles of double track subway and about one mile of four-track subway. The plans made by the commission call for high level subways throughout, except where it is necessary to dip below a cross line to avoid grade crossings. The top of the proposed subway would be about 3 ft. below the street level and the bottom would clear the present Illinois (freight) tunnels by 13 or 14 feet. The commission estimates that the subway outlined in the present plan could be built in three years. The members of the commission are: John Ericson, E. C. Shankland and J. J. Reynolds.

The Steel Corporation's Third Quarter.

The quarterly statement of the United States Steel Corporation for the three months ended September 30 shows that the total net earnings, after deducting all expenses incident to operations, including those for ordinary repairs and maintenance of plants, and interest on bonds, also fixed charges of subsidiary companies, were $29,522,725. This was better than was expected, even by the most optimistic, who thought that $28,000.000 would not be exceeded.. During the second quarter of 1911, $28,108,520 was earned, and during the first quarter, $23,519,203. In the last quarter of 1910, $25,990,978 was earned, as compared with $37,365,187 for the third quarter of last year. The largest earnings ever reported at the end of a September quarter were $43,804,285, in 1907. The earnings for July, 1911, were $8,750,467, as compared with $10,710,145 in August, and $10,062,113 in September. For the nine months ended September 30, 1911, the earnings have been $81,150,448, a decrease of $34,002,575, as compared with the corresponding period of last year.

A Distant View.

That distance gives accuracy of perspective often impossible to near-by observers is an old truth often illustrated. One of the best criticism on American railway affairs that we ever printed was dated in Nova Zembla. Last week we received the following. "Hong Chang" is not familiar to us; but by a little exercise of the imagination we can discern the water mark "H" in the letter, so it must be genuine.

"Hong Chang, China, October 25, 1911.

"To the Editor of the Railway Age Gazette:

"We are very much interested, here in China, in the question of state ownership of railways.

"In investigating this matter, I find in the book entitled Statistics of Railways in the United States, issued by the Interstate Commerce Commission, under the heading 'Summary of Railway Mileage Owned in the United States by States and Territories,' 234,799.4 miles so owned.

"On further examination of the book, this appears to be the total mileage of all railways in the United States. There is no other mention of state ownership in this large book.

"Do I correctly understand from this that all the railway mileage in the United States is owned by the states and territories? Li."

We think our correspondent is in error. Our understanding is that there is in this country a large mileage of railways still owned by the stockholders of the railway companies, and, to a

reasonable extent, operated by their representatives. This theory is supported by the fact that in our copy of the book referred to, there is a comma after "United States." It is comforting to think that in spite of all the great responsibilities resting on the shoulders of the Interstate Commerce Commission it still finds time to put in a comma where a comma is due and so, literally by a stroke of the pen, save the railways from government ownership. As we reach this point in our cogitations we notice the date on the letter. Really, it is hard to believe that it got here from China so soon. The time elapsed between the date of its mailing and its receipt in this office was short; as short, for instance, as the time the mail takes to get here from the office of the chairman of the Committee on Relations between Railroads.

The Suit Against the Steel Corporation.

Dissolution of the United States Steel Corporation and its subsidiary companies has been asked for by the government in a suit filed in the United States Circuit Court in New Jersey. The petition charges that the Steel Corporation is an illegal combination in restraint of trade and therefore prohibited by the Sherman anti-trust law of July 2, 1890.

The petition itself consists of ninety-three printed pages in which there is set forth in considerable detail the condition of the iron and steel trade prior and subsequent to the formation of the United States Steel Corporation. It is charged that the illegal monopolies complained of have been brought about by a series of combinations and mergers in which the steel interests of the country were brought under one general control. Further than this it is charged that by a series of interlacing directorates the great business interests of the country with the United States Steel Corporation as the dominant factor have been brought under one influence to crush out competition, maintain prices and control the steel and other business of the United States. The specific relief asked for is:

1. To order, adjudge and decree that the combination and conspiracies and monopolizations of trade and commerce hereinbefore described are unlawful and that all acts done or to be done to carry out the same or any part thereof are in violation of the act of Congress of July 2, 1890, entitled "An act to protect the trade and commerce against unlawful restraint and monopolies."

2. That the defendants and each and every one of them and the officers, directors, stockholders and agents of the defendant corporation and of each and every one of them be perpetually enjoined from doing any act in pursuance of or for the purpose of carrying out the same.

3. That the United States Steel Corporation in and of itself, as well as each and all of the elements composing it, whether separate or individual, whether considered collectively or separately, be decreed to be illegal and in restraint of trade, and an attempt to monopolize and a monopolization within the first and second sections of said act of Congress of July 2, 1890, and that it be dissolved.

4. That each and all of the said constituent or subordinate companies shown, as aforesaid, to have been combined in restraint of trade and commerce and in monopolization of trade or commerce within the meaning of the anti-trust act, each in and of itself, as well as each and all the elements composing each respectively, whether considered collectively or separately, be decreed to be illegal and in restraint of trade, and an attempt to monopolize and a monopolization within the first and second

5. That the holding of stock by any one of the defendant corporations in another of the defendant corporations under the

from exercising any right in connection therewith.

combined each with other persons and corporations to re-

the purposes of any of the above described combinations and conspiracies and attempts to restrain commerce and trade, or to monopolize any part of commerce and trade among the states and with foreign nations.

8. That such orders and decrees be made in respect of the stock issued under the several combinations aforesaid as shall be in accordance with equity and good conscience and that such disposition be made of the said various properties as shall effectuate the purposes of the said anti-trust act.

9. That the said lease entered into as aforesaid by the Great Northern interests and the Great Western Mining Company be decreed to be illegal, in restraint of trade and commerce, an attempt to monopolize and a monopolization within the first and second sections of said act and that the same be now cancelled.

10. The United States also prays for such other and further relief as the nature of the case may require and the court may deem proper in the premises.

Chinese Minister Dismissed.

The Chinese minister of posts and communications, Sheng Hsuan-Huai, who negotiated the foreign loan for the national railways, was dismissed from office October 26 by the Peking government, in accordance with the demand made by the National Assembly. Opposition to his railway and reform plans is one of the chief causes of the rebellion in China. He was considered by foreign representatives to be the strongest man in the Chinese cabinet. Tang Shao Yi, who formerly held the position, has been appointed to the vacancy.

Canadian Association of Passenger and Ticket Agents.

The twenty-fifth annual meeting of the Canadian Ticket Agents' Association, which has just been held at Sault Ste. Marie, decided to change the name of the association to that shown at the head of this paragraph. The change makes eligible to membership general, district and traveling passenger agents. Thirty-five new members joined the association. Among the speakers at this meeting were Mr. Callaway, of the Soo Line; Mr. Cumberland; Mr. Elliott, of the Grand Trunk; Mr. Bohreer, of the Mobile & Ohio; Mr. Cairns, of the Chicago & North Western, and Mr. Pond, of the Soo Line.

American Society of Civil Engineers.

At the meeting of the American Society of Civil Engineers held November 1, the following papers were presented for discussion: Some of the Properties of Oil-Mixed Portland Cement Mortar, by Logan Waller Page, Am. Soc. C. E., and Reinforced Concrete Bridge Across the Almendares River, Havana, Cuba, by Eugene Klapp and W. J. Douglas, Am. Soc. C. E. The latter paper was illustrated with lantern slides. These papers were printed in *Proceedings* for September, 1911.

MEETINGS AND CONVENTIONS.

dates of next or regular

F. M. Nellis, 53 State St., Boston, Mass.

A. G. Thomasen, Boston, Mass.

W. C.

R. O. Wells, East St. Louis,

O. G. Fetter,

H. C. Donecker, 29 W. 39th

W. F. Allen, 25 Church St., New York, November 15, Chicago.

C. A. Lichty, C. &

1912, Baltimore, Md.

F. H. Trich, Monadnock

March 19-21, 1912, Chicago.

American Railway Master Mechanics' Association.—J. W. Taylor, Old Colony building, Chicago. Annual convention, June 12-14, Atlantic City, N. J.

American Railway Tool Foremen's Association.—O. T. Harroun, Bloomington, Ill.

American Society for Testing Materials.—Prof. E. Marburg, University

C. W. Hunt, 220 W. 57th St.,

Wed., except June and August, New York

American Society of Engineering Contractors.—J. R. Wemlinger, 13 Park Row, New York; 2nd Tuesday of each month, New York.

American Society of Mechanical Engineers.—Calvin W. Rice, 29 W. 39th St., New York.

Association of American Railway Accounting Officers.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.

Association of Railway Claim Agents.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 22, 1912, Los Angeles, Cal.

Association of Railway Electrical Engineers.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago; annual, November 6-10, Chicago.

Association of Railway Telegraph Superintendents.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.

Association of Transportation and Car Accounting Officers.—G. P. Conard, 75 Church St., New York; December 12-13, Louisville, Ky.

Canadian Railway Club.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.

Canadian Society of Civil Engineers.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

Car Foremen's Association of Chicago.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

Civil Engineers' Society of St. Paul.—D. F. Jurgensen, 116 Winter St., St. Paul, Minn.; 2d Monday, except June, July and Aug., St. Paul.

Engineers' Society of Pennsylvania.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

Engineers' Society of Western Pennsylvania.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

Freight Claim Association.—Warren P. Taylor, Richmond, Va.; annual May 15, Buffalo, N. Y.

General Superintendents' Association of Chicago.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

International Railway Congress.—Executive Committee, rue de Louvain, 11 Brussels; 1915, Berlin.

International Railway Fuel Association.—D. B. Sebastian, La Salle St. Station, Chicago.

International Railway General Foremen's Association.—L. H. Bryan, Brown Marx building, Birmingham, Ala.

International Railroad Master Blacksmiths' Association.—A. L. Woodworth, Lima, Ohio.

Iowa Railway Club.—W. B. Harrison, Union Station, Des Moines, Ia.; 2d Friday in month, except July and August, Des Moines.

Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York.

Master Car Builders' Association.—J. W. Taylor, Old Colony building, Chicago. Annual convention, June 17-19, Atlantic City, N. J.

Master Car and Locomotive Painters' Association, of United States and Canada.—A. P. Dane, B. & M., Reading, Mass. Next annual convention, second week in September, 1912.

New England Railroad Club.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

New York Railroad Club.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

Northern Railway Club.—C. L. Kennedy, C., M. & St. P., Duluth, Minn; 4th Saturday, Duluth.

Omaha Railway Club.—H. H. Maulick, Barker Block, Omaha, Neb.; second Wednesday.

Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

Railway Club of Pittsburgh.—C. W. Alleman, P. & L. E., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

Railway Industrial Association.—G. L. Stewart, St. L. S. W. Ry., St. Louis, Mo.; annual, May 12, 1912, Kansas City, Mo.

Railway Signal Association.—C. C. Rosenberg, Bethlehem, Pa.

Railway Storekeepers' Association.—J. P. Murphy, Box C, Collinwood, Ohio.

Richmond Railroad Club.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

Roadmasters' and Maintenance of Way Association.—L. C. Ryan, C. & N. W., Sterling; September 10, 1912, Buffalo, N. Y.

St. Louis Railway Club.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

Society of Railway Financial Officers.—C. Nyquist, La Salle St. Station, Chicago.

Southern Association of Car Service Officers.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.

Southern & Southwestern Railway Club.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

Toledo Transportation Club.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

Traffic Club of Chicago.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.

Traffic Club of New York.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

Traffic Club of Pittsburgh.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

Train Dispatchers Association of America.—J. P. Mackie, 7042 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.

Transportation Club of Buffalo.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

Transportation Club of Detroit.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.

Traveling Engineers' Association.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.; August, 1912.

Western Canada Railway Club.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

Western Railway Club.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Wednesday in month except July and August, Chicago.

Wood Preservers' Association.—F. J. Angier, B. & O., Baltimore, Md.; annual, January 16-18, Chicago.

Traffic News.

The through express trains of the Canadian Pacific, between St. Paul and Seattle, are to be continued in service throughout the winter. In former years these trains were run only in the summer season.

The Pennsylvania Railroad this week began its fourth annual season of agricultural promotion by running an educational train over the Pittsburgh and Conemaugh divisions. The train made a tour occupying three days, during which time it stopped at seventeen stations.

The Business Men's League of St. Louis is said to be considering the establishment of a package car service from St. Louis to New York points on the Delaware, Lackawanna & Western, the Delaware & Hudson, the Boston & Maine, and the New York, New Haven & Hartford.

Evidence regarding the effect of the 2-cent passenger rates in the States of Illinois, Indiana and Ohio on the interstate passenger rates in those States, is being obtained by the Central Passenger Association, with a view to testing the validity of the State laws enforcing those rates.

Business men of St. Louis are forming the St. Louis-Gulf Steel Barge Line Company to take over the Mississippi Valley Transportation Company, and run barges on the Mississippi river between St. Louis and the gulf of Mexico. Robert H. Whitelaw has been elected president, and W. K. Kavanaugh, vice-president.

Beginning November 12, through passenger trains will be run from St. Louis and Memphis to Los Angeles and San Francisco over the Atchison, Topeka & Santa Fe and the St. Louis & San Francisco. The route will be from St. Louis or Memphis by the Frisco to Waynoka, Okla., and from there westward over the new Belen cut-off of the Santa Fe, via Amarillo and Albuquerque to California.

The number of colonists arriving at Los Angeles, Cal., this autumn has been greater than in any former season. Reduced fares were very generally availed of. On October 18 the Atchison, Topeka & Santa Fe took into that city 67 extra passenger cars, all well loaded, and the San Pedro, Los Angeles & Salt Lake 40 extra cars. The Southern Pacific took in eight extra trains.

The American Hawaiian Steamship Company has let contracts for five new freight steamers, which will make its total fleet 23 vessels. This line, in connection with the Tehuantepec Railway, carries freight between Pacific ports and the Atlantic seaboard in nearly as short a time as that taken by the transatlantic railways. The new vessels will be of 9,000 tons each, which is larger than any of the present vessels.

Two hundred prominent shippers of New England met in Boston last week and adopted a set of resolutions, to be sent to the American Railway Association and to the Interstate Commerce Commission, asking that the demurrage bureau in that city, which was established at the request of the commission a few months ago, be continued, and that Mr. Thomason be retained at the head of it. These shippers also ask for various concessions, including an additional allowance of free time for unloading certain kinds of freight.

The Northwest Development League, St. Paul, is to run a special demonstration train, starting November 27, through the eastern states, for the purpose of acquainting the people with the agricultural resources of the Northwest. The train will run from St. Paul to Chicago over the Burlington route, from Chicago to New York over the New York Central, from New York to St. Louis over the Pennsylvania, and from St. Louis to St. Paul over the Burlington, visiting all the important cities on the way and covering a distance of about 5,000 miles. The train will consist of four exhibition cars containing farm products from eight northwestern states, one observation car, two sleeping cars, one baggage car and one diner. The train will return to St. Paul in time for the Northwestern Land Products Show, which is to be held in that city from December 12 to 23, inclusive.

The American Express Company has offered to put into effect in Indiana its Michigan tariffs, which, it is estimated, would mean a reduction of approximately 15 per cent. in the earnings of the company on Indiana business. Representatives of the company said if the Michigan schedule were adopted and the present service and business continued, it would lose money, but they expected to cut down expenses to meet the proposed reduction and also to get more business. Accountants employed by the state commission have estimated that this company is making an annual profit of 101.75 per cent. on its business in Indiana, while the assistant traffic manager of the company submitted figures showing that on its intrastate business it was making a profit of only 4 per cent. The difference in the percentages is due to difference of opinion as to the proper working basis for the computations.

The second hearing at Chicago before the Interstate Commerce Commission in its general investigation into rates on wool, hides and pelts from western to eastern territory was concluded on October 27, and the case was opened at Boston before C. A. Prouty of the commission on October 30. At Chicago representatives of St. Louis shippers complained of excessive difference between carload and less-than-carload rates from Texas points to St. Louis. Traffic officers representing all the western lines were heard. Several statements supporting pending applications for relief from the operation of the fourth section of the Interstate Commerce act were filed, and arguments were presented regarding transit privileges and the difference that should be allowed between baled and sacked wool and between wool in grease and scoured wool. At Boston the wool merchants claimed that the rates on wool were far in excess of those for other commodities, and that there should be a reduction which should apply to wool, mohair, pelts and hides. They also protested against the rates east of the Mississippi. They classed the rates as high as compared with the rates to Chicago and Detroit.

INTERSTATE COMMERCE COMMISSION.

The state railway commission of Indiana has filed at Washington a complaint against the freight rates of the Wabash and the Toledo, St. Louis & Western from Indiana to points on the Missouri river. It is claimed that these rates are unreasonably high, as compared with rates to the same destinations from Chicago.

Intervening petitions, joining with the petition of the Chicago Association of Commerce, have been filed with the Interstate Commerce Commission by commercial organizations of San Francisco, St. Louis, Indianapolis, and Cincinnati, Springfield and Dayton, Ohio, asking for a suspension of the advances in class rates to the Pacific coast which were filed by the transcontinental roads to become effective November 1.

The commission has suspended until February 28 certain proposed increased rates on apples over western trunk lines. Rates on cotton and cotton linters proposed by the St. Louis Southwestern in Louisiana, effective November 2, have been suspended until March 1. Rates on iron and steel products proposed to be increased November 6 by the Pere Marquette and connecting roads have been suspended until February 29.

Hearing on a proposed advance of 3 cents a ton in the rate on bituminous coal from the Harrisburg district, a territory covering some 12 miles in Saline County, Ill., to Chicago, the rate passing into Indiana to which was fulfilled in Chicago, has been suspended by the Cleveland, Cincinnati, Chicago & St. Louis until May 1 to raise the rate from $1.07 to $1.10 per ton, but the new rate was suspended by the commission pending a hearing. Representatives of the Chicago & Eastern Illinois, the St. Louis, Iron Mountain & Southern, and the Illinois Central appeared in support of the application of the C. C. C. & St. L. Lawyers for the protestants regarding the increase in rates on coal from the Harrisburg district to Milwaukee, which was suspended by the commission, will take part if the case appears to be of general importance.

The commission this week listened to long arguments in the cases involving freight rates from the Atlantic seaboard westward, on merchandise imported from Europe. Baltimore shippers are complaining because the rates from that city are not lower than those from Boston and Philadelphia. The rates from New York are higher than from any of these other cities, three-fourths of all the import traffic, according to one of the witnesses, going through New York. When something was said about New York interests desiring delay, one of the lawyers on the other side observed that New York had had 30 years in which to prepare her case and therefore should be ready. Representatives of Boston said that while that city was not getting what it ought to have, still the tentative rates which have been in effect during the past year would be accepted without objection.

Demurrage on Car Held for Consignee's Order.

B. F. Roden Grocery Co. v. Alabama Great Southern. Opinion by the commission:

A carload of canned goods was shipped from Troutville, Va., to Birmingham, Ala., under an "order-notify" bill of lading. Delivering carrier placed the car on its team track, where, after notice, the car was held subject to consignee's order. Under such conditions the car was liable to demurrage charges after the lapse of 24 hours free time allowed for reconsignment or switching orders. (21 I. C. C. 469.)

Higher Cream Rates Refused.

Ohio Allied Milk Product Shippers v. Erie. Opinion by Chairman Clements:

Carriers from dairying districts of Ohio and Indiana, eastward to Pittsburgh, supplying domestic cream and condensed milk at Pittsburgh and centralizer cream at various intermediate centralizers, have applied for many years uniform rates to raw milk, cream, and condensed milk. By tariffs now under suspension it is proposed to increase the rates on cream and condensed milk approximately 50 per cent. over the present raw-milk rates. Without suggesting any rule of general application as to the relation that should exist between the rates on these respective commodities under the varying conditions that may obtain in different territories; it is held that on the particular facts and conditions disclosed by the present record the carriers have failed to sustain the burden of proof cast upon them by the amended law to show by competent evidence of justifying transportation conditions throughout the territory affected that the proposed increased rates are reasonable and just.

Greater value alone is not conclusive of the reasonableness of a higher rate of freight on a given article than on another commodity of the same general character, especially when all the incidents of transportation thereof except value are identical in the transportation of the less valuable commodity. (21 I. C. C. 522.)

Relation of Rates on Live Hogs and Hog Products.

T. M. Sinclair & Co. v. Chicago, Milwaukee & St. Paul et al. Opinion by Commissioner Clark:

Complaint alleges unjust discrimination against complainant, against Cedar Rapids, Iowa, and against the commodities, fresh meats, and other packing-house products from slaughtered hogs, in that defendants' charges for transportation of live hogs from points in Iowa to New York, Boston, etc., are lower than the charges for the transportation of the dressed meat and products of hogs.

Rates on live hogs west of the Mississippi river and west of Chicago are as a rule the same as or higher than the products rates. On the lines east of the Mississippi river and east of Chicago, the rates on the products are higher than on the live hogs, and this fact is alleged to result in unjust discrimination against the products. It is alleged that defendants have undertaken to establish and undertake to maintain commercial parity between complainant and eastern packers regardless of natural conditions, location, or commercial advantage, and without regard to cost of service to the carriers.

There is competition between complainant and packers located at New York, Boston, etc., and the defense here is that the rates complained of are adjusted to encourage commerce. The issue is purely one of discrimination. No complaint is made as to the

unreasonableness of any rate *per se*, and no showing is tendered that any rate is too high. On the contrary, it is suggested by complainant that the rates on live hogs to the east be raised. The commission is without power to order an increase in any rate. Packers at Missouri river points, at Chicago, New York, and at Boston have not been heard in this proceeding. There should be a definite relationship between the rates on live hogs and on the products thereof based on transportation conditions and not on commercial equality, but on the issues here presented and in the absence of vitally interested parties as well as the absence of allegation that any particular rate is unreasonable, no finding can here be made as to that relationship.

In the purchase of live animals as well as in marketing the several products thereof, there is active, actual, and keen competition between the packers at the Missouri river points and those at Chicago and complainant, and it is unjustly discriminatory against complainant for defendants to maintain a greater spread between their rates on cured meats in boxes and cured meats in bulk, bogs, or crates or between cured meats in boxes and fresh meats, from Cedar Rapids to New York and New York rate points, or from Cedar Rapids to Boston and Boston rate points, than they contemporaneously maintain in the rates from Missouri river points, or from Chicago to New York and New York rate points, and to Boston and Boston rate points. (21 I. C. C., 490.)

STATE COMMISSIONS.

For probable changes in the Canadian commission see note in General News.

The Indiana Commission has cost the state during the past fiscal year $33,358, and has turned into the state treasury $1,919.

The Indiana Commission has begun a prosecution of the Cleveland, Cincinnati, Chicago & St. Louis for a violation of the full crew law, in counting as the member of a train crew a negro porter, who, on examination, was found to be not qualified for the train duties to which he was assigned.

The Railroad Commission of Louisiana has issued a notice to all railway companies in Louisiana pointing out that it is their duty, when running passenger excursions, to provide an adequate number of coaches to conveniently accommodate the travel on such trains, and that the failure of a railway to so provide for its patrons, when reported to the commission, will be punishable by a fine.

The railway commission of Alabama has issued a supplement to its freight classification requiring that stoves, when shipped in less than carload lots, shall be crated. The president of the board of commissioners, Mr. Henderson, voted against the order, holding that stoves can be satisfactorily handled by the railways without putting the shippers to the expense of providing crates. The railways have been very persistent in their demand that the crating order should be issued and it is said that they are demanding a similar order in the states of Virginia, North Carolina, Georgia, Kentucky and Tennessee.

COURT NEWS.

The Commerce Court has adjourned sine die, after having taken under advisement the lumber reparation cases.

A decision of the Supreme Court of the United States, sustaining the federal safety appliance laws, is noticed in the editorial columns.

The Commerce Court has denied the petition of the Denver & Rio Grande et al for a temporary injunction setting aside the order of the Interstate Commerce Commission in the Salt Lake cases.

The Texas Supreme Court on October 25 refused a writ of error in the Galveston-Houston differential case, which was appealed from the court of civil appeals in Travis county. The lower court decided in favor of Galveston interests in their contention that freight rates from inland Texas points to that city should be the same as from the inland points to Houston, and that the differential of 6 cents between the rates to those points should be abolished. The state supreme court now upholds the decision of the lower court.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

James Glynn has been appointed general attorney of the Nevada-California-Oregon and the Sierra & Mohawk, with office at Reno, Nev., succeeding N. J. Barry.

R. W. Leonard, of St. Catharines, Ont., has been appointed chairman of the National Transcontinental Railway Commission (Canada), succeeding S. N. Parent, resigned.

P. J. Flynn, freight traffic manager of the Delaware, Lackawanna & Western, at New York, has been elected vice-president in charge of traffic, succeeding B. D. Caldwell, resigned to become president of Wells-Fargo & Co., as has already been announced in these columns.

D. R. Burbank, assistant secretary of the Illinois Central, at New York, has been elected secretary. The duties of secretary, have for some time been performed by Vice-President A. G. Hackstaff.

E. M. Alvord, vice-president and general manager of the Midland Valley, having resigned, J. W. McLoud, general solicitor, has been appointed also assistant to the president, with office at Muskogee, Okla., succeeding Mr. Alvord.

As has been announced in these columns, T. O. Edwards, auditor of Morgan's Louisiana & Texas R. R. & S. S. Company, has been appointed auditor of freight accounts of the Southern Pacific, with office at San Francisco, Cal., in which position he succeeds D. W. Horsburgh, retired under the pension rules of the company, and the office of assistant auditor of freight accounts has been abolished. J. C. Vinson has been appointed auditor of miscellaneous accounts, with office at San Francisco. C. C. Barry, recently appointed auditor of the Texas & New Orleans at Houston, Tex., has been appointed auditor of the Louisiana lines of the Southern Pacific, succeeding Mr. Edwards.

Newman Erb, whose election as president of the Minneapolis & St. Louis and the Iowa Central, has already been announced in these columns, is best known as a dealer in railways. In 1903 Mr. Erb formed a syndicate to buy the Cincinnati, Hamilton & Dayton, which then took over the Pere Marquette, and the two roads were later sold to J. P. Morgan & Co., and shortly after went into the hands of receivers. Mr. Erb was born in 1850, and was educated in the primary and high schools of St. Louis, Mo. He was admitted to the bar in 1872. In 1881 he became identified with the construction of the Memphis extension of the Kansas City, Fort Scott & Gulf Railroad, now part of the Frisco system; he became a director and was given charge of its law department for Arkansas and Tennessee. He obtained the charter for the Mississippi river bridge at Memphis, Tenn., and was identified with its construction. In 1886 he was appointed receiver of the unfinished Memphis, Selma & Brunswick, which he completed from Memphis to Holly Springs, Miss., and later, when the road was taken over by the Kansas City, Fort Scott & Memphis, he was identified with its extension to Birmingham, Ala., as the Kansas City, Memphis & Birmingham. For a time he was a director and had charge of the law department of the latter. In 1885 he organized and became president of the Western Telegraph Company and built a connection with the Baltimore & Ohio Telegraph Company, bringing that line into Memphis. In 1886 he began to build the Kansas City, Wyandotte & Northwestern, which he completed from Kansas City to Virginia, Neb., with several branch lines; he became vice-president, later president, and subsequently receiver. The property was bought by Jay Gould and is now part of the Missouri Pacific system. In 1892 Mr. Erb removed to New York and, acting for clients, bought the Meriden & Connecticut River, of which he was made vice-president, and which later was absorbed by the New York & New England, now part of the New York, New Haven & Hartford. In 1896 he acquired control of the St. Louis, Cape Girardeau & Western and several small lines in southeastern Missouri and northwestern Arkansas, which he combined, and then headed a syndicate which extended the line to St. Louis and Memphis, Tenn., making the shortest line between those points on a water

level. He sold the road, over 600 miles, to the St. Louis & San Francisco, of which it now forms a part. Two years later Mr. Erb with F. H. Prince, of Boston, formed a syndicate which acquired control of the Pere Marquette, of which he was assistant to the president. The same year he formed a syndicate and acquired control of the Wisconsin Central, but retired from the syndicate, and in 1908 again came into control of that property, selling it in 1909 to the Minneapolis, St. Paul & Sault Sainte Marie. In 1902 Mr. Erb was appointed temporary receiver of the Chattanooga Southern, and has been a director of that company ever since its reorganization. Recently he acquired full control of this property. He is now president of the Tennessee, Alabama & Georgia Railroad, the successor company. In 1904 he came into control of some twenty different public service corporations in various parts of the country, and in 1910 Mr. Erb with his friends came into control of the Ann Arbor Railroad, of which he is chairman of the board. On October 9, 1911, he was elected president of the Minneapolis & St. Louis, and president of the Iowa Central.

Operating Officers.

S. S. Russell has been appointed superintendent of car service of the Central of Vermont, with office at St. Albans, Vt.

D. Dale has been appointed acting superintendent of the Missouri & Louisiana, with office at Bevier, Mo., succeeding D. S. Jones, resigned.

T. W. Cardwell, trainmaster of the Louisville & Nashville, at Nashville, Tenn., has been appointed trainmaster at Knoxville, succeeding H. W. Brownlie, deceased.

E. Gaynor, assistant yardmaster of the St. Louis & San Francisco at New Orleans, La., has been appointed trainmaster of the Florida East Coast, with office at St. Augustine, Fla.

F. N. Reynolds, trainmaster of the Chicago Great Western at St. Paul, Minn., has been appointed superintendent of terminals at Oelwein, Iowa, succeeding P. B. Vermillion, assigned to other duties.

S. H. Barnes, until about two months ago superintendent of the Denver & Rio Grande at Alamosa, Colo., has been appointed superintendent of transportation of the Midland Valley, with office at Muskogee, Okla., a new position.

C. C. Riley, general superintendent of the Kansas City Southern, with office at Kansas City, Mo., has retired, effective November 15, and O. Cornelisen, superintendent of the Northern division, at Pittsburg, Kan., has resigned to accept a position with the Virginian Railway at Princeton, Va.

Edwin C. Keenan, superintendent of telegraph of the Lake Shore & Michigan Southern at Cleveland, Ohio, has been appointed also superintendent of telegraph of the Lake Erie & Western, the Fort Wayne, Cincinnati & Louisville, the Northern Ohio, the Toledo & Ohio Central and the Zanesville & Western, succeeding on the first three roads C. S. Rhoads; and he will jointly represent all six companies and the Western Union Telegraph Company, with office at Cleveland.

P. C. Allen, superintendent of the Northern division of the Great Northern at Crookston, Minn., has been appointed superintendent of the [illegible] division, with headquarters at Grand Forks, N. D., succeeding M. H. Murtha, assigned to other [illegible], with headquarters at Sioux City, Iowa, succeeds Mr. Allen. Jos. Lindsay, trainmaster at Great Falls, Mont., succeeds Mr. Knebel. M. H. Murtha has been appointed trainmaster of the terminals division, with headquarters at Minneapolis, Minn., [illegible] N. D.; succeeding P. C. Connelly, granted indefinite leave of absence [illegible]

[illegible]

service of that company. After learning telegraphy he became a clerk and operator at Baltimore, and in August, 1885, was promoted to train despatcher. In 1897, he was appointed a chief clerk in the operating department, and about three years later he was made chief clerk to the general superintendent at Pittsburgh, Pa., and was promoted in November, 1903, to assistant to the general superintendent of transportation. Mr. Lechlider was later appointed a special representative of the general manager, and in December, 1910, was promoted to inspector of transportation at Baltimore, Md., which position he held at the time of his recent appointment as assistant superintendent, as above.

Traffic Officers.

Paul J. Fischer has been appointed traveling freight agent of the Wabash, with office at Memphis, Tenn.

W. F. Beyreiss has been appointed advertising agent of the Queen & Crescent, with office at Cincinnati, Ohio.

G. B. Boone has been appointed a commercial agent of the Angelina & Neches River, with office at St. Louis, Mo., succeeding J. B. Chipman, resigned.

A. Traynor, general baggage agent of the Union Pacific and the Oregon Short Line at Council Bluffs, Iowa, has had his office removed to Omaha, Neb.

E. L. Strawser has been appointed soliciting freight and passenger agent of the Norfolk & Western, with office at Cincinnati, Ohio, succeeding H. G. Grant, promoted.

J. S. Wood has been appointed assistant general freight agent of the Lehigh Valley, with office at New York City, succeeding R. K. Barton, resigned, to go to another company.

William Humphreys, soliciting freight agent of the Southern Railway at Louisville, Ky., has been appointed commercial agent, with office at Dallas, Tex., succeeding Walter Shipley, promoted.

Herbert Thompson has been appointed assistant general freight agent of the Erie Railroad, with office at Buffalo, N. Y., and C. W. Clark, division freight agent at Buffalo, has been assigned to other duties and his former position has been abolished.

J. W. White has been appointed a commercial agent of the Georgia Southern & Florida, with office at Tampa, Fla., succeeding George H. Robinson, resigned, and John C. Lettice has been appointed soliciting freight agent, with office at Macon, Ga., succeeding J. T. Livsey, transferred.

George A. Cullen, general passenger agent of the Delaware Lackawanna & Western, at New York, has been appointed passenger traffic manager, with office at New York, and W. F. Griffitts, chief clerk in the passenger department, has been made assistant general passenger agent, with office at New York.

Frank J. Watson, division freight agent of the Grand Trunk, at Montreal, Que., has been appointed assistant general freight agent, with office at Montreal. G. I. Pettigrew, division freight agent at Stratford, Ont., succeeds Mr. Watson and R. J. S. Weatherston succeeds Mr. Pettigrew. James Waugh has been appointed a commercial agent at Omaha, Neb., succeeding Allan Wallace, resigned.

George H. Smitton, general agent of the Great Northern at Minneapolis, Minn., has been appointed assistant general freight agent, with office at Portland, Ore., succeeding Archibald Gray, resigned, to become general freight agent of the Western Pacific. W. A. Prinsen, general agent at Bellingham, Wash., has been transferred to Minneapolis, succeeding Mr. Smitton, and C. D. Thompson, general agent at Helena, Mont., succeeds Mr. Prinsen.

James Stuart, commercial agent of the Texas & Pacific and the International & Great Northern at Denver, Colo., has been appointed commercial agent of the Texas & Pacific, with office at Pittsburgh, Pa., reporting to the assistant general freight agent at St. Louis. He will look after the solicitation of traffic in West Virginia and in part of Pennsylvania and Ohio. P. B. Doddridge, traveling freight agent at St. Louis, succeeds Mr [illegible] at Detroit.

John H. Crawford, assistant freight traffic manager of the Delaware, Lackawanna & Western, at New York, has been appointed freight traffic manager, with office at New York, succeeding [illegible] Nat Duke,

general freight agent at New York, succeeds Mr. Crawford; A. S. Learoyd, assistant general freight agent at New York, succeeds Mr. Duke; J. B. Keefe, division freight agent at Scranton, Pa., succeeds Mr. Learoyd; E. C. Campbell, commercial agent at Cleveland, Ohio, succeeds Mr. Keefe, and M. J. Naughton, succeeds Mr. Campbell. See item under Executive, Financial and Legal Officers.

W. O. Warthen, who was recently appointed assistant general passenger agent of the Chesapeake & Ohio, with office at Richmond, Va., as has been announced in these columns, was born on March 26, 1866, at Richmond, and was educated in the public schools. He began railway work in September, 1884, with the Chesapeake & Ohio, and for three years was in the accounting department. He was then for 15 years clerk, and later chief clerk to the division passenger agent at Richmond, and the following nine years was district passenger agent at the same place, which position he held at the time of his recent appointment as assistant general passenger agent of the same road.

Elmer H. Wood, general freight agent of the Union Pacific at Omaha, Neb., has been appointed freight traffic manager, with office at Omaha, succeeding J. A. Munroe, recently elected vice-president in charge of traffic. Charles J. Lane, first assistant general freight agent at Omaha, succeeds Mr. Wood as general freight agent, with jurisdiction over all parts of the road except the main line from Kansas City to Denver and branch lines in Kansas. Henry G. Kaill, assistant general freight and passenger agent at Kansas City, Mo., has been appointed general freight and passenger agent, with office at Kansas City, in charge of the main line from Kansas City to Denver and branch lines in Kansas.

H. K. McEvoy, general agent in the passenger department of the Chicago & Alton at Chicago, has been appointed assistant general passenger agent, with office at Chicago. Mr. McEvoy was born in Chicago August 29, 1869, and finished his education at Beloit College, Beloit, Wis. He began railway work in 1890 as stenographer to the treasurer of the Wisconsin Central, now the Minneapolis, St. Paul & Sault Ste. Marie, at Milwaukee, Wis., and two years later was made a statistician with the Chicago & Northwestern at Chicago. He was appointed secretary to the general passenger agent of the Chicago & Alton in 1896, and in January, 1910, was promoted to city passenger agent at Chicago. In January, 1911, he was made general agent in the passenger department, which position he held at the time of his promotion as above.

Archibald Gray, who has been appointed general freight agent of the Western Pacific, with office at San Francisco, Cal., as has been announced in these columns, was born in 1863 in Argyleshire, Scotland. He received a common school education and began railway work as a night baggageman at Minneapolis in 1881 with the St. Paul, Minneapolis & Manitoba, now the Great Northern. All of his railway experience until the time of his recent appointment on the Western Pacific had been with the Hill lines. He was in the local freight office at Minneapolis for nine years from 1881, was in yard service two years, then local agent for a year, and from 1893 to 1894, chief clerk in the traffic department. In the latter year he was promoted to assistant general freight agent, which office he also held for two years at St. Paul, for nine years at Butte, Mont., one year at Sioux City, Iowa, four years at Seattle, Wash., and since April last has been at Portland, Ore., with the title assistant general freight and passenger agent.

C. A. Hayes, whose appointment as freight traffic manager of the Grand Trunk, with office at Montreal, has been announced in these columns, was born on March 10, 1865, at West Springfield, Mass., and was educated at Amherst College. He began railway work in 1882, and for two years was a clerk in the freight accounting department of the Connecticut River Railroad, and was then chief clerk in the freight accounting department of the Boston & Lowell, these roads are now a part of the Boston & Maine. From October, 1887, to November, 1890, he was chief clerk in the general freight office of the same road and the Boston & Maine. He was then appointed general passenger agent of the Central New England & Western, now a part of the Central New England, and from June to October 15, 1892, was division freight agent of the Philadelphia & Reading, and was then New England agent of the National Despatch Fast Freight Line until June, 1896, when he became New England agent and acting general manager, and in July, 1899, he was made manager of the same line. In April, 1902, he was appointed manager of the National Despatch-Great Eastern line. Mr. Hayes was appointed assistant general freight agent of the Grand Trunk in May, 1903, and since May, 1908, was general freight agent of the same road.

Engineering and Rolling Stock Officers.

J. H. Knowles, division engineer of the Western Pacific at Elko, Nev., has been appointed bridge engineer, with office at San Francisco, Cal.

H. H. Hale, whose appointment as superintendent of motive power of the Cincinnati, Hamilton & Dayton, with office at Cincinnati, Ohio, has been announced in these columns, was born in Minnesota on October 27, 1871. He received a high school education, after which he took private courses in mechanics, and began railway work in 1888 with the Chicago & North Western as a shop apprentice. He was later machinist on the Chicago, St. Paul, Minneapolis & Omaha, and then, consecutively, air brake instructor on the Duluth & Iron Range, and assistant master mechanic of the Southern Pacific. Mr. Hale next went with the Pere Marquette as master mechanic, and subsequently held the same title on the Gulf & Ship Island and the Cincinnati, Hamilton & Dayton. For some months prior to his recent promotion he was on leave of absence from the latter road, doing special work for the Ralston Steel Car Company.

H. H. Hale.

Harold B. Hayes, whose appointment as master mechanic of the Alabama Great Southern, with office at Birmingham, Ala., has been announced in these columns, was born on September 13, 1882, in Alabama, and was educated at Birmingham. He began railway work in 1895 as an apprentice in the master mechanic's office of the Southern railway, and in 1900 was transferred in the same capacity to Atlanta, Ga. Three years later he went to the Missouri Pacific as roundhouse foreman at Little Rock, Ark., and was then appointed general foreman of the Arkansas division at McGehee. In 1906 he was appointed general foreman of the Cincinnati, New Orleans & Texas Pacific, at Danville, Ky., and was promoted to master mechanic in November, 1910, with office at Chattanooga, Tenn., which position he held at the time of his recent appointment as master mechanic of the Alabama Great Southern, as above noted.

Harold B. Hayes

I. F. Stern, engineer of bridges of the Chicago & North Western, with office at Chicago, has resigned, and will open

an office as consulting civil engineer in the Old Colony building, Chicago.

J. F. Deems, general superintendent of motive power, rolling stock and machinery, of the New York Central Lines at New York City, has resigned to become president of the Ward Equipment Company. (See page 929.)

L. W. Smith, signal inspector of the Chicago, Milwaukee & St. Paul, at Milwaukee, Wis., has been appointed signal engineer of the Chicago, Milwaukee & Puget Sound, with office at Tacoma, Wash.

J. F. Prendergast, formerly for ten years master mechanic at the Baltimore & Ohio shops at Pittsburgh, Pa., has been appointed master mechanic of the East Broad Top Railroad & Coal Co., also of the Rockhill Iron & Coal Co., with office at Orbisonia, Pa.

Charles J. Scudder, master mechanic of the Pere Marquette at Saginaw, Mich., has resigned to become a district boiler inspector of the Interstate Commerce Commission. As has been announced in these columns. F. C. Pickard has been appointed master mechanic at Saginaw, succeeding Mr. Scudder.

W. C. Stears, master mechanic of the Lima district of the Cincinnati, Hamilton & Dayton at Lima, Ohio, has been appointed master mechanic of the Indianapolis and Springfield divisions, with office at Moorefield (near Indianapolis), Ind., succeeding F. C. Pickard, resigned to go with the Pere Marquette. J. R. Greiner succeeds Mr. Stears.

Purchasing Officers.

G. A. Hickok has been appointed purchasing agent of the Missouri, Kansas & Texas, with office at St. Louis, Mo., succeeding A. I. Miller, deceased. J. M. Gibbons, general store keeper at Parsons, Kan., has been appointed also tie and timber agent, and J. H. Hibben, fuel agent at Parsons, has been appointed superintendent of mines and fuel agent.

OBITUARY.

C. J. Lantry, a railway contractor, of Kansas City, Mo., who built the Pike's Peak Railway, died October 26 at Asheville, N. C., at the age of 48 years.

Carroll Wright, attorney for the Rock Island Lines in Iowa and South Dakota, with office at De Moines, Iowa, died at Colorado Springs, Colo., on October 28.

L. W. Goode. of New York City, president of the Cairo & Norfolk, an eleven-mile railway in Kentucky, died in the Parker House, Boston, Mass., on October 25. The newspapers say it was a case of suicide. Mr. Goode at the time of his death was 55 years old, and had been interested in railway development and timber lands for many years.

W. A. Church, formerly treasurer of the Philadelphia & Reading, died on October 26 at his home in Germantown, Pa. Mr. Church was born February 16, 1834, at Albany, N. Y., and began railway work in 1857. He was successively coal traffic accountant, assistant to treasurer, assistant treasurer, and, to March, 1904, treasurer of the Philadelphia & Reading Railroad, and its successor, the Philadelphia & Reading Railway. He was also treasurer of the Philadelphia & Reading Coal & Iron Company, and many affiliated companies.

[illegible], since January, 1907, superintendent of telegraph of the San Pedro, Los Angeles & Salt Lake, with office at Los Angeles, Cal., died at that place on October 25. Mr. [illegible] was born August 21, 1870, at La Grange, Mo., and began railway work as operator and agent on the St. Louis, Keokuk & Northwestern, now the Chicago, Burlington & Quincy. He was later [illegible] of the Western Union Telegraph Company at Quincy, Ill., and at St. Joseph, Mo. In June, 1899, he was [illegible] superintendent of telegraph of the Hannibal & St. Joseph and the Kansas City, St. Joseph & Council Bluffs now parts of the Burlington, and held that office until the latter part of 1904, when he went with the San Pedro, Los Angeles & Salt Lake as chief despatcher and superintendent. On January 1, 1907, he was promoted to superintendent of telegraph of that road and of the Western Union Telegraph Company.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Adirondack & St. Lawrence has ordered one locomotive from the Baldwin Locomotive Works.

The Wichita Falls is said to be in the market for 8 locomotives. This item has not been confirmed.

The Virginia & Southwestern has ordered an additional mikado locomotive from the Baldwin Locomotive Works.

The Portland Terminal Company is said to have ordered 4 locomotives from the American Locomotive Company. This item has not been confirmed.

The Grand Trunk has ordered 10 switching locomotives from the Montreal Locomotive Works and 10 consolidation locomotives from the American Locomotive Company.

The New Orleans Great Northern has ordered two 10-wheel locomotives from the American Locomotive Company. The dimensions of the cylinders will be 20 in. x 26 in.; the diameter of the driving wheels will be 61 in., and the total weight in working order will be 167,000 lbs.

The Canadian Northern has ordered 31 ten-wheel passenger locomotives and 20 ten-wheel freight locomotives from the Montreal Locomotive Works. The passenger locomotives will have 22 in. x 26 in. cylinders, 63 in. driving wheels, and in working order will weigh 172,000 lbs. The freight locomotives will have 20 in. x 24 in. cylinders, 57 in. driving wheels, and in working order will weigh 145,000 lbs.

CAR BUILDING.

The Canadian Northern has ordered 1,000 box cars from the Nova Scotia Car Company.

The Grand Trunk is negotiating with the Pressed Steel Car Company for 2,000 box cars.

The Northern Pacific is in the market for 50 center sills for the reinforcement of 40-ton cars.

The Pittsburgh & Lake Erie has ordered 3,000 box cars from the Pressed Steel Car Company.

The Wichita Falls is said to be in the market for 300 box cars. This item has not been confirmed.

The Iroquois Iron Company, South Chicago, Ill., is in the market for 10 all-steel 50-ton coal cars.

The Chesapeake & Ohio has ordered 2,000 all-steel hopper cars from the Standard Steel Car Company.

The Chicago, Burlington & Quincy has ordered 500 gondola cars from the American Car & Foundry Company.

The Texas & Pacific Coal Company, Thurber, Tex., is negotiating with the Pressed Steel Car Company for 100 gondola cars.

The Arms Palace Horse Car Company, Chicago, mentioned in the *Railway Age Gazette* of October 20 as having ordered 3 special horse cars from the Pullman Company has increased this order to 6.

The Baltimore & Ohio, mentioned in the *Railway Age Gazette* of October 27 as being in the market for 1,500 composite gondola cars and 1,000 box cars, is now also in the market for 2,000 all-steel gondola cars.

The Pittsburgh Coal Company, Pittsburgh, Pa., mentioned in the *Railway Age Gazette* of October 27 as being in the market for 1,200 coal cars, is in the market for center sills for 1,000 cars, but is not considering buying any cars.

The Delaware, Lackawanna & Western, mentioned in the *Railway Age Gazette* of October 13 as being in the market for 1,000 steel underframes, is now considering sending 1,000 miscellaneous freight cars to car builders to be reinforced, and is not in the market for underframes.

The Illinois Central is in the market for ten 60-ft. postal cars, seven 70-ft. baggage and mail cars, nine 70-ft. baggage and smoking cars, 26 70-ft. baggage cars, four 70-ft. cafe and coach cars, four 70-ft. parlor cars, four 70-ft. dining cars, ten 70-ft. chair cars, and 40 70-ft. coaches. The cars will all have steel underframes.

The Pennsylvania Railroad, as mentioned in the *Railway Age Gazette* of October 6, has ordered 850 gondola cars and 300 hopper cars from the Cambria Steel Company. The gondola cars will have a capacity of 50 tons and will weigh 48,400 lbs. Their inside measurements will be 40 ft. 8 in. long, 8 ft. 9 in. wide and 2 ft. 6 in. high. Their over-all measurements will be 43 ft. long, 10 ft 7⅛ in. wide and 6 ft. 4⅜ in. high. The bodies will be of wood and underframes of steel. The hopper cars will have a capacity of 55 tons and will weigh 39,000 lbs. Their inside measurements will be 30 ft. 5 in. long and 9 ft. 6 in. wide. Their over-all measurements will be 32 ft. 3 in. long, 10 ft. 1⅜ in. wide and 10 ft. high. Both the bodies and underframes will be of steel. The special equipment of these cars will be as follows:

	Gondola.	Hopper.
Axles	5½ in. x 10 in.	5½ in. x 10 in.
Bolsters, body	Built up.	Built up.
Bolsters, truck	Pressed or cast steel.	Pressed or cast steel.
Brakes	Westinghouse.	Westinghouse.
Brake beams	Davis.	Davis.
Brake shoes	Pittsburgh.	Pittsburgh.
Brasses	M. C. B. standard.	M. C. B. standard.
Couplers	Pitt for 400, Latrobe or Climax for 450.	Major.
Doors	Drop ends.	Drop.
Door fastenings		Symington or Lind.
Draft gear	Westinghouse.	Westinghouse.
Dust guards	Wood.	Wood.
Journal boxes	Buckeye or Kensington.	Buckeye or Kensington.
Paint	P. R. R. standard.	P. R. R. standard.
Springs	Helical.	Helical.
Trucks	Diamond.	Diamond.
Wheels	Cast steel.	Steel (Carnegie, Midvale and Standard, each 100 cars).

IRON AND STEEL.

The Cleveland Short Line has ordered 3,200 tons of rails from the Illinois Steel Company.

The Kansas City, Mexico & Orient has ordered 2,000 tons of rails from the United States Steel Corporation.

The Akron, Canton & Youngstown has ordered 550 tons of structural steel from the American Bridge Company.

The Buffalo, Rochester & Pittsburg has ordered 300 tons of bridge steel from the Lackawanna Bridge Company.

The Oregon Electric, Portland, Ore., has ordered 284 tons of structural steel from the American Bridge Company, for the bridge over Rock Creek, Ore.

The New York, New Haven & Hartford and the Pennsylvania have awarded the contract for the steel for the Hell Gate bridge to the American Bridge Company.

General Conditions in Steel.—Conditions in the steel industry show but little change. Prices are still at the same low level and orders are decreasing. It is anticipated that the production in October will show a shrinkage of from 5 to 10 per cent. compared with September production. During the last few days the railways have entered the equipment market more freely than of late, but orders for rails and structural steel are almost nil.

FOREIGN RAILWAY NOTES.

The railway from Ilo, on the coast of Peru, to Moquegua, 63 miles, has been leased by the government of Peru to the Peruvian Corporation for 20 years, with an option for 10 years more, to be operated in connection with the southern railways of this company.

It has been found on the Rhodesian railways, South Africa, that no wooden tie is absolutely secure from white ants; even creosoted ties succumb as soon as they lose their objectionable flavor. Local hard wood, karri and jarrah, have failed. Steel ties used since 1892, on the other hand, are apparently little the worse for wear.

Supply Trade News.

Walter R. Burrows has resigned his position of manager of the railway department of Topping Brothers, New York, and will make and sell Burrows jacks on his own account, with office at 150 Chambers street, New York. .

The Montreal Locomotive Works, Montreal, Que., has received an order from the Canadian Northern for one rotary snow plow with tender. The dimensions of the cylinders will be 17 in. x 22 in., and the scoop wheel will have a 10 ft. 7 in. cut.

H. P. Walden, purchasing agent in the manufacturing department of the Pullman Company, Chicago, has been transferred to Pullman, Ill., W. T. Stewart, purchasing agent of the operating department, will remain in Chicago.

The Scullin-Gallagher Iron & Steel Company, St. Louis, Mo., has recently purchased three cranes with capacities of 30 tons, 10 tons and 5 tons, from the Alliance Machine Company, Alliance, Ohio, and two cranes of 25- and 10-ton capacities from the Niles-Bement-Pond Company, New York. This equipment, together with the six new mold drying ovens, new core room and five ovens, and the extensions to the main foundry, annex and chipping shops of its No. 2 plant, will more than double the company's capacity for making miscellaneous steel castings. The No. 1 plant, the capacity of which was doubled less than a year ago, will continue to be devoted entirely to the production of steel castings for railway purposes.

J. F. Deems, general superintendent of motive power, rolling stock and machinery of the New York Central Lines, has resigned to become president of the Ward Equipment Company, New York, with office in that city. Mr. Deems was born at Brownsville, Pa., in 1856. After graduating from the South Western Institute of Pennsylvania he entered railway service as an apprentice on the Baltimore & Ohio. He left the Baltimore & Ohio to go to the Chicago, Burlington & Quincy as machinist in the shops at Beardstown, Ill., and after eight months he was made gang foreman and then roundhouse foreman. He was roundhouse foreman at Galesburg, Ill., and then returned to Beardstown as general foreman. He was next made master mechanic at Ottumwa, Iowa, but soon returned, in the same capacity to Beardstown, where he remained until he was made master mechanic at West Burlington, Iowa. It was in this capacity that he did his most important work on this road by establishing piece work on a new basis, which spread over the entire system. From April 1, 1900, to June 1, 1901, he was assistant superintendent of motive power at Burlington, and from June 1, 1901, to March 1, 1902, he was superintendent of motive power at Chicago. On March 1, 1902, he resigned his position with the Chicago, Burlington & Quincy to become general superintendent of the Schenectady, N. Y., plant of the American Locomotive Company, New York. In December, 1902, he was made general superintendent of motive power, rolling stock and machinery of the New York Central Lines, with office in New York, a newly created position. Mr. Deems is a past-president of the American Railway Master Mechanics' Association, and the keynote of his presidential address, before that association in 1907, was the necessity for the proper training and development of the men. He was the first to introduce modern apprenticeship. He was one of the five members of the committee representing the rail-

J. F. Deems.

ways in the safety appliance conferences at Washington. He has been president of the Western Railroad Club; president of the New York Railroad Club; and a delegate to the International Railway Congress.

The Ward Equipment Company, which is about three years old, makes car heating and ventilating systems. This company recently bought control of the Economy Car Heating Company, owners of the steam heating device described in the *Railway Age Gazette* of October 20, p. 776. During the past year the Ward company opened branch offices in Atlanta, Ga., Boston, Mass., and Chicago.

TRADE PUBLICATIONS.

Wire Tapes.—The Keuffel & Esser Company, Hoboken, N. J., has published, in a small circular, a price list of its flat wire tapes and band chains.

Lock Nuts.—The Columbia Nut & Bolt Company, Bridgeport, Conn., has published a small illustrated booklet describing its nut locks and showing why they lock.

Rock Drills.—The Chicago Pneumatic Tool Company, Chicago, has published an 88-page, illustrated catalog, describing in detail its rock drills, air compressors and pile drivers, with the prices of each and line drawings of the special parts.

Pipe Threading Dies.—The National Tube Company, Pittsburgh, Pa., has published Bulletin No. 6 on pipe threading dies. The bulletin is illustrated and gives an interesting discussion of the prime requisites of a die which will thread both wrought iron and steel pipe with equally good results.

Buckets.—The Hayward Company, New York, manufacturers of buckets and digging machinery, has issued pamphlet No. 576, describing in detail the new Hayward drag scraper bucket. The booklet shows several photographs of these buckets in operation and gives an illustration and a short description of each part of the bucket.

Coal Washing Plants.—The Roberts & Schaefer Company, Chicago, has published a 42-page booklet entitled Modern Coal Washing Plants, in which it illustrates and briefly describes a number of complete coal washing plants which have been installed throughout the country. Each plant is different from the others, for the company treats each coal washing proposition individually.

Universal Portland Cement.—The Universal Portland Cement Company, Chicago, has published an interesting booklet entitled The Manufacture of Universal Portland Cement, in which information is given regarding the output, the raw materials used, the operations, the sampling, etc., at the various plants. A graphic diagram is included, showing the various steps in the manufacturing operations.

Curtis Steam Turbines.—The General Electric Company, Schenectady, N. Y., has issued Bulletin No. [illegible] containing detailed descriptions and illustrations of its horizontal steam turbine generators of from 100 to 1,000 k. w. capacity at 3,600 r. p. m., which is the maximum speed with 60-cycle, alternating-current generators. These units are designed particularly for industrial and lighting plants requiring the economical generation of a moderate amount of power.

[illegible] The Land and Industrial Department of the Southern Railway has issued the 1911 textile directory, which gives a list of the cotton, knitting and woolen mills on the lines of the Southern Railway and the Mobile & Ohio. The [illegible] of looms and spindles, and the type of power used, as well as [illegible] The 1911 [illegible] spindles and 192,882 looms, situated on the lines of the Southern Railway and the Mobile & Ohio. The Land and Industrial Department of the Southern has spent, and is spending, a great [illegible] in regard to the advantages of milling sites in its territory, and the [illegible] dealing with this subject; and, of course, in addition the department has a great deal of information which it furnishes free to those interested.

Railway Construction.

New Incorporations, Surveys, Etc.

Arizona Construction & Finance Company.—Incorporated in Arizona with $2,000,000 capital, and headquarters at Phoenix, to construct an electric railway system; R. A. Lewis, W. B. Barr and S. D. Dunlap, are directors.

Atchison, Topeka & Santa Fe.—According to press reports this company has under consideration plans for building a 180-mile line from El Paso, Tex., east to Pecos, on the Pecos River Railroad, and it is understood that the line may eventually be continued further east to the Sterling City branch, at Sterling City, an additional 160 miles.

Baltimore & Ohio.—The report of this company for the year ended June 30, 1911, shows that satisfactory progress has been made on the extensive betterment work, referred to in the last report. The more important improvements completed during the year include the following: Change of line and grade reduction Concord, Pa., to Wilmington, Del., on the Philadelphia division. Third track on the Cumberland division between Cherry Run, W. Va., and Orleans Road; Bond and Swanton, Md., Deer Park and Moutain Lake Park; Terra Alta, W. Va., and Rodemer, also between West End and Hardman, a total of 44.7 miles. In connection with this work the tunnels at Everett, McGuires, Rodemer and Murray, were converted into open cuts. A change of grade and alinement between Hutton, Md., and Cornith, W. Va., or 24 miles was also finished, and the third track was completed between Foley and Manila, 6.1 miles on the Connellsville division. The Quemahoning branch was extended nine miles to a connection with the Somerset & Cambria branch at Somerset, Pa. Second track was completed from Wellsboro, Ind., to McCool, 21 miles on the Chicago division, including an interlocking plant at Babcock. The larger improvements now under way include the following: Second track construction on the Chicago division between Hamler, Ohio, and Holgate; Delaware Bend and Mark Centre, and Lapaz Junction, Ind., and Wellsboro, 35.5 miles. Grading is under way for second track between Holgate, Ohio, and Midway, also between Cromwell and Milford Junction, a total of 22 miles. Third track construction from Weverton, Md., to Sandy Hook; Green Spring, W. Va., to Patterson Creek; Manila to N. A. Tower and Garrett, Pa., to Rockwood, is now under way. Passing tracks and sidings are being put in at various points on the line between Parkersburg, W. Va., and East St. Louis, Ill. Work on the change of line and reduction of grade between Blaser and the west end of Kingwood Tunnel, about 4 miles, including the construction of a double track tunnel, 4,250 ft. long, has progressed steadily during the year, and is about one-half done. The present single track line from Kingwood Tunnel, operated in conjunction with this new line, will provide three tracks and afford necessary relief, where the movement of traffic has hitherto been much restricted. The construction of 1.8 mile of new line, including a double track tunnel 4,000-ft. long through the Allegheny mountains, between Sand Patch, Pa., and Manila, is under way, it is expected that this work will be finished by January, 1913. A new westbound freight classification yard is being constructed at Brunswick, Md., and additional interchange facilities with the Cumberland Valley Railroad are being constructed at Cumbo, W. Va.; work is also under way on additional terminal yards and facilities at Somerset, Pa. The new east and westbound yards at Chicago Junction, Ohio, have been put in operation.

Bartlett Western.—According to press reports work is now under way on an extension from Jarrell, Tex., west to Florence, 12 miles, and as soon as this work is finished, construction is to be started on an eastern extension from Bartlett, about 150 miles, to a connection with the Trinity-Colmesneil line of the Missouri, Kansas & Texas. It is understood that a line is also to be built north from Florence, to a connection with the Santa Fe. C. J. Grainger, vice-president and general manager, Bartlett.

Butte, Boise & San Francisco.—This company, which was incorporated at Helena, Mont., will soon start construction work, it is said, from Butte, Mont., southwest through Montana and Idaho. Dr. W. H. Haviland, Butte, Mont., is interested. (September 15, p. 543.)

California Roads.—A preliminary survey is now being made for a line from Dumont, Cal., on the Tonopah & Tidewater, to the mines of the Avawatz Gypsum Company, 12 miles. Construction work will not be started until next year. T. L. Henderson is secretary and field manager of the Avawatz Gypsum Company, Hellman building, Los Angeles, Cal.

California Roads (Electric).—It is understood that an electric line is to be built from a connection with the Western Pacific, near Virgilia, Cal., to Nevis, about 27 miles. The Great Western Power Company and T. B. Walker are said to be interested.

Plans are now being made by H. R. O'Bryan, it is said, to build from Del Monte Heights, Pacific Grove, Cal., to the Hot Springs.

A line is projected from Fresno, Cal., via. the Bullard district, to San Joaquin river. J. C. Forkner, Fresno, is interested.

Canadian Northern.—Bids will be asked for soon, it is said, to build an extension from mile 60 to mile 100 at Cowichan Lake, Vancouver Island.

Premier Roblin has announced that a direct railway from Winnipeg, Man., to Hudson Bay, along the east shore of Lake Winnipeg, will be built soon by the Canadian Northern and the government of Manitoba will give the necessary support to insure construction.

This company is asking for an extension of time to complete the following lines: Quebec, Que., to Moncton, N. B.; St. Jerome, Que., to the Gatineau branch of the Canadian Pacific Railway, and from the international boundary to Montreal; Toronto, Ont., to Ottawa; French River, to Ottawa; Sudbury to Port Arthur, and several branches in Northern Ontario. In western Canada the company will ask for an extension of time to build a number of lines already authorized.

Under the name of the Canadian Northern & Tunnel Terminal Co., application will be made for authority to construct a railway tunnel under Mt. Royal, at Montreal, Que. The estimated cost of the work is $25,000,000. It is understood that the Canadian Northern will spend a large sum of money on improvement work around Montreal, including lines connecting its tracks with the Canadian Northern Ontario, and the Canadian Northern Quebec railways, as well as those of the Harvard Commissioners of Montreal. The tunnel will be about three miles long.

Canadian Roads.—A charter has, it is said, recently been granted to D. J. McArthur, of Winnipeg, Man., and associates, to build from Edmonton, Alberta, to Fort George, B. C. The line is to enter British Columbia via Pine River Pass, north of Yellowhead Pass, and will be about 1,000 miles long. It is expected that the work will be finished and the line open for operation within four years. Financial arrangements have been made.

Chicago, Milwaukee & Puget Sound.—According to press reports a contract has been given to Cochran, Boynton & Co., at $100,000, for grading three miles from Atlas, Idaho, to Coeur d' Alene. This is the last contract for grading on the line from Spokane, Wash., to Coeur d'Alene, Idaho, a previous contract having been let to A. C. Henry, for work as far as Atlas. It is expected that the work will be finished by December 15. S. P. Sawyer will be in charge of the grading.

Chicago, Rock Island & Pacific.—The report of this company for the year ended June 30, 1911, shows that new lines were constructed during the year, including a single track connection, 1.46 mile long, between a point 6.55 miles west of Forsyth Junction, Mo., on the line leading from St. Louis to Kansas City and a point on the St. Louis Belt & Terminal Railway, near Olivette. This enables the R. I. to reach its terminal yards in North St. Louis, which have been completed during the current fiscal year, by a shorter route than if the traffic were handled through Forsyth Junction. This line was put in operation December 17, 1910. It is laid with re-rolled 80-pound rail on creosoted ties, and ballasted with gravel. Work is now under way on a line between Carlisle, Ia., and Allerton, 67 miles. The line will pass through valuable coal fields. Industrial side tracks have been constructed during the year to six coal mines and to 64 private industries, a total of 70 additional tracks. Extensions were made to one mine track and 31 tracks to other industries, making a total of 32 tracks extended during the year. A large sum of money was spent during the year for the construction of additions to terminals, and improved terminal facilities. J. B. Berry, chief engineer, Chicago, Ill.

Cleveland & Youngstown.—An ordinance has been introduced at the meeting of the city council of Cleveland to grant this company a right-of-way to enter that city with a four-track tunnel to a new terminal station, to be built at Ontario street and Prospect avenue. The company was organized several months ago to build and operate a steam or electric line in the state of Ohio, and it was understood that it would form the connecting link between Cleveland and Youngstown as an extension of the Youngstown lines of the Public Railway and Light Company, which has recently secured control of the Mahoning valley lines. The new company has secured a right-of-way through Cuyahoga, Geauga, Portage, Trumbull and Mahoning counties. J. P. Wilson, president, J. T. Harrington, vice-president and Judge N. C. Deford, treasurer.

Cuyuna Northern.—An officer writes that contract has been let to Guthrie Bros., Deerwood, Minn., to build a short section from Deerwood, Minn., to the mine at section 30-46-28. The line is being built to carry iron ore. C. Adams, president, Deerwood.

Denver, Northwestern & Pacific.—According to press reports, financial arrangements have recently been completed which insures the building of the extension from the present western terminus at Steamboat Spring, Colo., west towards Salt Lake City, Utah. L. D. Blauvelt, chief engineer, Denver, Colo.

Eugene Belt Line and Interurban.—Incorporated in Orgeon, with $250,000, to build a line to connect Eugene, with Springfield, Coburg and Junction City. The company proposes to put up shops at south Eugene. P. C. Lavey, J. H. Tingle and C. H. Lavey, Portland, are the incorporators.

Flathead Interurban.—Surveys are now being made, it is said, to build a line near Kalispell, Mont. A. L. Jaqueth is the engineer in charge of the work.

Gainesville & Robertstown.—According to press reports financial arrangements have been made to build from Gainesville, Ga., north via. Concord and Cleveland, into the Blue range. President McCombs, of the Bryd-Matthews Investment Co., St. Louis, Mo., is back of the project.

Great Northern.—An officer writes that a contract has been given to Caughren & Woldson, Spokane, Wash., to build from Bluestem, Wash., to the Columbia river, about 39 miles. A. H. Hogeland, chief engineer, St. Paul, Minn. (July 14, p. 105.)

Marshfield-Albion.—Incorporated at Albion, Idaho, with $100,000 capital, to build a nine-mile line from Albion. T. E. Harper, C. O. Dumas and W. Powell are interested.

Mississippi Roads.—J. F. Johnson is back of a project to build a logging line up the valley of the Pearl river in Mississippi, and it is expected that work will be started on the line before the close of 1911. Northern capitalists, who own large tracts of land in that section, are also interested in the project.

Montana Roads (Electric).—An electric line is to be built it is said, between Whitefish, Mont., and Kalispell. D. R. McGinnis, Flathead, is interested.

New York Subways.—The New York Public Service Commission, First district, has awarded the contract to the Bradley Contracting Co., New York City, for work on section 13 of the Lexington avenue subway, from 118th to 129th street. This company's bid was $4,071,416, and with the four other sections previously let to this company, it has now under contract $47,460,382 worth of subway work. The other bidders for section 13 were the Hugh Nawn Contracting Company, $4,269,594; Brody & Adler, $4,628,702, and the MacArthur Brothers Company, $4,892,484. (October 13, p. 735.)

Oakland Traction.—It is said that a line is to be built soon from Berkeley, Cal., to the northern boundary of Alameda county. Application for a franchise has been made. F. W. Nelson, chief engineer, Oakland, Cal.

Oregon & Southern.—Organized in Oregon to build from Medford, through the Rogue river valley, to a point in California. J. A. Voyle, Spokane, Wash., is said to be interested.

Oregon Roads (Electric).—Announcement has been made that a preliminary survey has been finished for an electric line between

Canby, Ore., and Portland, 14 miles. There is also to be a branch to Oregon City, 3 miles long. This work includes piercing a tunnel under Council Crest, with a subway extension into the heart of the city. It is understood that the line will cost $5,000,000. M. J. Lee, associated with Pennsylvania capitalists, is back of the project.

Oregon Trunk.—According to press reports a contract has been given to the Henry Construction Company for building an extension on a section of 30 miles from Bend Ore., south towards Klamath Falls. It is expected that additional contracts will be let soon. The line was recently completed from the Columbia river south to Bend. R. Budd, chief engineer, Portland. (October 6, p. 691.)

Oregon-Washington Railroad & Navigation Company.—According to press reports this company recently incorporated at Olympia, Wash., a $1,000,000 subsidiary, to build the North Coast extension from North Yakima to Point Mole, south of Auburn, connecting with the Harriman line between Tacoma and Seattle, the connecting point being 13 miles from Tacoma and 23 miles from Seattle. The projected line will be 117 miles long, paralleling the Northern Pacific's main line across the Cascades at an average distance of 30 miles to the south.

Portland & West Coast Railroad & Navigation Company.—Application has been made for permission to build between Pacific City, Ore., and Tillamook. The incorporators include W. F. Prier, C. M. Hendrickson and J. H. Upton. (August 18, p. 357.)

Royal Canadian Railway.—An application will be made to the Canadian Parliament for permission to build from Ste Anne de Bout de l'Isle, Jacques Cartier, Que., through the counties of Vaudreuil and Soulanges, to a point on the St. Lawrence river, in Glengarry county, with power to construct two bridges over the Ottawa river at Ile Perrot. The names of the promoters are not given.

Sacramento Woodland (Electric).—A contract has been given to the Dozier Construction & Engineering Company to build from Woodland, Cal., to Sacramento. T. T. C. Gregory, Suisun, and G. A. Posey, San Francisco, are incorporators. (August 4, p. 269.)

Salt River Valley (Electric).—This company, which was recently incorporated, has applied for a franchise at Phoenix, Ariz. The plans call for building from Phoenix to Scottsdale, also from Phoenix via Tempe, and Mesa to Chandler, and from Phoenix, via Glendale, to Peoria. F. M. Winter, president. Phoenix, Ariz. (August 25, p. 391.)

San Jose & Almaden (Electric).—Incorporated at San Jose, Cal., with $120,000 capital, to build from San Jose to Almaden, about 12 miles. C. A. Nones, D. M. Burnett and C. P. Anderson are incorporators.

Santa Fe, Prescott & Phoenix.—A contract has been given to the C. D. Smith Construction Company, Memphis, Tenn., for grading from Cedar Glade, Ariz., to Jerome, about 38 miles. J. A. Jaeger, chief engineer, Prescott. (October 27, p. 860.)

Southern Pacific of Mexico.—This company will soon make application to the Mexican government for a concession, it is said, to build an extension from Tepic to a connection with the Pan-American and the National Tehuantepec railways, about 900 miles. The proposed route is down the Pacific coast, in some places keeping close to the ocean in order to obtain a passage way. It is stated that the Southern Pacific has received assurances that a grant subsidy will be granted by the government in aid of the proposed extension. Much heavy construction would be encountered in the mountains at many places to the city of Mexico, particularly in the State of Guerrero. Many tunnels would be required, among the larger being the Cuba Tunnel, three miles and a half long, the Balsas Tunnel, three miles and a half long, and the Tepic Tunnel, two miles and a half long. The grading between the Pacific coast and Tepic has been completed and it is expected that trains will be running into the latter city soon. It is stated that the line from Tepic to the City of Mexico will be completed in the following order: Between that city and Orendain, near Guadalajara. The latter division lies through the Sierra Madre and at many points is of a very difficult character. Several months ago the Southern Pacific was granted a concession by the government to extend its line from Orendain to the City of Mexico, via Guadalajara, and it is stated that this construction work will be started as soon as the surveys are finished and formally approved by the federal authorities. L. H. Long, assistant general manager, Tucson, Ariz. (July 28, p. 199.)

Springfield & Western.—An officer writes that the company has secured a franchise from the city council of Springfield, Mo., to enter that city from the west on Division street. The permanent location is now being made on the line from Springfield west towards Joplin. M. M. Hollenbeck, chief engineer, Springfield. (November 25, 1910, p. 1023.)

Taloga, Putnam & Southern.—An officer writes that contracts will be let December 1 to build from Woodward, Okla., southeast to Chackasha, about 135 miles. S. H. Whittenberg, president, and C. W. Musgrove, general manager, Taloga.

Texas Roads (Electric).—A company is being organized to build an interurban line from Clarksville, Tex., southwest via Paris, Greenville and Rockwall to Dallas, about 140 miles. It is understood that the right-of-way is being secured. Major Joseph F. Nichols is the principal promotor, Greenville, Tex.

Tidewater & Southern.—This company is now building from Stockton, Cal., to Turlock. J. H. Wallace, president, Stockton. (October 13, p. 735.)

Washington Roads.—A line is to be built, it is said, from Vancouver, Wash., to a point near Klickitat Pass, about 100 miles. E. R. Ernsberger, of the Mount Hood Railway & Power Company, Los Angeles, Cal., is said to be interested.

RAILWAY STRUCTURES.

Arverne, N. Y.—The Long Island Railroad is shifting the tracks at Arverne, preparatory to beginning work on a new station, to be built at Vernon avenue.

Chattanooga, Tenn.—The Nashville, Chattanooga & St. Louis has let the contract for remodeling and enlarging its freight house and office quarters at Chattanooga.

Colfax, Wash.—The Spokane & Inland Empire has taken out a permit to build a new station at Colfax. (August 4, p. 269.)

Delrio, Tenn.—It is understood that the Southern Railway will soon build a station at Delrio, to replace the structure which was destroyed by fire some time ago. The company has recently opened a new station at Morristown.

Eugene, Ore.—See Eugene Belt Line & Interurban, under Railway Construction.

Grafton, W. Va.—The report of the Baltimore & Ohio, for the year ended June 30, 1911, shows that additional terminal facilities at Grafton, W. Va., referred to in the last annual report were about finished at the close of the fiscal year, and, together with the new passenger station, have since been put in service. Three improved ore handling machines were put in service at Lorain, Ohio, and new or enlarged station facilities were completed at Wilmington, Del.; Lorely, Md.; Harrisonburg, Va., Fort Defiance, Parkersburg, W. Va., Huntington, Philippi, Millers, Elm Grove, Oakley, Ohio, Portsmouth, Napanee, Ind., Garrett and at Noble, Ill. A large bascule drawbridge over the Cuyahoga river at Cleveland, Ohio, has been completed. Considerable progress has been made during the year in renewing bridges for the use of heavier power. The more important bridges renewed were: Schuylkill river drawbridge at Philadelphia, Pa., Brandywine viaduct at Wilmington, Del., and at the Cheat river at Rowlesburg, W. Va. The elimination of grade crossings in the cities of Baltimore, Md., Columbus, Ohio, and Chicago, has progressed steadily during the year. It is expected that this work at Columbus, Ohio, will be completed early in the current year, and that the work at Baltimore, Md., and Chicago will extend over a period of years.

Jamieson, Ore.—The Oregon Short Line will build a new station, it is said, at Jamieson.

Jasper, Ont.—See Nation.

Los Angeles, Cal.—The Pacific Electric has bought 100 acres

of land in Dominguez, it is said, and is planning to put up new shops on the site.

Lowell, Ore.—See Natron.

Lyons, Ore.—The Corvallis & Eastern will start work at once, it is said, on a new station at Lyons.

Minot, N. Dak.—The Minneapolis, St. Paul & Sault Ste. Marie is contemplating building a brick passenger station.

Morristown, Tenn.—See Delrio.

Natron, Ore.—The Southern Pacific has given a contract to W. L. Graff, San Francisco, Cal., to put up new stations at Natron, Ore., at Lowell and at Jasper.

New York.—The New York, New Haven & Hartford and the Pennsylvania Railroad companies have awarded the contract for the steel work for the Hell Gate bridge and approach viaducts on the New York Connecting Railroad to the American Bridge Company.

Oakmont, Pa.—According to press reports a contract has been given by the Pennsylvania Railroad, for building a new concrete and steel bridge over the hollow near Craigdell station, above Oakmont, on the Conemaugh division, to cost about $40,000.

Ottawa, Ont.—According to press reports, plans have been submitted to the city authorities of Ottawa for a union passenger station to be built between Canal street and Rideau Canal, opposite the Grand Trunk station, now nearing completion. It is understood that the Canadian Pacific and the Canadian Northern will jointly carry out the work.

Pasco, Wash.—The Northern Pacific has let the contract to Deeks, Deeks & Smith, St. Paul, for building a 37-stall brick and concrete roundhouse, a machine shop, car shop, power house, coal dock and repair shop. The cost of the entire group of buildings will be approximately $250,000. (July 14, p. 106.)

Power, Mont.—The Great Northern will probably build a new station at Power.

Riverbank, Cal.—The Atchison, Topeka & Santa Fe Coast Lines will build a 15-stall roundhouse at Riverbank, to cost approximately $50,000.

Saginaw, Mich.—The Pere Marquette has let the contract for building a woodworking shop 80 ft. x 150 ft.

Seattle, Wash.—The Northern Pacific has received bids for reconstructing pier No. 1 at Seattle, and it is understood that the contracts will be let soon. The improvements will cost about $60,000. (October 6, p. 692.)

Sidney, Neb.—The Union Pacific roundhouse at Sidney was recently destroyed by fire, with an estimated loss of $25,000.

Sturgis, Ky.—The Illinois Central is contemplating building a new passenger station.

Waurika, Okla.—The Chicago, Rock Island & Pacific is preparing plans for a new passenger station.

On June 30, 1911, there were 293 miles of railways under construction in New South Wales, of which 190 miles consist of a section of the North Coast line. The railways authorized but not commenced represented an additional 243 miles, of which 120 miles were sections of the North Coast line. Apart from the North Coast, therefore, there is really comparatively little new construction under way. On August 14 the first section of the North Coast line was opened for traffic from Maitland to Dungog, about 32 miles. The work on the railway is very heavy and involves the construction of two large bridges over the Paterson and Hunter rivers; also the building of a tunnel 330 yds. long. The railway is a first-class single track line, with full ballast and 80-lb. rails. The ruling grade is 1.25 per cent. and the sharpest curve has a radius of 154 yds. In addition to this portion, four other sections are under construction as follows: Dungog to Gloucester, Gloucester to Taree, Taree to Wanchope, and Grafton to Glenreagh. In addition, the Coff's Harbor to Glenreagh and the Coff's Harbor to Bellinger sections are to be commenced, in order to provide an outlet for the Bellinger trade. The Dungog-Gloucester section includes a long tunnel which will delay completion for a long time, but the Gloucester-Taree section is nearly finished.

Railway Financial News.

Atchison, Topeka & Santa Fe.—Stockholders have voted to approve the issue of $100,000,000 common stock to provide for the conversion of $100,000,000 convertible bonds, the issue of which was also approved. Stockholders have also voted to make available for improvements $10,800,000 preferred stock, deposited by the reorganization committee in 1896. The stockholders also approved the purchase of a line from Needles, Cal., to Mojave. This line is now owned by the Southern Pacific and operated under lease by the Santa Fe.

Delaware & Northern.—The New York Public Service Commission, Second district (state), has authorized this company, which is the successor of the Delaware & Eastern, to issue $1,000,000 common stock and $250,000 preferred stock, the common and half the preferred to be used to acquire from the reorganization committee of the bondholders of the Delaware & Eastern the property which was sold under foreclosure; $125,000 of preferred stock is to be used to pay for equipment and improvements.

Erie.—The New York Public Service Commission, Second district (state), has authorized the Erie to issue $4,600,000 equipment trust certificates.

Hocking Valley.—The *Ohio State Journal* says that the Ohio railway commission is to approve the issue of $4,000,000 2-year 4½ per cent. notes, of which $3,250,000 will be used to retire maturing obligations and $750,000 for additions and betterments.

Louisiana & Northeastern.—Stockholders have authorized the issue of $1,860,000 collateral trust notes, the money from the sale of these notes to be used for the extension of the line to Prescott, Ark.

Missouri Pacific.—Speyer & Co., New York, have bought and resold about $5,300,000 equipment trust notes, about half of them issued by the Missouri Pacific and the other half by the St. Louis, Iron Mountain & Southern. The notes are to be secured by equipment costing $6,300,000, toward which the railway companies have paid 10 per cent. in cash. The notes are due in 20 semi-annual instalments. The equipment consists of 65 locomotives; 50 passenger, baggage and mail cars; 5,400 freight cars, and a gasolene motor car.

National Railways of Mexico.—The earnings of this company, not being reported to the Interstate Commerce Commission, are not published in our regular table of earnings and expenses of railways. In September, 1911, the National Railways, operating 6,132 miles, had gross earnings of $5,287,218, as compared with $5,124,243 gross in September, 1910. Operating expenses amounted to $2,923,440 in 1911, and to $3,098,887 in 1910. This left net earnings of $2,363,778 in September, 1911, an increase of $338,442 over September, 1910.

New Orleans, Mobile & Chicago.—Alonzo Potter and Elisha Walker, both of William Salomon & Co., New York, have been elected directors of the New Orleans, Mobile & Chicago, control of which, as has been previously announced, has been bought by B. F. Yoakum, of the St. Louis & San Francisco. It is understood that William Salomon & Co. have bought $12,046,500 first and refunding mortgage 5 per cent. bonds of the N. O., M. & C.

Norfolk & Western.—This company has declared a quarterly dividend of 1½ per cent. on the common stock, payable December 18. This is an increase of one-quarter of 1 per cent. semi-annually and puts the stock on a 6 per cent. annual basis, as compared to a 5 per cent. paid annually since October, 1909. This will increase the requirements for dividends by about $750,000 on the stock at present outstanding, and with the full conversion of convertible bonds now outstanding, there will be about $91,569,000 common stock calling for the payment of $5,494,140 dividends at the 6 per cent. rate.

Raleigh & Charleston.—A press despatch dated Marion, S. C., says that the Seaboard Air Line has bought control of the Raleigh & Charleston, which runs from Lumberton, N. C., to Marion, 41 miles.

Seaboard Air Line.—See Raleigh & Charleston.

ANNUAL REPORTS

THIRTY-FIRST ANNUAL REPORT OF THE CHICAGO, ROCK ISLAND AND PACIFIC RAILWAY COMPANY.

To the Stockholders:

The Board of Directors herewith submit their report of the operations and affairs of the Rock Island Lines for the fiscal year ended June 30, 1911.

The results of the operations for the year were as follows:

Total operating revenue (increase $2,266,894.10, or 3.4 per cent.)	$68,487,473.04
Operating expenses (increase $986,314.09, or 2.1 per cent.)	49,055,683.00
Net operating revenue (increase $1,280,580.01, or 7.1 per cent.	$19,431,790.04
Taxes (decrease $168,049.71, or 5.8 per cent.)	2,708,650.96
Operating income	$16,723,139.08
Miscellaneous income	185,477.06
Total income	$16,908,616.14
Interest and rentals	11,465,902.48
Balance of income, after providing for all charges, being 7.2 per cent. on capital stock ($75,000,000.00)	$5,442,713.66
Dividends paid (5¼ per cent. on capital stock)	3,930,948.00
Balance surplus for the year (increase $507,156.58, or 50.5 per cent.)	$1,511,765.66

CAPITAL STOCK.

The capital stock of the company outstanding at the close of the previous fiscal year was $74,877,200.00, remaining the same at June 30, 1911.

FUNDED DEBT.

During the year the funded debt, not including equipment notes, increased $3,810,000.00 and equipment notes decreased $1,650,000.00, making a net increase in total funded debt of $2,160,000.00. Details will be found on pages 17 and 20.

ROAD AND EQUIPMENT.

The cost of the "Investment since June 30, 1907" increased $2,456,437.79 during the past year, which figure includes the value of new equipment purchased under trust agreement or otherwise acquired, and exependitures for additions and betterments. For particulars, see pages [illegible]

NEW LINES CONSTRUCTED.

A single track connection, 1.46 miles long, has been constructed between a point 6.55 miles west of Forsyth Junction, Missouri, on the line leading from St. Louis to Kansas City and a point on the St. Louis Belt & Terminal Railway near Olivette, Missouri. This enables your company to reach its terminal yards in North St. Louis, Missouri, which have been completed during the current fiscal year, by a shorter route than if the traffic were handled through Forsyth Junction, Missouri. This line was completed December 10, 1910, and put into operation December 17, 1910. It is laid with re-rolled eighty-pound steel rail on creosoted ties and ballasted with gravel.

NEW EQUIPMENT.

Orders have been placed during the year for 41 steel passenger train cars, and there are also to be delivered on previous year's contracts 7 smoking cars, 6 combination passenger and baggage cars and 6 baggage and mail cars, all of steel construction, making a total of 60 steel passenger train cars to be delivered after June 30, 1911.

GENERAL.

Under date of February 18, 1911, a charter was granted, under the laws of the State of Iowa, to the St. Paul and Kansas City Short Line Railroad Company, with authorized capital stock of $45,000,000.00, of which [illegible] has been issued and is owned by your company.

The St. Paul and Kansas City Short Line Railroad Company also exe[illegible] a first mortgage securing an issue of 4 per cent. [illegible] $10,000,000.00, maturing February 1, 1951, of which $10,000,000.00 were issued and acquired by your company. As consideration for the purchase of these securities [illegible] agreed with the St. Paul and Kansas City Short Line Railroad Company [illegible] Paul and Kansas City Short Line Railroad Company the capital stock, [illegible] of the St. Paul and Des Moines Railroad Company, a corporation organized and existing under the laws of the State of Iowa, to Minneapolis, Iowa, to Minden City, Iowa, a distance of [illegible] miles; the capital stock of the Des Moines, Winterset and Creston Railway Company, a corporation organized and existing under the laws of the State of Iowa, to Winterset, Iowa, a distance of [illegible] miles; the capital stock of the Des Moines, Indianola and Missouri Railroad Company, a corporation organized and existing under the laws of the State of Iowa, to Indianola, Iowa, a distance of [illegible] miles; the capital stock of the Des Moines, Iowa, and Northern Railway Company, a corporation organized and existing under the laws of the State of Iowa, to Alleman, Iowa, a distance of [illegible] miles; the capital stock of the Des Moines, Iowa, and Fort Dodge Railroad Company, a corporation organized and existing under the laws of the State of Iowa, to Fort Dodge, Iowa, a distance of [illegible] miles; the capital stock of the Des Moines, Iowa, and Northwestern Railway Company, a corporation organized and existing under the laws of the State of Iowa, to Madrid, Iowa, a distance of [illegible] miles; the capital stock of the Des Moines, Iowa, and Southwestern Railway Company, a corporation organized and existing under the laws of the State of Iowa, to Winterset, Iowa, a distance of [illegible] miles; the capital stock of the Des Moines, Iowa, and Northern Railway Company, a corporation organized and existing under the laws of the State of Iowa, to Humboldt, Iowa, a distance of [illegible] miles; the capital stock of the Des Moines, Iowa, and Northwestern Railway Company, a corporation organized and existing under the laws of the State of Iowa, to Manson

Outside operations (debit balance)	$135,725.03	$155,897.39	$40,165.66	25.77
Hire of equipment (debit balance)	1,273,707.01	1,171,066.25	—102,701.36	8.77
Other income	1,574,970.30	1,550,189.36	24,780.94	1.59
Total	$185,477.06	$223,231.82	—$37,754.76	16.91
Total income	$16,908,616.14	$15,497,741.18	$1,410,874.96	9.10
Interest	$9,741,852.72	$9,129,874.61	$611,978.11	6.70
Rentals	1,704,925.05	1,547,402.01	157,523.04	10.12
Betterments on leased lines	19,124.71	72,583.48	—53,458.77	73.65
Total charges	$11,465,902.48	$10,749,860.10	$716,042.38	6.66
Balance of income available for dividends)	$5,442,713.66	$4,747,881.08	$694,832.58	14.63
Dividends	3,930,948.00	3,743,272.00	187,676.00	5.00
Balance surplus (carried to credit of profit and loss)	$1,511,765.66	$1,004,609.08	$507,156.58	50.48

Dividends Declared During Year Ended June 30, 1911:

Dividend No. 121, 1¼ per cent. paid October, 1910	$935,940.00
Dividend No. 122, 1 per cent. paid January, 1911	748,752.00
Dividend No. 123, 1½ per cent. paid April, 1911	1,123,128.00
Dividend No. 124, 1½ per cent. paid June, 1911	1,123,128.00
Total, 5¼ per cent.	$3,930,948.00

PROFIT AND LOSS.

Credit balance, June 30, 1910			$17,292,815.56
Surplus for year ended, June 30, 1911		$1,511,765.66	
Interest prior to current fiscal year on advances for construction		24,232.64	
Profit on purchase of scrip and warrants used in payment of taxes		3,729.65	
Sundry adjustments not affecting current year's income		56,874.74	
		$1,596,602.69	
Less:			
Loss on securities and lands sold.	$171,679.53		
Engineering expenses—special surveys made prior to current fiscal year — anticipated construction abandoned	89,701.24		
Unextinguished discount on securities	829,167.81		
	$1,090,548.58		
Depreciation on:			
Tracks removed	$69,286.18		
Structures sold, removed or destroyed	44,887.90		
Equipment sold, dismantled or destroyed	676,392.90		
	$790,566.98	1,881,115.56	$284,512.87
Credit balance, June 30, 1911			$17,008,302.69

CONDENSED GENERAL BALANCE SHEET.

June 30, 1911, and Comparison with Previous Year.

Assets.	1911.	1910.	Increase or Decrease.
Property investment:			
Road and equipment:			
Investment to June 30, 1907	$255,585,343.24	$255,585,343.24	.....
Investment since June 30, 1907	28,160,896.88	25,704,459.09	$2,456,437.79
Reserve for accrued depreciation—credit	470,618.86	[illegible]	—132,609.02
Total road and equipment	$283,275,621.26	$280,951,792.49	$2,323,828.77
Securities:			
Securities of proprietary, affiliated and controlled companies —pledged	99,504.00	3.00	99,501.00
Securities of proprietary, affiliated and controlled companies —unpledged	8,966,521.52	9,019,834.25	—53,312.73
Other investments:			
Advances to proprietary, affiliated and controlled companies for construction, equipment and betterments	7,041,287.21	5,511,717.39	1,529,569.82
Miscellaneous investments	2,258,858.07	1,739,696.55	519,161.52
Total property investment	$301,641,792.06	$297,223,043.68	$4,418,748.38
Working assets:			
Cash	$3,241,991.16	$4,541,460.59	—$1,299,469.43
Securities issued or assumed—held in treasury	4,758.23	4,227.50	530.73
Marketable securities	15,955,932.87	17,081,146.72	—1,125,213.85
Loans and bills receivable	456,522.76	596,515.44	—139,992.68
Traffic and car-service balances due from other companies	398,354.26	299,506.92	98,847.34
Net balance due from agents and conductors	1,041,406.29	1,142,880.35	—101,474.06
Miscellaneous accounts receivable	3,222,814.22	2,889,530.25	333,283.97
Materials and supplies	5,813,008.40	6,224,132.74	—411,124.34
Other working assets	1,387,350.35	1,540,956.20	—153,605.85
Total working assets	$31,522,138.54	$34,320,356.71	—$2,798,218.17
Accrued income not due:			
Unmatured interest, dividends and rents receivable	$507,640.25	$392,302.46	$115,337.79
Deferred debit items:			
Advances	$1,864,213.75	$1,534,707.44	$329,506.31
Rents and insurance paid in advance	56,479.94	151,382.30	—94,902.36
Special deposits	417,622.86	7,798,005.43	—7,380,382.57
Other deferred debit items	1,213,559.53	1,433,345.22	—219,785.69
Total deferred debit items	$3,551,876.08	$10,917,440.39	—$7,365,564.31
Grand total	$337,223,446.93	$342,853,143.24	—$5,629,696.31

Liabilities.	1911.	1910.	Increase or Decrease.
Stock:			
Capital stock	$75,000,000.00	$75,000,000.00	.....
Mortgage, bonded and secured debt:			
Funded debt	230,162,000.00	228,002,000.00	$2,160,000.00
Total capital liabilities	$305,162,000.00	$303,002,000.00	$2,160,000.00
Working liabilities:			
Traffic and car-service balances due to other companies	$940,931.30	$795,878.70	$145,053.60
Audited vouchers and wages unpaid	5,042,603.29	5,254,493.94	—211,890.65
Miscellaneous accounts payable	239,813.50	323,070.38	—83,256.88
Matured interest, dividends and rents unpaid	1,980,352.26	2,683,910.84	—703,558.58
Matured mortgage, bonded and secured debt unpaid	23,000.00	23,000.00	.....
Working advances due to other companies	213,101.29	189,799.69	23,301.60
Other working liabilities	818,638.44	735,643.55	82,994.89
Total working liabilities	$9,258,441.08	$10,005,797.10	—$747,356.02
Accrued liabilities not due:			
Unmatured interest, dividends and rents payable	$1,872,923.87	$1,808,001.10	$64,922.77
Taxes accrued	1,371,588.74	1,354,229.48	17,359.26
Total accrued liabilities not due	$3,244,512.61	$3,162,230.58	$82,282.03
Deferred credit items:			
Operating reserves	$952,868.86	$1,193,907.38	—$241,038.52
Other deferred credit items	1,532,953.93	8,132,024.86	—6,599,070.93
Total deferred credit items	$2,485,822.79	$9,325,932.24	—$6,840,109.45
Grand total liabilities	$320,150,776.48	$325,495,959.92	—$5,345,183.44
Appropriated surplus:			
Additions to property since June 30, 1907, through income	[illegible]	64,367.76	[illegible]
Profit and loss:			
Balance	[illegible]	$17,292,815.56	—284,512.87
Grand total	$337,223,446.93	$342,853,143.24	—$5,629,696.31

Note. In stating the assets and liabilities of the companies forming the Rock Island Lines, the holdings of The Chicago, Rock Island and Pacific Railway Company in the bonds and capital stock of the auxiliary lines, together with loans between the various companies, have been eliminated from the liabilities and a like deduction made in the assets pertaining thereto, the figures shown, therefore, represent the book value of the assets and the liabilities without duplication.

ROAD AND EQUIPMENT—INVESTMENT SINCE JUNE 30, 1907.

Changes During Year Ended June 30, 1911.

Balance, June 30, 1910, as per balance sheet			$25,704,459.09
Changes During the Year:			
Additions:			
Additions and betterments, current year (not including equipment), see page 19			$3,425,524.53
Disbursements for additional and improved equipment:			
1 Business car converted from dining car	$125.92		
1 Barge with necessary appurtenances to be used for repairing inclines at Memphis, Tenn.	5,239.91		
2 Locomotive cranes	13,034.40		
1 Locomotive steel pile driver	12,456.40		
1 Locomotive pile driver	12,558.03		
1 Sand blast car including 50 H. P. engine compressor and all necessary fittings	5,407.05		
1 Weed burner	8,000.00	$56,821.71	
New appliances for existing equipment, required by federal and [illegible]	$40,772.01		
Other new appliances for existing equipment	19,863.40		
Substitutes for dining and cafe cars	3,900.00	64,535.41	
		$121,357.12	
Less:			
Substituted [illegible] equipment on Pullman cars	$35,353.78		
Various adjustments	408.22	35,762.00	85,595.12
Total additions and betterments, as per page 19			$3,511,119.65
United States Express Company of New York, equipment purchase under indenture of January 1, 1911			101,498.28
Pullman Car Company, equipment purchase under indenture of May 1, 1910			38,210.76
Ballasting line, Tucumcari, N. M., to Santa Rosa, N. M.			30,923.44
Adjustment of charges, Yarnall, Texas-Amarillo, Texas, line			22,581.93
			$3,704,334.06
Investments:			
Central Trust Company of New York, equipment purchase under indenture of April 1, 1909.—Credit [illegible]			$[illegible]
Reserve for replacement of destroyed equipment which, under mortgages and equipment trust agreements, must be replaced	111,823.28		
Value of equipment destroyed, dismantled or sold during the past fiscal year (exclusive of equipment which, under mortgages or equipment trust agreements, must be replaced). Such value, less salvage, was charged to operating expenses and profit and loss	915,714.88		
Adjustment of charges Rock Island, Arkansas and Louisiana Railroad Company, Alexandria, La., to Eunice, La.	15,527.69	1,247,896.27	
Net increase			2,456,437.79
Balance, June 30, 1911, as per balance sheet			$28,160,896.88

EXPENDITURES FOR ADDITIONS AND BETTERMENTS.

Year Ended June 30, 1911.

Right of way and station grounds	$240,296.04	
Real estate	[illegible]	
Widening cuts and fills	195,102.18	
Protection of banks	25,217.99	
Grade revisions and changes of line	26,431.89	
Bridges, trestles and culverts	259,178.16	
Increased weight of rail	130,651.75	
Improved frogs and switches	14,771.59	
Track fastenings and other material	299,571.92	
Ballast	604,459.86	
Additional main tracks	31,055.41	
Sidings and spur tracks	232,053.05	
Terminal yards	357,136.42	
Fencing right of way	6,696.44	
Improvement of over and under grade crossings	36,168.78	
Track elevation, elimination of grade crossings, etc.	126,200.76	
Interlocking apparatus	8,038.47	
Block and other signal apparatus	218,499.69	
Telegraph and telephone lines	11,067.40	
Station buildings and fixtures	198,388.10	
Roadway machinery and tools	4,462.06	
Shops, engine houses and turn tables	154,586.16	
Shop machinery and tools	32,348.65	
Water and fuel stations	143,343.59	
Grain elevators and storage warehouses	83,091.29	
Dock and wharf property	1,675.16	
Electric light and power plants	7,429.65	
Electric-power transmission	2,844.19	
Miscellaneous structures	204.77	
Interest and commissions	28,250.00	$3,425,524.53
Equipment:		
Steam Locomotives	$28,843.43	
Passenger train cars	[illegible]	
Freight train cars	15,199.63	
Work equipment	56,628.38	
Floating equipment	5,239.91	85,595.12
Total additions and betterments		$3,511,119.65

* Also described on page 18.
Figures in *italics* denote credits.

[illegible] OF WAY AND STRUCTURES—REMARKS.

Year Ended June 30, 1911.

[illegible] OF RAIL AND BALLAST IN MAIN AND BRANCH LINES OWNED OR LEASED AS OF JUNE 30, 1910 AND 1911.

Rail.	Track Miles Owned or Leased.	Tons Per Yard and Miles of Each Weight							
		100	85	80	Reduced 80	70	65 6-7 8	60	56-8	54 and under
[illegible]	*4,418.71	61.85	1,124.58	1,961.23	225.28	40.81	[illegible]	334.97	9.03	.....
[illegible]	[illegible]	[illegible]	149.04	[illegible]	[illegible]	3.93	[illegible]	[illegible]	[illegible]	.....
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.....	7.62	.....	.....	[illegible]	.....
	4,694.06	[illegible]	1,273.62	2,043.97	225.28	61.06	652.26	334.97	9.03	.....
Per cent. of main lines		2.00	27.13	43.54	4.80	1.30	13.90	[illegible]	.19	.....
[illegible]	*[illegible]	5.20	1,089.46	[illegible]	208.50	69.16	665.48	[illegible]	9.23	.....
[illegible]	[illegible]	[illegible]	148.85	118.46	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.....
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	9.48	[illegible]	[illegible]	[illegible]	.....
	4,695.20	[illegible]	[illegible]	[illegible]	[illegible]	78.59	[illegible]	[illegible]	9.23	.....
		.11	26.38	48.59	4.44	1.67	14.17	7.44	.20	.....
[illegible]	2,987.65	[illegible]	24.41	265.25	12.48	349.87	304.32	1,182.91	583.80	264.61
[illegible]	14.90	[illegible]	5.02	1.83	[illegible]	.16	[illegible]	7.89	[illegible]	.....
[illegible]	3,002.55	[illegible]	29.43	[illegible]	[illegible]	350.03	[illegible]	1,190.80	583.80	264.61
Per cent. of branch lines		[illegible]	[illegible]	[illegible]	[illegible]	11.66	10.14	39.66	19.44	8.81
[illegible]	2,985.49	[illegible]	24.86	[illegible]	[illegible]	353.54	303.55	1,173.02	591.25	275.29
[illegible]	14.90	[illegible]	5.02	1.99	[illegible]	[illegible]	[illegible]	7.89	[illegible]	.....
[illegible]	[illegible]	[illegible]	29.88	[illegible]	[illegible]	[illegible]	[illegible]	1,180.91	[illegible]	275.29
Per cent. of branch lines		[illegible]	1.00	[illegible]	[illegible]	11.78	[illegible]	39.36	19.71	9.17
[illegible]	7,696.61	[illegible]	1,303.05	[illegible]	237.76	411.09	[illegible]	1,525.77	592.83	264.61
[illegible]	[illegible]	[illegible]	16.93	[illegible]	3.09	5.34	12.43	19.82	7.70	3.44
1910 [illegible]	[illegible]	5.20	1,268.19	2,406.60	208.50	432.13	969.03	1,530.17	600.48	275.29
[illegible]	[illegible]	[illegible]	16.48	[illegible]	2.71	[illegible]	12.59	[illegible]	7.80	3.58

MAINTENANCE OF WAY AND STRUCTURES REMARKS.

YEAR ENDED JUNE 30, 1911.

COMPARATIVE STATEMENTS OF RAIL AND BALLAST IN MAIN AND BRANCH LINES OWNED OR LEASED AS OF JUNE 30, 1910 AND 1911.—(Continued.)

	Ballast.	Total Miles Owned or Leased.	Kind of Ballast and Miles of Each Kind. Rock.	Burned Clay.	Gravel.	Cinder.	Total.	Sand or Dirt.
	Main Lines.							
1911	First track	*4,418.71	1,290.77	523.52	1,360.59	364.36	3,539.24	879.47
	Second track	267.34	24.86	.....	209.91	29.57	264.34	3.00
	Third track	8.01	.....	.....	.39	7.62	8.01	.....
	Total	4,694.06	1,315.63	523.52	1,570.89	401.55	3,811.59	882.47
	Per cent. of main lines	.....	28.03	11.15	33.47	8.55	81.20	18.80
1910	First track	*4,418.46	1,211.27	491.71	1,357.81	411.25	3,472.04	946.42
	Second track	267.31	16.10	.....	222.90	25.40	264.40	2.91
	Third track	9.43	.....	.....	9.43	.....	9.43	.....
	Total	4,695.20	1,227.37	491.71	1,590.14	436.65	3,745.87	949.33
	Per cent. of main lines	.....	26.14	10.47	33.87	9.30	79.78	20.22
	Branch Lines.							
1911	First track	2,987.65	115.15	35.16	656.18	263.49	1,069.98	1,917.67
	Second track	14.90	.....	.....	.50	14.40	14.90	.....
	Total	3,002.55	115.15	35.16	656.68	277.89	1,084.88	1,917.67
	Per cent. of branch lines	.....	3.84	1.17	21.87	9.26	36.14	63.86
1910	First track	2,985.49	118.95	30.83	625.11	271.31	1,046.20	1,939.29
	Second track	14.90	.....	.....	.....	14.90	14.90	.....
	Total	3,000.39	118.95	30.83	625.11	286.21	1,061.10	1,939.29
	Per cent. of branch lines	.....	3.96	1.03	20.38	9.54	35.36	64.64
1911	Total track	7,696.61	1,430.78	558.68	2,227.57	679.44	4,896.47	2,800.14
	Per cent. of total track	.....	18.59	7.26	28.94	8.83	63.62	36.38
1910	Total track	7,695.59	1,346.32	522.54	2,215.25	722.86	4,806.97	2,888.62
	Per cent. of total track	.....	17.49	6.79	28.79	9.39	62.46	37.54

*See statement on next page, showing the miles which are classified as "Main lines."

MAINTENANCE OF WAY AND STRUCTURES REMARKS —Concluded.

YEAR ENDED JUNE 30, 1911.

The following is a comparative statement of miles of the first track main lines (as distinguished from branch lines) owned or leased, not including trackage rights, which are used in the rail and ballast tables on preceding page:

	June 30, 1911.	1910.
Chicago, Ill., to Colorado Springs, Colo.	1,063.09	1,063.03
Davenport, Ia., to Dallas, Tex. (via Kansas City)	833.61	833.61
Herington, Kan., to Santa Rosa, N. M.	526.92	526.92
Burlington, Ia., to Minneapolis, Minn.	307.58	307.58
Altamont, Mo., to North Topeka, Kan. (via St. Joseph)	137.91	137.96
McFarland, Kan., to Belleville, Kan.	103.19	103.19
Memphis, Tenn., to Tucumcari, N. M.	869.87	869.87
Biddle, Ark., to Eunice, La.	292.64	292.40
St. Louis, Mo., to Kansas City, Mo.	283.90	283.90
	4,418.71	4,418.46

Improvements to roadway have been made as follows:

Ties were renewed to the extent of 2,378,361 or an average of 311 per mile of first, second and third main track owned and leased: of these ties; 1,924,783 were treated with creosote.

Track miles of new ballast	184.30 miles
Track miles reballasted	281.71 miles
Miles of roadbed widened to standard width	299.43 miles
Road miles of new right of way fence built	56.84 miles
Linear feet, transversely to track, of concrete arch culverts built	4,967 feet
Linear feet, transversely to track, of iron pipe culverts built	6,223 feet
Linear feet, transversely to track, of vitrified pipe culverts built	212 feet
Linear feet of timber bridges or trestles replaced with steel, concrete or masonry bridges	418 feet
Linear feet of bridges and trestles filled	9,133 feet
Linear feet of iron or steel bridges replaced with heavier structures	3,273 feet
Linear feet of new pile trestles built	1,134 feet
Linear feet of new steel bridges built	480 feet

The following table shows the aggregate length and nature of bridges for June 30, 1911, compared with previous year:

Bridges.	Total (feet).	Kind of Bridge and Length (in feet) of Each Kind. Steel and iron.	Masonry.	Combination (wood and iron).	Wooden.	Trestles.
main track, June 30, 1911.	514,081	149,821	891	1,488	2,385	359,496
Per cent. of total length	.....	29.14	.17	.29	.46	69.93
Main track, June 30, 1910.	521,879	147,616	620	3,093	2,449	368,101
Per cent. of total length	.....	28.29	.12	.59	.47	70.53

The average expense of maintenance of way and structures per mile of first, second and third main track owned and leased during the past fiscal year was $1,246.11, as against $1,372.85 last year.

All the rail relaid during the year has replaced lighter weight, and a corresponding increase in metal has been made in appliances.

FREIGHT TRAFFIC STATISTICS.

YEAR ENDED JUNE 30, 1911, COMPARED WITH PREVIOUS YEAR.

	1910-11.	1909-10.	Increase or Decrease.
Revenue per ton mile	$ .0092	$ .0092	
Revenue per ton	$ 2.268	$ 2.203	$ .065
Revenue per train mile	$ 2.479	$ 2.380	$ .099
Revenue per car mile (excludes caboose car miles)	$ .0965	$ .0992	$ .0027
Revenue per mile of road	$5,403.43	$5,248.76	$154.67
Number of tons per train mile revenue freight	269.66	257.43	12.23
Number of tons per train mile company freight	50.26	39.51	10.75
Number of tons per train mile all freight	319.92	296.94	22.98
Number of tons per loaded car mile revenue freight	14.92	15.07	— .15
Number of tons per loaded car mile company freight	2.78	2.31	.47
Number of tons per loaded car mile—all freight	17.70	17.38	.32
Number of cars per train—loaded	18.05	17.06	.99
Number of cars per train—empty	7.61	6.89	.72
Number of cars per train—all	25.66	23.95	1.71
Average haul per ton—revenue freight (in miles)	246.80	238.28	8.52
Average haul per ton company freight (in miles)	139.05	117.37	21.68
Average haul per ton—all freight (in miles)	220.02	209.55	10.47
Average ton miles of revenue freight per mile operated	287,890	567,792	20,098

PASSENGER TRAFFIC AND PER MILE OF ROAD STATISTICS.

YEAR ENDED JUNE 30, 1911, COMPARED WITH PREVIOUS YEAR.

Passenger Traffic:	1910-11.	1909-10.	Increase or Decrease.
Revenue per passenger mile	$ .0200	$ .0191	$ .0009
Revenue per passenger	$ 1.020	$ .962	$ .058
Revenue per train mile (excluding mail, express, etc.)	$ 1.100	$ 1.035	$ .065
Revenue per train mile (including mail, express, etc.)	$ 1.312	$ 1.226	$ .086
Revenue per car mile (cars carrying passengers)	$ .0[illegible]	$ .0[illegible]	$ .016
Revenue per mile of road (excluding mail, express, etc.)	$2,521.84	$2,409.14	$112.70
Revenue per mile of road (including mail, express, etc.)	$3,009.37	$2,869.56	$139.81
Number of passengers per train mile	54.91	54.31	.60
Number of passengers per car mile (cars carrying passengers)	14.55	14.46	.90
Average distance carried (in miles)	50.90	50.47	.43
Number of cars per train	5.32	5.10	.22
Average miles of revenue passengers per mile operated	125,844	126,360	— 516
Per Mile of Road:			
Total operating revenue	$8,533.11	$8,232.71	$300.40
Operating expenses	[illegible]	5,976.11	135.92
Net operating revenue	$2,421.08	$2,256.60	$164.48
Taxes	[illegible]	357.64	—$ 20.16
Operating income	$2,083.60	$1,898.96	$184.64
Other operating income [illegible]	[illegible]	[illegible]	$ [illegible]
Hire of equipment [illegible]	[illegible]	[illegible]	[illegible]
Other income	196.23	192.72	3.51
Total income	$ [illegible]	$1,926.71	$180.00
Interest	$1,213.77	$[illegible]	$ [illegible]
Rentals	212.42	[illegible]	[illegible]
Betterments on lines leased from other companies, per mile of the leased lines so improved	$ [illegible]	$ [illegible]	[illegible]
Total charges	$1,428.57	$[illegible]	$ [illegible]
Balance of income (available for dividends)	$ [illegible]	$ [illegible]	$ 87.87

*Used average miles operated same as for other companies, covers Keokuk and Des Moines Railway and Little Rock and Hot Springs Western Railroad.

BALTIMORE AND OHIO RAILROAD COMPANY EIGHTY-FIFTH ANNUAL REPORT.

Office of The Baltimore and Ohio Railroad Company.
Baltimore, Md., October 19, 1911.

To the Stockholders of The Baltimore and Ohio Railroad Company.

The President and Directors submit herewith the report of the affairs of the Company for the fiscal year ended June 30, 1911.

The statement following shows the results of the operations of the entire System, with the exception of the Staten Island Railway Company, the Staten Island Rapid Transit Railway Company, and the Baltimore and Ohio Chicago Terminal Railroad Company, and covers 4,433.74 miles of [illegible] as detailed in Table No. 1.

The Gross Earnings from rail operations were $88,145,003.76, a decrease of $756,248.61, or .85 per cent.

The earnings from freight traffic decreased $1,778,175.67, or 2.56 per cent. The tons of freight carried were 60,547,887, a decrease of 2,249,858 tons, or 3.58 per cent., and the total tons carried one mile were 11,703,539,445, a decrease of 321,044,082, or 2.67 per cent., as compared with the previous year. The average freight earnings per ton per mile were .578 cents, an [illegible] of .6 cents.

Table 14, gives a comparative statement of commodities carried during the year. The main losses in tonnage, it will be noted, were in coke, ores, stone, lumber and iron products, such losses indicating the effect upon this Company's revenues of the diminished activity which was general with industrial interests throughout the greater part of the fiscal year.

The earnings from passenger traffic were $15,208,432.15, an increase of $722,847.06, or 4.99 per cent. The number of passengers carried was 21,969,166, an increase of 862,046, or 4.08 per cent. The average distance each passenger was carried was 36.23 miles, an increase of .06 miles. The average earnings per passenger per mile were 1.911 cents, an increase of [illegible] cents.

The earnings from express traffic were $1,780,346.92, an increase of $65,189.95, and from the transportation of mails $1,169,068.20, a decrease of $7,775.55.

The Operating Expenses for the year were $62,766,067.04, an increase of $1,432,266.25, or 2.34 per cent.

There will be found in Table 8 of this report, a comparison in detail of the items entering into the operating accounts. The increase in transportation expenses was principally occasioned by the increase in wages paid, which was largely due to advances made in rates of pay, effective the latter part of the fiscal year ended June 30, 1910. The interruptions to traffic incident to the [illegible] for betterment work carried on at numerous points also affected adversely the transportation costs, and recent legislation, State and Federal, (notably the so-called "Full Crew" laws) has had similar effect upon the expenses. On account of the previous liberal maintenance expenditures, particularly in the preceding year, and because of the diminished volume of business moving in the last six months of the fiscal year, it was practicable to reduce maintenance expenditures to such an extent as to partly offset the increase in transportation charges above referred to. The total of all maintenance costs for the year was 29.68% of the gross earnings, which is a liberal basis of expenditure and [illegible] for the maintenance of the road and equipment under existing conditions.

The net result from "Outside Operations" shows a deficit for the year of [illegible] against a deficit last year of $599,633.70.

The [illegible] of $1,684,574.78, a decrease of $1,863,478.93 as compared with previous year.

The increase in "Other Income" of $678,700.28 is due principally to the increase in "Interest on Bonds Owned." This increase includes interest on bonds acquired during the previous fiscal year and included in the [illegible] of June 30, 1910, but on which no interest was received during that period.

"Deductions from Gross Corporate Income" shows an increase in charges of $2,242,817.15, and is mainly caused by increase in "Interest on Funded Debt," which is principally due to interest charges on $40,000,000.00 of Three Year Secured Notes issued June 1st, 1910, interest on which was accrued for the entire twelve months of the present fiscal year as against one month of the previous year. In this connection it is proper to state that as yet little benefit has been realized from the use of the additional capital, but with the completion of the additions and betterments, (hereinafter referred to in some detail) the road will not only be in position to care for a largely increased business, but will also be enabled to handle more effectively and economically the present volume of traffic.

The General Income Account of the Company for the year, in comparison with the previous year, follows.

Outside Operations:			
Total Revenue	$1,823,126.74	$1,262,148.72	$560,978.02
Total Expenses	1,971,438.88	1,861,782.42	109,656.46
Net Revenue	Def.$148,312.14	Def.$599,633.70	$451,321.56
Total Net Revenue	$25,230,624.58	$26,967,817.88	—$1,737,193.30
Taxes Accrued	2,596,249.80	2,469,964.17	126,285.63
Operating Income	$22,634,374.78	$24,497,853.71	—$1,863,478.93
Other Income:			
Rents			
Joint Facilities — Total Receipts	$517,455.19	$495,521.00	$21,934.19
Miscellaneous Rents — Total Receipts	478,540.14	466,973.88	11,566.26
Dividends on Stocks Owned	1,630,735.14	1,541,777.41	88,957.73
Interest on Bonds Owned	758,842.75	203,968.26	555,874.49
Other Interest	1,398,815.28	1,381,863.42	16,951.86
Western Union Telegraph Company Annuity	60,000.00	60,000.00	.....
Miscellaneous Income	52,209.79	68,794.04	—16,584.25
Total Other Income	$4,896,598.29	$4,217,898.01	$678,700.28
Gross Corporate Income	$27,530,973.07	$28,715,751.72	—$1,184,778.65
Deductions from Gross Corporate Income:			
Rents—			
Hire of Equipment—Net Balance	$772,566.72	$437,653.06	$334,913.66
Joint Facilities — Total Payments	835,461.12	853,377.04	—17,915.92
Miscellaneous Rents — Total Payments	191,052.89	170,298.43	20,754.46
Interest on Funded Debt	12,558,458.80	10,763,826.06	1,794,632.74
Other Interest	350,575.53	234,043.77	116,531.76
Other Deductions account Subsidiary Lines	2,866.78	8,966.33	—6,099.55
Total Deductions from Income	$14,710,981.84	$12,468,164.69	$2,242,817.15
Net Corporate Income	$12,819,991.23	$16,247,587.03	—$3,427,595.80
Additions to Property through Income	.....	415,760.61	—415,760.61
Balance Net Corporate Income	$12,819,991.23	$15,831,826.42	—$3,011,835.19
Balance Net Corporate Income			$12,819,991.23
Dividend Payments:			
Preferred			
March 1, 1911, 2%	$1,177,805.04		
[illegible]	1,177,740.16	$2,355,545.20	
Common—			
March 1, 1911, 3%	$4,560,061.60		
September 1, 1911, 3%	4,560,538.00	9,120,599.60	11,476,144.80
			$1,343,846.43
Amount to Credit of Profit and Loss, June 30, 1910		$23,377,100.33	
[illegible] Sundry Adjustments, including $10,965,168.91 transferred from "Additions to Property prior to June 30, 1907, through Income," making Net Credit Balance		13,731,472.53	37,108,572.86
Amount to Credit of Profit and Loss June 30, 1911			$38,452,419.29

The General Balance Sheet will be found in Table 1.

The Property Investment account of "Road and Equipment" shows a net increase for the year of	$27,291,803.16
[illegible]	
Expenditures for Road	$14,092,875.15
Expenditures for Equipment	14,568,327.31
Sundry book adjustments	879,578.81
	$29,540,781.27
Less:—Increase in Reserve for Accrued Depreciation	2,248,978.11
	$27,291,803.16

Year Ended June 30, 1910.

	1911.	1910.	Increase or Decrease.
[illegible]			
[illegible]	$67,629,937.01	$69,408,112.68	—$1,778,175.67
[illegible]			722,847.06
From Express Traffic	1,780,346.92	1,715,156.97	65,189.95
[illegible]	1,169,068.20	1,176,843.75	—7,775.55
[illegible]	1,475,275.69	1,327,726.42	147,549.27
[illegible] other than [illegible]	881,943.79	787,827.46	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]			
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]			
[illegible]	15,881,620.38	16,373,775.93	—492,155.55
For Traffic Expenses	[illegible]	[illegible]	71,762.90
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	3.22
Net Earnings from Operation	[illegible]	[illegible]	[illegible]

Note.—The decrease of $4,801,146.98 in "Investment to June 30, 1907—Road," represents a credit to the grouping and a charge to "Investment since June 30, 1907—Road," in book instruments and does not affect the cost of the grouping of "Road and Equipment."

The decrease in "Securities" during the year, $219,736.16, is due to the exchange by the Kentucky and Indiana Bridge and Railroad Co. of its 1st Mortgage Bonds, $220,454 of which were held by your Company. This decrease was partly offset by the acquisition of stocks of subsidiary companies.

The increase of $1,000,945.28 in "Other Investments," is due to the transfer to this account of Richmond Washington Company stock, $441,000.00, "Real Loan Account," $443,805.16, and other similar adjustments made during the year to conform to the Interstate Commerce Commission's [illegible] of accounts.

The decrease in "Working Assets" of $25,317,203.18, was caused principally by the reduction in "Cash" and "Loans and Bills Receivable," on account of the large expenditures for construction, improvements and equipment during the year.

The increase in "Preferred Stock" of $3,611.50, and in "Common Stock" of $44,144.40, was occasioned by the exchange of securities and the conversion by the holders of $88,000.00 of Convertible Debenture Bonds into Common Stock.

The "Mortgage, Bonded, and Secured Debt" increased....		$10,825,938.60
occasioned as follows:		
Issuance of First Mortgage Bonds in recoupment of expenditures for construction on properties under this mortgage		$1,000,000.00
Issuance of Pittsburgh, Lake Erie & West Virginia System Refunding Mortgage Bonds in exchange for underlying securities		1,000.00
Issuance of Three Year Gold Notes due 1913, to retire a like amount of One Year Notes matured March 10, 1911....		10,000,000.00
		$11,001,000.00
Less:		
Ten Year Convertible Debenture Bonds converted into Common Stock.....	$88,000.00	
West Virginia & Pittsburgh R. R., First Mortgage Bonds, deposited with trustees.....	18,000.00	
B. & O. R. R. Co., Extended Bonds retired....	34,000.00	
Net decrease in Ground Rent Liens, capitalized.	14,561.40	
And the following items transferred to the grouping "Matured Mortgage, Bonded and Secured Debt Unpaid"—		
B. & O. R. R. Co., Loan of 1853...	$500.00	
" Loan of 1885...	1,000.00	
" Loan of 1887...	9,000.00	
Ten Year Convertible Debentures	10,000.00	20,500.00 175,061.40
		$10,825,938.60

The decrease in "Loans and Bills Payable" is due mainly to the retirement of $10,000,000.00 of One Year Gold Notes due March 10, 1911, in place of which an equal amount of Three Year Gold Secured Notes were issued as shown above.

The decrease of $10,965,168.91 in "Appropriated Surplus—Additions to Property through Income prior to June 30, 1907," is occasioned by the transfer to "Profit and Loss—Balance" of this amount. The Classification of the Interstate Commerce Commission not providing for the account mentioned, the transfer was made for the purpose of bringing the Balance Sheet into full conformity with the Commission's requirements.

ADDITIONS TO ROAD AND EQUIPMENT.

In pursuance of the purpose of your Board, referred to in the last Annual Report, in the issuance of $50,000,000.00 Three-Year Gold Secured Notes, due June 1, 1913, to provide necessary facilities to meet the demands of general business and particularly the increasing industrial development upon your lines of railway, large additions were made during the year to your locomotive and car equipment, and the extensive addition and betterment work undertaken at various points was vigorously prosecuted.

Table 23 shows in detail the equipment acquired during the year, which includes 187 locomotives, 8,268 freight cars, 26 passenger cars and other equipment at a cost of $15,439,203.30.

Satisfactory progress has been made with the extensive betterment work referred to in the last report, and also in connection with the additional undertakings, estimated to cost about $13,000,000, which were authorized during the year.

Table 5 shows the expenditures made during the year, classified under the principal subdivisions of Addition and Betterment accounts, aggregating $14,092,875.15.

ROAD.

Some of the more important improvements completed during the year were:

Change of line and grade reduction, Concord to Wilmington, Philadelphia Division.

Third Track on Cumberland Division between Cherry Run and Orleans Road, Swanton and Strickers, Deer Park and Mountain Lake Park, Terra Alta and Rodemer, and between West End and Hardman, a total of 44.3 miles additional and standardized third track. In connection with this work, the Tunnels at Everetts, McGuires, Rodemer and Murray were converted into open cuts. The change of grade and alignment between Hutton and Corinth, a distance of 2.4 miles was also completed.

A third track was completed between Foley and Manila, on the Connellsville Division, a distane of 7 miles.

The Quemahoning Branch Railroad was extended 9 miles to a connection with the Somerset & Cambria Branch at Somerset.

Second track, Wellsboro to McCool, on the Chicago Division, a distance of 21 miles, including interlocking plant at Babcock, was practically completed at the close of the year and has since been put in operation.

Interlocking plants were completed and put in service at Schuylkill River Drawbridge; at East End Susquehanna River Bridge; at End of Third Track, Hobbs; N. & W. Crossing, at Charlestown; Bridge 401 at Cleveland; Muskingum River Drawbridge at Marietta; and Wabash River Drawbridge at Vincennes.

Automatic signals have been installed between Goehring and New Castle Junction; Pittsburgh and Connellsville; Loveland and Cincinnati; and Washington Junction and Brunswick, providing automatic block protection for 104.9 additional miles of main double track.

At Grafton, W. Va., the additional terminal facilities referred to in the last Annual Report, were practically completed at the close of the fiscal year and, together with the new Passenger Station, have since been put in service.

Three improved ore handling machines were put in service at Lorain. The ore and coal docks at this point, over which is handled the coal from West Virginia and south-eastern Ohio coal fields, are among the largest on the Great Lakes. The arrangements for weighing ore direct into cars are believed to be the most complete so far installed at any dock.

New or enlarged station facilities were completed at Wilmington, Del.; Lonely, Md.; Harrisonburg and Fort Dehance, Va.; Parkersburg, Huntington, Philippi, Millers and Elm Grove, W. Va.; Oakley and Portsmouth, Ohio; Napanee and Garrett, Ind.; and Noble, Ill.

The large Bascule Drawbridge over the Cuyahoga River, at Cleveland, has also been completed.

The following are some of the larger improvements now under way:

Additions to Track and Betterment of Road.

Second track construction on the Chicago Division between Hamler and Holgate, Delaware Bend and Mark Centre, and Lapaz Junction and Wellsboro, a distance of 35.5 miles. Grading is being done for second track between Holgate and Midway and between Cromwell and Milford Junction, a total distance of 22 miles.

Third track construction from Weverton to Sandy Hook, Green Spring to Patterson Creek, Manila to N. A. Tower and Garrett to Rockwood is now under way.

Passing sidings at various points on the line between Parkersburg and East St. Louis are now being constructed.

The change of line and reduction of grade between Blaser and the west end of Kingwood Tunnel, a distance of about 4 miles, including construction of double track tunnel 4,250 feet in length, has progressed steadily during the year, and is approximately one-half done. The present line through Kingwood Tunnel, which is single track, operated in conjunction with this new line, will provide three tracks, and afford necessary relief where the movement of traffic has hitherto been much restricted.

The construction of 1.8 miles of new line, including a double track tunnel 4,000 feet long through the Allegheny Mountains between Sand Patch and Manila, is under way. Upon the completion of this work, which it is expected will be about January, 1913, a very serious restriction to the movement of traffic over this division will have been removed.

Additions and Betterments of Yards and Terminal Facilities.

Brunswick, Md. A new west-bound freight classification yard to expedite the handling of trains is being constructed.

Cumbo, W. Va. Additional interchange facilities with the Cumberland Valley Railroad are being constructed at this point.

Somerset, Pa. Additional terminal yards and facilities at this place are under construction. These improvements are necessary in connection with the new Quemahoning Branch Railroad Extension, above referred to, and to care for the general increase in traffic in this region.

Chicago Junction, Ohio. The new east and west-bound yards have been put in operation.

The Renewal of Bridges and Elimination of Grade Crossings.

Considerable progress has been made in renewing bridges for the use of heavier power. Among the more important bridges renewed were the Schuylkill River Drawbridge at Philadelphia; Brandywine Viaduct at Wilmington; and Cheat River at Rowlesburg.

The elimination of grade crossings in the cities of Baltimore, Columbus and Chicago, has progressed steadily during the year. The work at Columbus will be completed early in the current year; that at Baltimore and Chicago will extend over a period of years.

EQUIPMENT.

Total Book Value of Equipment, June 30, 1910, was.....		$72,946,825.18
During the year there was added to the equipment the following: 187 Locomotives, 26 Passenger Cars, 8,268 Freight Cars, 5 Work Cars, 2 Steel Car Floats, 2 Wooden Car Floats, 1 Refrigerator Lighter, at a value of.....		15,439,203.30
Total		$88,386,028.48
During the year the following equipment was put out of service through condemnation, wreck, fire and sale: 37 Locomotives, 10 Passenger Cars, 3,202 Frieght Cars, 335 Work Cars, 1 Wharf Boat and 1 Scow, the book value of which, viz. ..... was credited to "Property Investment, Equipment" and charge made to "Reserve for Accrued Depreciation" as noted below, and the balance to Operating Expenses;		870,875.99
Making the Gross Book Value of Equipment.....		$87,515,152.49
From this should be deducted:		
"Reserve for Accrued Depreciation," as follows—		
Amount at Credit June 30, 1910.....	$6,048,981.51	
Amount charged Operating Expenses during year ended June 30, 1911, covering depreciation	2,317,848.60	
	$8,366,830.11	
Less charges, account of depreciation accrued on Equipment put out of service during the year	68,870.49	
Total "Reserve for Accrued Depreciation".....		8,297,959.62
Leaving Net Value of Equipment, June 30, 1911.....		$79,217,192.87

The title to 177 of the locomotives and 8,000 of the freight cars, acquired during the year, was taken in the name of the Baltimore and Ohio Equipment Company, all the securities of which are owned by your Company, making a total of 340 locomotives and 15,000 freight cars now held by that Company.

INDUSTRIAL DEPARTMENT.

Two hundred and twenty-four new industries, manufacturing and commercial, were located on or immediately adjacent to your line during the year, from which it is estimated the Company should ultimately derive freight revenue of over $1,000,000.00 per annum. Side tracks have been constructed to 135 of these plants.

The latest results in scientific agriculture have been presented to farmers on special educational trains by demonstrators and lecturers from the experiment stations of the various States served by System lines.

INSURANCE FUND.

A summary of the operations for the year ended June 30, 1911, and a statement of the assets and liabilities are shown in Table 6. The surplus in this Reserve Fund at June 30, 1911, was $1,172,099.85.

RELIEF DEPARTMENT.

The report of the Relief Department for the twelve months ended June 30, 1911, will be printed, as is customary, for distribution to members. The operations of the department, covering the Relief, Savings and Pension features, will be found in Table 7 of this report.

The Board record with deep regret the death, on June 28, 1911, of Mr. Joseph R. Ford, a Director of the Company since October 11, 1906, and express their high appreciation of the attentive and effective consideration which he gave to the interests of the Company.

The President and Directors acknowledge with pleasure the loyal and efficient services of the officers and employees during the past year.

By order of the Board,

DANIEL WILLARD,
President.

Table 1.

GENERAL BALANCE SHEET.

The Baltimore and Ohio Railroad System.

ASSETS.			Comparison with June 30, 1910. Increase or Decrease.
Permanent Investment:			
Road and Equipment—			
Investment to June 30, 1907—			
Road	$199,390,939.31		—$3,801,146.98
Equipment	62,942,416.61		
		$262,333,355.92	
Investment since June 30, 1907—			
Road	$36,806,301.71		18,771,942.35
Equipment	24,572,735.88		14,568,327.31
General Expenditures.	31,405.53		1,658.59
		54,409,442.12	
		$316,742,798.04	$29,540,781.27
Reserve for Accrued Depreciation—			
Cr. (Equipment)		8,297,959.62	Cr. 2,248,978.11
Total		$308,444,838.42	$27,291,803.16
Securities—			
Securities of Proprietary, Affiliated and Controlled Companies Pledged			
Stocks	$43,219,166.30		$96,296.10
Funded Debt	126,741,878.87		1,000.00
Miscellaneous	5,905,583.01		
		$175,866,628.18	
Securities of Proprietary, Affiliated and Controlled Companies Unpledged			
Stocks	$8,047,004.75		62,652.28
Funded Debt	950,349.67		—379,674.54
Total		8,997,354.42	
		$184,863,982.60	—$219,726.16
Other Investments:			
Miscellaneous Investments—			
Physical Property	$4,257,036.06		$466,390.72
Securities Pledged	46,673,284.00		
Securities Unpledged	4,018,017.50		540,545.06
		$54,948,337.56	$1,006,935.78
Total Property and Other Investments		$548,257,158.58	$28,079,012.78
Current Assets:			
		$7,539,414.95	—$4,216,536.39
Securities Issued or Assumed Held in			
Stocks	$1,399,887.29		173,541.20
	7,066,370.00		873,430.23
		8,466,257.29	
Marketable Securities—			
	$188,217.53		—707,903.96
	838,289.14		—29,179.50
		1,026,506.67	
		18,750,933.65	—20,878,959.24
		249,770.74	—153,180.57
		2,456,822.08	—119,074.44
		8,827,551.06	—44,231.00
		7,311,150.30	—215,109.51
		$43,030,933.73	—$21,310,943.13
Deferred Debit Items:			
			$260,000.00
			8,796.81
	89,581.65		29,581.65
		$138,378.46	
Special Deposits		121,378.46	17,000.00
		244,991.02	—41,009.30
Insurance and			
		1,172,099.85	
		99,175.20	
		3,000.00	77,485.67
		$45,811,578.93	—$21,298,669.80
		$806,513,578.19	—$19,299,660.96

LIABILITIES.			Comparison with June 30, 1910. Increase or Decrease.
Stock:			
Capital Stock—			
Common Stock—			
Held by Company	$286,895.50		$50,494.34
Not Held by Company	151,950,092.26		37,650.06
		$152,236,987.76	
Preferred Stock—			
Held by Company	$1,112,991.79		4,296.49
Not Held by Company	58,873,974.71		—1,283.99
		59,986,966.50	
		$212,223,954.26	
Stock Liability for Conversion of Outstanding Securities of Constituent Companies		83,713.74	—3,276.87
Total		$212,307,668.00	$87,880.03
Mortgage, Bonded, and Secured Debt:			
Funded Debt—			
Mortgage Bonds—			
Held by Company	$2,058,900.00		$914,250.00
Not Held by Company	228,945,680.00		24,250.00
		$231,004,580.00	
Collateral Trust Bonds—			
Held by Company	$5,007,470.00		—40,890.00
Not Held by Company	44,992,530.00		40,890.00
		50,000,000.00	
Plain Bonds, Debentures and Notes—			
Held by Company	.....		
Not Held by Company	$50,000,000.00		9,902,000.00
		50,000,000.00	
Miscellaneous Funded Obligations—			
Held by Company	.....		
Not Held by Company	$1,130,495.66		
		1,130,495.66	—14,561.40
Total		$332,135,075.66	$10,825,938.60
Total Capital Liabilities		$544,442,743.66	$10,913,818.63
Working Liabilities:			
Loans and Bills Payable		$300,333.33	—$9,699,666.67
Traffic and Car-Service Balances Due to Other Companies		341,731.76	—24,037.32
Audited Vouchers and Wages Unpaid		5,520,920.50	—691,423.12
Miscellaneous Accounts Payable		669,402.71	—243,580.72
Matured Interest, Dividends, and Rents Unpaid		2,540,181.98	$2,359,744.62
Matured Mortgage, Bonded, and Secured Debt Unpaid		20,500.00	20,500.00
Working Advances Due to Other Companies		273,222.01	—2,164,414.99
Other Working Liabilities		107,976.33	107,976.33
Total		$9,774,268.62	—$10,334,901.87
Accrued Liabilities Not Due:			
Accrued Interest, Dividends, and Rents Payable		$7,478,776.32	—$2,495,082.13
Total		$7,478,776.32	—$2,495,082.13
Deferred Credit Items:			
Liability on Account of Provident Funds		$1,821,653.71	$534,640.05
Other Deferred Credit Items		1,233,714.82	443,327.28
Total		$3,055,368.53	$977,967.33
Appropriated Surplus:			
Additions to Property through Income			
Profit and Loss, June 30, 1910			$10,965,168.91
Profit and Loss, June 30, 1911		$1,[illegible]7,709.06	—58,279.58
Reserve for Renewals of Equipment			
Invested in Other Reserve Funds		1,[illegible]099.85	96,627.26
Total		$[illegible]8,808.91	—$10,926,821.23
Profit and Loss			
Credit		$[illegible]419.79	$15,075,318.96
Debit			
Total		$60[illegible]43	$3,210,299.69

[illegible] Cincinnati, Hamilton & [illegible] The following securities bear the [illegible] Mortgage Bonds, [illegible] 0.00; Richmond-Washington Company, 1st Mortgage Bonds,

[illegible] December 31, 1911.

C. W. BOOTH, *Comptroller.*

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Including the Railroad Gazette and the Railway Age

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IN the *Railway Age Gazette* of December 9, 1910, page 1105, we gave some figures to show that the charge of railway obstruction of waterway development of Connecticut harbors and their water fronts was unfounded. Among the ports named was New London, where two rival railway lines—the Grand Trunk and the New Haven—have their water front terminals, the latter owning a total of 1,880 ft. of water frontage. But, outside of railway ownership, there are in the city of New London and the town of Groton, on the opposite side of the Thames river, miles on miles of unimproved water frontage, above and below the drawbridge. Harbor and river are both deep; the deep water runs near shore and the federal government has spent, first and last, $159,000 on improvement of the harbor and $539,000 on the Thames river. Where Nature had done so much and our government had done still more, it might have been inferred that private enterprise would do the rest and develop the waterway business of the port. But it did not, and New London has now made a successful appeal for state aid and secured from the Connecticut legislature $1,000,000 for waterfront development. The big appropriation is unique in the history of the state. It had also its perils as a precedent; what New London secured yesterday, New Haven, Bridgeport and Stamford may demand tomorrow. But all that is a matter for the Connecticut tax payers. The main points to notice are that those tax payers will now be called on to subsidize at the rate of some $40,000 a year—interest on $1,000,000—a seaport which the railway companies have already developed as far as they care to; that those railways have asked for no state subsidy; and that if in the future—as is not at all likely—waterway rivalry with the railways and their boat lines should develop, the cost of it to the Connecticut taxpayer should be taken into account. The New London case is not in itself important, but is symbolical and commends itself to the present and future attention of the theorists who expound the proposition of highly subsidized water competition with the unsubsidized railway, even in a case where private enterprise, under the most favorable physical conditions, defaults.

THE "Orphan," whose letter we print in another column, speaks forcibly on a number of interesting and vital questions regarding the supply department. We think that he takes up the cudgels rather more energetically than he needs to; perhaps he is being influenced by faulty premises as to the ability of the "Old Railway Official." He replies to the latter with statements, some of which are his own conclusions rather than detailed evidence. If "D. A. D." did not have the facts at hand, but was dealing in generalities and drawing conclusions without knowing enough of the subject to qualify him to do so, it might be pardonable to dismiss his ideas as summarily as "Orphan" does. But "D. A. D." has had, not only on railways but in other lines of activities, just the practical experience in storekeeping which "Orphan" assumes he has not had. His conclusions may be wrong, but they cannot be dismissed on the ground that he does not know what he is talking about.

THE Illinois Manufacturers' Association, which includes many manufacturers both large and small in Illinois, has asked a committee of prominent citizens of the country, including lawyers, educators and business men, to draft an amendment to the Sherman anti-trust law, the enactment of which by Congress will make clear to the business interests of the country just what forms of business combinations may be effected and at what purposes they may aim. The statement issued by the association includes railways among the concerns which are or may be harmed by rigorous enforcement of the law as it stands; and James J. Hill is one of those asked to serve on the committee, which it is proposed shall draft an amending statute. It is impossible not to recall that it has not been long since this association started a movement for action by the government against the railways under the Sherman act on the ground that their concerted attempt to raise freight rates was in violation of that law. Furthermore, the association sent representatives to Topeka, Kan., to attend a meeting of persons desirous of having the Sherman law enforced against the railways, and this meeting adopted resolutions, which we suspect were framed by the representatives of the Illinois Manufacturers' Association, denouncing the roads' alleged violation of the Sherman law and demanding their prosecution. In other words, so long as it was only the railways who were charged with disregarding the anti-trust law the Illinois Manufacturers' Association regarded it as a good statute and was quite willing to put it in operation against them and benefit by its provisions, however unjust. When, on the other hand, concerns belonging to the association find themselves in danger of prosecution it immediately becomes very solicitous that the law shall be so changed that it shall be adapted to the requirements of equity and economic conditions; and it does not hesitate to call upon

the railways, whom it was trying to get prosecuted, to help get the amendments. There does not seem much chance for intelligent revision of the Sherman law; and that this is true is largely due to organizations such as the Illinois Manufacturers' Association, which for years have carried on unfair propaganda against the railways which have helped create a radical public sentiment in the United States regarding not only railways but all other large corporate interests. There has been no statement regarding railways too injurious, no attack too libelous, for some of these organizations to give the wildest circulation. There have not been wanting those who foresaw and predicted that the public misconceptions regarding the carriers that were thus being fostered would lead to the development of a belief on the part of the public that all large corporations were over capitalized, were being mismanaged, and were grinding the faces of the people. But the campaign of misrepresentation, often by paid agitators, went on. The mistaken and hostile public opinion regarding all large industries which was feared has developed, and the fools who rocked the boat now find themselves in the water along with the railways, whom alone they intended should get a bath. The severe regulation to which the railways have in recent years been subjected has had many bad results; but it has had some very good ones, too. Whatever the immediate results may be, the ultimate effects of hazing some of the large industrial corporations in the same way for a while might not be wholly bad. After they have had some such experience as the railways have been going through they will learn, what has long been clear to many persons, that the question of the proper relations between large industrial concerns and the public is not essentially different from the question of the proper relations between the railways and the public; that they constitute one big problem; and that if all of us in the United States do not want to continue steering straight for socialism it is high time that the best minds in business and the best minds in statesmanship should get together and try to work out a constructive policy for the public regulation of business which will adequately protect the public, and at the same time will not put undue burdens and restrictions on private enterprise, whether it be engaged in running a railway or a manufactory.

NORTHERN PACIFIC.

THE Northern Pacific in the year ended June 30, 1911, cut down operating expenses, especially maintenance of way expenses, to a quite extraordinary extent, and did this without detriment to the physical property. There will probably have to be a greater renewal of rails within the next year or two than in the last two, but the property as a whole is in very good condition. This seems remarkable when the details of the roads operating expenses are studied.

In 1911 the company spent $23 per track mile for ballast for maintenance work, and $29 per mile for rails for maintenance. For ties, however, $205 was spent per mile of track. These accounts are mostly costs of material, labor cost not entering into them to any extent. Such relatively small sums spent for rails and ballast show that the company has found it necessary to hold down expenses as closely as was possible, and it has been able to do so because of generous expenditures for maintenance in the past. A remarkable saving is made in the roadway and track account. In 1910 the company spent $5,346,000, while in 1911 it spent only $3,830,000. This was $529 per mile of track in 1911. This saving made was partly due to a reduced cost of track labor and partly to cutting down forces through a much more economical system of maintaining the property.

Maintenance of equipment was also done more cheaply in 1911 than in 1910; but since the volume of traffic carried, which was less last year than the year before, more directly affects maintenance of equipment cost than maintenance of way cost, the saving is not so remarkable. Last year $7,911,000 was spent for maintenance of equipment, a decrease of $1,081,000. A considerable reduction was made in expenditures of repairs of locomotives last year; and less was spent for repairs of freight cars, and considerably less was charged for depreciation of freight cars, for which there was good reason in the fact that heavy depreciation charges have been made for the last five years, and that the capital sum on which depreciation is computed is less each year. The saving in transportation expenses was the result of a smaller volume of traffic, both passenger and freight, and of more effective work in the operating department. The higher wage scale made the actual cost of transportation per unit* somewhat higher in 1911 than in 1910. The cost per 100,000 units last year was $390, and $376 the year before.

That conditions tended to make necessary a very strict policy of economy last year is quite apparent from the income account, and in comparing 1911 with 1910, it will be recalled that 1910 itself was a very hard year for the Northern Pacific in respect to expense. Last year the company earned $64,069,000 from transportation. This is less by $9,695,000 than revenues in 1910, Expenses last year amounted to $39,730,000, a decrease of $6,258,000 from 1910. The sums received as rentals and as hire of equipment were larger last year than the year before, and gross corporate income amounted to $27,669,000, as compared with $29,475,000 the year before. After the payment of interest and 7 per cent. dividends on the stock, the company had a surplus of $3,082,000, as against $4,936,000 in 1910.

The decrease in freight earnings is explained by President Elliott as resulting from a smaller grain movement, a smaller lumber movement and less marked business expansion in such cities as Butte, Spokane, Seattle, etc. The decrease in passenger earnings is due to lessened business activity and to the absence of such events as the Alaska-Yukon-Pacific Exposition, which took place year before last, and the opening of the Flat-

*The unit taken is passenger miles and ton miles added together. This would be a poor basis for comparison, as the ratios of passenger mileage to ton mileage were nearly the same in 1910 and 1911.

The Northern Pacific and the Spokane, Portland & Seattle.

head, Coeur d'Alene and Spokane Indian reservations, which in the recent past have helped to swell the roads passenger earnings.

Last year the total revenue ton mileage carried amounted to 4,800,000,000 tons, which is a decrease of 11.41 per cent. from the year before; the ton mileage of company freight was 953,612,242, a decrease of almost 20 per cent. from last year and total passenger mileage amounted to 759,000,000, a decrease of 22.27 per cent. The average haul, both passenger and freight, was shorter last year than the year before, the average for freight per ton being 279 miles in 1911 and 297 miles in 1910; and for passengers, 82 miles in 1911 and 101 miles in 1910. This is a decrease of 17.8 miles for freight and of 19.3 miles for passengers. In the case of freight, greater operating efficiency more than offset the decrease in amount of traffic. The mileage of revenue freight trains was 9,772,000, a decrease of 18.84 per cent. from the year before; the average number of loaded freight cars in train was 25.34, an increase of 7.97 per cent.; the average revenue train load was 461 tons, an increase of 32 tons, or 7.49 per cent.

The fact that while both the average haul and the revenue freight ton mileage decreased the average revenue tonnage per train, which already was large, increased, reflects credit on the efficiency with which the traffic was handled. More favorable weather conditions contributed somewhat to this increase in train load. The total train load—which includes company and commercial freight—also increased from 524 to 553 tons.

The mileage of revenue passenger trains was 11,380,000 in 1911, a decrease of 9.50 per cent. The average number of passengers in train was 63.21 in 1911, as compared with 74.23 in 1910.

The Northern Pacific gets only a fair average rate per passenger per mile and per ton per mile, not by any means as large a ton mile rate, for instance, as the Southern Pacific gets. In 1911 the average receipt per passenger per mile was 2.276 cents, and in 1910 2.184 cents. The average receipt per ton per mile in 1911 was 9.03 mills, and in 1910, 9.00 mills. The following table compares certain train mile figures for the Northern Pacific, the Great Northern and the Burlington:

Revenue per train mile:	
Northern Pacific	$2.94
Great Northern	2.79.8
Burlington	2.53
Expenses per train mile:	
Northern Pacific	1.82
Great Northern	1.72.5
Burlington	1.70.9
Net revenue per train mile:	
Northern Pacific	1.12
Great Northern	1.07.3
Burlington	.82.5

The annual report of the company does not give any figures for classified tonnage carried, but from the company's report to the Interstate Commerce Commission for 1910 we find that 19 per cent. of the total tonnage carried in that year was furnished by products of agriculture; 2 per cent. by products of animals; 24 per cent. by products of mines; 38 per cent. by products of forests; 10 per cent. by merchandise, and 2 per cent. by miscellaneous articles (L. C. L.).

The balance sheet shows that at the end of 1911 the company had $5,932,000 cash on hand, as against $8,397,000 cash at the end of 1910. At the end of 1911 miscellaneous accounts payable amounted to $6,598,000, while at the end of 1910 there were only a few thousand dollars of accounts payable. It is understood, that this "accounts payable" on the 1911 balance sheet is made up largely of sums owed to subsidiary or affiliated companies because of transactions not yet completed and which are now in process of adjustment.

The report would have been more enlightening if it had included a detailed statement of what these accounts payable include, and also a description or list of "marketable securities," which are carried on the balance sheet at $19,363,000.

The showing as regards traffic and earnings made in 1911 cannot be taken as particularly encouraging, but it must be remembered that the Northern Pacific has had a year of decreased traffic following a year of abnormally high operating costs due to bad weather and other causes, and a correct judgment as to any property must be based on the results of a period of years. The road is in sound physical condition; its management is enterprising and efficient; its territory is developing rapidly; and with a change in business conditions generally its earnings may confidently be expected to improve unless the settlement of the transcontinental freight rate cases cuts too deeply into the earnings of all the transcontinental lines.

The Northern Pacific is comparatively lightly capitalized. This point was especially emphasized in the finding of the special master in the Minnesota rate case, in which he placed a much higher value on the property than the amount of the company's total outstanding securities. It is a company which, beside its own great main line between the Pacific coast and St. Paul, has an investment in other very valuable properties. The equity in the stock of the Chicago, Burlington & Quincy, which is deposited under joint Northern Pacific-Great Northern bonds, is in itself a very valuable asset. The Northern Pacific also owns a half interest in the Spokane, Portland & Seattle, and owns nearly all the stock of a subsidiary company—the Northwestern Improvement Company having valuable coal properties.

The Northern Pacific itself is a property that has changed in character very much in the last six years. In 1905 there was no 90-lb. rail in track, and only 529 miles of 85-lb. rail, while in 1911 there was 1,109 miles of 90-lb. rail and 2,000 miles of 85-lb. rail. Indeed all important main lines now have 90- and 85-lb. rail, and the more important branches 72-lb. rail. There is, however, still in main, second and third track 1,696 miles of 56-lb. rail.

While business conditions were unfavorable during the year the company continued making important improvements in addition to the property, for example seven permanent and 77 timber structures having 11,300 lineal feet were replaced by embankments or by truss, girder, eye beam or reinforced concrete trestles, over 120 miles of timber structures have been replaced by steel bridges, embankments or other permanent structures since July 1, 1885. Mileage on block signals was substantially increased during the year, and at its end on important main line mileage of 2,485 there were 401 miles protected by automatic block signals and 914 miles protected by manual block signals. New buildings and increased structures, or increased facilities were provided at 45 stations. The amount charged to additions and betterments was $7,998,106, and the total amount expended in improving and increasing the company's facilities was around $12,000,000.

If the Northern Pacific is feeling the competition of the St. Paul's Pacific coast extension, as it probably is, this may account to some extent for the decrease in passenger and freight traffic last year; but there is quite a tendency for shippers to try a new road when it first builds into their territory, and it may well be that the effect of the St. Paul competition is felt more now than it will be in a year or two.

The following table shows the principal figures for operation in 1911, as compared with 1910:

	1911.	1910.
Average mileage operated	5,950	5,765
Freight revenue	$43,332,918	$48,758,736
Passenger revenue	17,278,813	21,333,313
Total operating revenue	64,912,832	74,525,826
Maint. of way and structures	8,065,467	10,842,955
Maint. of equipment	7,911,331	8,996,137
Traffic	1,137,283	1,036,404
Transportation	21,601,477	24,045,197
Total operating expenses	39,729,761	45,987,405
Taxes	3,296,797	3,622,000
Operating income	22,328,077	25,818,896
Gross corporate income	27,668,506	29,475,201
Net corporate income	20,442,267	22,296,259
Dividends	17,360,000	17,360,000
Surplus	3,082,267	4,936,259

Letters to the Editor.

A LETTER TO AN OLD RAILWAY OFFICIAL FROM AN ORPHAN.

Chicago, October 4, 1911.

To the Editor of the Railway Age Gazette:

If all of the poor railway men who "just growed" had been blessed with an affectionate D. A. D. to check up our shortcomings and steer a true course for us through every emergency that might beset our onward careers, how happy would have been our lot, and how perfect our performance!

No one can witness D. A. D.'s solicitude for his struggling offspring, as expressed in his most interesting and instructive letters in your columns, without wishing that he might have been similarly blessed in his youth, and yet there is always a lurking suspicion that the younger man must be just a little dull-witted to require such exhaustive directions in regard to every detail of his daily work. Perhaps we can forgive him this misfortune because of the good fortune it has brought to the rest of us in permitting us to read and enjoy D. A. D's. admonitions and to admire the keen insight displayed by the older head.

Nevertheless, D. A. D. seems to be convinced that his son must not be permitted to work his brain overtime in solving the problems that the rest of us have had to meet and overcome single handed, and to that extent his fatherly anxiety sometimes leads him into unfamiliar paths.

It is possible that his proximity to the Great Salt Lake when he wrote his letter of July 22 (which appeared in the *Railway Age Gazette* of September 15) inspired the belief that even if he should slip unexpectedly into deep water he couldn't sink, and led him to wade further from the shore than usual. Be that as it may, when he started his correspondence school working on the supply department, it certainly looked to an ordinary orphan as if he had gotten out of his depth.

The question of the proper administration of the supply department is admittedly rather deep water as yet, because its origin is so recent that sufficient time has not elapsed to permit of any exhaustive study of its possibilities, and enough positive data concerning them has not been collected to enable either sire or son to speak with authority regarding this youngest branch of the railway service.

That it has come, and that it has developed to a point where it has attracted D. A. D's. serious attention argues some sort of necessity, at least, for its existence.

D. A. D. characterizes the development of the "so called" store department as "one-sided," and says that *"one of the fallacies introduced by the store people is that the user of material cannot be trusted with its custody, because," etc., etc.*

Now, his son, being a younger man, and therefore presumably more familiar with the happenings of recent years, could tell his D. A. D. a whole lot about the development of the supply department if he only dared to speak up because it must be remembered that it originated only a few years ago, after the older man had won his spurs and retired from active service. For instance his son, who was a division superintendent when the first supply department was organized and, therefore, more closely in touch with what was actually "doing" out on the line, might have told him that the new department was not the result of a hasty idea on the part of some one with a grudge for [illegible] but that it originated solely from the recommendations of railway conditions that the [illegible] to [illegible] to [illegible] the waste and [illegible] of material which had grown to such proportions as to [illegible] that it had literally taxed itself upon the attention of the "men higher up."

[illegible] remind his amusing parent that from the time the first rails were laid in this country in 1827, and for a period of over sixty years, the users of material were busy demonstrating the truth of what D. A. D., from the safe recesses of his easy chair, proclaims a "fallacy," and that their demonstration was so successful and conclusive that it was directly responsible not only for the birth, but for the remarkably rapid development of the "so called" store department.

He might further remark in passing that as to the "introduction" of the aforesaid "fallacy" the store department pleads "not guilty," and rests its case upon evidence obtainable from those railways which have not as yet established such an organization.

As to the development being "one-sided," a great many things appear that way to the observer who regards them from only one point of view.

Considering the obstacles with which it has been surrounded, both by misguided friends and well-meaning foes, the wonder is that the new department survived long enough to develop even on one side.

These adverse conditions have acted temporarily to check its growth and hamper its usefulness, but until it has reached a more perfect stage of development it is somewhat premature to decide that it cumbers the ground and acts as a brake on the wheels of progress.

Before concluding his letter, the writer propounds a few questions which are shrewdly calculated to cast some doubt upon the efforts being made by the department to better existing conditions and to make his youthful general manager a little uneasy with regard to the ultimate effect of those efforts upon the operations of the railway. There is no need, however, for the boy to become unduly alarmed. No movement of any consequence is ever fully consummated in a moment. It takes time to reach perfection. The mistakes of today are corrected tomorrow. The answers to the questions are not difficult.

He asks, "Have we not overdone the matter of low working stocks?" The answer may be found by consulting the official records of a considerable majority of the railways, including the roads which he mentions by name, as well as the "happy medium." A comparison of these figures with those of a few of the other equally well managed railways will show conclusively that the matter of low stocks of material has not been overdone by the average road.

> "Is it not more expensive for a railway to carry too small a working stock of material and supplies than one too large?"

The answer is, yes, *up to a certain limit.* The first and most important function of the supply department is "to supply," as might be inferred from its name. This means that it must be prepared to supply *on demand* material of every description requisite for the operation and maintenance of the property, catastrophies and unusual emergencies alone excepted. Unless it does this it has not reached a proper and normal stage of development. Another of its functions, second only to this, is the performance of its duty with the minimum possible investment of the company's funds.

The next three questions are the same in substance, but phrased in three different ways. No one has ever claimed that "very rigid comparisons" can be instituted between different roads in respect to the operations of any department of the service, and yet comparisons are being constantly instituted as to details of operation and maintenance on different roads, from which great good is derived, even though they may not be "very rigid"; such comparisons, for example, as fuel consumption per 100 ton miles or per locomotive mile; maintenance of equipment, per locomotive, per car and per mile; maintenance of way and of structures; tons moved per train mile and per car mile, etc., etc. All these are made possible by the uniformity of accounting enforced by the Interstate Commerce Commission, and so soon as the accounting for supplies can be placed upon a uniform basis, similar beneficial comparisons can be drawn between the operation of the supply department on different roads, the conditions under which they are operated being generally known.

"Are not some records for seemingly low economical stocks based upon the fallacy that it costs the company nothing to ship and reship its own materials?"

And the following question is like unto it:

"Where would these records land if company material carried a freight charge of, say, five mills per ton per mile?"

There is no doubt but that there is at present a wide diversity in the methods of supply department accounting employed by different railways. It does not follow, however, that records which disclose seemingly low stocks are necessarily based upon fallacies of any kind. Unfortunately, it is true that some roads select methods of accounting which do not always disclose all of the facts, and to that extent they fool themselves, as well as others.

There is no question but what the cost of transportation is a factor in the economical assembling and distribution of supplies, and should properly be considered as part of the cost of operating the department. On some roads the number of ton miles of company material handled during the year by the transportation department is made a feature of their records, but uniformity in the accounts of the department would go far to answering these questions in a satisfactory manner.

"Is it not more economical to handle numerous items of supply in carload lots regardless of average monthly consumption?"

It is more economical as a rule to handle supplies in carload lots, but not without regard to the average monthly consumption. For instance, if a given road used, let us say, an average of five tons of a certain kind of tool steel in a year, it would not be economical to buy a carload of forty or fifty tons to protect its requirements in that line. True economy in the handling of the material is an important feature of the work of a properly organized supply department.

"Have we given due weight to the concealed items of expense in arriving at conclusions as to the cost of handling company material and supplies?"

Up to date we have not, as a general rule, but this is one of the features which is being rapidly worked out and brought to the attention of managing officials through the work that is being done by the Railway Storekeepers' Association. The same question might properly be asked with regard to the work of every other department of the service, the present organization of which has been the outcome of many years' experience.

The necessities of time and space both forbid a more extended analysis of the ideas advanced by the Old Railway Official as to the relationship which the store department should properly bear to any general scheme of railway organization, but when the premises from which he reasons are so manifestly faulty, as in the present case, the logical structure which he rears falls of its own weight, and leaves nothing more to be said.

It is fair to suggest, however, that he should make a closer study of the supply department and secure a more accurate knowledge of its origin, its aims, and its possibilities before reorganizing it out of existence.

AN ORPHAN.

THE DETROIT RIVER TUNNEL.

In a paper presented before the Institute of Civil Engineers of England recently, William J. Wilgus gave a full account of the methods used in the construction of the Michigan Central Railroad tunnel under the Detroit river between Detroit, Mich., and Windsor, Ont. The general features of this work, including the method of construction of the tubes, the excavation of the trench in the bottom of the river, the sinking and concreting of the tubes, as well as the details of the track construction and the type of locomotives used, have been fully described from time to time in the *Railway Age Gazette.* There are, however, a number of items in regard to details of the work and its cost that are brought out by Mr. Wilgus's paper which will be of interest. The following is an abstract of Mr. Wilgus's paper.

THE APPROACH TUNNELS.

In the construction of the approach tunnels the contractor originally intended to excavate, with the exception of the cut and cover portions, by means of a four-story drift for the center wall and a three-story drift for each side wall, after which the inverts and arches were to follow, all with temporary timber lining and without the use of air.

On the Detroit side, westward from the permanent shaft, the harder nature of the clay permitted the use of this method for the center drift for a distance of approximately 1,360 linear ft. Compressed air, at pressures ranging from 5 lbs. to 22 lbs., and averaging 7 lbs. per sq. in., was used for a short distance (400 ft.) near the eastern end, for the prevention of undue surface settlement.

On the Canadian side, after the lower level and a part of the second level of the center drift had been completed for the larger portion of the distance between the permanent shaft and the 3,080-ft. shaft, the pressure of the clay became so great as to crush and distort the timber lining, making desirable the use of a hydraulically-driven shield, which was pushed forward on top of the concrete already laid in the lower level of the drift.

The center shield started from the temporary 3,080-ft. shaft at the west end of the cut-and-cover section, and was driven westward for a distance of 2,013 ft., beyond which, for 1,061 ft., the original method of drifting was employed as far as the permanent shaft. Considerable difficulty was experienced with this type of shield, because of its light construction and a tendency to work out of line, the latter trouble being aggravated by the necessity of chopping away portions of the previously-constructed timber drift.

The high pressure that developed as the excavation progressed, and the surface settlement that followed excessive inflow at the faces of the headings, led to the abandonment, in March, 1907, of the original method of constructing the side walls, inverts and arches, and the adoption in both approaches of hydraulically-driven side shields, guided and partially supported by the previously-constructed center walls, in which channel-bars had been inserted for that purpose.

In the Canadian approach the side shields were started from the same shaft as the center shields, and used continuously for 3,052 ft. to a connection with the short section constructed by

TABLE 1.—APPROXIMATE TUNNEL QUANTITIES AND COSTS EXCLUSIVE OF CONTRACTOR'S PROFITS
(Electrification, Tracks, Safety Devices, Terminals, and Right-of-Way not included.)

			Western Open Cut.			Western Approach.			Subaqueous.		
	Items.	Unit.	Quantity.	Unit Cost.[1]	Cost.	Quantity.	Unit Cost.[1]	Cost.	Quantity.	Unit Cost.[1]	Cost.
1.	Excavation	Cubic yard	39,300	$1.33	$52,304	109,500	$4.73	$518,261	350,000	$0.50	$175,950
2.	Iron and steel	Tons	.....	.....	3,075	98	92.23	9,039	5,520	136.45	753,065[2]
3.	Concrete A (1:2:4)	Cubic yard	260	11.45	2,977	27,557	10.11	278,494	27,170	12.74	345,978
4.	Concrete B	Cubic yard	5,210	6.97	36,288	12,091	8.54	103,400	79,100	4.42	349,830
5.	Concrete D	Cubic yard	4,597	5.28	24,253	.....	.....	.....	21,000	3.72	78,049
6.	Waterproofing	100 square feet	248	2.00	494	2,741	14.67	40,064	.....	.....	.....
7.	Duct	Linear feet	26,004	0.187	4,864	121,956	0.131	15,957	178,124	0.097	17,349
8.	Miscellaneous	.....	.....	.....	163	.....	.....	5,750	.....	.....	52,223[3]
9.	Totals	Linear feet, single track	3,080	....	$124,418	4,264	$227.71	$970,965	5,334	$332.29	$1,772,444

[1]Unit costs obtained by dividing total costs by quantities, and are therefore approximate.
[2]Includes plank sides.
[3]Includes coffer-dam for making westerly connections with approach-tunnel.

Table 1.—Continued.

Items.	Unit.	Eastern Approach. Quantity.	Unit Cost.[1]	Cost.	Eastern Open Cut. Quantity.	Unit Cost.[1]	Cost.	Totals. Quantity.	Cost.
1. Excavation	Cubic yard	186,000	$5.54	$1,030,927	163,700	$0.393	$64.400	848,500	$1,841,842
2. Iron and steel	Tons	129	131.20	16,941	.....	....	1,983	5,745	784,103
3. Concrete A (1:2:4)	Cubic yard	51,353	10.08	517,396	75	9.04	678	106,415	1,145,523
4. Concrete B	Cubic yard	14,507	9.40	136,504	2,490	6.17	15,368	113,398	641,390
5. Concrete D	Cubic yard	.....	.....	.....	2,350	4.75	11,164	27,947	113,466
6. Waterproofing	100 square feet	4,463	11.38	50,716	110	1.18	130	7,562	91,404
7. Forms	Linear feet	205,175	0.141	29,034	7,040	0.132	928	538,299	68,132
8. Miscellaneous	.....	.....	.....	19,985	.....	....	11,325	.....	89,446
9. Totals	Linear feet, single track.	7,022	$256.55	$1,801,503	5,884	....	$105,976	25,584	$4,775,306

[1] Unit costs obtained by dividing total costs by quantities, and are therefore approximate.

the original drift method eastward from the permanent shaft. Compressed air, at pressures varying from 6 to 20 lbs. and averaging 11 lbs. per sq. in., was required for the entire distance.

In the United States approach the side shields were started at different points and pushed eastward to the permanent shaft, the distances for the north and south tunnels being 1,606 ft. and 1,166 ft., respectively. No compressed air was required on this side of the river, except for the short distance in the center drift, as already mentioned.

In the cut-and-cover sections on the Canadian side the eastern 382 ft. of the approach-tunnel was constructed by the ordinary cut-and-cover method. On the Detroit side the same method was used at the western end for 436 ft. and 714 ft. on the north and south tunnels, respectively. About 200 ft. of the southern track east of the cut-and-cover section was built according to the original plan.

RIVER SECTION.

The subaqueous connections between the shore approaches and the subaqueous tunnel were treated differently on the two

Table 2.—Detailed Costs of Concrete Per Cubic Yard.

Class of Concrete.	Subdivision.	Western Open Cut. Dollars.		Western Approach. Dollars.		Subaqueous. Dollars.		Eastern Approach. Dollars.		Eastern Open Cut. Dollars.	
A	Concrete: Labor	4.26		2.57		5.63		2.74		3.45	
	Concrete: Material	3.05		3.92		4.33		3.84		3.52	
	Concrete: Overhead charges	1.09		0.98		1.50		0.99		1.04	
			8.40		7.47		11.46		7.57		8.01
1:2:4	Forms		3.05		2.64		1.28		2.51		1.03
	Total		11.45		10.11		12.74		10.08		9.04
B	Concrete: Labor	1.50		2.82		0.85		2.94		0.81	
	Concrete: Material	2.80		3.89		2.99		3.71		3.14	
	Concrete: Overhead charges	0.62		0.93		0.58		1.00		0.59	
			4.92		7.14		4.42		7.65		4.54
1:3:6	Forms		2.05		1.40		....		1.75		1.63
	Total		6.97		8.54		4.42		9.40		6.17
D	Concrete: Labor	1.65		....		0.73		....		0.68	
	Concrete: Material	2.48		....		2.50		....		3.22	
	Concrete: Overhead charges	0.62		....		0.49		....		0.58	
			4.75		....		3.72		....		4.48
1:4:7½	Forms		0.53		....		....		....		0.27
	Total		5.28		....		3.72		....		4.75

Considerable difficulty was experienced in the driving of the side shields, because of light construction that necessitated frequent repairs and strengthening, and the inexperience of the

Table [illegible]. Labor, Material and Overhead Charges.

Location.	Labor.	Material.	Overhead charges (15 per cent.).	Total.
Western open cut	$61,018	$47,174	$16,226	$124,418
Western approach	307,338	356,941	126,647	970,965
[illegible]	[illegible]	1,199,435	231,189	1,772,444
Eastern approach	952,666	613,859	234,978	1,801,503
Eastern open cut	46,852	46,163	13,820	105,976
[illegible]	$1,888,874	$2,263,572	$[illegible]	$[illegible]

[illegible] to maintain alignment and to maintain alignment. Ultimately these faults were corrected so that progress was quite satisfactory, the average daily movement of each shield [illegible] ft.

sides of the river. On the United States side the center drift was completed to the west end of the subaqueous tunnel, and the apron was completed for the west end of Section I. The difficulties encountered led to the use of a coffer-dam 66 ft. long, 104 ft. wide, and 54 ft. deep, which was built between the shore and the west end of the previously-deposited subaqueous section, and the connection as far as the shaft, 53 ft. in length, was then constructed in the dry.

Before lining was started, short 1-in. pipes in the top and bottom, spaced 12 ft. apart, were connected with holes bored in the steel shell, with which connections could be made, after the completion of the lining, for forcing grout into all cavities and spaces between the shell and the exterior concrete, and between the shell and lining. This same procedure was followed in the approach-tunnels to stop leaks in the extrados of the [illegible]. Grouting under a pressure of 75 to 100 lbs. per

Table [illegible]—[illegible] Tunnel Construction Cost per Foot of Interval Centers.

Place.	[illegible]	[illegible]	Method of Construction.	Internal Area of Each Bore. Sq. Ft.	Cost of Tunnel Project. Per Cubic Foot.	Per Linear Foot, Single Bore.
[illegible]	[illegible]	[illegible]	[illegible]	314	$1.057	$332
				309	0.757	228
[illegible]	[illegible]	[illegible]	[illegible]	309	0.853	257
					$0.896	$273
[illegible]	[illegible]	[illegible]	[illegible]	309	1.08	333
[illegible]	[illegible]	[illegible]	[illegible]	395	0.61	241
[illegible]	[illegible]	[illegible]	[illegible]	181	1.65	300
[illegible]	[illegible]	[illegible]	[illegible] and compressed air.	165	2.27	375
[illegible]	[illegible]	[illegible]	[illegible] and compressed air.	164	2.38	390

[illegible] [illegible] [illegible] [

Table 5.—Costs of Tunnel Per Linear Foot of Single Track and Per Cubic Foot of Contents.
(Exclusive of Contractor's Profits.)

Location.	Linear Feet Single Track.	Area Sq. Ft. within Internal Circumference.	Costs per Linear Foot Single Track. Excavation.	Iron and Steel.	Concrete, Class A.	Concrete, Class B.	Concrete, Class D.	Waterproofing.	Ducts.	Miscl.	Totals.	Costs per Cubic Foot within Internal Circumference.
Westerly approach....	4,264	300.8	$121.54	$2.12	$65.31	$24.35	.....	$9.39	$3.74	$1.36	$227.71	$0.757
Subaqueous	5,334	314.16	32.98	*141.18	64.86	65.59	$14.63	.....	3.26	9.79	332.29	1.057
Easterly approach....	7,022	300.8	146.81	2.41	73.68	19.44	.....	7.22	4.13	2.86	256.55	0.853
Total between portals.	16,620	.....	.....	.....	.....	.....	.....	.....	.....	.....	$273.46	$0.896

*Plank sides included.

sq. in. was carried out in the spring of 1910, with the result that the minor leaks that had resulted from imperfect calking and waterproofing were closed, the total leakage between portals in both tunnels being less than 10 gals. per minute, equivalent to 0.85 gals. per day (24 hours) per linear foot of single bore.

While there were on the subaqueous section a number of casualties incidental to the magnitude of the work, such as carelessness of employees and minor accidents, there was not a single fatality attributable to the adopted method of construction, nor, of course, was there any trouble with "bends," as the use of compressed air, except for divers, was avoided.

Windsor Yard; Detroit Tunnel.

COST FIGURES.

The history of an undertaking like the Detroit river tunnel would be incomplete without a statement of costs of the portions of the work that involved the use of new methods. The approximate quantities and actual costs of the tunnel-construction, exclusive of contractor's profits, are given in Table 1, these being taken from inspector's reports, with 15 per cent. added for overhead charges. The total cost from summit to summit will be seen to amount to $4,775,306.

The current prices of labor, tools and material were as follows:

Unskilled labor ..... 15 to 30 cts. per hour; average 18⅞ cts. per hour.
Skilled labor ..... 25 to 45 cts. per hour; average 32½ cts. per hour.
Cement ..... $1.16 to $2.25 per barrel; average $1.35 per barrel.
Sand and gravel ..... 60 cts. per cubic yard.
Steel in tubes delivered on site of work..... 5 cts. per pound.
Dredging, based on "pay quantities," with slopes of 1 to 1, beyond which no allowance was made for removed material..... 40 cts. per cubic yard.
Steam shovels, each..... $5 per day.
Cars, each ..... $1 per day.
Scows, derricks and miscellaneous tools..... At prices to cover interest, depreciation and replacement.

It will be noticed in Table 1 that the cost of excavation in the western open cut was $1.33 per cu. yd., as contrasted with 39.3 cts. per cu. yd. in the eastern cut, the difference being due to smaller quantities, a larger proportion of hard digging, and the care required to avoid disturbance of adjoining temporary track-supports at the former place. In the approach-tunnels the use of compressed air on the Canadian side largely accounts for the cost of $5.54 per cu. yd. for excavation as compared with $4.73 on the Detroit side. The subaqueous cost of 50c. per cu. yd. includes dredging, coffer-dam excavation, backfilling, riprap and other work connected with the excavation and refilling of the trench, with the exception of the coffer-dam itself, which is included under "Miscellaneous."

The item of iron and steel appears most prominently in the subaqueous section, where 5,000 tons was required in the tubes and the balance, 528 tons, in grillages and reinforcing rods. The approximate cost of the tubes in places was:

	Net Cost per Ton.
Steel tubes delivered [illegible]	$112.00
Labor of sinking and [illegible]	8.40
Plank sides	6.10
Overhead charges (15 per cent.).....	19.00
Total	$145.50

The cost of concrete per cubic yard varied, of course, with the classification and with the conditions under which it was placed,

the cost of forms having much to do with the differences, as will be noted in Table 2.

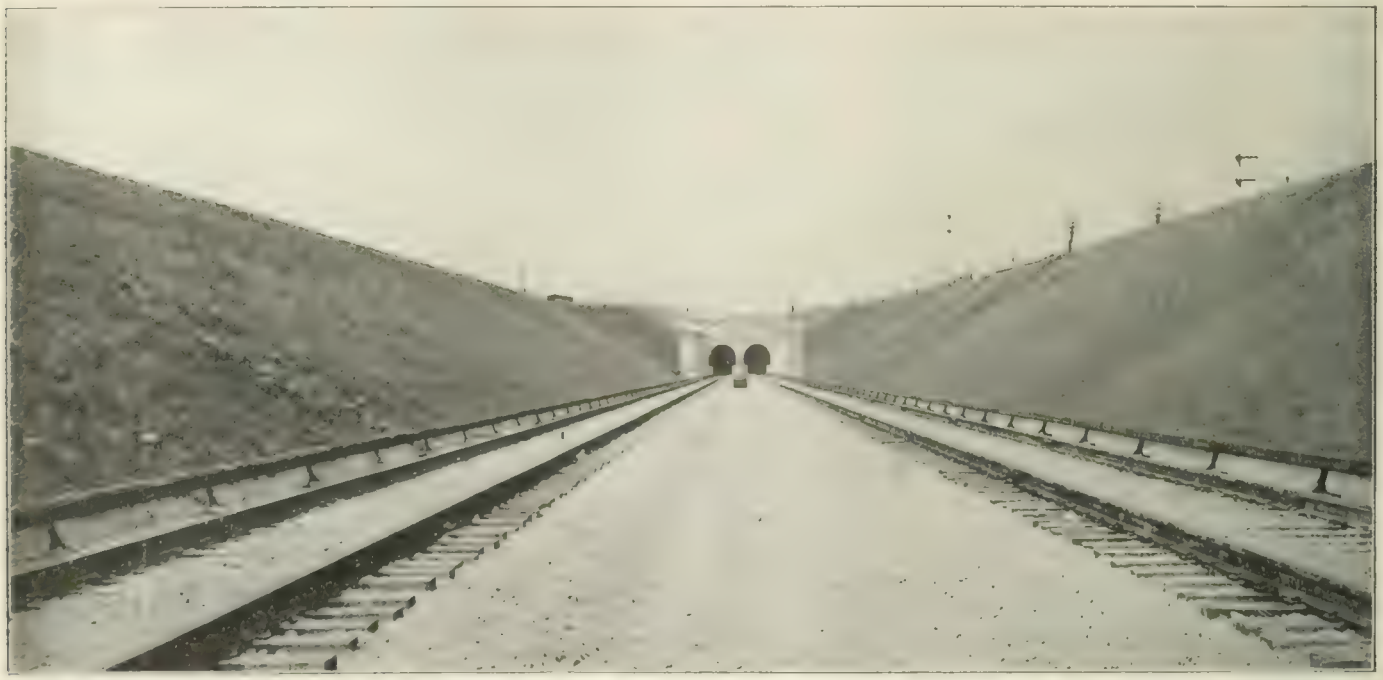
Class A concrete (1:2:4) was the most uniform in cost, averaging $10.76 per cu. yd., the highest reaching $12.74 per cu. yd. in the subaqueous tunnel-lining where the comparative thinness of the ring and the presence of reinforcing rods increased the labor item. Class B concrete (1:3:6) ranged from $6.17 to $6.97 per cu. yd. in the open-cut retaining walls, and from $8.54 to $9.40 in the approach-tunnels; while in the river section the cost fell to $4.42 per cu. yd., because of the use of tremies and the absence of forms other than the tubes and appurtenances that are provided for under iron and steel. Class D concrete (1:4:7½) cost $4.75 to $5.28 per cu. yd. in the open-cut retaining-walls, and $3.72 per cu. yd. in the foundation-course of the subaqueous sections, where the increase from the calculated quantity, 6,800 cu. yd., to the actual quantity of 21,000 cu. yds., is accounted for by the large amount of "prodding" that was required in the soft clay near mid-channel, as clay; $2.27 and upwards in sand and rock; from $1.65 to $2.38 in silt; and 61 cts. in firm clay free from water.

The author believes that the subaqueous method used at Detroit may be utilized with marked reduction of cost and hazard, in locations where the employment of shields and compressed air has hitherto been considered obligatory; and where the gradients and proximity of portals to shore-lines make desirable or necessary the raising of the top of the structure up to or above the water-bed.

SIGNALING AND SAFETY DEVICES.

Complete installations of electric automatic signals and electric interlocking plants with alternating current track-circuits were installed by the tunnel company with purchased materials, all devices complying with the requirements of the New York Central Lines for safeguarding traffic.

An independent telephone system for the use of transportation and maintenance employees connects the tunnel substation with portals, shafts, and subaqueous sump, and also



Approach to West Portal of Detroit Tunnel.

well as for the excess excavation beyond the neat lines of the trench.

A sub-division of the tunnel-costs given in Table 1 into labor, material and overhead charges appears in Table 3, the items of dredging and steel tubes ready for sinking appearing in subaqueous material, because they were sub-contracted, and therefore their labor costs did not show on the reports of the principal contractor's operations.

It may not be amiss to compare these results with those obtained in subaqueous-tunnel practice elsewhere in the United States, during the past 20 years. For this purpose the cost of the tunnel between portals, per cubic foot of content within the internal circumference, is of special value in making a comparison of the costs of tunnels having different dimensions. While of course, the comparison shown in Table 4 is of little precise value, owing to differences in local conditions, varying prices of labor and materials, the inclusion in some instances and the exclusion in others of contractor's profits and losses, and uncertainty as to the strict accuracy of the cost data, still it has considerable interest as indicating in a general way the results obtained in different materials by various methods.

Summarizing, it appears that tunnel costs per cubic foot of content within the internal circumference, may be said to have ranged from 90 cts. to $1.70 at Detroit, to $1.08 and upwards, in soft

with the signal towers near the summits at which sectionalized circuit-breakers are placed.

The advisory board concluded that provision should be made for the prompt cutting off of propulsion-current, and for a supply of water under pressure, in the event of accidents in the tunnel. In accordance with this policy a continuous "pull-chord" and "break-glass" boxes have been placed in both tunnels, by means of which any passenger or employee may send an alarm to the substation operator, who in turn will cause the fire pump in the substation at once to be started and water under pressure to be supplied through a 5-inch main in each tunnel to hose connections spaced about 100 ft. apart. At the same time the substation operator will notify the men in charge of the signal towers to open the circuit-breakers controlling the affected section and cut off the supply of propulsion-current to the third rail. With these precautions, supplemented by the use of the independent telephone system, it is possible on short notice immediately to interrupt the supply of propulsion-current, secure fire pressure in the pipe lines, and take any other measures that may be required for the comfort and safety of passengers and employees.

An automatic train stop, devised by the author, was installed experimentally to secure, if possible, means by which rear-end collisions, due to carelessness or disability of employees, would

be rendered impossible. The improper passing of a home signal results in the de-energizing of a normally closed air brake magnet on the locomotive, thereby venting the train pipe and causing the brakes to be applied. The de-energizing of the air brake magnet is effected by the automatic cutting off of the supply of propulsion-current to a short movable section of working-conductor at the home signal, when the block ahead is occupied. As the device depends for proper working upon a closed circuit, any defect or injury thereto will result in the application of the brakes.

Artificial ventilation in the tunnel is considered unnecessary, because of the adoption of electricity as a motive power, the access to outer air at shafts and portals, and the running of trains in one direction through single-track tubes acting as pistons to expel foul air in front, and draw in fresh air from the rear.

Detroit Portal.

ELECTRIFICATION.

Electricity as a motive power was adopted at the beginning, and, in fact, it was the recognition of its applicability to steam railway conditions, based on the promised success of the New York Central installation at New York, that led to the decision to construct the tunnel.

The problem to be solved involved the electrifying of the tunnel-zone extending from a point ¾ mile west of the Detroit summit to a point 1¼ mile east of the Canadian summit, a total distance of 4½ miles, and embracing 18 to 20 miles of single track in main line and yards.

The service to be handled, exclusive of future additions from foreign lines, was estimated to consist of twenty freight trains and eighteen passenger-trains daily, the former ranging in weight, exclusive of locomotives, from 1,366 to 1,685 tons, and the latter from 134 to 535 tons. The conditions of operation were assumed to necessitate at times the simultaneous movement on the ascending gradients through the tunnel of a 1,800-ton goods-train in each direction at a speed of 10 miles per hour, plus assumed main-line and yard movements beyond the summits. The number of cars to be moved daily approximates to 1,200, or about 400,000 per annum.

Provision was also required for the working of sump-pumps, and for lighting the tunnel and yards.

The fiercely-asserted rival claims made by the advocates of various methods of electrification rendered imperative the adoption of a means of reducing arguments to some measureable basis that would be equally fair to all, and afford the advisory board justification for selecting an electric propulsion system that would combine safety and reliability with economy.

In compliance with this policy, specifications were prepared, setting forth the physical conditions as to alinement and gradients, the speed, frequency, and weights of both classes of trains, the lighting and pumping, and all other information that would be required by those tendering propositions, to produce the results desired by the tunnel company.

Each tenderer, therefore, was to submit a proposition for a definite scheme to meet these conditions, the design being prepared with a view to cause the tunnel company a minimum amount of expense for meeting the growth of traffic. It was mentioned that if foreign railways used the tunnel route the traffic would be approximately doubled, and the proposed method of providing for this had to be stated. Any tenderer who deemed the requirements of the general specifications prohibitive to the free exercise of his best skill in meeting the conditions was invited to offer suggestions for the consideration of the company.

Attention was called to the clearance provided in the tunnel

above the top of the rail, and notice was given that the cost of enlarging the tunnel to afford additional space for any system involving the use of overhead working-conductors would be considered as a charge against such system in making comparisons with other systems not requiring enlargement.

As the annual cost of operation should have equal consideration with first cost in determining which system was to be adopted, tenderers were required to insert in the specifications their estimate of the annual costs, both fixed charges and working expenses, of the system upon which they tendered, whether direct-current, single or three-phase alternating-current, or any other system that they considered properly adapted to the conditions. In order that the tenders might be properly compared, the cost of maintenance and operation was to be calculated in accordance with a specified method, and before the contract was finally awarded, a form of guarantee was required, protecting the tunnel company against a higher cost of maintenance and operation. These annual costs comprised interest charges, taxes, insurance, risks, depreciation, operation and maintenance.

Other clauses of the specifications described in detail the general requirements applicable to any or all systems, among the principal items being the power station and substation buildings and machinery, the duct-system, cables, working-conductors, track-bonds, lighting, locomotives, and pumps. As a rule, the specifications in force for the electric-zone improvements of the New York Central at New York governed the workmanship and material.

Invitations to contractors were issued on March 1, 1906, and on August 15 of the same year proposals were received from three companies, a comparison of which is presented in Table 6. It was therefore apparent that for this particular problem direct current was respectively 12 per cent. and 32 per cent. less expensive in first cost than the three-phase and single-phase system, and 4 per cent. and 20 per cent. less expensive annually, apart from the avoidance of necessity for encroaching on tunnel-clearances. The adoption of the single-phase system in this instance would have imposed upon the tunnel company an added burden of nearly $40,000 per annum.

Table 6.—Comparison of Costs of Three Types of Electric Installations.

		Locomotives for Specified Service.		*Comparison of Costs, Omitting Batteries.				
				First Costs.				Annual Costs, Including Fixed Charges, Operation and Maintenance.
System.	No.	Weight each. Tons.	Aggregate Weight. Tons.	Generation.	Distribution.	Locos.	Total.	
Direct current..	8	[illegible]	514	100	100	100	100	100
Three-phase† .	8	72¼	578	[illegible]	167	103	112	104
[illegible]	16	[illegible]	880	111	104	107	132	120

*Traction only. Direct-current costs, 100 assumed as basis for comparison.
†In making this comparison of cost no charge has been made for the enlargement of the tunnel if found necessary for overhead conductors.

Moreover, the advisory board considered that direct current possessed elements of greater reliability, this feature being emphasized by the demand of the operating department of the railway company for the installation of storage batteries as a reserve in case of power-interruption.

POWER SUPPLY.

A careful consideration of the subject led to the decision that the best interests of the company would be served by the purchase of power from the Detroit Edison Company, which, with its multiplicity of generating plants, offered a favorable price and a reliability of supply that could not be guaranteed with an isolated station of the tunnel company.

The use of a storage battery by the tunnel company was imposed in order to ensure reliability of service and for regulating the short periodic fluctuations of demand for primary alternating current for traction purposes to within 300 kilowatts above and below the capacity agreed upon from time to time.

The substation building, covering a space 70 ft. by 207 ft., and entirely arranged for the installation of motor-generators, booster and battery, together with the fire-pump and appurtenances, was constructed near the Detroit shaft, down which ducts were provided for the thirty-two cables of the distributing and telephone systems. Two motor-generators, each with a capacity of 1,000 kilowatts, are installed, with space for a third; these transform the 4,400-volt alternating current to 650 volts direct current for the track. The battery consists of 312 cells, and has a capacity of 1,500 kilowatts on an hourly rating; it was supplied under a maintenance agreement for a long time-period at a fixed annual cost.

The 650-volt third-rail working-conductor is of the under-running protected type devised by the author in collaboration with Frank J. Sprague, and was first used on the New York Central. In this type the 70-lb. bull-head steel rail is clasped in porcelain insulators made in two halves and fastened to cast-iron brackets spaced 11 ft. apart. Between the insulators the rail is sheathed in a wooden insulated covering so that only the lower surface is exposed to contact, thus guarding against accidents to employees and interruption of service from sleet and snow. This covering is in three pieces, the lower two pieces being fixed to the upper by long screws when in place.

West Bound Approach Tunnel.

LIGHTING AND PUMPS.

The contract for lighting included the furnishing and installation of all parts necessary for lighting the tunnel and yards. Duplicate lines of lighting in each tunnel are supplied from an independent 4,400 volt alternating circuit so as to be unaffected by interruptions of propulsion-current, the 16 candle power lamps being spaced 40 ft. apart on each line. One hundred and twenty-four series arc-lights on steel poles were installed by the tunnel company in the yards and tunnel open cuts.

Automatically-controlled motor-driven sump-pumps of the submerged vertical centrifugal type were installed. Particulars of their situation and other data appear in Table 7.

Table 7.—Capacity of Sump Pumps.

	Aggregate Capacity. Gals. per Minute.	Capacity of Sump. Gals.	Gravity Head. Feet.	Outlet.
Detroit portal ..	1,400	13,000	29	City sewer
Detroit shaft ...	700	20,000	69	River
[illegible]	[illegible]	37,000	91	River
[illegible]	[illegible]	20,000	87	River
[illegible]	4,500	53,400	40	Tunnel Company's sewer

To facilitate the change of locomotives from steam to elec-

tric, and *vice versa,* ample yard facilities have been provided beyond the tunnel-summits on both sides of the river. Eastbound passenger trains on the Detroit side proceed under steam to the existing station near the water front, thence back to the yard at the junction with the tunnel line near the summit, where the motive power is changed to electricity, and thence they proceed to the Windsor yard, where steam locomotives are again attached. Westbound passenger trains drop their steam locomotives at the interchange yard at Windsor and proceed by electricity to the Detroit yard, where the change is made to steam and the train is backed into the station.

Freight trains are handled in the same manner as the passenger service, excluding, of course, the back movements at the joint station.

When the new joint station at the western summit is completed back movements will be obviated, and the change of motive power of passenger trains will be made at the station while the loading and unloading of passengers, luggage, mails and parcels, are being effected.

As Detroit is a division point, necessitating an exchange of locomotives on all trains from both the East and the West, the use of electricity in the tunnel imposes but one extra change of power, the average time required, for which is between 4 and 5 minutes per train.

The saving in time that results from the use of the new method of crossing the river, as compared with car-ferriage, averages 15 to 20 minutes for passenger trains and 3 to 4 hours for freight trains, without taking into consideration the elimination of the absolute stoppage of traffic that formerly occurred in winter months when running ice was particularly heavy.

On July 26, 1910, not quite four years after ground was first broken, the initial electric train passed through the tunnel, the fruit of 50 years of endeavor to conquer nature's obstacle to a continuous rail connection between the east and the west, via Detroit.

From this improvement, costing with contiguous work between $10,000,000 and $15,000,000, the public will reap the benefits of greater safety, reliability and speed that will result from the substitution of an electrically operated tunnel for the uncertainties and dangers incident to car ferriage across a pathway encumbered in summer and autumn with a traffic of more than 60,000,000 tons annually, and rendered hazardous in winter by storms and ice. The railway in turn will profit by savings in time and cost of working, and in a larger sense, from the increase of traffic that will inevitably follow growth of public favor, and the removal of a handicap to competition for trunk-line traffic.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.

The fourth annual convention of the Association of Railway Electrical Engineers was opened Tuesday, November 7, at the La Salle Hotel, Chicago, with a brief address by the president, J. R. Sloan, general electrician of the Pennsylvania Railroad. Mr. Sloan referred to the important work which is now being done by the United States Bureau of Standards in co-operation with the Pennsylvania Railroad, on specifications for incandescent lamps.

About 120 members registered, and the secretary, Joseph Andreucetti, reported a total membership, regular, junior and honorary, of 551.

Under unfinished business a communication was read from the American Institute of Electrical Engineers, requesting the Association of Railway Electrical Engineers to send a petition to the president of the United States asking for the appointment of a permanent commission to deal with improvements in patent laws. The meeting decided to send to the president a resolution similar to that prepared by the Institute of Electrical Engineers.

Under the same order of business was read another communication from the Institute of Electrical Engineers, relating to the terminology used in defining electric conductors, wires and cables, it was decided to accept the terminology suggested by that association, and the proposed definitions were referred to a committee on specifications.

Under new business was presented a report of a committee relating to revision of the constitution and by-laws. The principal item related to the number of votes which various classes of members should be entitled to, and it was proposed that in the adoption of standards a representative member should have a number of votes equal to one-tenth of the number of electric lighted cars owned by the company which he represented. This was referred to a committee.

At the afternoon meeting on Tuesday there was presented a report of the committee on data and information, by F. E. Hutchinson, chairman. This report contained valuable data relating especially to car lighting. It included some statistics regarding axle lighting belts, showing why belts are lost. It stated that the number lost due to careless application was 28 per cent.; to the dynamo being out of line, 24 per cent.; to poor inspection, 22 per cent.; to striking brake beams, 11 per cent.; and to miscellaneous causes, 15 per cent. Belts are invariably broken at the clamps or rivets, showing the necessity for a better fastening for belts used in this service and for more careful instruction of the men who apply them. The report contained figures relating to electric car lighting in the United States, which showed that there are now over 11,000 cars so equipped out of a total number of about 50,000 passenger cars. Of the electric lighted cars 1,372 use straight storage; 3,185, the head end system; 5,900, the axle system; and the number of cells in the batteries used for train lighting is 202,744. The report estimates the cost of equipping a locomotive with an electric headlight and cab lights, exclusive of the dynamo, to be $28.

At the same session on Tuesday there was presented a report of the committee on ventilation, E. M. Cutting, chairman. This report refers to the two systems in use on passenger cars—the natural system, which makes use of the movement of the train to force some of the outside air into the cars, including that which exhausts air from the top of the cars where the incoming air is first passed over heating coils; and the artificial system, which employs fans to drive air into the car and to force it out; the latter possessing some advantages, as it does not depend on the motion of the train for its successful operation. The report describes the Pennsylvania Railroad system of car ventilation and gives an abstract of the paper on the ventilation of Pullman cars by Dr. Crowder, which we have already published. It appears from Dr. Crowder's exhaustive study of the ventilation of sleeping cars that the present situation is marked improvement over that existing before the application of exhaust ventilators, and that if there is any discomfort it is more probably due to the phenomenon known as heat stagnation than to an excessive amount of carbonic acid in the air of the car. It has been demonstrated that the absence of appreciable air currents is responsible for much of the discomfort in passenger cars, and it would appear necessary, in addition to providing adequate exhaust and intakes, to install fans which will furnish air currents to penetrate or break up the aerial envelope which surrounds the human body, thus relieving the sensation of stuffiness or closeness.

On Wednesday morning there was presented a report of the committee on standards, D. J. Cartwright, chairman. This stated that no official action has been taken on any of the recommendations of the various committees on standards, owing to the fact that the value of a representative senior active member's vote has not been officially determined. The question was referred to the executive committee at the last annual meeting, and the decision of that committee appears as a proposed amendment to the constitution. The recommendation of the M. C. B. committee on train lighting was submitted to letter ballot and was rejected. Through an oversight the report was voted on as a whole and not by sections. The committee, therefore, presented again a number of recommendations for standard practice relating to car lighting.

The report of the committee on Improvements was presented

by H. C. Meloy, chairman. This was an interesting report and covers various improvements relating to apparatus used by the railways which have been brought out since October, 1910. These are described under the following classifications: Axle lighting equipment; storage batteries; lamps, shades and fixtures; fans; motors and generators; controlling devices; wires and wiring devices; transformers and rectifiers, and instruments. The report includes special articles which have been prepared by the different electric manufacturing and supply companies relating to their recent improvements. One of the most interesting is that on the use of forced ventilation on car motors which has been tried on a large scale on the Pennsylvania's Long Island Railroad cars. The used of forced ventilation enables the motors to be operated at a much higher continuous rate than would be possible without it.

At the afternoon session on Wednesday there was presented a report of the committee on shop practice, by C. J. Causland, chairman, and we publish in this issue a liberal abstract of the report. The session on Wednesday concluded with a paper on insulation, by K. R. Sternberg.

The further programme of the convention includes the report of the committee on specifications, a paper on The Light for Safety, by F. R. Fortune, and reports of the committees on train lighting practice and on illumination. The programme for the last day includes routine business and election of officers, closing with a paper on Industrial Trucks, by T. V. Buckwalter. A further report of the convention will be published in a later issue.

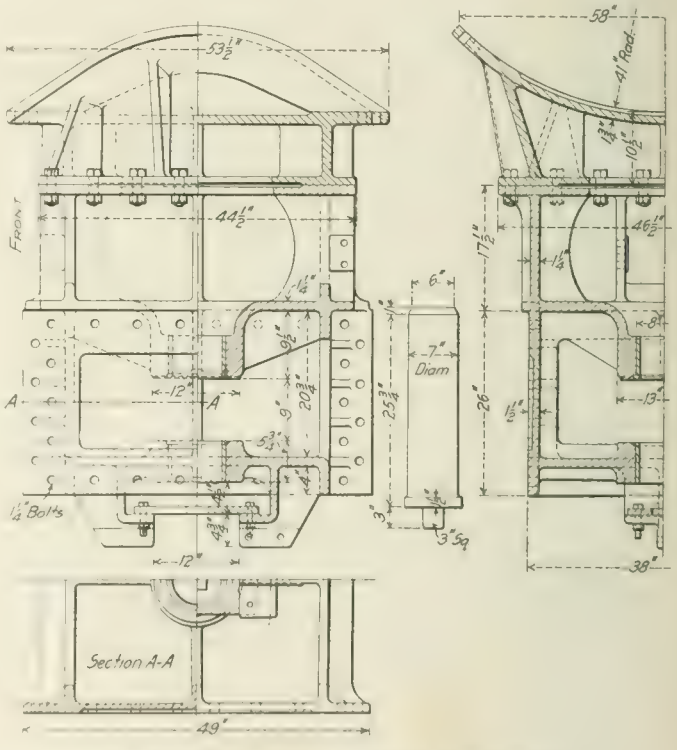
Among the exhibits were the following:

Adams-Bagnall Company, Cleveland, Ohio.—A-Bolite flaming arc lamps, train ventilating fans.
Adams & Westlake Company, Chicago.—Train lighting fixtures.
American Pulley Company, Philadelphia, Pa.—Pulleys and bushings.
Benjamin Electric Manufacturing Company, Chicago.—Arc lights and train lights.
Central Electric Company, Chicago.—Okonite Wire and products, D. & W. material, Invincible renovator, Diehl car fans, Columbia train lamps.
Consolidated Railway Electric Light & Equipment Company, New York.—Generating sets, circuit breakers and train lighting system.
Crouse-Hinds Company, Chicago.—Full line of condulets and panel boards.
Cutler Electric & Manufacturing Company, Philadelphia, Pa.—I. T. E. circuit breakers, 4-panel board, remote control.
Edison Storage Battery Company, Orange.—Edison storage batteries for train lighting.
Electric Storage Battery Company, Philadelphia, Pa.—Storage batteries for train lighting.
General Electric Company, Schenectady, N. Y.—Generating sets, dynamos, train lighting turbine parts, circuit breakers, fans and mercury arc rectifiers.
Gould Storage Battery Company, Depew, N. Y.—Generating sets, Gould storage batteries, switchboard and control.
Holophane Company, Newark, Ohio.—Full line of reflectors.
Jefferson Glass Company, Follansbee, W. Va.—Lighting glassware.
Kerite Insulated Wire & Cable Company, New York.—Full line of Kerite wire and cable.
J. Lang Electric Company, Chicago.—Panel boards and Lang induction [illegible]
National Electric Lamp Company, Inc., Cleveland, Ohio.—Headlight lamps [illegible]
New York Leather Belting Company, New York.—Leather belting.
Niagara Lead Battery Company, Niagara Falls, N. Y.—Train lighting, stor[illegible]
Nungesser Carbon & Battery Company, Cleveland, Ohio.—Carbon special[illegible]
Oneida Steel Pulley Company, Oneida, N. Y.—Pulleys and shafting.
Pass & Seymour Company, Inc., Chicago.—Special porcelain sockets and full line of sockets.
Pyle-National Electric Headlight Company, Chicago.—Pyle-National head[illegible]
[illegible] Lighting Company, New York.—Generating sets, g[illegible]
Sangamo Electric Company, Springfield, Ill.—Switchboard, watt-hour [illegible]
United States Light & Heating Company, New York.—National storage battery for car lighting, axle generators, regulating panels, lamp regu[illegible]
[illegible] Company, Chicago.—Interphones and train lighting [illegible]
[illegible] & Manufacturing Company, Pittsburgh, Pa.—Lamps and lighting specialties.
Willard Storage Battery Company, Cleveland, Ohio.—Storage batteries for [illegible]

The government of Peru has entered into a contract with the Arthur Koppel Company, Berlin, to build the first section of the Paita-Maranon Railway. The approximate cost of this work is estimated to be $ 000,000, to be met by the issue of 6 per cent. government bonds.

MALLET LOCOMOTIVES FOR THE SOUTHERN PACIFIC.

The Southern Pacific Company recently received twelve Mallet locomotives from the Baldwin Locomotive Works, Philadelphia, Pa., which will be used in passenger service on the Sacramento division of the Central Pacific. Eastbound there is a continuous ascending grade from Sacramento, Cal., to Summit, a distance of 105 miles. The total rise is 7,000 ft., and the maximum grade is 116 ft. per mile for about 40 miles. Since 1907 the passenger service on this division has been handled by ten-wheel locomotives built to the Associated Lines standards. They weigh 203,000 lbs., and have 160,000 lbs. on the driving wheels. The tractive effort is 34,700 lbs., and two engines are required to handle a 500-ton train on the 116-ft. grade. Each of the new Mallet locomotives will replace two of the ten-wheel engines and under ordinary conditions, the double heading of passenger trains will be avoided. The general design of the new locomotives follow that of the Mallet freight locomotives with 2-8-8-2 wheel arrangement, which were described in the *Railway Age Gazette*, April 30, 1909, page 933, and have



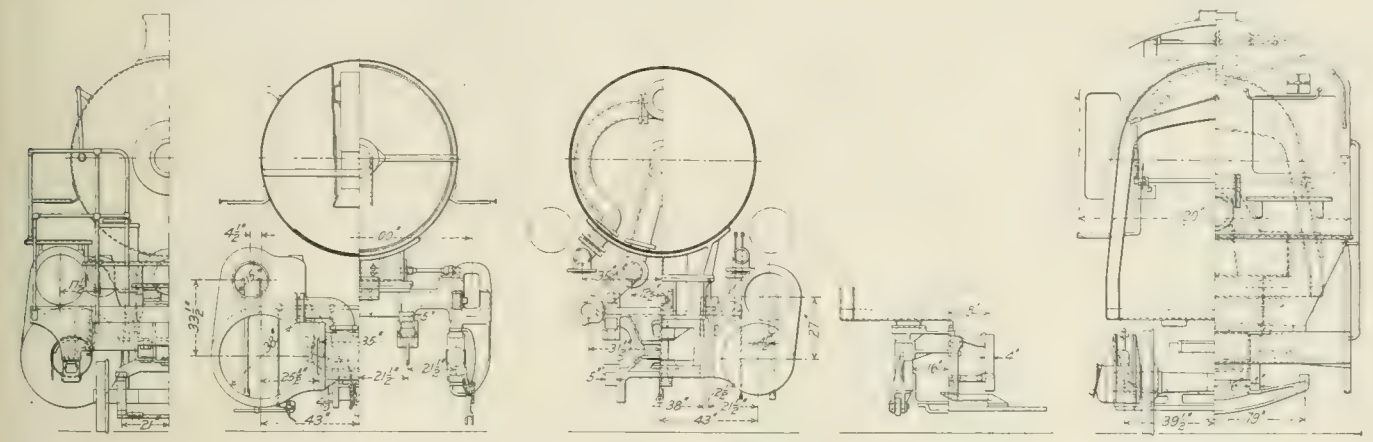
Cast Steel Saddle for Mallet Locomotive.

been in successful use on this division since 1909. A number of modifications have been introduced, however, and these include some features which are new to the practice of the builders.

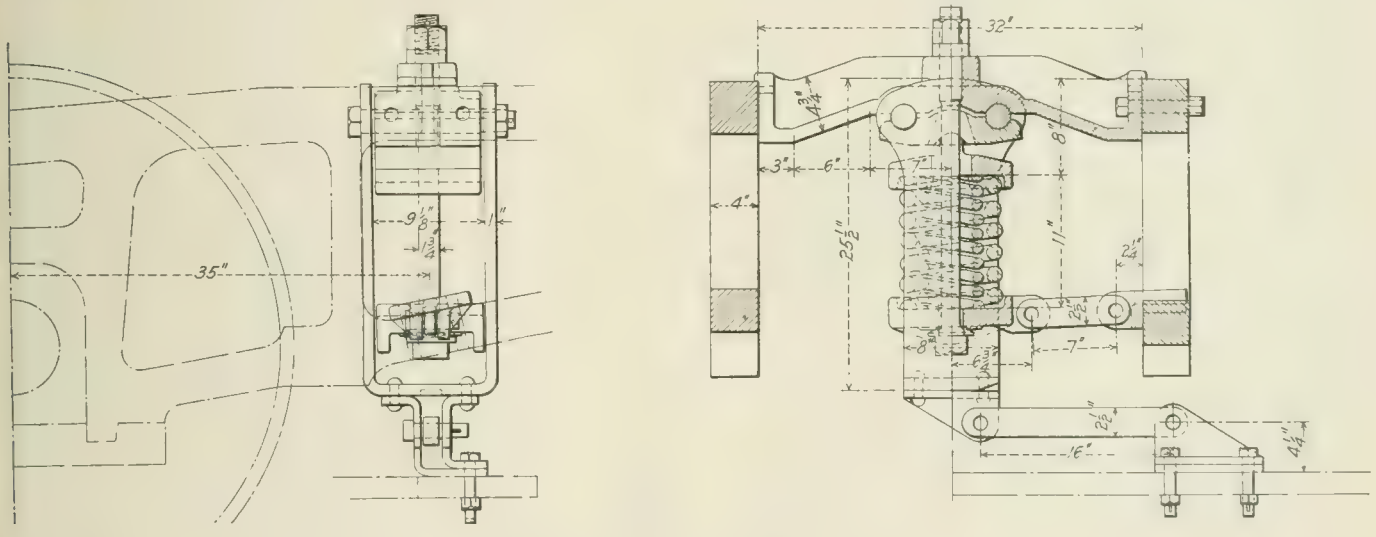
The boilers of the new Mallet engines are of the separable type, with the dome placed a short distance ahead of the firebox. An internal dry pipe conveys the steam from the dome to the intermediate combustion chamber. This chamber contains right and left hand steam pipes of the ordinary construction, which communicate with short horizontal pipes leading to the high pressure steam chests. The high pressure exhaust is conveyed to the smoke-box through a horizontal pipe located in a large flue which traverses the feedwater heater, and is carried to the flexible receiver pipe. The injector piping is arranged so that the feedwater enters the heater on the bottom center line and leaves it on the top center, thus causing the water to circulate through the entire heater. The hot water enters the boiler proper on both sides, at a distance of 35 in. from the front tube sheet. Check valves are placed at both the heater and the boiler inlets.

The steam distribution to all cylinders is controlled by inside admission piston valves, which are of the built-up type 15 in. in diameter. The valves are operated by the Walschaert valve gear, and are set with a lead of 5/16 in. The exhaust clearance of the high pressure valves is ¼ in., and of the low pressure ⅜ in. No by-pass valves are used, but a large relief valve is tapped into the steam pipe leading to each cylinder. Special attention has been given to the steam distribution, and to providing ample sectional areas in the steam and exhaust piping. The low pressure pistons have extension rods which are supported on crossheads at their outer ends, the guides for these crossheads being carried by the cylinder heads and the cast steel bumper beam. The crossheads have cast steel bodies and bronze gibs, and these bear on the tops of the guides only.

The high pressure cylinders are secured to the saddle by a slab frame 26 in. deep and 2½ in. wide, which is interposed between them. This slab is spliced to the main frame by 21 bolts 1½ in. in diameter, and by two vertical keys, driven in a parallel key-way, with their tapered faces in contact. The same plan is used for keying the frames to the cylinders and saddle. The saddle itself is of cast steel, and is composed of two sections. The lower section extends the full depth of the slab frames, and supports the hinge pin, which is 7 in. in diameter. With this arrangement the separate crosstie heretofore used to support the lower end of the hinge pin is combined with the saddle casting and the cylinders, frames and saddle are



Sections of Mallet Locomotive.



Centering Device for Trailing Truck.

Mallet Passenger Locomotive with Cab at Leading End; Southern Pacific.

bolted and keyed together to form a strong and rigid structure. The low pressure cylinders are bolted directly to a steel box-casting which is secured to the frames.

These engines are designed to run firebox end first to give the enginemen an unobstructed view of the track. The truck under the firebox therefore becomes the leading truck. It is of the Hodges type, and has spring links jointed so as to allow a fore-and-aft motion, as well as a lateral motion. A new design of centering device is applied to this truck. It consists of a double coil centering spring that is held in a vertical position between two cast steel washers, and is guided by a vertical thrust bar. This thrust bar is placed on the center line of the locomotive and is suspended from a crosstie. The upper spring washer bears on the crosstie, through two 2-in. pins and a bearing plate. On these pins is suspended a U-shaped strap, which is wide enough to embrace the spring washers. A link connects the lower end of the strap with a lug which is bolted to the truck frame. When the frame is displaced from its middle position, the strap is pulled to one side, and one of the upper pins is drawn down, thus pushing on the bearing plate and throwing the spring into compression. The bottom spring washer is held in place by a link which is pinned to the engine frame.

These locomotives are equipped for burning oil, and the tenders are coupled at the smoke-box end. The two tanks are semi-cylindrical in shape, and are placed end to end. The tender frame is composed of 12-in. channels weighing 40 lbs. per foot, and braced transversely. The end bumpers are of cast steel. The tender trucks and the trailing truck, are equipped with Standard forged and rolled steel wheels. A table of the important dimensions and ratios follows:

General Data.

Type	2-6-6-2
Service	Passenger
Fuel	Oil
Tractive effort	66,500 lbs.
Weight in working order	568,000 lbs.
Weight on drivers	320,100 lbs.
Weight of engine and tender in working order	568,000 lbs.
Wheel base, driving	32 ft.
Wheel base, rigid	11 ft.
Wheel base, total	51 ft. 4 in.
Wheel base, engine and tender	85 ft. 1 in.

Ratios.

Total weight ÷ tractive effort	5.76
Weight on drivers ÷ tractive effort	4.80
Tractive effort × diam. drivers ÷ heating surface	591.
Total heating surface ÷ grate area	101.7
Firebox heating surface ÷ total heating surface, per cent.	3.3
[illegible]	41.
Total weight ÷ total heating surface	54.
Volume of equivalent simple cylinders, cu. ft.	22.5
Total heating surface ÷ vol. cylinders	316.
Grate area ÷ vol. cylinders	3.11

Cylinders.

Kind	Compound
Diameter	25 in. and 38 in.
Stroke	28 in.

Valves.

[illegible]	Piston
[illegible]	14 in.
[illegible]	16 in.

Wheels.

Driving, diameter over tire	63 in.
Driving, thickness of tire	3½ in.
[illegible]	11 in. x 12 in.
Driving journals, others, diam.	10 in. x 12 in.
Engine truck, diameter	30½ in.
[illegible]	6 in. x 12 in.
Trailing truck, diameter	45 in.
Trailing truck journals	8 in. x 14 in.

Boiler.

[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
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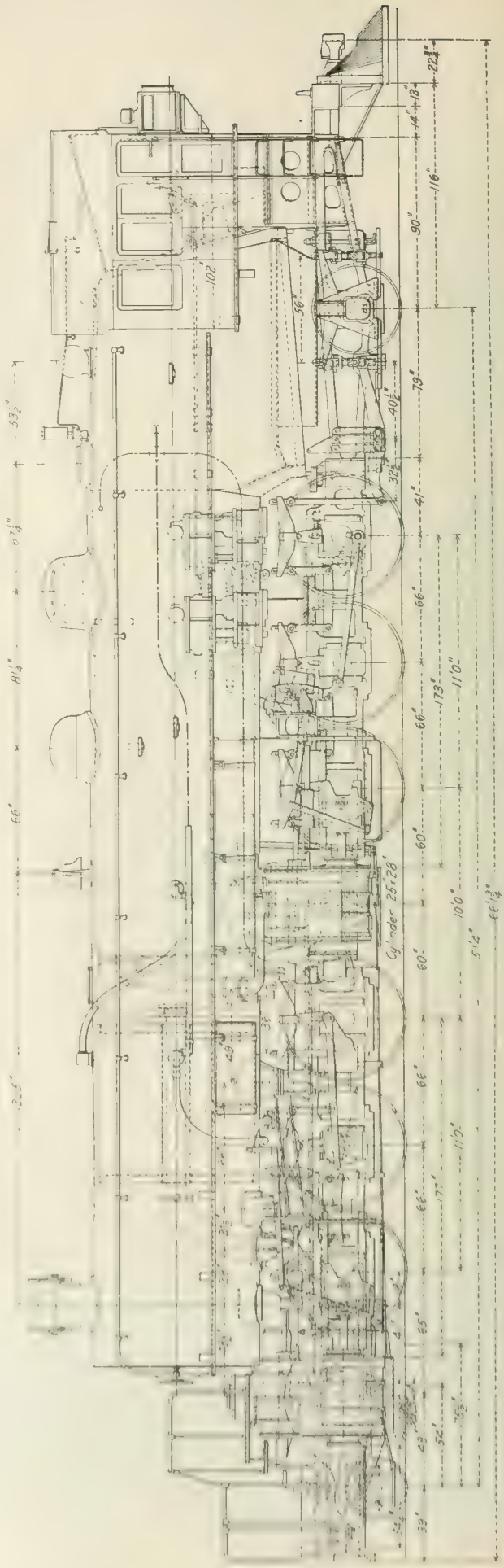
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

Tender.

[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
Oil capacity	[illegible]



Oil Burning Mallet Passenger Locomotive; Southern Pacific.

ELECTRIC POWER FOR RAILWAY SHOPS.*

There are three systems of generating current for operating shop machinery; alternating current, direct current, and a combination of both. The first modern repair shops used direct current exclusively. This was due both to lack of knowledge concerning the characteristics and uncertainty regarding the feasibility of using alternating current; also the high cost of motors and generating apparatus which then prevailed. About seven or eight years ago shops were installed using a combined alternating current and direct current system. In some cases both direct current and alternating current prime generating units were used, and direct current was obtained through the medium of a motor generator set or a rotary converter. The advantages of the latter arrangement are numerous, but the flexibility of operation and the high efficiency of large units would form a determining factor in deciding on this method in preference to the former.

During the past five years several installations have been made where alternating current is used exclusively, probably the most prominent being that of the New York, New Haven & Hartford shops at Readsville, Mass. The committee is dubious, even at this time as to whether or not the best plan is to use alternating current to the exclusion of direct current, as no doubt exists but what increased output can be obtained from certain classes of machine tools by the use of variable speed direct current motors, in view of the present high labor costs, this is certainly an important consideration. The recent development of multi-speed alternating current motors, and the increased use of variable speed alternating current motors in conjunction with mechanical gear changes, however, may in a short time alter present engineering practice.

Practically all of the machine tool builders have so arranged their machines that the constant speed motor drive may be used through the medium of mechanical gear changes, and in small shop installations where the power plant capacity does not exceed 500 k.w., it would seem inadvisable to complicate power distribution by installing both alternating and direct current, inasmuch as the relative saving in labor would be less than in a large shop where, as in a great many cases, manufacturing is done for smaller shops on the system.

In the first place, we must consider the original cost, beginning at the power plant and ending at the motors which drive the machinery. The cost of certain parts of the power plant will remain practically constant, regardless of whether or not direct or alternating current is used, provided, of course, that the same method of operating generating units is decided on. If alternating current turbines are compared with direct current generators with cross-compound condensing engines, the cost of the building and foundations would be considerably greater for the latter installation; the boilers, condensers and other accessories would remain practically the same. We should assume, however, that the comparison would be between alternating current turbo-generators, and direct current turbo-generators; in which case the cost of the building and all equipment, exclusive of the generating units, would be essentially the same. Where alternating current is decided on the installation of turbines is practically the only thing considered, as recent developments in the design of non-condensing units makes them eminently satisfactory where water cannot be secured for condensing purposes. In the case of direct current many engineers prefer engine type units to turbo-generator units.

We give below the approximate first costs of generating units in a power plant installation to provide power and light for a large locomotive and car repair shop, with fifty pits in erecting shop, and sufficient car repair facilities to take care of the division on which the shop is located. Undoubtedly, for a shop of this character and size, most engineers would decide upon three prime generating units of approximately 750 k.w. capacity each; and, if a combination system is considered, two motor generator sets of approximately 300 k.w. capacity each, to provide direct current for the variable speed machine tools and, possibly, for the cranes. The first cost for generating units will be as follows:

Alternating current (turbines)	$41,500
Alternating current (engine type generating units)	74,500
Direct current (turbines)	65,000
Direct current (engine type generating units)	72,000
Alternating and direct current (turbines)	51,500
Alternating and direct current (engine type generating units)	84,500

Special attention is called to the fact that the above estimate on a combined system, contemplates the use of a synchronous motor in connection with the motor generator set as a power factor corrective device. It is the usual method for electrical manufacturers to rate alternating current generating units on the basis of 80 per cent. power factor. By actual practice, however, it has been ascertained that the power factor usually prevailing in both manufacturing establishments and railway shops, will vary from 55 per cent. to 75 per cent., rarely being as high as 80 per cent. On this account it is generally advisable to install a synchronous motor in the power plant, which can either be efficiently used for driving direct current generators or as a synchronous condenser, floating on the line to bring the power factor up to the desired point.

It is clearly evident that a straight alternating current installation is far cheaper in first cost, from the power plant standpoint, than either of the alternatives. Next, the distributing system must be considered. We are practically limited on account of commutation to 250 volts as a potential for transmitting direct current, but in the case of alternating current 440 volts or 550 volts are generally used. Taking into consideration transmission line losses alone, we can transmit nearly four times the power at 440 volts alternating current as at 250 volts direct current, with the same percentage of loss. In shop practice, however, the limited distance at which power is transmitted generally makes the current carrying capacity of the wire a determining feature, rather than the losses through resistance. On this account it will probabty be found that the transmission lines for alternating current will require about 60 per cent. as much of copper as those used for direct current. The percentage of loss, however, will, of course, be considerably less, on account of the higher voltage at which the current is transmitted.

It has been customary where direct current is used to operate both arc and incandescent lamps from a 250-volt circuit. With an installation of this character, the life and efficiency of incandescent lamps are greatly reduced, and the arc lamps do not operate as successfully as on a 125-volt circuit. The development of the tungsten lamp for shop lighting has practically made imperative the use of 125-volt transmission, which in the case of direct current would require special generators for this service, on the assumption that 250 volts has been standardized for power service. It is very simple in the case of alternating current to obtain the low tension lighting voltage, as the transmission can be made at the full voltage of the generating unit, and transformed to the desired potential near the point at which it is used.

Some consideration must be given to the relative cost of alternating current and direct current motors for operating machinery and cranes. We would estimate that the cost of alternating current motors for individual and group drive would be less than direct current motors, but the cost of alternating current motors for cranes will be somewhat in excess of direct current motors, as the fundamental principles of alernating current motor construction make it necessary to use on cranes much larger alternating current motors than direct current motors. The ease of speed control, however, is approximately the same, and it is doubtful if an operator could tell from the operation of the crane whether direct current or alternating current motors were applied.

As a general proposition, it is only fair to assume that the difference in first cost of electrical equipment for a large railway repair shop, based on the use of alternating or direct current, would be mainly represented by the difference in cost of

*Abstract of a committee report presented at the Chicago meeting of the Association of Railway Electrical Engineers, November, 1911. The committee consisted of C. J. Cadwell (chairman), C. L. Kincaid, J. C. McElree, J. H. Klink, A. I. Totten, and J. Dixon.

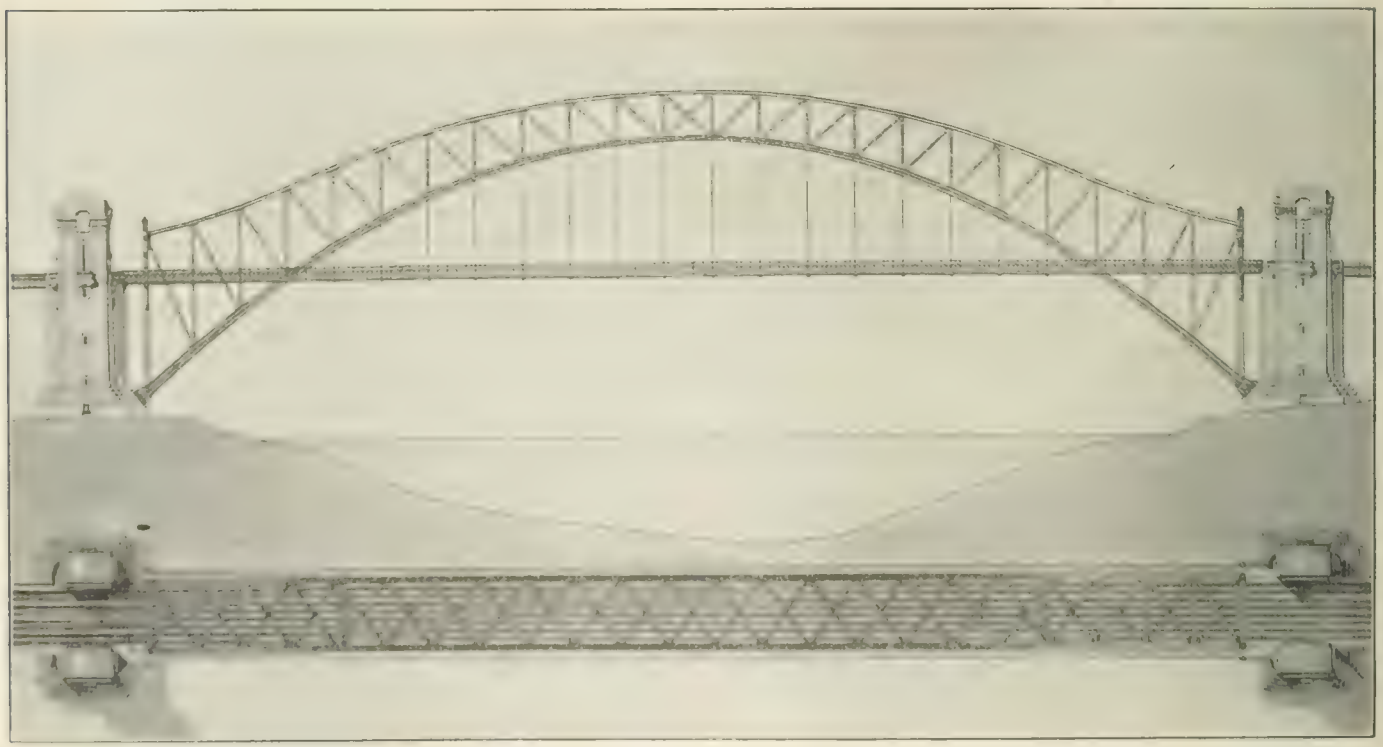
the power plant equipment. The saving in the transmission system, by using alternating current, and the lower cost of alternating current motors for driving machine tools, would be practically counterbalanced by the increased cost of alternating current motor driven cranes and variable speed machines, where it is necessary to provide them with mechanical speed changes.

We should bear in mind the possible necessity in the future of transmitting current for a long distance for the purpose of operating pumps, or furnishing light to depots or other property removed from the power plant. Also the possible likelihood of purchasing alternating current from a hydroelectric company based on rates lower than the same current could be generated by the railway.

The general conclusion is that alternating current should be used exclusively in small division railway repair shops, where the capacity of generating units in the power plant does not exceed 500 k.w., and that the combination of alternating current and direct current should be used in larger installations. The direct current units should be installed for the purpose of operating variable speed machine tools only. The use of alternating current for operating cranes, transfer tables, turntables and hoists it would not only be feasible but strongly advisable if the compressed air consumption is greatly reduced by the substitution of electrical equipment as above indicated.

STEEL ARCH BRIDGE OVER THE EAST RIVER, NEW YORK.

Contracts were let last week for the steel work of the New York Connecting Railroad's bridge over the East river at Ward's and Randall's islands. The New York Connecting, which is owned jointly by the Pennsylvania and the New York, New Haven & Hartford, is to connect the Long Island Railroad's belt line, now building around Brooklyn from Bay Ridge, with the Harlem river branch of the New Haven. This branch of the New Haven has been six-tracked and will be electrified. A large part of the through freight from New England now carried from the Harlem river terminals of the New Haven around New York harbor by long car ferry routes to the rail terminals of the roads on the New Jersey shore will be carried by the new line down to the Bay Ridge terminals and thence by car ferry across to the Pennsylvania's Greenville terminals, as shown on the accompanying map. There will also be a connection with the Pennsyl-



Elevation and Plan; Hell Gate Bridge.

exists for converting alternating current to direct current for

1,000 to 10,000 cu. ft. of free air. In order to obtain this vol-

We desire to unequivocally endorse the substitution of electric

of electric drive for hoists, riveters, chipping hammers, drills, etc., makes it wholly practical to eliminate the majority of pneu-

pressors to be electrically driven and arranged to automatically

may not be wholly feasible under present operating conditions,

tunnels at Sunnyside yards, by which through passenger cars and trains can be handled.

The plans for this connecting road were published in the *Railroad Gazette* of December 28, 1906, April 12, 1907, and May 31, 1907. In the latter article, drawings of the proposed four-track 1,000-ft. steel arch bridge over Hell Gate were shown. A somewhat similar view of the bridge is published herewith. Since the plans of the bridge were made public in 1907 there have been but few changes. The New York Connecting is to be 12 miles long. The southerly part will be largely on an earth fill with concrete retaining walls, the numerous intersecting streets being spanned by concrete arches and by girders. The approach to the bridge at Hell Gate was originally planned as an all steel viaduct. It has since been decided to use plain concrete piers, [illegible] girder spans. This construction will be used also across Ward's island. The line will be carried over Little Hell Gate channel between Ward's and Randall's islands by a five-span deck truss bridge. The character of this bridge is not fully

decided on, however, as the War Department has not decided what it will do with regard to a proposed plan for deepening this channel. The viaduct continues over Randall's island and will be carried over the Bronx kills on a bridge yet to be decided on, for the same reason that Little Hell Gate bridge is still in doubt. The contract just let is for the Hell Gate bridge, the portion over

New York Connecting Railroad and Pennsylvania Railroad Connections.

Ward's island and the southerly approach. The work is to be completed in the spring of 1914. The great majority of the right-of-way for the whole road has been acquired.

Gustav Lindenthal, consulting engineer of the railway, designed the bridge, with Palmer & Hornbostel, architects.

ACCIDENT BULLETIN NO. 40.

The Interstate Commerce Commission has issued Accident Bulletin No. 40, containing the record of Railway accidents in the United States during the three months ending June 30, 1911, and also the totals for the year to that date.

The number of persons killed in train accidents during the quarter was 152, and of injured 2,936. Accidents of other kinds, including those sustained by employees while at work, by passengers in getting on or off cars, by persons at highway crossings, by persons doing business at stations, etc., by trespassers, and others, bring up the total number of casualties, excluding "industrial accidents," to 17,317 (2,216 killed and 15,101 injured). The casualties are classified in Table No. 1, given herewith, including some details from Table 1B, not here shown.[1] The accident statistics of electric lines are given in a separate table. Supplementing the statement of railway accidents proper, the commission gives the following record of "Industrial Accidents"; those occurring to employees of the railway on railway premises in which the movement of cars or engines is not involved:

Industrial Accidents to Employees.

	Killed.	Injured.
While working on tracks or bridges	42	4,993
At stations, freight houses, engine houses, coaling stations, water stations, etc., where no moving railroad car or engine is involved	6	4,371
In and around shops	20	8,441
On boats and wharves	5	226
At other places	14	1,129
Total	87	19,160

Adding the casualties to employees in industrial accidents to the figures given in the larger table, the total number of employees killed, including those not on duty, is 659, and injured 28,605; and this makes the total number of persons killed, all classes, 2,303, and injured 34,261.

TABLE NO. 1A.—COMPARISON OF PRINCIPAL ITEMS WITH LAST QUARTERLY BULLETIN AND WITH ONE YEAR BACK.

		Bulletin 40.	Bulletin 39.	Bulletin 36.
1.	Passengers killed in train accidents	21	28	12
2.	Passengers killed, all causes	58	66	55
3.	Employees (on duty) killed in train accidents	107	105	125
4.	Employees (on duty) killed in coupling	37	55	45
5.	Employees (on duty) killed, total (Table 1B)	512	647	711
6.	Total, passengers and employees (items 2 and 5, above)	570	713	766
7.	Other persons killed (including trespassers, nontrespassers, and employees not on duty), all causes	1,646	1,411	...
8.	Employees killed in industrial accidents	87	113	...

The total number of collisions and derailments in the

[1]This bulletin is the fourth to be issued under the revised accident law. The quarterly bulletins previous to No. 37 included only four classes of accidents, namely, (1) collisions, (2) derailments, (3) casualties to passengers, and (4) casualties to employees on duty. The statistics of other accidents on railroads previous to July 1, 1910, will be found in the annual statistical reports of the Commission.

The class termed "Industrial accidents," as found in the present bulletin, includes a large part of those casualties to employees which in former bulletins have been included in the eighth item ("Other causes") of Table No. 1, as explained in Bulletin No. 37.

TABLE NO. 1.—CASUALTIES TO PASSENGERS, EMPLOYEES AND OTHER PERSONS.

	Passengers.		Employees on duty.		Employees not on duty.		Other persons not trespassing.		Trespassers.		Total persons.	
	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.
Collisions	9	664	44	451	2	10	2	17	1	8	58	1,150
Derailments	12	826	49	415	1	10	3	4	12	27	77	1,282
Accidents to trains, cars, or engines, except collisions, derailments, and boiler explosions	...	49	5	178	...	2	...	9	...	2	5	240
Bursting of, or defects in, locomotive boilers or boiler attachments	...	...	9	261	...	1	...	2	3	...	12	264
Total train accidents	21	1,539	107	1,305	3	23	5	32	16	37	152	2,936
Accidents to roadway or bridges not causing derailment, such as fires, floods, landslides, explosions, etc.	1	2	4	9	...	...	8	13	...	...	13	24
Coupling or uncoupling cars (does not include accidents with air or steam hose)	...	...	37	697	...	...	...	...	...	...	37	697
While doing other work about trains (not in shops or engine houses) or while attending switches	...	...	17	370	...	...	...	...	...	...	17	370
Coming in contact, while riding on cars, with overhead bridges, tunnels, or any signal apparatus, or any fixed structure above or at the side of the track	1	11	10	321	...	5	...	4	10	23	22	364
Falling from cars or engines	3	73	73	1,065	4	8	6	18	94	147	179	1,311
Getting on or off cars or engines	21	556	29	1,496	9	74	...	29	154	513	215	2,668
Other accidents on or around trains not here named	...	767	8	283	1	18	3	123	2	55	12	1,146
Being struck or run over by engine or car at stations or yards	9	...	114	87	18	12	8	58	261	262	430	658
Being struck or run over by engine or car at highway grade crossings	1	2	2	2	1	1	168	501	34	29	206	535
Being struck or run over by engine or car at other places	...	1	104	104	19	10	23	21	728	344	874	480
Other causes	1	100	7	110	5	28	15	269	31	95	59	602
Total other than train accidents	37	1,534	105	2,954	57	163	251	1,046	1,314	1,468	1,964	12,165
Grand total	58	3,073	512	9,259	60	186	256	1,078	1,330	1,505	2,216	15,101

quarter now under review was 2,550 (989 collisions and 1,561 derailments), of which 101 collisions and 187 derailments affected passenger trains. The damage to cars, engines and roadway by these accidents amounted to $2,008,471, as shown below:

TABLE NO. 2.—COLLISIONS AND DERAILMENTS.

	Number.	Loss.	Killed.	Injured.
Collisions, rear	121	$121,356	4	150
Collisions, butting	92	208,348	33	516
Collisions, train separating	72	32,739	1	55
Collisions, miscellaneous	704	313,531	20	429
Total	989	$675,974	58	1,150
Derailments due to defects of roadway, etc.	326	$314,184	27	466
Derailments due to defects of equipment.	690	517,900	11	155
Derailments due to negligence of trainmen, signalmen, etc.	86	53,214	6	140
Derailments due to unforeseen obstruction of track, etc.	60	67,085	6	104
Derailments due to malicious obstruction of track, etc.	22	21,031	1	62
Derailments due to miscellaneous causes.	377	359,083	26	355
Total	1,561	$1,332,497	77	1,282
Total collisions and derailments	2,550	$2,008,471	135	2,432
Total for same quarter of 1910	2,609	2,124,506	123	2,245
1909	2,100	1,703,642	91	1,842
1908	2,130	1,617,398	104	2,008

In Table No. 2A will be found the usual list of class A train accidents—all in which the damage is reported at $10,000 or over, notable cases in which passengers are killed, and those doing damage less than $10,000 and down to $2,000, wherever the circumstances or the cause may be of particular interest:

TABLE NO. 2A.—CAUSES OF 26 PROMINENT TRAIN ACCIDENTS.

[Note.—R stands for rear collision; B, butting collision; M, miscellaneous collisions; D, derailment; P, passenger train; F, freight and miscellaneous trains.]

COLLISIONS.

No.	Class.	Kind of train.	Killed.	Injured.	Damages to engines, cars and roadway.	Reference to record.	Cause.
1	R	P and F	1	3	$1,665	1	Exceeding speed limit at point of collision, engineman held responsible. Was dismissed from the service.
2	B	P and F	..	8	11,533	2	Freight crew held to blame for not looking at time card or making inquiry of each other as to the movement of passenger train. No train orders involved. (See note in text.)
3	B	P and F	1	24	7,512	3	Train No. 2 ran by meeting point. (See note in text.)
4	M	P and F	..	8	4,251	4	Failed to protect train with flag.
5	R	P and F	..	11	3,200	5	Delay in flagging passenger train.
6	B	P and F	..	17	8,900	6	Disobeying orders.
7	B	F and F	2	2	9,204	7	Misunderstanding of despatcher's orders. (See note in text.)
8	M	F and F	1	2	3,994	8	Engineman with meeting orders pulling through siding and fouling main track.
9	R	F and F	1	2	4,935	9	Not protecting train by flag.
10	B	P and F	14	28	35,200	10	Failure of train No. 12 to receive order No. 19. (See note in text.)
11	B	F and F	4	4	10,700	11	Despatcher overlooking orders.
12	R	F and F	4	4	22,000	12	Caused by bad condition of lights and failure of engineman to observe them. (See note in text.)
13	B	P and F	2	18	3,700	13	Conductor thinking he had plenty of time remained out on main track too long, and neglected to send out flag.
		Total	26	141	$181,744		

DERAILMENTS.

1	D	F	1	3	$4,912	1	Excessive speed over skeleton track.
2	D	P	1	8	4,391	2	Broken rail. (See note in text.)
3	D	F	2	1	6,065	3	Explosion of locomotive boiler caused by low water.
4	D	P	..	20	11,000	4	Excessive speed on curve.
5	D	P	1	104	10,000	5	Defective track; error in judgment of section foreman in not flagging. (See note in text.)
6	D	F	1	..	4,500	6	Trestle gave way.
7	D	P	1	10	[illegible]	7	Broken rail.
8	D	P	1	1	14,641	8	Defective track; error in judgment of track foreman in not having sufficient ballast on track and at the heads of the ties on the outside curve to hold it.
9	D	P	1	11	7,000	9	Spreading rails.
10	D	P	1	..	500	10	Without looking at dike of irrigating ditch.
11	D	P	1	2	10,000	11	Excessive speed on sharp curve. (See note in text.)
12	D	F	1	..	5,000	12	Excessive speed.
13	D	F	3	..	3,000	13	[illegible] neglected to get a right-hand switch point. "Feather rail" used as a temporary splice to make connection.
		Total	20	41	$80,109		
		Total collisions and derailments	46	182	$261,853		

Collision No. 1 between westbound freight train No. 553 and southbound passenger train No. 48 was due to the engineman of the freight train relying on his memory as to the time of passenger train No. 48. He thought the train was due to leave [illegible] at 9 a. m., about an hour and a half later than it was due to leave. He did not examine his time table, neither was anything said to the fireman or any other member of the crew as to where they should meet the train. The conductor of the freight train thought the engineman was going to M for No. 48, and as he was working on his reports, he did not notice the train was passing M until it had gone past the switch; and shortly after passing the switch the collision occurred.

There was a failure on the part of each member of the freight-train crew to have an understanding as to where No. 553 would meet No. 48. None of the members of the crew of the freight train looked at the time table or made inquiry of each other as to this passenger train.

Collision No. 3 was a butting collision of passenger trains —No. 2 moving about 6 miles an hour colliding with No. 1 running about 35 miles an hour. Train No. 2 ran by the meeting point. Employees at fault; in the service of the company more than eight years. The conductor is the only living employee considered responsible. He claims to have sounded one blast of the air whistle approaching station, which, according to the rules of the company, called the attention of the engineman to a meeting point. This signal, the conductor claims, was answered by the engineman, who reduced speed of train to some extent. The conductor thought he saw train No. 1 standing on siding, though both his brakeman and the porter told him they did not see the train, and while he was debating in his mind as to whether or not train was on siding the collision occurred. The conductor could and should have stopped the train by using the emergency air brake valve.

Collision No. 7, between extra freight No. 2633 and extra freight No. 2410 at TL switch north of GL station, was due to a misunderstanding of meeting orders. Conductor of extra 2633 received order No. 15 giving him running order to TL and to meet extra 2410 at GL. At GL he received another order (No. 17) to meet extra 2410 at LV instead of GL and at the same time received an order (No. 18) annulling order No. 17. These orders were put out by a despatcher who was but recently appointed and when the despatcher annulled order No. 17 the meet in order No. 15 still stood. These orders were delivered to the engineman

by the head brakeman on the train and not by the conductor. The report states that the engineman says he understood the orders to meet with extra 2410 had been annulled. A heavy fog prevailed at the time. The conductor and engineman were held responsible for the accident and were dismissed from the service.

Collision No. 10 (Indianola, Neb., May 29), in which 14 persons were killed and 28 injured, between westbound passenger train No. 9 and eastbound passenger train No. 12, was due to the failure of the operator at M to deliver an order to the eastbound train, which provided for the meeting place of these trains. The operator who handled the orders at M failed to deliver to crew of train No. 12 order No. 19. (Conductor of train No. 12, when he arrived at RW, not having order No. 19, proceeded without meeting train No. 9.)

The conductor on train No. 12 received at M a train order which stated that he should have, among other orders, order No. 19. He failed to check the orders given him by the operator at M, and for that reason did not notice the non-delivery of this order. The operator at M is at fault for failure to deliver order No. 19. The conductor and engineman in charge of train No. 12 are at fault for failure to properly check their orders and see whether they had order No. 19.

The operator at fault had been off duty 16 hours with 8 hours' sleep, and on duty 5½ hours at the time of the accident. He has been in the employ of this company as operator and extra despatcher for the past six years, and claims that he did not receive order No. 19 addressed to No. 12, and consequently did not hold this order for delivery to the train when the conductor reported for orders. The train despatcher's record shows that the order was transmitted to the operator at M.

Collision No. 12 was a rear collision of eastbound freight trains, derailing engine and five cars of the rear train and the caboose and five cars of the forward train; the wreckage being thrown across four main tracks. About this time two other trains, bound west on tracks Nos. 1 and 3, were caught in the wreckage. This accident was due to the bad condition of lights and the failure of enginemen to observe the rules governing them, the lights on the home signal being out, and no effort made by towerman to have them lighted until after the wreck occurred.

The first train passed the block station F going east on track No. 2 at 11:16 p. m. and stopped about one-half mile east of the station, on account of air brakes leaking. The flagman who was ordered back to flag this train was a new man with only one month's service and was not familiar with the road and did not go back a sufficient distance to insure full protection to his train and he also failed to place a lighted fusee between the tracks when called in. The following train passed block station F at 11:31 p. m. with the signal set at danger, and struck preceding train at about 11:32 p. m. The lights on the home signal were out, but distant signals were burning and showed yellow, which is caution.

Towerman at place of accident stated that he saw train following the one that was struck entering the block with his signal set at danger, and realizing that the preceding train had not yet cleared, he grasped a red light and the extra towerman, who was in the tower with him, grasped a white light, and both swung the lamps, endeavoring to stop the train. The red light was swung from the tower window facing track No. 2, the white light swung from the window on the west side of tower, for neither one had time to get to the ground where a signal would be more apt to be seen; but all their efforts to stop the train failed.

Derailment No. 2 was caused by passenger train No. 4 running about 40 miles an hour, the engine jumped the track and went down embankment of about 10 feet. A thorough investigation failed to disclose the cause. However, the report furnished says a rail was found lying in the ditch, which

TABLE NO. 1B. CASUALTIES TO PASSENGERS, EMPLOYEES, AND OTHER PERSONS, YEAR ENDING JUNE 30, 1911.

	Passengers.		Passengers on freight trains.		Persons carried under agreement or contract.		Total pass.		Train men.		Trainmen in yards.		Yard trainmen.		Switch tenders, crossing tenders, and watchmen.		Trackmen and bridgemen.		Other employees.		Total employees on duty.		Employees not on duty.		Other persons not trespassing.		Trespassers.		Total persons.	
	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.
Collisions of trains	55	3,176	14	121	24	375	93	3,672	184	1,634	41	578	34	480	2	7	16	127	20	245	297	3,071	7	135	6	79	33	37	436	6,994
Derailments of trains	89	2,374	2	150	7	360	48	2,884	184	1,211	18	145	19	193	1	4	13	76	14	119	249	1,748	6	34	3	45	43	88	349	4,799
Boarding or alighting from trains in motion		85		15	1	61		441	8			93	8	109				17		30	18	690		4	2	48	2	11	23	914
Coupling or uncoupling cars		5						5	52	762	1	174	3	132		3		1		20	56	1,092		1		3	3	5	59	1,106
Total	94	5,640	16	286	32	796	142	6,722	428	4,048	61	990	64	914	3	14	30	221	34	414	620	6,601	13	174	11	175	81	141	867	13,813
Collisions of trains	2	16	..	..	..	4	2	20	2	55	..	13	1	13	..	2	..	6	..	16	5	73	1	2	10	20	2	..	20	115
Derailments of trains	..	..	..	..	..	..	..	..	69	858	33	511	96	1,529	..	10	..	1	..	57	209	2,966	..	..	..	..	..	..	209	2,966
Boarding or alighting from trains in motion	5	28	..	..	1	7	6	35	52	698	7	267	12	489	1	6	..	11	4	30	76	1,510	..	13	1	9	30	81	115	1,648
Coupling or uncoupling cars	43	264	2	17	11	36	54	317	157	2,207	60	1,046	119	1,795	4	27	17	107	25	427	379	5,450	12	53	14	64	389	564	848	6,456
Other accidents to trains	36	2,414	2	54	2	72	90	2,540	49	2,983	28	1,372	38	2,499	4	67	11	162	17	442	160	7,530	37	305	18	155	570	1,696	805	12,226
Total	86	2,721	..	287	3	444	8	3,592	52	6,842	128	3,399	265	6,425	9	112	28	387	46	1,260	824	17,529	50	407	43	428	1,024	2,346	1,993	23,251
Collisions of trains	..	104	..	4	4	7	43	115	52	1,121	85	187	111	280	43	67	17	265	23	457	786	1,357	2	91	8	448	21	218	66	2,975
Derailments of trains	..	3	..	..	..	..	3	3	1	69	..	2	..	6	12	14	1	3	6	11	30	39	11	2	133	364	1,015	1,025	1,970	2,975
Boarding or alighting from trains in motion	1	4	..	..	..	..	1	4	4	47	..	3	3	11	37	19	813	263	105	1,130	968	495	111	54	812	2,261	148	124	992	2,474
Coupling or uncoupling cars	4	399	..	1	..	24	7	424	14	454	3	89	4	119	2	44	13	97	15	224	51	857	13	158	64	1,433	116	390	251	3,332
Total	187	5,753	2	368	25	595	214	6,711	477	17,466	252	6,802	426	10,788	103	425	540	1,173	453	2,593	2,251	39,247	279	780	1,143	4,898	5,203	5,473	9,090	57,109
Grand total	281	11,393	18	649	57	1,391	356	13,433	905	21,514	313	7,792	490	11,702	106	439	570	1,394	487	3,007	2,871	45,848	292	954	1,154	5,073	5,284	5,614	9,957	70,923

had indications of a heavy flange blow on the end of the rail and near the outer side as if the rail had been mismatched and the wheel struck the end of the rail. It also had the flange mark of the wheel on the outer base of the rail almost its entire length, which indicated that a joint had been broken. The track had been inspected by the section foreman at 11:20 a. m. on the day of the accident, which occurred at 5:30 p. m., and there were no indications of the track washing or settling.

Derailment No. 5 was that of a passenger train running 50 miles an hour over a piece of track that was undergoing repairs on the day of the accident, and was caused by the uneven, irregular and insecure condition of track, which would not permit a train to pass over it in safety at a high rate of speed. The derailed train had no notice of the condition of the track. (Martin's Creek, N. J., in April, heretofore reported.)

Derailment No. 11, in which two persons were killed and six injured, was due to excessive speed on a 7-deg. curve in a deep cut. Estimated speed of train at time of derailment, about 45 miles an hour. The engineman at fault was familiar with the road, and the 7-deg. curve at point of accident was brought specially to his attention. The fact that equipment was all new steel cars in first-class condition is a potent factor in the loss of life being so small; only one passenger being injured in this accident.

Electric railways reporting to the commission had 89 persons killed and 771 injured; and there were 38 collisions and 17 derailments. Train accidents are charged with four fatalities—all employees. The total number of passengers killed from all causes was 6 and of employees 18, including 4 in industrial accidents. The number of trespassers struck or run over by cars was 35; 24 killed and 11 injured.

YEARLY TABLES.

This bulletin is the first yearly publication of the accident records under the law of May 6, 1910; it includes all accidents, and therefore the total figures shown in the annual tables are not comparable with those of the annual bulletins for preceding years. We reproduce Table 1-B, a summary of the quarterly tables, but containing more details than we usually give in our quarterly reprint. Previous to July, 1910, the monthly accident reports did not include the table on the preceding page and the following:

	Killed.	Injured.
[illegible]	297	954
In and around shops..	73	35,530
On [illegible]	47	1,204
[illegible]	74	5,420
[illegible] reported in monthly reports prior to July 1, 1910	186	4[illegible]
[illegible]	1,154	5,073
[illegible]	[illegible]	5,614
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

The total number of casualties for the year is 160,555 (10,396 killed and 150,159 injured.) Of this number 439 killed and 79,237 injured are classed under the head of "Industrial accidents," and do not appear in Table 1-B.

Annual Table No. 1-B includes a small proportion of casualties which did not appear in the quarterly bulletins, the reports from which they are taken having been received after the quarterly bulletins were printed.

ANNUAL TABLE 1C.—CASUALTIES TO PASSENGERS AND EMPLOYEES, YEARS ENDING JUNE 30.

	1911.		1910.		1909.	
	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.
Passengers:						
In train accidents...	142	6,722	217	7,516	131	5,865
Other causes	214	6,711	204	6,240	204	6,251
Total	356	13,433	421	13,756	335	12,116
Employees:						
In train accidents...	633	6,775	715	6,791	520	4,877
In coupling accidents	209	2,966	206	2,985	161	2,353
Overhead obstructions, etc.	78	1,523	96	1,377	76	1,229
Falling from cars, etc.	588	13,346	586	13,196	481	10,259
Other causes	1,655	22,192	1,780	44,269	1,218	33,086
Total	3,163	46,802	3,383	68,618	2,456	51,804
Total passengers and employees..	3,519	60,235	3,804	82,374	2,791	63,920

Electric Railways.—The annual table of accidents on electric railways shows a total of 420 persons killed and 3,663 injured, of which 10 deaths and 399 injuries are classed as occurring in industrial accidents. Collisions are charged with 74 passengers and 12 employees killed; derailments, one passenger, four employees and one other person killed. The total of casualties to "other persons" not trespassing is 133 killed and 481 injured; trespassers, 117 killed and 119 injured. These totals include a few casualties which did not appear in the quarterly bulletins. The total number of collisions on electric roads was 176; damage to cars, engines and roadway, $95,830; total derailments, 79; damage, $14,636.

EMPLOYEES IN SERVICE.

The number of employees in service of the railway companies on June 30, 1911, was as follows:

Steam Roads. Employees in service June 30, 1911.

	Number of persons.
1. Trainmen (enginemen, firemen, conductors, brakemen, "trainmen," rear flagmen, train baggagemen)	235,841
2. Other persons employed on trains (dining-car employees, train porters, etc.)	13,245
3. Yardmen (all employees in yard train work and switching—enginemen, firemen, conductors, brakemen, foremen, droppers, fieldmen, etc.)	91,694
4. Switch tenders, crossing tenders, and watchmen	30,231
5. Bridgemen and trackmen	470,556
6. Others (station and miscellaneous employees, excluding all those officers, clerks, shopmen, indoor employees, and others who ordinarily are engaged in work in which they are not liable to railroad accident)	218,408
7. Total	1,059,975
8. Employees excluded from item No. 6	588,058
Total persons employed by steam roads June 30, 1911	1,648,033

ANNUAL TABLE NO. 2.—COLLISIONS AND DERAILMENTS; DAMAGE TO CARS, ENGINES, AND ROADWAY, YEARS ENDING JUNE 30.

	1911.			1910.			1909.		
	Number.	Loss.	Killed.	Inj'd.	Number.	Loss.	Killed.	Inj'd.	Number.	Loss.	Killed.	Inj'd.
[illegible]	1,[illegible]	$1,[illegible]	169	1,526	1,311	$1,398,763	119	2,324	859	$933,375	83	1,556
[illegible]	[illegible]	1,[illegible]	187	[illegible]	[illegible]	[illegible]	194	3,008	488	874,729	159	1,878
[illegible]	[illegible]	[illegible]	2	41	418	164,883	5	197	856	146,067	6	159
[illegible]	[illegible]	[illegible]	133	2,695	3,437	1,551,252	115	2,236	2,681	1,154,520	94	1,802
[illegible]	[illegible]	[illegible]	416	6,994	5,861	$4,629,279	433	7,765	4,411	$3,108,691	342	5,395
[illegible]	[illegible]	[illegible]	17	1,560	[illegible]	$914,642	42	1,337	991	$708,658	25	1,195
[illegible]	[illegible]	[illegible]	64	[illegible]	2,734	2,227,352	40	636	2,362	1,875,646	29	651
[illegible]	[illegible]	[illegible]	16	[illegible]	[illegible]	[illegible]	[illegible]	414	307	186,768	25	329
[illegible]	[illegible]	[illegible]	66	[illegible]	[illegible]	[illegible]	58	825	431	444,308	81	486
[illegible]	[illegible]	[illegible]	16	176	[illegible]	[illegible]	18	227	51	93,037	21	166
[illegible]	[illegible]	[illegible]	146	1,374	1,276	1,184,243	159	1,478	1,217	1,063,095	83	1,338
[illegible]	[illegible]	[illegible]	89	4,799	5,918	$5,194,679	[illegible]	4,814	5,259	$4,371,512	264	4,165
[illegible]	[illegible]	[illegible]	733	[illegible]	[illegible]	[illegible]	[illegible]	12,579	[illegible]	$7,480,203	606	9,560

Proportions killed and injured during the year.

	Number employed.	Killed.	Injured.	Number employed for one killed.	Number employed for one injured.
Trainmen	235,841	1,218	29,306	194	8.0
Yardmen	91,694	490	11,702	187	7.8
Switch tenders, crossing tenders, and watchmen	30,231	106	439	285	68.9
Trackmen and bridgemen	470,556	724	19,906	650	23.6
Total employees in service	1,648,033	3,602	126,039	458	13.1

Electric Railways. Employees in service June 30, 1911.

	Number of persons.
1. Trainmen[1] (enginemen, firemen, conductors, brakemen, "trainmen," rear flagmen, train baggagemen)	20,541
2. Other persons employed on trains (dining-car employees, train porters, etc.)	84
3. Yardmen (all employees in yard train work and switching—enginemen, firemen, conductors, brakemen, foremen, droppers, fieldmen, etc.)	946
4. Switch tenders, crossing tenders, and watchmen	324
5. Bridgemen and trackmen	12,512
6. Others (station and miscellaneous employees, excluding all those officers, clerks, shopmen, indoor employees, and others who ordinarily are engaged in work in which they are not liable to railroad accident)	4,727
7. Total	39,134
8. Employees excluded from item No. 6	12,453
9. Total persons employed by electric railways June 30, 1911	51,587

[1]Includes motormen.

A CO-OPERATIVE SYSTEM AS APPLIED TO TRAIN SERVICE.

BY A TRAINMASTER.

The piece work system in the departments to which it has been applied has in the main brought favorable results to all concerned, because it puts a prize on individual effort—it develops the incentive to produce. In turning over the pages of the train and engineman's schedules we do not find that the payment for freight train service by the train mileage system is in harmony with the desire of the company or (after removing the element of seniority and luck connected with the payment of train service by the mileage system) is to the best interests of the men.

The desire of the company is ton miles, and the spirit of the schedules is train mileage. Naturally, the two interests are enemies from birth. In the beginning, and on some very small roads still, train service was paid for by the day or for some lump sum per month. There was nothing in this arrangement to encourage a man to double the road unless he happened to be starting from his home terminal. As an encouragement for more mileage out of the engines as well as other things, the mileage system of payment was evolved. This was in the day of "fido" engines and when nobody strained their nerves with tonnage. The mileage system of payment fitted the conditions very nicely at that time.

Since that day we have seen wonderful changes in the power and operating conditions in general, and yet no move is made to modernize the system which actuates the men behind the guns to get the best results out of these big instruments, and hence the inevitable discord between heavy tonnage trains and the payment of train service by train mileage—that pounding symptom of leaky valves.

The companies, to meet their needs, must have every ton possible moved for the mileage for which they pay, while train and enginemen can increase their own numbers as well as lighten their own burdens and still make the same money by a radically opposite view, which of course is human nature, pure and simple.

Did you ever stop to consider that it would be possible as well as practicable to pay for train service on a ton mileage basis plus a fixed stipend for train mileage? And that in such a system the drag, that best paying train from a ton mileage standpoint for the company, would also be an equitable if not a more desirable catch for the chain gang man first out? Today he is worrying for fear he will catch a drag and is figuring long in advance on what his chances are of getting passed by the next chain gang crew behind, which has been fortunate enough to catch a hot shot. He is also figuring how much tonnage and work he can evade so as not to get passed.

It is not the intention of this article to say what the rates should be, as these would have to be made for each division separately; and even then would necessarily be changed perhaps as conditions changed. Competent representatives from both parties could do this. The intention is rather to point out the advisability of such a change; and the writer, who has had some experience with the subject from both sides, has gathered the following facts and figures as a basis of argument.

The figures are taken from a record of actual operation, and are the averages of four months, two of winter and two of summer.

The division chosen is on a representative trunk line with a half way point, *B*, which is the intersection of an auxiliary division. The following is the data:

L Length of division *A* to *C*: 100 miles.
l Length of subdivision *A* to *B*: 50 miles; *B* to *C*: 50 miles.

R Rating of power in service between *A* and *B*: 2,275 tons.
rw Rating same power *B* to *C*: 1,255 tons.
re Rating same power *C* to *B*: 1,380 tons.

Vw Average movement *A* to *B*: 11,114 tons per day.
vw Average movement *B* to *C*: 4,695 tons per day.
Ve Average movement *B* to *A*: 9,781 tons per day, 88 per cent. of *Vw*.
ve Average movement *C* to *B*: 3,860 tons per day, 82.2 per cent. of *vw*.

Tm Average train mileage between *A* and *B*: 2 x 442.5 miles per day.
tm Average train mileage between *B* and *C*: 2 x 245 miles per day.

Tw Average train haul *A* to *B*: 1,256 tons per train, 55.2 per cent. of rating.
Te Average train haul *B* to *A*: 1,105 tons per train, 48.6 per cent. of rating.
tw Average train haul *B* to *C*: 958 tons per train, 76.3 per cent. of rating.
te Average train haul *C* to *B*: 788 tons per train, 57.1 per cent. of rating.

Percentage of empties to loads *A* to *B*: 33.9 per cent.; *B* to *A*: 47.1 per cent.
Percentage of empties to loads *B* to *C*: 54.1 per cent.; *C* to *B*: 47.7 per cent.

Nature of traffic *A* to *C*: various loading, empty refrigerator and stock cars, but no time restrictions.
Nature of traffic *C* to *A*: stock, meat, fruit, merchandise, time freight, averaging about 15 miles an hour.

Positive direction of business: that direction in which trains must arbitrarily be run regardless of full tonnage to meet time requirements and protect high class business. It may and it may not be the direction in which the greatest volume of business is moved. It may be influenced from time to time by various other factors, but in this case it has been uniformly from *C* to *A*.
Negative direction of business: opposite from positive.

To attain an ideal train haul the positive direction of business is obviously the point of attack. In this connection, let us see what a monthly train mileage for the division is. This is equal to 30 $(Tm + tm)$, or 41,250 train miles. Then see what a monthly train mileage would have been had the train haul been increased in the positive direction of business to 75 per cent. of the rating. Solving $2\ (ve \times 50 \times 30)$, we get

$$\frac{}{0.75 - re},$$

2 x 5,594 miles per month. Then 11,188 miles per month would have moved the business between *B* and *C*, which of course is accomplished by increasing the train haul *C* to *B* from 788 tons to 1,035 tons per train, while train haul *B* to *C* would have risen from 958 to 1,259 tons per train (4 tons over the rating for the ruling grade) by $\frac{vw \times 30 \times 50}{5594}$

Train mileage between *A* and *B* would then be $\frac{2\ (Ve \times 50 \times 30)}{75 - R}$,

or 17,201 miles, having the effect of necessitating a westward train haul of 1,938 tons per train, by $\frac{Vw \times 50 \times 30}{8000.3}$

It now follows that 17,201 + 11,188, or 28,389 miles, is all that would be necessary to have moved the business were it possible to handle 75 per cent. in the positive direction of business. Then 41,250 — 28,389, or 12,861 miles at 50 cents per mile is $6,430.50 the sum saved per month, or $77,166 per

year. We note from the actual performance that 13 crews making 3,173 miles per month can handle 41,250 miles, and that if 75 per cent. of the rating in the positive direction of business had been maintained, 9 crews making 3,154 miles per month would have moved the business. Hence, there being 5 men to the crew and neglecting the variation between their respective salaries, we find that per man they would have saved the company $\frac{\$6,430.50}{9 \times 5}$, or $142.90. Ten per cent. ($14.29) would probably be a very gratifying addition to each man's pay check at the end of the month, and the other $70,000 per year would build a good many sidings, yards and other needed improvements, tending to soon pay for themselves by increasing ton mileage per train.

Under the present system, the chief despatcher can start two sections of the meat train from *C*. The first one has 30 loaded meat cars, weighing 1,050 tons, and the second one has only 15 meat cars, but is filled out with dead freight to 1,050 tons, which is plenty from *C* to *B*, but less than 50 per cent. of the rating *B* to *A*. Neither crew is at all anxious to fill out at *B*, and if the chief instructs them to do so it is 10 to 1 that one or both will go in late; and after a few failures of this kind the chief loses some of his interest. Under a community of interest plan, the chief could say to the first and second meat trains that they have just 6 hours *C* to *A*, and ask them to see if they could put the 45 meat cars (1,575 tons) together at *B* and deliver the whole at *A* inside the 6 hours,, and let the other fellow fill up to 2,275 tons; or, if not close together enough for that, then each fill out to what they can make the time with. It is just 11 to 0 that these 11 men will give the company full value received for their train mileage; this simply because the trainman's and the engineman's maximum income is derived from the same source that the company's income is. When a man's pay check is being affected his head begins to work. This will also either make a man out of the drone on the train or get rid of him; and do it quicker than the trainmaster can.

The applications of the above example are multifarious. If business were heavy and labor scarce, an experimental bonus for ton mileage on top of the present pay schedules would need only a short trial to prove its utility.

THE ITALIAN RAILWAYS.

The annual report of the Italian State Railways for 1910 gives an interesting retrospective comparison between the operation of the Italian railways under state management and under private management. The mileage was increased during the fiscal year of 1910 from 8,211 to 8,247 miles by the opening of a number of branch lines. The total length of lines in operation, including the navigation lines of the States of Messina, was 8,305 miles. In the operation of the lines the management has made such additions and betterments as were found practicable. Some improvement in the make-up of passenger trains was effected, but the cars in use are not up to the requirements of the traffic. Progress has been made in equipping the cars with Westinghouse air brakes, and also in heating and lighting. Train delays were diminished and the service on the lines which were affected by the earthquake was entirely reorganized in the latter part of 1909. The average delay of the principal trains was reduced in 1910 to about 11 minutes, from an average of from 13 to 17 minutes in the previous year. The financial results of the system are far from satisfactory. In a recent address, the minister of public works admitted that the net earnings of the roads were far below the requirements for fixed charges, to nothing of maintenance expenditures.

Members of the Russian special committee on the proposed trans-mountain tunnel at Archot have left Tiflis to examine the geological aspect of the question. The tunnel if made will be [illegible]

EXTENSION CAR STEP.

As the result of an accident, sustained some time ago from the step box ordinarily used in assisting passengers on and off of passenger cars, the extension car step shown in the accompanying illustrations has been devised. At its best the step-box is an unstable affair, especially in descending from the car

Extension Car Step, Raised.

steps, as the passengers are not always careful to step on the middle of it. The porters are also often negligent in having the box ready, which inconveniences the passengers. The illustrations show the extension step in the open and closed positions. It is easily applied to the car, and may be quickly operated by swinging a lever on the end of the car through an angle of 180

Extension Car Step, Lowered.

degrees. A pedal in the back board of the second step, which operates a clutch locking the steps in either the open or closed position, must be pressed down before the operating lever can be moved. In this way the danger of inquisitive and meddlesome persons working the device, while the train is in motion, is greatly reduced.

When the step is lowered the bottom is about 6 in. from the top of the rail. The treads are covered with corrugated rubber to prevent slipping. The step is always in place ready for use, and is secure and more convenient than the ordinary porter's step-box. It weighs only about 36 lbs., and that it is strong enough is indicated by one of the illustrations showing two men standing on the bottom step. It has been placed on some cars in the South. The inventor is J. S. Blake, and the step is being manufactured in Charlotte, N. C., by the Blake Car Step Works.

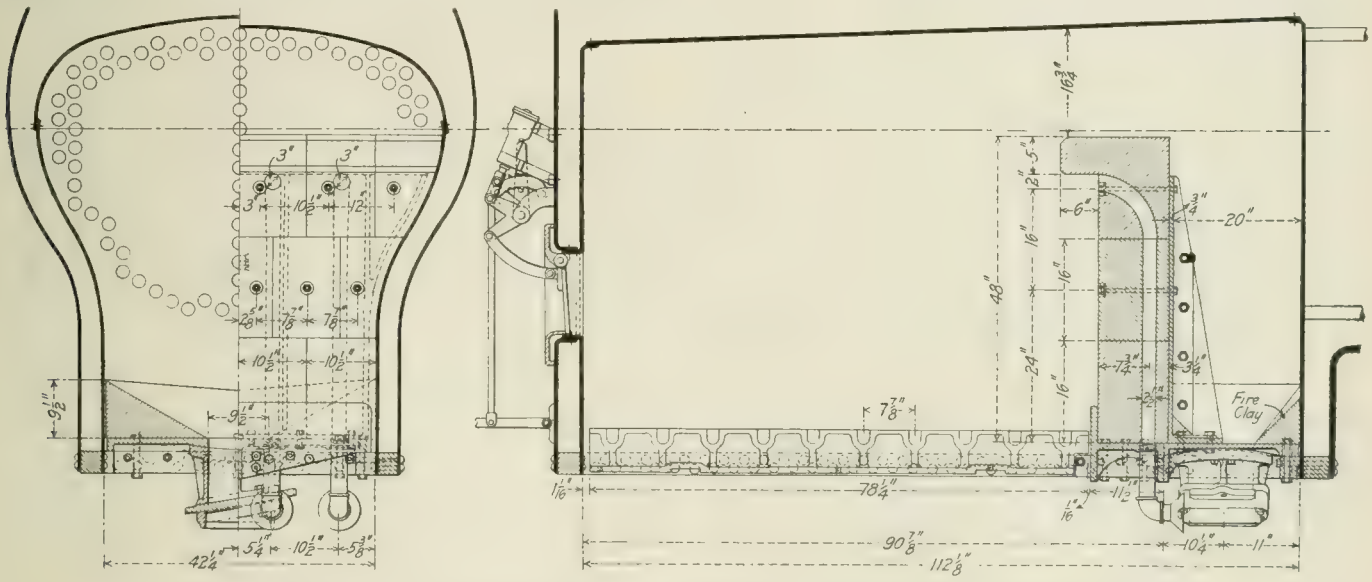
COMBUSTION CHAMBER AND HOLLOW BRICK WALL.

The improved firebox with a hollow brick wall and combustion chamber, designed by F. F. Gaines, superintendent motive power, Central of Georgia, and described by him in an article in the *Railway Age Gazette* of August 5, 1910, page 225, continues to give such good results, especially with regard to its protection of the tubes, that its use has been extended to other locomotives on the Central of Georgia as well as on several railways in the north. The hollow brick wall on engine No. 1014 has been in service since February, 1909. The reports show no tube failures after a service of 80,000 miles, and it is expected that the life of the tubes will be about three times that obtained from similar engines with plain fireboxes. Inferior coal does not give so much trouble with clinker on the grate and lack of steam to the extent of causing an engine failure, while other engines in the same service frequently fail from these causes. Following are the results of tests of three locomotives equipped with different arrangements of fire brick in the firebox:

The same train, 18 carloads of coal, weighing 1286.25 tons, and the same engineer and fireman were used on each trip. The distance between Macon and Columbus is 100 miles, and four trips were made with each engine. The analysis of the coal used was: Moisture, 1.39; volatile combustible, 30.56; fixed carbon, 55.11; ash, 12.94. B. t. u. per lb. of coal 13,179. Unfortunately, in spite of every effort, the average time of each trip and the average number of stops varied considerably for the different engines, so that the actual results are not strictly comparable.

The application of the hollow brick wall to a ten-wheel freight locomotive on the Chicago Great Western is shown on the drawing. It has been in service on a trial engine for five months, and recently two other engines were so equipped. While no tests have been made the first engine has been operating in a bad water district, where there is unusual trouble due to leaky tubes, and the hollow wall has largely reduced this. Comparative tests will be made to determine the relative value of the vertical hollow brick and the ordinary type of brick arch.

The hollow wall has been found especially efficient in improving the combustion and in preventing leaking tubes in fire-boxes with very short water legs. The hollow brick wall is now being handled by the American Arch Company, New York City.



Application of Gaines Hollow Brick Wall to Chicago Great Western Freight Locomotive.

The fuel question is one of the unsatisfactory features in connection with the operating expenses of the Argentine railways, for, whereas in other countries a period of dull trade as a rule means cheaper coal, in Argentina the reverse is true. When trade in Argentina is bad, due to crop failure, which is the only cause of bad trade, the cost of coal rises at once, because the steamers which import the coal depend on getting a cargo of grain for the return trip, and if they fail to secure a good cargo of grain, they have to charge a higher rate on coal; so in years of bad crops, the Argentine railways are affected by diminished revenues and increased fuel bills.

Test of Consolidation Freight Locomotives on the Central of Georgia Between Macon, Ga., and Columbus, January, 1911.

Engine.	Cylinders.	Heating Surface, Sq. Ft.	Average Time Consumed.	Average Number Stops.	Total Time Consumed in Stops.	Average lbs. Coal per 1,000 Ton-miles.	Average lbs. Water Evaporated per lb. of Coal.	Miles Run to One Ton of Coal.	Relative Efficiency.
1014*.....	21 in. x 32 in.	2,987	6 hr. 32 min.	7	4 hr. 38 min.	101	8.50	15.38	100.
1012**.....	21 in. x 32 in.	3,022	7 hr. 19 min.	5¾	4 hr. 41 min.	163	5.74	9.54	61.96
1716†.....	22 in. x 30 in.	3,230	7 hr. 25 min.	10	7 hr. 16 min.	115	7.39	13.14	85.58

*Engine equipped with a new firebox, a combustion chamber and a hollow brick wall.
**Original boiler and plain brick arch.
†Plain brick arch.

General News Section.

The commission of railway securities ("the Hadley Commission"), is said to have finished its report to President Taft. The President is expected to return to Washington November 12, when it is expected, the contents of the report may be made public.

Passenger train No. 43 of the Rock Island was stopped by robbers near Hurlburt, Ark., on the morning of November 1, and the mail car and express car were partly destroyed by explosives, but the robbers were frightened, while at their work, by the approach of a switching engine, and they ran away.

In one year the stationer of the Rock Island Lines distributed to the various departments of the road 3,329,568 rubber bands, and it is estimated that these are enough to reach if stretched end to end, from Chicago to Kansas City. These rubber bands cost a total of more than $5,000, and investigations of the way they were used indicate that probably half of them, or $2,500 worth, were wasted.

The annual track inspection of the Bessemer & Lake Erie has just been completed, and chief engineer H. T. Porter, with other officers, followed the inspection by taking the section foremen on an excursion over the Lake Shore & Michigan Southern from Erie to Buffalo. This visit to another line appears to be a permanent feature on the B. & L. E., the section foremen having been taken last year and the year before over divisions of the Pennsylvania.

C. P. Rodgers, who left New York September 17, in an aeroplane with the purpose of crossing the continent, succeeded in accomplishing the feat in 49 days, having arrived at Pasadena, Cal., November 5. He took a roundabout course, passing through Chicago, Ill., and San Antonio, Tex., and the distance flown is calculated at 4,231 miles. The actual time spent in flying was 82 hours, 4 minutes, and the average rate while in motion was 51.59 miles an hour.

That the Pennsylvania Railroad is running a train lighting instruction car with which by means of lectures and demonstrations employees will be given uniform instruction. The apparatus in the car consists of a 32-cell storage battery, a turbo-generator, a variable speed motor with necessary controlling apparatus for driving the axle devices, and a number of axle generators with their regulating equipments. One end of the car has been partitioned off and equipped as an office and sleeping quarters for the instructor.

The Canadian Pacific has just given out its prizes for the best floral displays at its stations, the winners are the station agents at Woodstock, New Brunswick; Sherbrooke, Quebec; Portage La Prairie, Man., and Agassiz, British Columbia. The last named station took the grand prize, the credit of which is given to the wife of the station agent, who, besides attending to the flowers, also has the custody of her thirteen children. The Canadian Pacific has encouraged the cultivation of flowers for more than 20 years and now sends out over 33,000 packages of seeds every spring.

Since January, 1910, when the pension system was established on the Rock Island Lines, 12 retiring employees of the road have had their names added to the list. There are now 107 former employees receiving pensions ranging from $25 to $150 a month, 13 having died since the system was started. Retirement is compulsory at 70 years of age, and an employee receives a pension if at the time of his retirement he has been in the continuous service of the company for 20 years. After a continuous service of 25 years pensions are granted, irrespective of age, if the employee has been permanently disabled in the service.

[illegible] and Commissioner of Labor Neill, acting as mediators under the Erdman act between the Baltimore & Ohio telegraph operators and officials, have brought about a settlement whereby the telegraphers get an increase of approximately 8 per cent. in wages; the working hours in offices, which were formerly 11 hours, will be reduced to 10 hours; in the three-men offices the hours will be 8; and there will be an increase of five cents in overtime. The total cost of these increases in wages and changes in hours will approximate 8 per cent. The telegraphers had demanded reductions in working hours from 11 to 9 hours; three-men offices from 9 to 8 hours; increases in wages amounting approximately to 13 per cent.; increases of ten cents in all overtime rates; and other changes in working conditions.

Bruce W. Benedict, for several years in the motive power department of the Atchison, Topeka & Santa Fe, has been appointed director of the shop laboratories in the department of mechanical engineering at the University of Illinois. Mr. Benedict was born at Buda, Ill., in December, 1876, and graduated from the University of Nebraska in 1901. Before going to college he served an apprenticeship on the Chicago, Burlington & Quincy, and after graduating returned to that road, where he was successively, machinist, assistant in testing laboratory, assistant road foreman of engines, road foreman of engines, general foreman of locomotive and car repairs and mechanical inspector. He was then for two years editor of the *Railway Master Mechanic* at Chicago, which position he left to become supervisor of schedules on the Santa Fe, and he has more recently been bonus supervisor on that road.

Fire Fighting Apparatus On Locomotives.

W. R. Barton, fire prevention inspector of the Missouri Pacific, has developed a fire fighting apparatus for use on locomotives. A test of the appliance was recently made at the Ewing Avenue shops of the Missouri Pacific in St. Louis. It was demonstrated that a stream of water could be thrown 65 ft. in the air with 200 lbs. of steam pressure on a locomotive. All yard engines and some of the road locomotives will be equipped with it. The tanks of the large yard engines hold 6,000 gals. of water. The plan is to carry 50 ft. of 1¼ in. steam hose on a reel under the running board. Steam hose is used, as the water which comes from the tank and is forced through the branch pipe is hot, and in a short time would destroy the ordinary rubber hose. The hose connection is placed on the branch pipe between the boiler check and the injector. When an engine reaches the fire in the yards a switchman jerks the hose from the reel and attaches it to the coupling leading from the branch pipe. The engineer starts the injector, while the fireman goes out on the running board and opens the valve in the branch pipe leading to the boiler check. The cost of the apparatus is about $35.

Manufacturers Demand Light on Trust Law.

The Illinois Manufacturers' Association has asked that a committee of prominent men in various walks of life throughout the country shall get together and draft a bill for the amendment of the Sherman anti-trust law to be submitted to Congress at its next session.

The committee is to be composed of the following: Charles Piez, Chicago; La Verne W. Noyes, Chicago; Richard Olney, Boston; Louis D. Brandeis, Boston; F. O. Watts, Nashville, Tenn.; Dr. A. T. Hadley, Yale University; Samuel Untermeyer, New York City; Murdo McKenzie, Trinidad, Colo.; Clark Howell, Atlanta; James J. Hill, St. Paul; Rudolph Spreckels, San Francisco; and John Wanamaker, Philadelphia.

The association in a statement regarding the reasons for its action said in part:

"Recent decisions of the Supreme Court imply that the legality of the larger combinations must be submitted to the court for adjudication; and the determination of the administration to enforce the act means that business will be subjected to periodical stocks for years to come.

"The Illinois Manufacturers' Association has among its members some of the most successful corporations engaged in the industrial enterprises. Its members have faith in their country, are obedient to the law and to the dictates of fair dealing. Nor are they so lacking in patriotism that they are unwilling to submit to a temporary setback in business if necessary to purge industry of lawless acts.

"But are the large industrial combinations of the last twenty

years simply the result of a defiant disregard of the law, in pursuit of illicit profits? Are the claims of economy achieved by combination or greater and more rapid trade expansion secured by larger capital, simply idle claims to hide the real purpose of these enterprises? Are the abuses practiced by some of these combinations only the reflections of dishonesty, or are they a necessary outgrowth of these combinations?

"The Illinois Manufacturers' Association does not feel that lawlessness among the leading business men of the country is so rampant as to justify an affirmative answer to these questions.

"There exists a crying necessity for ascertaining the true economic value of industrial combinations, for determining whether the Sherman anti-trust law is still economically wise, and for deciding whether big business is to continue, and, if so, under what rules and regulations.

"The only remedy seems to be by the enactment of a law which will prescribe a rule for those doing an interstate business."

Good Advice for the Improvident.

D. C. Moon, general manager of the Lake Shore & Michigan Southern, has lately issued a circular, the substance of which is here given, informing employees of the policy of the company concerning assignments of wages. This is an important subject, sometimes dealt with by managers without due care, and Mr. Moon's circular is worthy of imitation because of its fulness and detail. Unpleasant subjects are often dealt with briefly, because of their unpleasantness; but brevity sometimes proves a mistake. This notice is issued two months in advance of the time that it goes into effect, so as "to give those now in trouble a chance to arrange their affairs." The first three paragraphs are a reprint of an order already in force.

LAKE SHORE & MICHIGAN SOUTHERN RAILWAY COMPANY.

Board orders will not be accepted by the company unless approved by the head of the department in which the person signing the order is employed, and then only in especially urgent cases covering board and lodging for the *first two months* after the employee enters the service of the company.

"Assignments on account of insurance premiums, company's doctors' examination fees and the purchase of watches and uniforms must be made on forms provided for that purpose.

"The execution of assignments and orders other than for the above exceptions will be regarded as cause for immediate dismissal from the service."

We regard "selling time" or assignment of wages at a discount, in any form, as unwise, unnecessary, and a discredit to the employee and as usually indicating he is careless of habit and reputation. This in turn is reflected to some extent upon the company for having such employees, and more especially upon the great mass of other employees, because the public does not usually trouble itself to discriminate in this respect. Neither the man who "sells" nor his family has the proper benefit of what he earns.

Discount rates are exorbitant and are often followed by garnishee proceedings, further adding costs to be deducted from wages.

The man who is in such financial embarrassment is usually troubled in mind, often is over-indulgent in habits of living, and his mental and physical ability to safely and properly perform duty is impaired, and he cannot be regarded as a good man to keep in service.

On and after January 1, 1912, each employee in every department will be expected, whenever possible, to personally receive his pay check. When sickness, absence or working conditions prevent, the checks will be delivered in accordance with existing instructions.

Board assignments must conform to instructions, be limited in amount and contain directly or indirectly only board items. (Assignments for borrowed money, tobacco, cigars, liquor, etc. are prohibited.) Heads of departments authorized to approve, must carefully scrutinize each order.

The assignment of wages to anyone, in any form, at a discount, whether followed by garnishee or not, hereafter, is forbidden, and violation, if discovered, will be considered cause for dismissal. The pay checks of this company are worth full face value, and for the benefit of all employees and the families, and for the reputation of the company, we shall hereafter expect every employee in this respect to receive the full return of pay for his work.

To more than 95 per cent. of our employees, who are living right, this will be of no concern.

To the remainder, however, who are not, it is both a request and a warning. We prefer that you heed, for the general benefits above expressed. If you do not, your service with this company is not desired.

Telephone Train Despatching.

News items concerning the introduction of telephones on train despatching wires are becoming literally almost too numerous to mention. Information concerning the extension of telephone despatching on railways already using the telephones largely have been printed in these columns nearly every week for a long time. The Baltimore & Ohio has construction work going on between Grafton and Parkersburg; Grafton and Wheeling; Wheeling and Newark; Connellsville and Fairmont; Rockwood and Johnstown; and Pittsburg and Wheeling. These lines aggregate 486 miles, parts of which mileage were mentioned in a former item. About half the stations will have Gill selectors and half Western Electric selectors. Some of the lines will be in operation probably during the present month. The B. & O. intends to continue its present policy until every division of the road is equipped with telephone lines.

The Missouri, Kansas & Texas has lately put in operation two telephone despatching circuits, one from McAlester to Denison, 95 miles; and one from Smithville to Hillsboro. The first-named line has numerous telephones in booths at passing tracks where there is no agent. The way-station equipment consists of telephone arms of the accordion type, equipped with head band, receivers and Gill selectors of the two-figure main-line bell type, on which the clearing out impulses have been eliminated. No call requires over 3½ seconds. At non-test offices the line wires terminate on knife switches which when open disconnect all office equipment, including the lightning arresters. Knife switch panels are provided at test offices to faciliate opening the line to locate faults or patching a section of emergency line into the circuit in case of trouble.

The other line, which is on the Waco division, has 34 telephones in stations and nearly as many in booths at side tracks. The wire chiefs' test boards are arranged with voltmeter and mil-ammeter tests to enable them to locate faults quickly and with accuracy. The despatchers use the regulation breast telephones and individual Gill silent calling keys. Wrecking trains carry portable telephones.

The Louisville & Nashville, which already operates 2,200 miles of telephone despatching circuits, has ordered from the Western Electric Company 42 selectors for the line from Lexington, Ky., to Quicksand, 96 miles. There will also be a message circuit on this line.

The Chicago, Rock Island & Pacific has ordered Gill selectors from the United States Electric Company for 30 telephone stations, and the Gulf, Colorado & Santa Fe has given a similar order for 12 stations.

American Land and Irrigation Exposition.

The American Land and Irrigation Exposition opened at Madison Square Garden, New York, on November 3, and will continue to November 12. The entire garden, including the basement and galleries, as well as the main floor, is occupied by the exhibit. In the main hall are the exhibits of the railways, chambers of commerce, land and development companies, and others who are making an effort to arouse interest in more extensive and intensive agriculture. The mention of a few of the exhibits will give some idea of their character. For instance, the Great Northern has a large display of agricultural products, including grain in the straw, potatoes and other vegetables, and a most extensive and enticing display of apples. There are also pictures of scenes along the route of the railway; and in connection with the exhibit, James J. Hill has given a $1,000 silver cup for the best 100 lbs. of wheat grown in the United States in 1911. The Canadian Pacific has a small field of alfalfa actually growing with a system of irrigation in operation. The Pennsylvania Railroad has models drawn accurately to scale of the Horseshoe Curve, the Cumberland Valley and models of the Hudson river tunnels. The International Harvester Company has on exhibit a miniature irrigation farm divided into three

sections, each showing a specific kind of irrigaton. One of these systems is for use in trucking sections where irrigation is necessary. It consists of a number of overhead pipes from which water is forced, giving an irrigation that is much like rain. Alaska exhibits not only gold ore, but preserved berries, hay, grain and garden truck. The Kansas City, Mexico & Orient, besides the products along its own lines, exhibits 12 silver cups that are to be awarded for competitions in the production of wheat, corn, oats, cotton, potatoes, barley, sugar beets, apples, hops and alfalfa.

The balconies contain exhibits of railways, colonization companies, seed companies, etc. During the entire time that the exhibit is open, lectures are being given in the lecture hall by various exhibitors. These lectures are, in the main short, well illustrated by lantern slides and moving pictures, and are descriptive of the various areas of farm and agricultural land through the United States.

In the basement of the garden there are exhibits of some farm machinery and of various devices and methods by which farm labor may be made more attractive and more efficient. For instance, the Crocker-Wheeler Company, Ampere, N. J., have a number of exhibits showing the application of their motors to a number of farm operations, such as pumping, milking, sheep shearing, feed grinding, etc.

Of course, with all of these exhibits is a large amount of advertising and descriptive pamphlets, a few of which are mentioned in these columns under Trade Publications.

War Department Endorses Scientific Management.

A modified form of the Taylor system of shop management has been in use at the Watertown, Mass., arsenal for two years. Secretary of War Stimson has made public an exhaustive report of the results which have been obtained and has summed up the situation as follows: "The Watertown arsenal has been used practically as an experiment station, with a view of trying out the theory before applying it generally. The results thus far are highly gratifying and full of promise. There has been an undoubted increase in the efficiency of manufacture at the shop and a material reduction in the cost of manufacture, but at the same time, and to my mind of even of more importance, these results have been obtained without in any wise endangering the interests of the workingmen, either by decreasing their pay or requiring unpleasant exertion or speeding up. On the contrary, any increase in real efficiency must inure to the benefit of the workingmen.

"I have been too long and too vitally interested in and active in movements which make for the advancement of the conditions of labor for me now to lend even the slightest encouragement to any theories which work counter to the true interests of labor. To my mind, scientific management can and deserves to prevail only where increased efficiency means increased human efficiency and the workingmen's participation in the rewards resulting from efficiency. It means a betterment and in no wise impairment of the conditions of labor. A change for that kind of betterment is the only kind of change which the government will permit through the installation of any scientific management. We are still very much in the experimental stage, but I have strong hopes that by cooperation and a willingness to see the facts fairly, economies will result to the government, betterment to workingmen, and a more satisfactory and more human relation between the two in the future than in the past."

The following extract from the report of Brigadier General Crozier gives a brief outline of the methods which have been used. "Something over two years ago the trial at the Watertown arsenal of some of the elementary features of what is known as the 'Taylor system' was authorized. An expert in [illegible] was employed, and under his guidance the method of putting work into shops so systematized that orders for manufacture now go from the office to the shops with a much more complete arrangement and supply than formerly of drawings, specifications, lists of parts, bills of material and orders relating to particular parts of the structure to be produced, so that the foreman are relieved from much of the [illegible] and [illegible] which they used to have to do, and for which they are not well qualified and cannot attend to without a neglect of the more appropriate duties. The work of planning the [illegible] of component parts of the structures to be manufactured through the shops of the arsenal has been systematized, so that the [illegible] shall be regular and orderly, and the work shall in no time be held through the lack of some component which is not at hand when needed, and that no wasteful effects shall arise through congestion of work at particular machines, or the idleness of other machines, or workmen while waiting for assignment of operations which should have been planned for them in advance.

"For this purpose there has been installed a planning room equipped with personnel and appliances for the regular production of what might be called the time tables of the thousands of pieces which must travel through the various shops on their way from the stage of raw material to that of finished product, without collisions or unnecessary delays. The issue of material from the storehouse to the shops has been systematized, and the task of estimating the amount of material required placed among the duties of persons other than those who are to make use of the materials in manufacture, so as to reduce the likelihood of over-estimates, to insure the possession of the material at the time when it is needed, prevent the disappearance of material while awaiting use, and the duplication of issues, and to insure the return to the storehouse of surplus material; with the result of a useful reduction of the amount of material issued, and supposedly used for particular fabrications. The care of material in store, and the accountability for it, have been systematized so as to insure more frequent and accurate check of the material on hand with the clerical statement of what ought to be on hand. The method of caring for machines and tools has also been systematized so as to preserve their efficiency. For example, the proper maintenance of the condition and tightness of the extensive system of belting, and the systematic tempering and grinding of cutting tools; such improvements have been made in the efficiency of certain machines as to greatly increase their output.

"The principal elements of wastage in the machine shops include failure to appreciate and to utilize the full and efficient power of machine tools, lack of planning by which machines are frequently without work, the employment of skilled workmen to bring work to machines or to procure and grind their cutting tools, etc. By the establishment of specified feeds and cuts the work done by the machines is increased, and by regulating the flow of the work so that it shall be even and continuous, and employing laborers and messengers to supply the work and tools to the skilled workmen, the latter are able to devote the time and labor which they previously expended in other ways to work proper for their grade.

"The average premium of all machinists who have been placed on premium work in the machine shop at the Watertown arsenal has been 25 per cent. of their wages. The real point in the matter, however, is the determination by a method of scientific common sense of the time within which the work can and should be done, and the particular method of compensation as a stimulus for meeting this time is not important.

"In view of the successful results obtained, a board of officers assembled at the Watertown arsenal recommended the adoption of these methods for similar work at other manufacturing arsenals, with such changes in details as local conditions seemed to require. In accordance with this recommendation, preliminary steps toward introducing the methods, so far as they are applicable, have been taken at several other arsenals. Due, it is believed, to an erroneous conception of the purposes which it is intended to accomplish by these methods, the employees at one of the other arsenals to which the changes are to be applied have protested against the installation.

"The department has not yet reached a conclusion as to the extension to other arsenals of the part of the 'Taylor system' of shop management which affects the workmen, and it is not intended to do so in advance of further trial at the Watertown arsenal, but it seems certain that either by this system or by some other, it ought to be possible to secure better co-operation of the employees among themselves and between them and the management than has been had in the past."

Pan American Railway in Guatemala.

The roadbed of the Pan American Railway in Guatemala has been constructed from Las Cruces to the river Las Aninas, 6½ miles, and timber has been cleared to the end of the nineteenth mile, nearly to the village of Coatepeque. Rails have been laid for [illegible] miles. Work is progressing rapidly from Las Aninas,

600 men being employed in grading. Between Coatepeque and the Mexican frontier, it is planned to connect this branch of the road with that of Vato Ancho, so that the Ocos Railroad will form a part of the route to the frontier for a distance of about eight miles. A section of the track, three miles long, will be constructed, starting from the Ocos Railroad at El Prado and crossing the Melendres river. It will join the Pan American Railway at Mexico on the Guatemala side of the Suchiate river. The bridge over the Talchulul river is to be 400 ft. long and 75 ft. high, and the bridges over the Batza and Talpiches rivers are to be 500 ft. long and 115 ft. high.

The American Society of Mechanical Engineers.

At the meeting of the American Society of Mechanical Engineers, to be held November 14, three papers will be presented. One deals with the general aspects of autogenous and electric welding, the origin and principles of each process and the apparatus used in each, by H. R. Cobleigh, International Steam Pump Company, New York, and the other two are on special phases, Thermit Welding, by G. E. Pelissier, superintendent Goldschmidt Thermit Company, New York, and Electric Welding, by C. B. Auel, assistant manager of works, Westinghouse Electric and Manufacturing Company, Pittsburgh, Pa. The discussion will be grouped about the following topics: Electric resistance welding, Electric arc welding, Thermit welding, Oxy-acetylene welding, Oxy-hydrogen welding. Among those who expect to participate are, W. R. Noxon, Davis-Bournonville Company, New York; Nelson Goodyear, Nelson Goodyear, Inc.; W. H. Levin, International Oxygen Company, New York; G. E. Kershaw, Linde Air Products Company, Buffalo, N. Y.; Henry Cave, Autogenous Welding Equipment Company; B. Morgan, Newport, R. I.; W. H. Brown, Cleveland, Ohio; W. H. Spire, Electric Welding Products Company, and L. P. Alford, editor-in-chief the *American Machinist*, New York.

Central Railway Club.

At the meeting of the Central Railway Club, to be held at the Hotel Satler, Buffalo, N. Y., November 10, F. M. Whyte, general manager of the New York Air Brake Company, New York, will present a paper on The Distribution of Instructions and Information in Large Industries.

Master Boiler Makers' Association.

The executive committee of the Master Boiler Makers' Association has decided to hold the sixth annual convention of this association in Pittsburgh, May 14 to 17, inclusive, 1912. The headquarters will be at the Fort Pitt hotel.

Railroad Club of Kansas City.

At the meeting of the Railroad Club of Kansas City, which was held November 9, Congressman William P. Borland gave an illustrated lecture on the Panama Canal.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

Air Brake Association.—F. M. Nellis, 53 State St., Boston, Mass.

American Association of Demurrage Officers.—A. G. Thomason, Boston, Mass.

American Association of General Passenger and Ticket Agents.—W. C. Hope, New York; next convention, Seattle, Wash.

American Association of Freight Agents.—R. O. Wells, East St. Louis, Ill. Annual, June 18-21, Chicago.

American Association of Railroad Superintendents.—O. G. Fetter, Carew building, Cincinnati, Ohio; 3d Friday of March and September. Annual, March 17, Chicago.

American Electric Railway Association.—H. C. Donecker, 29 W. 39th St., New York.

American Railway Association.—W. F. Allen, 75 Church St., New York; November 15, Chicago.

American Railway Bridge and Building Association.—C. A. Lichty, C. & N. W., Chicago. Next annual convention, third week in October, 1912, Baltimore, Md.

American Railway Engineering Association.—E. H. Fritch, Monadnock Block, Chicago; annual convention, March 19-21, 1912, Chicago.

American Railway Master Mechanics' Association.—J. W. Taylor, Old Colony building, Chicago. Annual convention, June 12-14, Atlantic City, N. J.

American Railway Tool Foremen's Association.—O. T. Harroun, Bloomington, Ill.

American Society for Testing Materials.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.

American Society of Civil Engineers.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

American Society of Engineering Contractors.—J. R. Wemlinger, 13 Park Row, New York; 2nd Tuesday of each month, New York.

American Society of Mechanical Engineers.—Calvin W. Rice, 29 W. 39th St., New York.

Association of American Railway Accounting Officers.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.

Association of Railway Claim Agents.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 22, 1912, Los Angeles, Cal.

Association of Railway Electrical Engineers.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago.

Association of Railway Telegraph Superintendents.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.

Association of Transportation and Car Accounting Officers.—G. P. Conard, 75 Church St., New York; December 12-13, Louisville, Ky.

Canadian Railway Club.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.

Canadian Society of Civil Engineers.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

Car Foremen's Association of Chicago.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

Civil Engineers' Society of St. Paul.—D. F. Jurgensen, 116 Winter St., St. Paul, Minn.; 2d Monday, except June, July and Aug., St. Paul.

Engineers' Society of Pennsylvania.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

Engineers' Society of Western Pennsylvania.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

Freight Claim Association.—Warren P. Taylor, Richmond, Va.; annual May 15, Buffalo, N. Y.

General Superintendents' Association of Chicago.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

International Railway Congress.—Executive Committee, rue de Louvain, 11 Brussels; 1915, Berlin.

International Railway Fuel Association.—D. B. Sebastian, La Salle St. Station, Chicago.

International Railway General Foremen's Association.—L. H. Bryan, Brown Marx building, Birmingham, Ala.

International Railroad Master Blacksmiths' Association.—A. L. Woodworth, Lima, Ohio.

Iowa Railway Club.—W. B. Harrison, Union Station, Des Moines, Ia.; 2d Friday in month, except July and August, Des Moines.

Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York. Annual convention, May 14-17, Pittsburgh, Pa.

Master Car Builders' Association.—J. W. Taylor, Old Colony building, Chicago. Annual convention, June 17-19, Atlantic City, N. J.

Master Car and Locomotive Painters' Association, of United States and Canada.—A. P. Dane, B. & M., Reading, Mass. Next annual convention, second week in September, 1912.

New England Railroad Club.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

New York Railroad Club.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

Northern Railway Club.—C. L. Kennedy, C., M. & St. P., Duluth, Minn; 4th Saturday, Duluth.

Omaha Railway Club.—H. H. Maulick, Barker Block, Omaha, Neb.; second Wednesday.

Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

Railway Club of Pittsburgh.—C. W. Alleman, P. & L. E., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

Railway Industrial Association.—G. L. Stewart, St. L. S. W. Ry., St. Louis, Mo.; annual, May 12, 1912, Kansas City, Mo.

Railway Signal Association.—C. C. Rosenberg, Bethlehem, Pa.

Railway Storekeepers' Association.—J. P. Murphy, Box C, Collinwood, Ohio.

Richmond Railroad Club.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

Roadmasters' and Maintenance of Way Association.—L. C. Ryan, C. & N. W., Sterling; September 10, 1912, Buffalo, N. Y.

St. Louis Railway Club.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

Society of Railway Financial Officers.—C. Nyquist, La Salle St. Station, Chicago.

Southern Association of Car Service Officers.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.

Southern & Southwestern Railway Club.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

Toledo Transportation Club.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

Traffic Club of Chicago.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.

Traffic Club of New York.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

Traffic Club of Pittsburgh.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

Train Despatchers' Association of America.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.

Transportation Club of Buffalo.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

Transportation Club of Detroit.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.

Traveling Engineers' Association.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.; August, 1912.

Western Canada Railway Club.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

Western Railway Club.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Wednesday in month except July and August, Chicago.

Wood Preservers' Association.—F. J. Angier, B. & O., Baltimore, Md.; annual, January 16-18, Chicago.

Traffic News.

The Western Passenger Association has decided not to make reduced rates during the Christmas and New Year's holiday season this year. At a meeting of the executive committee of the association on November 2 it was also decided to refuse special rates which had been applied for to a number of expositions and conventions.

At a meeting of the Denver chamber of commerce on October 27, that body decided to petition the Interstate Commerce Commission to order a tariff of freight rates from the port of Galveston to Denver, which will produce equality with the rates now in effect between New York and Chicago, and between Newport News and St. Louis.

The governor of Georgia has directed the institution of a suit in the courts against the Nashville, Chattanooga & St. Louis, lessee of the Western & Atlantic, to compel the adoption of Georgia standard freight tariffs throughout the W. & A., both on interstate and intrastate business. The road being owned by the state, the governor proposes to see if the state cannot regulate the rates throughout the length of the railway, which extends into Tennessee.

The Erie and the Lackawanna have notified the Public Utilities Commission of New Jersey that they will not comply with the commission's order requiring the sale of season tickets to Hoboken and Jersey City. Rates to these places are the same as to New York City, New York tickets being used, and the order of the commission was intended to bring this traffic under the control of the state authorities, New York tickets being subject to the control only of the federal authorities.

The Pennsylvania Railroad has established a new department for the purpose of developing its milk traffic. F. B. Barnitz, formerly chief tourist agent, has been appointed milk agent in charge of the department, and I. Elkin Nathans, formerly special agent of the freight traffic department, has been appointed assistant milk agent, with headquarters at Philadelphia, Pa. They will have charge, under supervision of the passenger and freight traffic departments, of the milk and cream traffic of the Pennsylvania Railroad.

During the days that the fleet of war vessels has been lying in the Hudson river, along the west side of New York City, both the elevated and the subway trains of the Interborough Rapid Transit Company carried unusually large numbers of passengers. On Monday, October 30, the subway trains carried over a million and the elevated trains a million. On Tuesday, November 1, when the traffic was nearly as large as this, all of the trains of both the subway and elevated lines ran without a single delay in the 24 hours. The car mileage for the day was 375,000.

The Freight Department of the Pennsylvania Railroad publishes figures from the Department of Agriculture of Virginia, showing that the value of the trucking crop for this year in [illegible] County will amount to [illegible] Accomac is one of the two counties of Virginia situated on the Delaware-Maryland-Virginia Peninsula. One farmer this year has five thousand barrels of sweet potatoes to his credit. One [illegible] 10,000 barrels, for which he will realize $5 a barrel. His crop [illegible] some time in January, because representatives from New York [illegible] interest in this inquiry, but the commercial bodies of Baltimore are presenting their case in great detail, aiming to show that [illegible] interior cities, who gave reasons why they desired to have their import freight go through Baltimore.

American Association of Freight Traffic Officers.

The seventh annual convention of the American Association of Freight Traffic Officers will take place at the Sinton Hotel, Cincinnati, Ohio, on November 17 and 18. At the annual banquet on the evening of the first day Fairfax Harrison, president of the Chicago, Indianapolis & Louisville, will deliver an address.

The Increase in Farm Values.

The report of the sale of an averaged-sized farm in central Illinois, with ordinary building on it, at the rate of $300 an acre, probably is to be taken as an indication of the movement of available capital into farm property which non-agricultural fields have failed to attract. The drift of free capital to agricultural lands is always a characteristic of times like these, when other ordinary investment demands are not expanding and when surplus is accumulating because of economical ways of living. The surplus must have outlet in some direction in due time, and people who know the value of land in agricultural states, for its revenue, its increment and its security, turn to the investment of their accumulations in good rural properties.

The price mentioned for this specific farm is, however, far out of line with the average of the United States. The average value of land and buildings in 1910 for the 6,340,357 farms of the country was $39.69 an acre compared with $19.81 in 1900, or an increase of 100.4 per cent. With such an increment in value in ten years, averaging 10 per cent. a year, it is perfectly natural that funds should flow from bankers, merchants, professional men and others in rural directions. In some of the older states the advance has not been so great. Pennsylvania, for instance, where the number of farms has diminished in the past ten years and the improved acreage has lost ground, the average price per acre of land and buildings was $55.79 in 1910, compared with $46.37 in 1900, showing a gain of 25 per cent. In Indiana the average value per acre of farm land with buildings increased 92 per cent. Below are some of the comparisons of representative states of the average value per acre of land with its improvements in the form of buildings, showing rates of increase in the decade:

	Total value land & bldgs.	Per acre, 1910.	Per acre, 1900.	Per cent increase.
United States	$34,681,507,000	$39.69	$19.81	100.4
[illegible] Atlantic	[illegible]	[illegible]	11.57	106.8
South Central	4,837,353,000	19.57	8.04	143.4
Western	3,786,548,000	34.32	13.80	148.7
[illegible]	[illegible]	108.13	53.81	101.0
Texas	1,822,713,000	16.69	5.50	204.0
Pennsylvania	1,035,300,000	55.79	46.37	20.0
Iowa	1,590,225,000	75.00	39.00	92.0
Kansas	1,733,653,000	40.07	15.45	159.0
Minnesota	1,259,510,000	46.00	26.00	77.0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Georgia	477,603,000	17.78	6.95	156.0

These records of increase in the average value of lands, improved with buildings, are at least proof that the past decade has not been wholly unprofitable to those who invested their capital in land. With few exceptions the rate of increase has been over 100 per cent. It may be said that there is some element of speculative values in the total of $34,681,507,000. But, on the contrary, prices of farm products rather than competitive buying for speculative ends, are responsible for the rapid growth in the market value of lands and buildings. The prosperity of agriculture, in contrast with manufacturing, transportation and mining, may well command a portion of the available surplus under existing conditions of investment. As a result, lands should tend higher rather than lower, excepting in the cotton belt, where the big crop tends temporarily at least to check advances.—*Wall Street Journal*

The Railway Traffic Manager.

[illegible] from an article by Franklin K. Lane, [illegible] Commerce Commissioner, in *The California [illegible]*

There is in theory a minimum below which the traffic manager cannot [illegible] that minimum is the actual cost of transportation. Any return above this is a profitable rate. This is the American theory of rate making upon which almost one hundred [illegible] have been built which yield annually a gross return of more than $2,000,000,000.

Because of the latitude which he enjoys in fixing a rate and the effect which such rates have upon the rise and growth of communities, it is not a figure of speech, and in no sense an exaggeration, to say that the American traffic manager is the most powerful and important factor in the internal economy of the United States. He is a statesman. His policy more certainly tends to determine the character of a community than the policy of any legislature. It is more essential to the business interests of a community that he should consider its welfare than it is that its laws should be equitable or their enforcement prompt and certain, for he has it within his power to raise a city into being by the preference of a locality, or by discrimination to deny to the most naturally favored locality the power to rise out of villagehood. He can determine what kind of fuel shall be used upon the farm and in the city, what margin of profit the orange grower of California or the wheat raiser of the Dakotas shall enjoy.

John Smith invents a kind of pipe which for irrigation plants, mining purposes, and similar uses, is preferable to any other pipe on the market, and can be produced for less than any other. He establishes his plant near the source of material where his competitors have their plant; but by a classification which makes a rate, he finds himself unable to lay down his pipe at the point of demand in competition with the pipe of his rival, and after years of struggle is compelled to sell his plant for a tithe of what it cost and under a new classification soon sees his plant develop into a great industry after it is in the hands of his late rival.

One city enjoys the privilege of stopping a raw product while in transit and converting it into a finished product while it is on its journey, and thus becomes a great manufacturing center. The government expends millions to render a city accessible by water, and a railway by an adjustment of its rates contravenes the intention of the government.

It is a constant and a growing surprise that this vast power has been exercised as beneficently as it has. When we consider the tens of millions of railway rates that are in force and are used each day, and upon which turn to so great an extent the welfare of individuals and communities, it is a matter of wonder that there is not much greater complaint of favoritism, discrimination and unfairness than is now made.

Manifestly, however, such power should not be permitted to go unrestrained. The railway must get business; it must have freight to handle; and it may be to the interest of that corporation itself—that its own best interest immediately will lie in a rate policy which will be unjust. Therefore, it is not to be said that the self-interest of the railway alone will surely lead to a wise and fair schedule of rates. The law of the United States gives to the traffic manager of a railway the power to fix the charge . . . and it is as binding and absolute as if the rate itself had been incorporated into a statute and passed by Congress and approved by the president of the United States.

Here is a power, then, vested in a traffic official not only to make a rate, but to make a rate that is a law from which there can be no deviation without incurring the penalty of fine or imprisonment.

To protect the community, the shipper and the railway are denied the right to agree upon any different rate, or to accept or pay a different rate from the one published with the commission. To protect the railway the shipper is prohibited from even so much as asking any rate other than that legally filed. And the burden is placed upon both shipper and railway to know what the rate is and adhere thereto.

The railway makes its own rate subject to no limitation or restriction except those found in the act to regulate commerce, that such rates shall be reasonable, nondiscriminatory under like conditions and circumstances, and that the rates shall be made to meet the requirements of the long and short haul clause. . . . What has been done to safeguard against arbitrary and unwise exercise of so vast and unlimited power? A commission has been created whose judgment may intervene between that of the public and that of the railways, which intervention, however, shall be subject to the review of the courts under the guarantees of the Constitution against taking property without due process of law and confiscation. The commission may regulate what has been done. It is not a creative body. It cannot initiate rates. It may not say, as may the English commission, that a railway is exceeding its legal maximum, because no such maxima have been fixed in our law. It may, however, withhold its approval of an individual rate or of a schedule of rates, before such rates go into effect, as may the commission of Canada. Its function is to correct an abuse of power.

It is unfortunate that railway men have not yielded more gracefully to the imperative demand of the people for effective regulation, but this I take to be but another evidence of the extreme conservatism of the American people. We have been raised under a philosophy which taught that governmental interference with the individual will was tyranny. Our land has been so abundant, the opportunities have been so many, that we have come readily to believe in our inalienable right to do as we please.

It is within the power of the railways themselves to avert hostile legislation and insure to themselves entirely fair treatment. It is not to be expected that a railway, touching the people from so many directions and so intimately affecting their industrial life, can always avoid criticism, or that so great an enterprise can, no matter how earnest the desire of its officials, avoid mistakes which give just reason for complaint, but the spirit of the present law is based upon the theory that the railway can, if it will, deal honestly and fairly by the people, and that the foundation for complaint will be so slight that it will be within the power of a comparatively small number of government officials to bring about just and equitable treatment for the tens of thousands of communities in this country and our multitudinous industries.

The contest over rate regulation has been a democratic movement, and after a protracted struggle of twenty-five years the government may be said to have finally proved two things—that it could control these common carriers and that it intended to. To say this is to say much. How powerful the influences against regulation have been no one can say. It has been recognized that the battle over railway regulation was a test of strength between the people and organized wealth, and there has come to the people a new faith in our government, a greater confidence in its future and less impatience with existing conditions, because it has been believed that in this one matter the welfare of the public has gained a victory.

How successful the regulation of privately owned railways will prove is still a problem. We must feel our way down to some fundamental laws by which to test the traffic manager's judgment. Sydney Brooks, perhaps the greatest of present writers on economics, thinks that Europe would not have taken to government ownership if the plan of regulating by commission as we have it in the United States had been earlier discovered. It must be remembered by those who advocate government operation that they do not by this means escape governmental regulation. The control of rates must rest somewhere, and those rates cannot be fixed by some merely mechanical rate. Under government ownership, as under private ownership, there must be rate regulation; personal judgment must have its play as well as economic law.

. . . To be just to the stockholders, however, does not mean that injustice must be done the public. The traffic manager may not ask all that the traffic will bear without doing his railway in the end a great wrong, nor can the shipper hope to have lasting benefit from any injustice done to those who have put their money at the public service.

Encouraging Agricultural Development on the Santa Fe.

The Atchison, Topeka & Santa Fe now employs four agriculturists—two for New Mexico, with headquarters at Albuquerque, and two for northern Texas, with headquarters at Amarillo—whose duty it is to instruct the farmers along the line of the road in better farm methods. Under the supervision of these men experiments with various crops are also being carried on by the farmers, the amount of land devoted to a single crop by one farmer usually varying from one half to sometimes two or three acres. Frequently there are ten to fifteen farmers in a given district carrying on the work, and it is arranged so that no one has more than four or five acres in all devoted to the experimental work. The road furnishes seed to carry on the experiments and if the farmer does not have the right kind of implements it also furnishes these. The railway agriculturists, who have to cover considerable territory, are provided with automobiles so that they can satisfactorily supervise the work.

Car Surpluses and Shortages.

Arthur Hale, chairman of the committee on relations between railways of the American Railway Association in presenting statistical bulletin No. 105-A, giving a summary of car shortages and surpluses by groups from June 22, 1910, to October 25, 1911, says:

"The surplus and shortage figures reported for the period ending October 25, 1911, show a surplus of 39,306 cars and a shortage of 18,774 cars, leaving a net surplus of 20,532 cars. Every class of car (flat cars excepted), shows a decided decrease in the number of idle cars. The largest decrease is shown in coal cars, that class of car decreasing from 19,543 cars on October 11, 1911, to 12,148 cars on October 25, 1911, a decrease of 7,395 cars. During the same period box cars show a decrease of 5,206 cars and miscellaneous cars decreased 6,492 cars, which together with an increase of 17 flat cars make a total decrease of 19,076 cars for that period.

"Of the increase of 5,817 cars reported in the total shortage, it will be noted that the box car shortage is the greatest, increasing from 10,090 cars on October 11, to 14,943 cars on October 25, an increase of 4,853 cars or 48.09 per cent. Coal cars show an increased shortage of 766 cars, and miscellaneous cars an increased shortage of 385 cars, while the flat car shortage decreased 187 cars."

The accompanying table gives surpluses and shortages by groups for the last period covered by the report, and the charts show total bi-weekly surpluses and shortages in 1907 to 1911.

Total Revenues and Expenses in August.

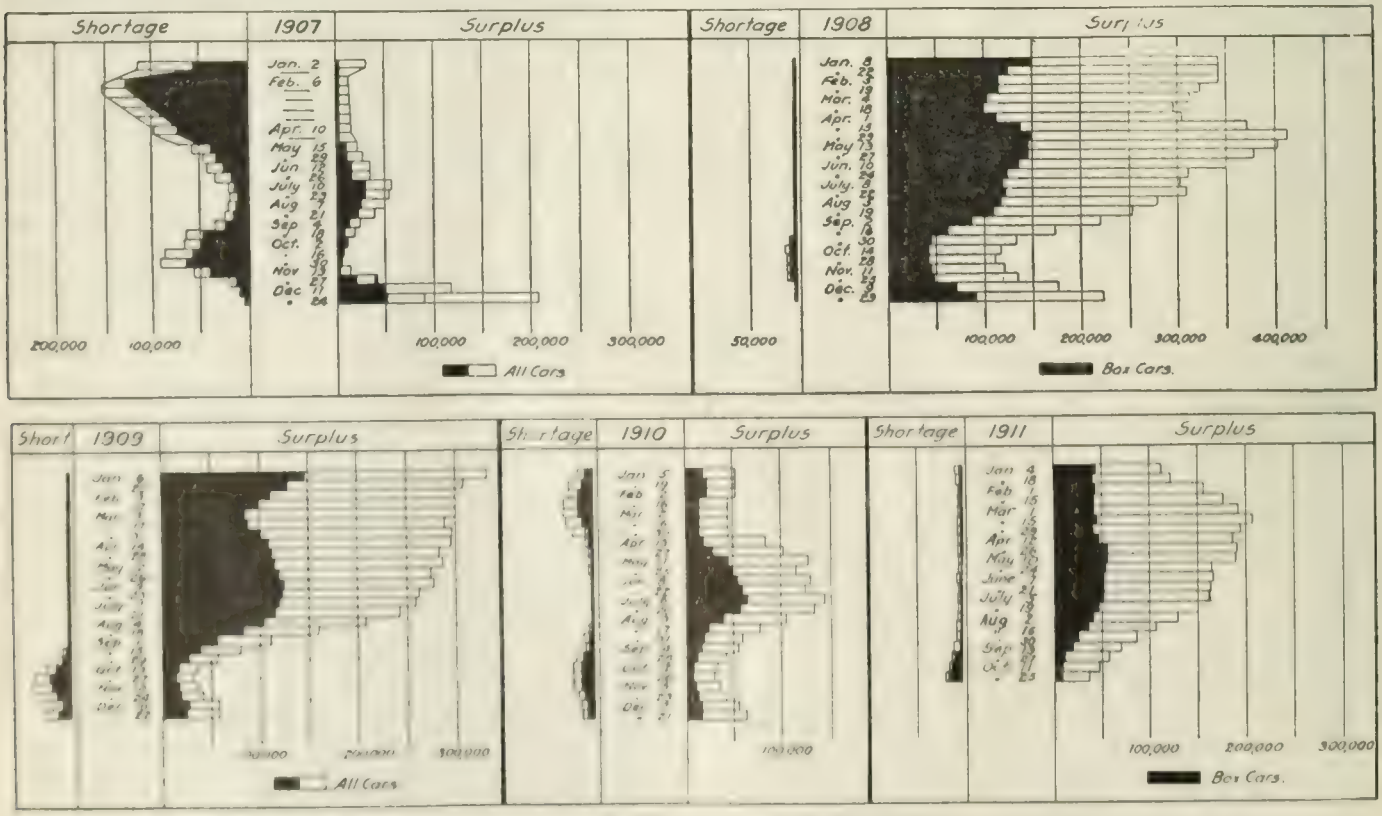
Logan G. McPherson, director of the Bureau of Railway Economics in the summary of revenues and expenses of steam roads in the United States for the month of August, 1911, says:

"The railways whose returns are included in this bulletin operated 220,228 miles of line, or 90 per cent. of all the steam railway mileage in the United States. The total operating revenues for the month of August, 1911, amounted to $237,643,752. This includes revenues from freight and passenger traffic, from carrying mail and express, and from miscellaneous sources. Compared with August, 1910, these total operating revenues show a decrease of $1,558,811. Operating revenues per mile of line amounted to $1,079, as compared with $1,101 in August, 1910. This represents a decrease of $22 per mile, or 2.0 per

Car Surpluses and Shortages.

Date.	No. of roads.	Surpluses: Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.	Shortages: Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.
Group *1.—October 25, 1911	7	84	631	469	317	1,501	840	119	300	9	1,268
" 2.— " 25, 1911	23	545	88	939	1,132	2,704	547	0	153	39	739
" 3.— " 25, 1911	24	214	219	4,627	1,445	6,505	1,859	0	465	211	2,535
" 4.— " 25, 1911	10	211	74	751	819	1,855	1,194	141	954	2	2,291
" 5.— " 25, 1911	17	216	121	550	1,084	1,971	543	118	50	0	711
" 6.— " 25, 1911	24	4,077	645	1,465	3,367	9,554	131	0	102	0	233
" 7.— " 25, 1911	3	15	26	35	421	497	121	0	0	0	121
" 8.— " 25, 1911	17	0	108	1,027	1,832	2,973	2,417	152	254	66	2,889
" 9.— " 25, 1911	12	1,325	437	574	694	3,030	300	0	0	0	300
" 10.— " 25, 1911	19	389	611	1,629	4,114	6,743	3,092	163	0	162	3,417
" 11.— " 25, 1911	5	84	901	82	906	1,973	3,899	203	0	168	4,270
Total	161	7,166	3,861	12,148	16,131	39,306	14,943	896	2,278	657	18,774

*Group 1 is composed of New England lines; Group 2—New York, New Jersey, Delaware, Maryland, and Eastern Pennsylvania lines; Group 3—Ohio, Indiana, Michigan and Western Pennsylvania lines; Group 4—West Virginia, Virginia, North and South Carolina lines; Group 5—Kentucky, Tennessee, Mississippi, Alabama, Georgia and Florida lines; Group 6—Iowa, Illinois, Wisconsin, Minnesota and the Dakotas lines; Group 7—Montana, Wyoming and Nebraska lines; Group 8—Kansas, Colorado, Missouri, Arkansas and Oklahoma lines; Group 9—Texas, Louisiana and New Mexico lines; Group 10—Oregon, Idaho, California and Arizona lines; Group 11—Canadian lines.



Car Surpluses and Shortages in 1907 to 1911.

cent. This decrease in operating revenues was due wholly to a decrease in freight revenue amounting to $25 per mile, or 3.4 per cent. There were small increases in the other revenue accounts.

"Operating expenses, which include all the costs of maintaining track and equipment, operating trains, securing traffic, and of administration, amounted to $153,655,921. This was $1,251,053 less than for August, 1910. Operating expenses per mile amounted to $698, compared with $714 in August, 1910. This represents a decrease of $16 per mile, or 2.2 per cent., which was due to decreases in all the primary operating expense accounts except that of maintaining equipment. In the cost of maintaining way and structures, i. e., track and buildings, there was a decrease compared with August, 1910, of $9 per mile, or 5.6 per cent., while the cost of conducting transportation declined $7, or 1.9 per cent.

Net operating revenue, which is total operating revenues less operating expenses, shows a decrease as compared with August, 1910, of $7 per mile, equivalent to 1.8 per cent. By cutting down operating expenses the railways have been able partially to overcome the decrease of $22 per mile in operating revenues. Operating expenses have been decreased in large measure, as was the case in July, by reducing the amount spent for maintaining way and structures. The net revenue for each mile of line for each day of August averaged $12.30, as compared with $12.52 for August, 1910. It should be recalled that net revenue is gross profit before anything has been taken out for taxes, rentals, interest on bonds, appropriations for betterments, or dividends. Taxes for the month of August amounted to $9,105,655, or $41 per mile, an increase of 5.9 per cent. over August, 1910. The operating ratio for August, that is, the per cent. of the total operating revenues which was absorbed in operating expenses, was 64.7 per cent., as compared with 67.9 per cent. in July, 1911, and 64.8 per cent. in August, 1910.

"The western group of railways show a decrease in total operating revenues per mile as compared with August, 1910, of 5.9 per cent. and the eastern group a decrease of 0.1 per cent., while the operating revenues per mile of the southern group increased 4.3 per cent. over August, 1910. Operating expenses per mile were reduced 3.2 per cent. by the western railways as compared with August, 1910, and by the eastern railways 2.6 per cent., but increased on the southern railways 3.8 per cent. The cost of maintenance of way and structures shows a decrease per mile in every group in comparison with August, 1910. Net operating revenue per mile in the western group declined 10.2 per cent. as compared with August, 1910, while that of the eastern group increased 4.8 per cent., and that of the southern group 5.2 per cent. Taxes increased in all the groups as compared with August, 1910, the increase per mile amounting to 9.4 per cent in the southern group, 8.7 per cent. in the eastern group, and 2.2 per cent. in the western group.

"Comparison of the returns for two months of the fiscal year 1912 with those of the corresponding months of the fiscal year 1911 shows a decrease in total operating revenues per mile of 2.1 per cent., and in net operating revenue per mile of 1.6 per cent. The considerable decrease of 11.2 per cent. in the net operating revenue per mile of the western group contrasts with increases of 5.9 per cent. in the eastern group and 6.4 per cent. in the southern group."

The following table shows the per cent. of total operating revenues consumed by each class of expenses:

Per cent. of total operating revenues.	August, 1911.	August, 1910.	Fiscal year ended June 30, 1911.	Fiscal year ended June 30, 1910.
Maint. of way and structures.	13.8	14.3	13.1	13.4
Maint. of equipment.....	14.8	14.4	15.3	15.0
Traffic expenses	2.0	2.1	2.1	2.0
Transportation expenses	31.9	31.8	35.5	33.4
General expenses	2.2	2.2	2.6	2.5
Total operating expenses.....	64.7	64.8	68.6	66.3

INTERSTATE COMMERCE COMMISSION.

The commission announces that the first hearing in its general investigation of the business of express companies will be held in New York City November 22. The commission has had 60 men examining the books of the companies in New York.

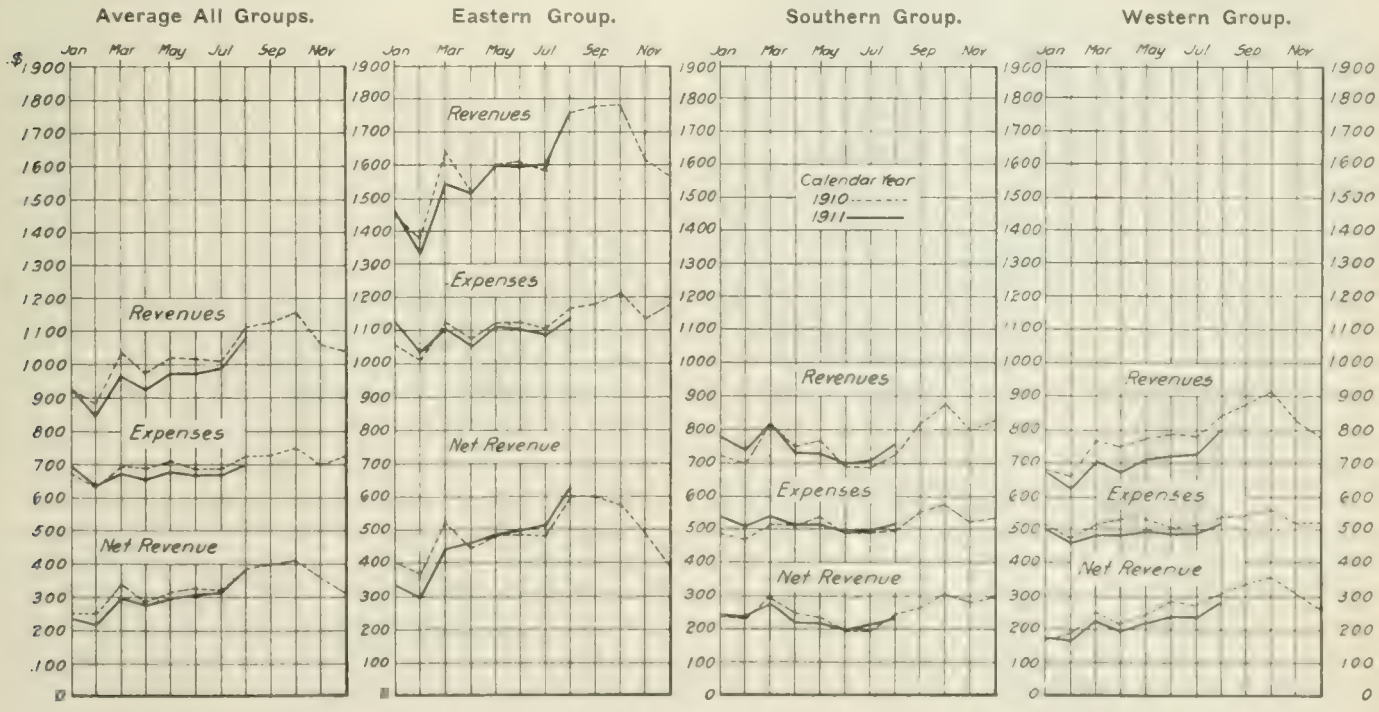
Complaint Dismissed.

C. & W. Lumber Co. v. Tallulah Falls et al. Opinion by the commission:

A rate limited to shipments for delivery within the New York lighterage limits does not apply on shipments ordered to be delivered outside of those limits. Complaint dismissed. (21 I. C. C., 463.)

H. W. Joynes et al. v. Pennsylvania Railroad. Opinion by the commission:

Complainants allege that the Pennsylvania Railroad's present track storage tariffs applicable to cars detained in its produce yards at Pittsburgh, Pa., are unreasonable and unduly prejudicial because of failure to provide for certain exemptions from the charges therein prescribed. Reaffirming *Wilson Produce Co.* v. *P. R. R. Co.*, 14 I. C. C., 170, the complaint is dismissed. (21 I. C. C., 458.)



Monthly Earnings and Expenses Per Mile of Railway in 1910 and 1911.

Barred by Statute of Limitations.

Standard Oil Co. v. Chicago Terminal Transfer et al. Opinion by the commission:

Complaint asks reparation on account of alleged unreasonable charges for transportation of eight carloads of petroleum oil from Whiting, Ind., to Bear Springs, Tenn. Shipments were delivered more than two years before complaint was filed. (21 I. C. C., 460.)

STATE COMMISSIONS.

The Pennsylvania Commission announces that it is going to make a thorough investigation of suburban fares to and from Philadelphia.

The Indiana commission is preparing to try a case in the Hammond Superior Court against the Grand Trunk to collect a penalty for failure to comply with the Block Signal Law of 1907.

The Railroad Commission of Louisiana is now holding hearings on the question of abolishing all concentration charges allowed on shipments of cotton seed to cotton seed mill points in Louisiana, and of establishing flat rates without refunds.

COURT NEWS.

Judge Anderson in the Federal Court at Indianapolis has assessed penalties totaling $7.25 against the Pennsylvania (Southwest) on its admission of violating the Hours of Service Act by keeping twenty-two employees on duty more than sixteen hours. The employees were trainmen on trains engaged in interstate commerce.

In the appelate division of the supreme court of New York, November 3, a decision was rendered affirming the judgment of the lower court for damages for the loss of money by a passenger. Joseph A. Knieriem recovered from the New York Central for the loss of $1,800 which he carried in his pocket and which was lost when the train in which he was riding was derailed and wrecked by a washout. The passenger was soon going, with his wife, on a long journey; and the court seems to have held that $1,800 was a reasonable sum of money for him to carry. But there was a strong dissenting opinion, by Judges Ingraham and McLaughlin, who held that the journey on which the passenger had started was really a short one; he had not actually begun the long journey.

Judge William C. Hook of the federal court at Kansas City, Mo., on November 1 refused to grant an injunction asked by 13 Missouri railways to restrain the state railway commission from putting into effect its reduced rates on iron and steel products. He said such an injunction would be illegal unless two other United States judges concurred in granting it, and set November 10 as the date for the next hearing. He stated that if two other judges could be obtained who would sit with him on that date he would issue the injunction to become effective when their signatures could be secured. Attorneys for the roads refused to agree to keep an account of the totals in rate differences until the injunction should be indorsed by two other judges, under which provision representatives of the state and of the shippers said they would be willing to have it granted.

The Indiana supreme court, in the case of the state against the Louisville & Nashville, has held constitutional the law of that state requiring railways to equip their engines with automatic bell-ringing devices. The decision reverses the decisions of several circuit courts in the state which declared the law unconstitutional. The railway alleged the law to be unconstitutional because it attempted to control the construction of locomotives to be used in interstate service and that the words "efficient" and "proper," used in describing the kind of device required, were indefinite, and further, that there was no such thing as an automatic bell-ringing device. The supreme court [illegible] in other states. The court said it has judicial knowledge that [illegible] the device which may be chosen shall be effective to continually ring the bell

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

Mrs. S. A. Kidder, president of the Nevada County Narrow Gage Railroad, with office at Grass Valley, Cal., has resigned.

Arthur P. Foss, auditor of disbursements of the Maine Central at Portland, Me., has been appointed assistant controller, with office at Portland; Albert J. Raynes, succeeds Mr. Foss.

W. L. Alexander, general claim agent of the Gulf, Colorado & Santa Fe at Galveston, Tex., has been appointed general claim agent of the Missouri, Kansas & Texas of Texas, with office at Texas.

C. E. Wright, assistant freight auditor of the Chicago, Milwaukee & St. Paul, has been appointed auditor of the Copper Range, with office at Houghton, Mich., succeeding Wallace Tedford, assigned to other duties.

John S. Douglas, claim adjuster for the Gulf, Colorado & Santa Fe at Cleburne, Tex., has been appointed acting general claim agent, with office at Galveston, Tex., succeeding W. L. Alexander, resigned to accept service with another company.

C. B. Seger, general auditor of the Southern Pacific, the Union Pacific, the Oregon Short Line, the Oregon-Washington Railroad & Navigation Company, the Southern Pacific of Mexico, the Sonora Railway and the Arizona Eastern at Chicago, has been elected deputy comptroller, with office in New York City.

The following officers of the Galveston, Harrisburg & San Antonio and the Texas & New Orleans have been appointed to similar offices on the Houston & Texas Central and the Houston East & West Texas, with office at Houston, Tex.; D. B. Keiser, car accountant; F. J. Cox, assistant auditor, and W. E. Briggs, freight auditor. They will continue to have jurisdiction over the Galveston, Harrisburg & San Antonio, but these offices have been abolished on the Texas & New Orleans.

Referring to the changes in jurisdiction of officers of the Southern Pacific, it was stated in our issue of October 27 that W. H. Bancroft, who has heretofore been general manager of the Southern Pacific lines east of Sparks, will hereafter devote all of his time to the Oregon-Washington Railroad & Navigation Company. This was erroneous, as Mr. Bancroft has not been connected with the latter company, but has long been vice-president and general manager of the Oregon Short Line, and he will in future devote his time to this road and to the San Pedro, Los Angeles & Salt Lake, of which he is first vice-president.

William H. Bruce, whose appointment as secretary and treasurer of the Atlanta & West Point and the Western Railway of Alabama, has been announced in these columns, was born on December 28, 1866, at Nashville, Tenn., and graduated from the Atlanta, Ga., High School in 1884. He began railway work in October of the same year as a clerk in the general freight office of the Atlanta & West Point and the Western Railway of Alabama, at Montgomery, Ala., and was appointed secretary to the president and general manager of the same roads in 1886. From 1891 to 1892 he was secretary to the third vice-president of the Louisville & Nashville at Nashville, Tenn., and then, for three years, was secretary to August Belmont, chairman of the board of the Louisville & Nashville. In 1896, Mr. Bruce was appointed assistant to the president of the Louisville & Nashville Terminal Company at Nashville, and since 1901 he was assistant secretary of the Louisville & Nashville at Louisville, Ky.

F. J. Hearn, whose election as vice-president of the Delaware Lackawanna & Western, in charge of traffic, has been announced in these columns, was born March 12, 1856, at Granville, N. Y., and began railway work in 1870 with the Philadelphia & Reading. He was later in the telegraph and traffic departments of several [illegible] in January, 1880, he was appointed station agent of the Atchison, Topeka & Santa Fe, at Trinidad, Colo. Three years later he was made general agent of the same road at Salt Lake City, Utah, and was later transferred to Cincinnati, Ohio, and then to Denver, Colo. From November, 1887, to August, 1889,

he was general agent and assistant superintendent in charge of Denver Terminals, including the Denver Circle Railway, and division of the Atchison, Topeka & Santa Fe, at Denver. He was oppointed general western freight and passenger agent of the Missouri Pacific in August, 1889, and the following April was made general freight and passenger agent of the Rio Grande-Midland route, composed of the Colorado Midland and Denver Rio Grande and Rio Grande Western lines, with office at Denver. From April, 1891, to September, 1899, he was commissioner of the Colorado-Utah Traffic Association, Denver, Texas & Fort Worth Association and Local Utah Railway Association, and from January, 1892, to September, 1899, he was chairman of the Colorado Passenger Association. Mr. Flynn was appointed general freight agent of the Delaware, Lackawanna & Western in September, 1899, and since March, 1903, was freight traffic manager of the same road at New York.

In an article on the reorganization of the Harriman Lines in the *Railway Age Gazette* on October 6, we published an account of the life of Epes Randolph, the new president of the Southern Pacific Lines in Mexico. The photograph of Mr. Randolph reproduced herewith, was not received in time to be published with the photographs of the other Harriman Lines officers shown in the article mentioned above. Mr. Randolph's first important railway work was as an engineer on eastern railways controlled by Collis P. Huntington. He has been in the southwest since 1894, serving in various positions on Harriman Lines, particularly those in which his engineering ability was most needed, such as the development and protection of the Imperial valley and the extension of the Southern Pacific lines into Mexico.

Epes Randolph.

Operating Officers.

C. J. Burkholder, trainmaster of the Kansas City Southern at Pittsburg, Kans., has been appointed superintendent, with office at Pittsburg, succeeding O. Cornelison, resigned to go to the Virginian Railway.

W. W. Collins, superintendent of the Iowa and Dakota division of the Chicago, Milwaukee & St. Paul at Mason City, Iowa, has been appointed also superintendent of the Black Hills division, with office at Mason City. R. P. Edson, superintendent at Murdo Mackenzie, S. D., has been appointed assistant superintendent of the Iowa and Dakota division west of Sanborn and of the Black Hills division, with office at Mitchell, S. D. The jurisdiction of A. C. Peterson, assistant superintendent at Mason City, will hereafter be over the lines east of and including Sanborn, and the office of trainmaster has been abolished.

H. C. Bixler, trainmaster of the New York terminal division of the Pennsylvania Railroad, has been promoted to assistant superintendent of the Philadelphia Terminal division. He will have charge of the passenger service in and out of Philadelphia. Mr. Bixler was born at Broad Ford, Pa., on March 21, 1868, and entered the service of the Pennsylvania Railroad as a telegraph operator on the Pittsburgh division on May 17, 1887. In December, 1892, he was promoted to extra train despatcher of the same division, and on April 1, 1893, was made train despatcher. On June 1, 1903, he was promoted to assistant trainmaster of the Pittsburgh division, which position he held until November 1, 1909, when he was transferred to the New York Terminal division as trainmaster, in charge of the train service on the company's New York improvement and tunnel extension.

Stanley Saunders Russell, whose appointment as superintendent of car service of the Central Vermont, with headquarters at St. Albans, Vt., has been announced in these columns, was born October 18, 1874, at Rednersville, Ont., and was educated in the public schools and at Belleville College. He began railway work in November, 1891, in the office of the assistant superintendent of the Grand Trunk at Belleville, and the following year was transferred to Toronto. In August, 1896, he was appointed secretary to the superintendent at Toronto, and in March, 1898, he became chief clerk to the joint superintendent of the Grand Trunk and the Wabash, at St. Thomas. From June to December, 1902, he was private secretary to the general manager of the Central Vermont at St. Albans, and from January, 1903, to December of the following year was chief clerk to the superintendent of transportation, and then became chief clerk to the general manager, which position he held at the time of his recent appointment as superintendent of car service, as above noted.

Following the recent reorganization of the Harriman Lines, a change has been made by which all the old lines of the Southern Pacific go back to the Southern Pacific Company, Pacific system, and the Pacific system, which has heretofore been divided into the Northern and Southern districts, has been redistricted. Under the new plan the Northern district will embrace the lines in Oregon (which will hereafter be known as the Portland division) and the Shasta division. The Central district will comprise the Western, Coast, Stockton, Sacramento and Salt Lake divisions, being the same as the old Northern district except that the Shasta division has been taken from it and the Salt Lake division (heretofore under the jurisdiction of officers of the Oregon Short Line, and known as the "lines east of Sparks") has been added to it. The Southern district will continue as in the past to include the Los Angeles, San Joaquin and Tucson divisions. D. W. Campbell, assistant general manager in charge of maintenance and operation of the Second district of the Oregon-Washington Railroad & Navigation Company, at Seattle, Wash., has been appointed general superintendent of the Northern district of the Southern Pacific, with office at Portland. Officers of the old Northern district will hereafter have jurisdiction over the Central district.

Grant Hall, who has been appointed assistant general manager of the western lines of the Canadian Pacific, with office at Winnipeg, Man., as has been announced in these columns, was born November 27, 1863, at Montreal, Can., and was educated at Bishops College and School, Lennoxville, Que. He began railway work as an apprentice machinist with the Grand Trunk at Point St. Charles shops, Montreal, in 1883. He was locomotive foreman on the Canadian Pacific from 1887 to 1893, when he was made general locomotive foreman of the Intercolonial Railway, with office at Moncton, N. B., where he remained for five years. In September, 1898, he returned to the Canadian Pacific, where he was consecutively general foreman, first at the McAdam and later at the Winnipeg shops; master mechanic of the British Columbia division; assistant superintendent of motive power of the eastern lines, and superintendent of motive power and car department of the western lines, from which last office he has just been promoted.

Grant Hall.

Traffic Officers.

B. A. Rockwell has been appointed assistant division freight agent of the Erie Railroad, with office at New York City.

For notice of the appointment of milk agent and assistant milk agent, of the Pennsylvania Railroad, see an item under Traffic News.

J. F. Barber has been appointed traveling passenger agent of the Illinois Central, with office at Freeport, Ill., succeeding S. C. Baird, promoted.

Harry Baker, agent of the San Antonio & Aransas Pass at Corpus Christi, Tex., has been appointed commercial agent, with office at Corpus Christi.

V. B. Sharritts has been appointed acting agent of the Traders Despatch, with headquarters at Indianapolis, Ind., succeeding O. J. Hammon, resigned.

George H. Wilcox, commercial agent of the Georgia Southern & Florida, at Cincinnati, Ohio, has been appointed assistant general freight agent, with office at Macon, Ga.

Geo. F. Ramspacher has been appointed commercial agent of the Rock Island lines, with office at Philadelphia, Pa., succeeding D. W. Farrow, retired under the pension rules.

R. W. Darling has been appointed traveling passenger agent of the Cleveland, Cincinnati, Chicago & St. Louis, with office at Huntington, W. Va., succeeding M. L. Griffin, promoted.

M. C. Bradley has been appointed traveling freight agent of the Pere Marquette, with office at St. Louis, Mo., succeeding E. B. Wood, resigned to accept service with another company.

A. T. Pratt has been appointed traveling freight agent of the Texas & Pacific, with office at St. Louis, Mo., succeeding P. B. Doddridge, transferred. W. J. Lane has been appointed traveling freight agent, with office at Los Angeles, Cal.

J. J. Livingston, traveling agent of the Chicago & North Western at Kansas City, Mo., has been appointed traveling agent, with office at Chicago, succeeding Clinton McCullough, promoted, and his former position has been abolished.

The following have been appointed agents of the new Frisco Refrigerator Line, which began operations on November 1: E. P. Lannan, general agent at St. Louis, Mo.; I. T. Preston, agent at New Orleans, La.; and C. E. Pierce, agent at Chicago.

D. L. Moorman, traveling passenger agent of the Cincinnati, Hamilton & Dayton at Dayton, Ohio, has been appointed traveling passenger agent at Toledo, Ohio, succeeding J. R. McCord, granted a leave of absence on account of ill health. L. H. McArthur, agent at Hamilton, Ohio, succeeds Mr. Moorman.

G. H. Westcott, commercial agent of the Chicago, Milwaukee & St. Paul at Buffalo, N. Y., has been appointed division freight agent, with office at Chicago, succeeding A. A. Wilson, appointed commercial agent, with office at Milwaukee, Wis. G. E. Chase, traveling passenger agent at Buffalo, N. Y., succeeds Mr. Westcott.

J. L. Martin, traveling freight agent of the Southern Railway, at Cincinnati, Ohio, has been appointed a freight soliciting agent, with office at Louisville, Ky., succeeding William Humphreys, whose appointment as commercial agent at Dallas, Tex., has already been announced in these columns. H. E. Woodworth, freight soliciting agent at Nashville, Tenn., succeeds Mr. Martin.

M. C. Browning, traveling freight agent of the Louisville & Nashville at Detroit, Mich., has been appointed commercial agent, with office at Cleveland, Ohio, succeeding A. E. Mann, whose promotion to general agent at St. Louis has been announced in these columns. F. A. McHale, traveling freight agent at Louisville, Ky., succeeds Mr. Browning, and Q. D. Butler succeeds Mr. McHale.

R. D. Williams, district passenger agent of the Union Pacific at Denver, Colo., has been appointed city passenger agent of that road, the Oregon Short Line, the Oregon Washington Railroad & Navigation Company and the Southern Pacific, with office at Chicago, succeeding B. H. Bullard, resigned. H. E. Hill, traveling passenger agent of the Union Pacific at Denver, succeeds Mr. Williams with the title of city passenger agent, and John J. Craron succeeds Mr. Hill as traveling passenger agent.

C. W. Russell, commercial agent of the Southern Railway at Johnson City, Tenn., has been appointed commercial agent at Charlotte, N. C., succeeding C. V. Palmer, removed to go to another position. S. W. Mays, traveling freight agent at Laredo, Tex., succeeds Mr. Russell, and S. B. Douglass succeeds Mr. Mays. J. B. Garvey, traveling freight agent at New Orleans, La., has been appointed freight soliciting agent with office at New Orleans, succeeding J. R. Barnwell, resigned. W. S. Voorsanger, traveling freight agent at Dallas, Tex., succeeds Mr. Garvey, and W. T. Keating has been appointed traveling freight agent at Dallas, succeeding R. D. Tate, resigned.

Incident to the redistricting of the Southern Pacific (see item under Operating Officers), J. M. Scott, assistant general passenger agent of the Oregon-Washington Railroad & Navigation Company, and the Southern Pacific lines in Oregon at Portland, Ore., has been appointed general passenger agent of the Northern district of the Southern Pacific, with office at Portland. H. E. Lounsbury, assistant general freight agent of the Oregon-Washington Railroad & Navigation Company and the Southern Pacific lines in Oregon at Portland, has been appointed general freight agent of the Northern district of the Southern Pacific, with office at Portland. Officers of the old Northern district of the Southern Pacific will hereafter have jurisdiction over the Central district.

C. B. Compton, traffic manager of the Louisville & Nashville, at Louisville, Ky., has been appointed to the new position of freight traffic manager and his former position has been abolished. W. A. Russell, general passenger agent at Louisville, has been appointed to the new position of passenger traffic manager and Robert D. Pusey, assistant general passenger agent, succeeds Mr. Russell, all with offices at Louisville, and John K. Ridgely, division passenger agent at New Orleans, La., has been appointed assistant general passenger agent, with headquarters at New Orleans, with authority over the lines south of and including Birmingham, Ala. L. G. Waldrop, general agent at Sheffield, Ala., has been appointed general agent at Anniston, succeeding H. P. Salter, promoted; S. B. Jones, succeeds Mr. Waldrop.

Engineering and Rolling Stock Officers.

T. S. Lloyd, superintendent of motive power and equipment of the Delaware, Lackawanna & Western, with office at Scranton, Pa., has resigned, effective at the pleasure of the management, and the selection of his successor.

D. C. King, roadmaster of the Fort Worth & Rio Grande and the St. Louis, San Francisco & Texas at Brownwood, Tex., has been transferred to Fort Worth, Tex., succeeding J. S. Beck, resigned to go with the St. Louis Southwestern at Dallas, Tex.

V. M. Robinson, foreman in the car department of the Missouri Pacific at De Soto, Mo., has been appointed general car foreman of the Trinity & Brazos Valley, with office at Teague, Tex., succeeding W. R. Duff, resigned to accept service with another company.

John G. Sullivan, who has been appointed chief engineer of the western lines of the Canadian Pacific, with office at Winnipeg, Man., as has been announced in these columns, was born June 11, 1863, at Bushnells Basin, Monroe county, New York. He finished his education at Cornell University, which he attended from 1884 to 1888, and began railway work as a rodman on the Great Northern in the latter year. The following year he went with the Spokane Falls & Northern, now part of the Great Northern, as instrument man and assistant engineer; and was then consecutively, assistant engineer on the Great Northern; assistant engineer with the Alberta Railway & Coal Company, now the Alberta Railway & Irrigation Company; locating engineer with the Butte, Anaconda & Pacific; principal assistant engineer of the Kaslo & Slocan, now the Kootenay Railway & Navigation Com-

J. G. Sullivan

pany, and from 1896 to 1900 he was with the Columbia & Western, now part of the Canadian Pacific, first as reconnaissance engineer and later as principal assistant engineer in charge of construction and operation. He was then for five years with the Canadian Pacific proper as division engineer in charge of all new construction on the western lines. He was assistant chief engineer on the Panama canal from September, 1905, to January, 1907, and then returned to the Canadian Pacific, where he was manager of construction of the eastern lines until September, 1908. He was appointed assistant chief engineer of the eastern lines in the latter month, and from February, 1911, until the time of his promotion as above he was assistant chief engineer of the western lines at Winnipeg.

J. A. Roland, roadmaster of the Chicago & North Western at Sioux City, Iowa, has been appointed roadmaster, with office at Missouri Valley, Iowa. A. W. Allstrand, roadmaster at Carroll, Iowa, succeeds Mr. Roland; and L. Gilbert, section foreman at Sioux City, succeeds Mr. Allstrand.

T. W. Younger, master mechanic of the Southern Pacific lines in Oregon at Portland, Ore., has been appointed superintendent of motive power of the Northern district of the Southern Pacific, with office at Portland. F. L. Burckhalter, division engineer at Los Angeles, Cal., has been appointed district engineer of the Northern district, with office at Portland. (See item under Operating Officers.)

Purchasing Officers.

V. P. Adrian has been appointed division storekeeper of the Missouri, Kansas & Texas, with office at Denison, Tex., succeeding J. F. Slaughter, resigned to accept service with another company.

J. F. Slaughter, division storekeeper of the Missouri, Kansas & Texas at Denison, Tex., has been appointed division storekeeper of the Wichita Falls & Northwestern, with office at Wichita Falls, Tex.

W. J. Given, has been appointed division storekeeper of the Mobile & Ohio, with office at Whistler, Ala., succeeding W. O. Williamson, resigned, and P. E. Keller has been appointed division storekeeper at Tuscaloosa, Ala., succeeding J. J. Tomlinson, resigned.

A. E. Hutchinson, general purchasing agent of the Oregon Short Line and the Southern Pacific lines east of Sparks at Salt Lake City, Utah, has been appointed purchasing agent of the Northern district of the Southern Pacific, with office at Portland, Ore. (See item under Operating Officers.)

OBITUARY.

J. P. Spivey, superintendent of the Kansas City Southern demurrage bureau, died in Kansas City, Mo., on October 31. He was 39 years old.

Dr. Thomas M. Colley, formerly chief surgeon of the International & Great Northern at Palestine, Tex., died at Houston, Tex., on October 30, at the age of 76 years.

H. Victor Newcomb, formerly for several years vice-president of the Louisville & Nashville, died on November 3, at Atlantic City, N. J. Thirty years ago Mr. Newcomb was one of the well-known operators in Wall street. He was born in Louisville, Ky., in 1844. In 1874 he was chosen vice-president, and in 1879 succeeded his father as president of the Louisville & Nashville. He held that office about two years. Mr. Newcomb retired from active business life several years ago. He was a direct descendant of Martha Washington.

William H. Flynn, formerly engaged in railway construction work, died at South Berwick, Me., on October 30, at the age of 68 years. Mr. Flynn was engaged in the construction of the Bangor & Piscataquis, afterward merged in the Bangor & Aroostook, a portion of the Eastern Railroad (Mass.), now part of the Boston & Maine; also in construction work on the Maine Central, Boston & Maine and Massachusetts Central, which is now part of the Boston & Maine. All this work was carried out at various places in New England. In addition, he carried out work on the Central Railroad of New Jersey and the Pennsylvania Railroad. Mr. Flynn was born in St. Andrews, N. B.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Louisville & Nashville is building 13 consolidation locomotives at its South Louisville, Ky., shops.

The Chicago & North Western has ordered one mogul locomotive from the American Locomotive Company. The dimensions of the cylinders will be 11 in. x 18 in.; the diameter of the driving wheels will be 43 in., and the total weight in working order will be 50,000 lbs.

The Chicago & Illinois Midland has ordered 1 four-wheel switching locomotive from the American Locomotive Company. The dimensions of the cylinders will be 13 in. x 18 in.; the diameter of the driving wheels will be 36 in., and the total weight in working order will be 56,000 lbs.

The Boston, Revere Beach & Lynn has ordered 2 Forney type passenger locomotives from the American Locomotive Company. The dimensions of the cylinders will be 14 in. x 18 in.; the diameter of the driving wheels will be 49½ in., and the total weight in working order will be 91,000 lbs.

The Illinois Central has ordered 40 mikado locomotives from the Baldwin Locomotive Works and 10 Pacific type locomotives from the American Locomotive Company. The dimensions of the cylinders of the mikado locomotives will be 27 in. x 30 in., the diameter of the driving wheels will be 63 in., and the total weight in working order will be 280,000 lbs.

The Akron, Canton & Youngstown, mentioned in the *Railway Age Gazette* of October 13 as being in the market for 5 switching locomotives, has ordered this equipment from the Lima Locomotive & Machine Company. Three of the locomotives will have 19 in. x 26 in. cylinders and will weigh 135,000 lbs., and the other two will have 21 in. x 26 in. cylinders and will weigh 159,000.

CAR BUILDING.

The Canadian Pacific is in the market for 10 sleeping cars.

The Armour Car Lines, Chicago, are building 400 refrigerator cars at the company's shops.

The Norfolk & Southern is making inquiries for 500 sixty-ton steel underframe ventilated box cars.

The Southern Railway has ordered 600 all-steel 50-ton gondola cars from the Pressed Steel Car Company.

The Chicago, Milwaukee & St. Paul has ordered 500 steel underframes from the Bettendorf Axle Company for reinforcing freight cars.

The Illinois Central is in the market for 30 caboose cars in addition to the equipment mentioned in the *Railway Age Gazette* of November 3.

The Lehigh Valley, mentioned in the *Railway Age Gazette* of October 6 as being in the market for 25 passenger cars, has ordered 15 all-steel combination passenger and baggage cars from the Pullman Company and 10 all-steel combination passenger and baggage cars from the Barney & Smith Car Company.

The Chicago, Burlington & Quincy, as mentioned in the *Railway Age Gazette* of November 3, has ordered 500 all-steel gondola cars from the American Car & Foundry Company. These cars will have a capacity of 100,000 lbs., and will weigh 38,500 lbs. The inside measurements will be 40 ft. long, 9 ft. 6 in. wide and 4 ft. 7 in. high. The over-all measurements will be 41 ft. 6 in. long, 10 ft. 1 in. wide, and 8 ft. 6 in. high. They will be built at the company's St. Louis, Mo., plant. The special equipment will be as follows:

Axles	American Car & Foundry Co.
Bolsters, truck	Simplex
Brakes	Westinghouse
Brake beams	Simplex
Brake shoes	Safety
Couplers	Simplex
Draft gear	Ludlow
Journal boxes	McCord.
Side bearings	Parry
Trucks	Andrews
Wheels	American Car & Foundry Co.

IRON AND STEEL.

The Great Northern is in the market for 40,000 tons of rails.

The Pennsylvania is making inquiries for 2,000 tons of bridge steel for the bridge at Williamsport, Pa.

The Norfolk & Western has ordered 50,000 tons of rails from the United States Steel Corporation.

The Seaboard Air Line has ordered 200 tons of bridge steel from the Virginia Bridge & Iron Company.

The Buffalo, Rochester & Pittsburg has ordered 700 tons of bridge steel from the American Bridge Company.

The Chicago, Burlington & Quincy is in the market for from 20,000 to 25,000 tons of rails for 1912 requirements.

The Central of New Jersey is taking bids on 200 tons of structural steel for the grade separation work at Elizabethport, N. J.

The Chicago, Burlington & Quincy has ordered a 60-ft. deck plate girder, a 69-ft. 8-inch skew deck plate girder, a total weight of 368 tons, and a 30-ft. I-beam span, 121 tons, from the McClintic Marshall Construction Company.

The New York, New Haven & Hartford and the Pennsylvania, as mentioned in the *Railway Age Gazette* of November 3, have placed a contract with the American Bridge Company for the construction of the Hell Gate bridge. This contract calls for 40,000 tons of structural steel.

General Conditions in Steel.—Orders in the steel industry have shown a decided improvement during the past week. This increase is believed to be about 10 per cent. over the previous week. The Steel Corporation is booking orders at the rate of about 37,000 tons a day, or at the rate of more than 11,000,000 tons a year, and the mills are operating at about 74 per cent. of capacity. There is no immediate prospect of higher prices, for steel men are satisfied with the present level so long as the high rate of production is maintained. Orders are pending for about 100,000 tons of rails.

MACHINERY AND TOOLS.

The Lehigh Valley is making inquiries for a number of machine tools.

The Delaware, Lackawanna & Western has placed orders for a small number of machine tools and is preparing a large list for 1912 requirments.

The New York, New Haven & Hartford has issued a list of machine tools, including a number of large lathes, planers and shapers, which will probably be used in the shops at New Haven, Conn. The estimated cost is $50,000.

FOREIGN RAILWAY NOTES.

At the close of 1910 there were about 1,230 miles of government railways in Java, and about 307 miles of new line are expected to be opened in a short time. The number of passengers traveling over the government lines in 1910 was 26,439,020, with a total passenger mileage of 442,372,389.

In 1909 a German firm obtained from the Peruvian government a provisional concession to connect the port of Paita, in northern Peru, such a point open to navigation on the Amazon river in order to make to the Pacific ocean, a route of about 400 miles, for products of the Amazon region, which now have to go 2,500 miles down this river before reaching the Atlantic ocean. They then often reach the United States by way of Europe. The length of this line will be either 353 miles or 367 miles, according to which of the two available routes is chosen, and the cost is estimated at either $17,119,400, or $22,272,500. The line will have the great advantage of presenting very few serious difficulties in its construction as compared with other South American trans-Andean lines. Two of these latter to have been opened in nearly 15,000 ft., while the proposed road would be able to cross the Andes at a height of not over 7,000 ft., and possibly at 5,000 ft. by tunneling.

Supply Trade News.

The Western Steel Car & Foundry Company, Chicago, will build a one-story machine shop at its Hegewisch, Ill., plant to cost approximately $32,000.

The Crawford Locomotive & Car Company, Streator, Ill., has been awarded a contract by the Detroit, Toledo & Ironton for repairing freight equipment.

D. C. & William B. Jackson, engineers, Chicago, have moved their Chicago offices from the Commercial National Bank building, to the new Harris Trust building.

The Isthmian Canal Commission will receive bids until November 22 on miscellaneous supplies, including locomotive cranes, stiff-leg derricks and hoisting engines. Circular No. 662.

Frank G. Coggin has resigned his position in the sales department of the Chicago Car Heating Company, Chicago, to go to the Ward Equipment Company, New York, with office in that city.

The Strauss Bascule Bridge Company, Chicago, has received an order from the Canadian Pacific to build a 336-ft. single-leaf, double track bascule bridge over the United States ship canal at Sault Ste. Marie, Mich.

The Power Specialty Company, New York, has received among recent orders, one from the New York, New Haven & Hartford for 10,620 h. p. Foster superheaters, to be used with Bigelow-Hornsby and Babcock & Wilcox boilers for the Cos Cob, Conn., and Bridgeport plants.

J. P. Coleman, chief engineer of the Union Switch & Signal Company, Swissvale, Pa., has been made consulting engineer of that company. L. F. Howard has been made engineering manager of the company, and F. B. Corey has resigned from his position with the General Electric Company, Schenectady, N. Y., to become engineer in charge of inspection of the Union company.

The American Steel & Wire Company, Chicago, has issued a pamphlet announcing that it has changed its standard of gages for steel wire to the new standard recently issued by the government Bureau of Standards, Washington, D. C. In the future, this company will use the name Steel Wire Gage in connection with steel wire in place of the name American Steel Wire Gage used heretofore, and for copper wire it will use the name American Wire Gage (B & S).

The Pollak Steel Company, Cincinnati, Ohio, which was recently organized, has taken over the manufacturing business of the Block-Pollak Iron Company, Cincinnati. The officials of the new company are as follows: President, Emil Pollak; vice-president, Maurice E. Pollak; treasurer and general manager, Bernard E. Pollak; secretary, Julian A. Pollak. For many years the plant, which is located at Carthage, a suburb of Cincinnati, has been given over to the manufacture of large forgings, principally car axles and other railway forgings, machine and engine builders' forgings, both light and heavy. The annual capacity of the plant has been nearly 100,000 tons, with over 50 per cent. of the total running in car axles. Improvements contemplated by the succeeding company include an addition to the present machine shop of a building 400 ft. long. A testing department will also be added for the treatment of steels, which will be equipped with annealing furnaces and all necessary apparatus. A special brand of heat-treated steels will be put on the market designed particularly for locomotive driving axles and forgings, which will meet the requirements of the specifications recently adopted by the M. C. B. association.

The Bucyrus Company, South Milwaukee, Wis., has recently been reorganized under a plan by which its authorized capital stock has been increased to $10,000,000, of which $8,000,000 has been issued. This action was taken so that some necessary additions to the plant and equipment could be made. Besides the plant at South Milwaukee, the company will own and operate the new shops, now under construction at Evansville, Ind., where wire rope shovels and chain shovels will be made. The plant site comprises 70 acres, and it is expected that 1,000 men will be employed in the new shops alone. The company now builds dredges of all sizes and types, wrecking cranes, pile drivers, drag line excavators, ballast plow unloaders and steam shovels of the heavier type, and intends to bring out a full line of light revolving shovels weighing up to 40 tons, and to take

up the manufacture of other types of earth-handling and excavating machinery. It also intends to extend its business to foreign markets, where it has not heretofore solicited trade, although its equipment has been used in a number of foreign countries. Through the banking firms of Pomroy Brothers, New York, and Edward B. Smith & Company, Philadelphia, Pa., the interest of influential stockholders in the east has been secured. The officers of the reorganized company will be as follows: President, William W. Coleman; vice-president, E. K. Swigart; secretary, G. A. Morison; treasurer, Dan P. Eells. The board of directors is made up as follows: H. P. Eells, former president of the Bucyrus Company, chairman; C. H. Cutler, president of the American Brake Shoe & Foundry Company, Mahwah, N. J.; W. H. Marshall, president of the American Locomotive Company, New York; A. H. Lockett, of Pomroy Brothers; W. W. Coleman; D. E. Pomroy, vice-president of the Bankers' Trust Company, New York; E. K. Swigart; G. W. McGarrah, president of the Mechanics and Metals National Bank, New York; H. H. Dean, of Edward B. Smith & Company; G. F. Steedman, president of the Curtis & Company Manufacturing Company, St. Louis, Mo.; J. B. Terbell, vice-president of the American Brake Shoe & Foundry Company; and Dan P. Eells.

TRADE PUBLICATIONS.

Sifting Machines.—The Hanna Engineering Works, Chicago, has published a 36-page illustrated catalog describing in detail the sand-sifting machines made by that company.

Land Show, New York.—One of the most interesting of the many pamphlets which are being distributed at the American Land and Irrigation Exposition, New York, is published by the Pennsylvania. This pamphlet enumerates and describes the various models and pictures exhibited by this company, and tells how they are intended to show the historical picture of the strides made by the Pennsylvania in transportation facilities, as well as to illustrate present day activities in the encouragement of agricultural development. The booklet then tells of the many efforts the company has made to promote scientific agriculture; how these efforts have been received by the farmers, and also why the company is making them. It ends with a brief account of the company's activities in conservation of timber resources.

The Wyoming State Board of Immigration, Cheyenne, Wyo., distributed bulletins on Irrigated Lands, Dry Farming and on Coal and Oil. The first bulletin tells of the enormous area that has been reclaimed by irrigation. It describes the remarkable yields secured by irrigation, and finally gives a list of irrigation projects which have been investigated by the board of immigration and have been found worthy of the confidence of the home-seeker. The bulletin on Dry Farming tells how good crops may be secured without irrigation on land where the annual rainfall is between 12½ and 15 inches. The bulletin on Coal and Oil describes the remarkable wealth of the state in these two products.

At the Denver & Rio Grande booth an attractive little folder is being distributed called The Land of Irrigation, in which many prosperous farms along the lines of this company are illustrated.

The agricultural department of the Southern Railway is distributing an interesting booklet called the Southeastern States, the Favored Region in Location, Resources, Products and Opportunities, in which some astonishing facts are given in regard to the productivity, diversity of resources and the industrial development of this region. This company has also published a booklet called Fruit and Farm Lands in the Southeast, which gives a list of farms in the states covered by the railway, briefly describing them and giving the price of each.

The passenger department of the Norfolk & Western has issued a very full booklet, entitled the Southern Home Seeker and Investor's Guide, in which interesting information is given on the localities along this company's lines.

The Massachusetts Board of Agriculture, Boston, Mass., has published a 169-page book describing Massachusetts' agricultural resources, advantages and opportunities. This book includes a very large list of farms for sale in the state, giving a full description and the price of each.

The agricultural department of the Bangor & Aroostook is distributing a small illustrated leaflet entitled Aroostook and the Potatoes That Have Made It Famous, in which the yield and exceptional quality of this crop are described.

Railway Construction.

New Incorporations, Surveys, Etc.

Altus Lubbock & Roswell.—This company, which is building from Memphis, Tex., southwest, has grading finished on about 80 miles and expects to have all the grading work finished between Memphis and Lubbock, 140 miles, by February 1, at which time track-laying is to be started. The line is projected from Altus, Okla., southwest via Memphis, Tex., to Roswell, N. M. Work will be finished on the division between Memphis and Roswell, 300 miles, before work is started on the section from Memphis east to Altus. The Texas Construction Company, of Memphis and Kansas City, Mo., which is backed by the Empire Construction and Finance Company, Kansas City, is building the line.

Canadian Pacific.—An officer writes that a contract has been given to Foley Bros., Welsh & Stewart, to build from Fort Steele, B. C., to Skookumchuck. J. G. Sullivan, chief engineer, Winnipeg, Man. (October 27, p. 859.)

This company will apply to the Parliament of Canada at its next session for an act authorizing it to construct the following branch lines of railway:

From a point at or near Hawarden, on its Moosejaw northwesterly branch in a northerly direction to a point at or near Floral or Cheviot, on its Pheasant Hills branch, or to a point between these two places in the province of Saskatchewan.

From a point on its Estevan-Forward branch in township 2 or 3, range 12, 13 or 14, west 2nd meridian, in a westerly and northwesterly direction to a junction with its Weyburn-Lethbridge branch in township 5 or 6, range 25 or 26, west 2nd meridian, in the province of Saskatchewan.

From a point at or near Sedgewick on its Hardisty subdivision in a southerly direction to a point in township 39 or 40, Range 11, 12 or 13, west 4th meridian, in the province of Alberta.

In a northwesterly and northerly direction from a point on its line from Wilkie, Sask., to a point near the North Saskatchewan river in township 51, 52, 53, 54, 55 or 56, range 1, 2, 3, 4, 5, 6, 7 or 8, west 4th meridian, in the provinces of Saskatchewan and Alberta.

From a point at or near Kipp on its Crow's Nest subdivision in an easterly and northeasterly direction to a point in township 12 or 13, range 12 or 13, west 4th meridian, in the province of Alberta.

From the northwesterly terminus of the line from Asquith, in a westerly and northwesterly direction to a point at or near Battleford, in the province of Saskatchewan.

From a point at or near Irricana in an easterly and southeasterly direction to a point in township 20 or 21, range 11, 12, 13 or 14, west 4th meridian, in the province of Alberta.

Authorizing it to make the terminus of its line from Lauder westerly at a point at or near Stoughton, on its Arcola branch.

Authorizing it to enter into an agreement with the province of New Brunswick for any of the purposes specified under section 361 of the railway act in respect of a line of railway extending from Norton to Minto, New Brunswick, and for other purposes.

Application will also be made for an extension of time to build the following lines:

From Osborne to a point between Cartwright and Boissevain, Manitoba.

From Otterbourne to Stuartburn, Manitoba.

From a point on the Icelandic river northerly and northwesterly 100 miles, Manitoba.

From Killam to Strathcona, Alberta.

Gulf, Florida & Alabama.—An officer writes that a con-tract has been given to Charles Merritt, Pensacola, Fla., for work on 80 miles between Pensacola, Fla., and Jasper, Ala. The plans call for a line via Atmore, Ala., Local, Fannsdale, Greensboro and Tuscaloosa. Track has been laid on 63 miles. Some of the work is heavy; maximum grades will be 1 per cent.; maximum curvature 4 deg. There will be two steel bridges, a number of piers, terminals, warehouses and station buildings. The line is being built to carry coal, lumber, cotton, naval stores and agricultural products. Roy C. McGargel, president, 5 Nassau street, New York. G. A. Berry, chief engineer, Pensacola, Fla.

Harriman Morgan Railroad.—Incorporated in Tennessee with

$10,000 capital, and headquarters at Harriman, to build and operate a railway from a point near Oliver Springs, Tenn., westerly through Crookedfork valley to a point near the intersection of Morgan, Scott and Anderson counties. It is understood that the line will be eventually extended north to a point on the Ohio river. The incorporators include C. E. Hendrick, J. R. McDowell, W. J. Clarke, J. M. Baker and R. B. Cassell.

Houston & Texas Central.—An officer writes that contracts will be let on November 15, for grading 13 miles in Lee county, Tex. This work is on a section of the branch line being built between Stone City, on the Brazos river, at a point at or near Giddings. Bids for building the rest of the line will probably be asked for within 60 days. E. B. Cushing, engineer of construction, Houston.

Marshall & East Texas.—An officer writes, regarding the report that an extension is to be built from Elysian Fields, Tex., south to Newton, about 120 miles; also from Winsboro north to Paris, about 50 miles, that while the company has had the question of building extensions under consideration for sometime, nothing definite has yet been decided regarding the carrying out of this work. R. J. Lockwood, chief engineer, Marshall. (October 27, p. 860.)

Northern Pacific.—The report of this company for the year ended June 30, 1911, shows that work on the Oregon Trunk Railway has been continued and grading has been finished to Bend, Ore., 156 miles from Fallbridge, on the Columbia river, where a connection is made with the Spokane, Portland & Seattle, and track has been laid to Opal City, 126 miles. The bridges over the Columbia river at Fallbridge, and over the Crooked river at Opal City, are nearly completed, and track laying is expected to be finished to Bend by November. Arrangements have been made to extend the Oregon Electric Railway from Salem, Ore., to Albany, about 60 miles. Work on the United Railways Company has been continued, and this line is now in operation between Portland, Ore., and Banks, 28 miles. During the year an extension of 22 miles was built on the Pacific & Eastern, making a total of 33 miles now in operation, from Medford, Ore., to Butte Falls. Grading was finished in 1910 and track laying was to be completed, ready for operation, in October, on the double track work, and change of line and grade, between St. Cloud, Minn., and Rices, 14.79 miles. Second main track has been laid on 2.68 miles from St. Paul to the Minneapolis (Line B) freight line. Grading for second main track was finished on the line in 1910 between Bloom, N. D., and Jamestown, 4.99 miles, but on account of a decrease of business this work has been postponed. Grading was finished in 1910 on a branch from Pingree to Wilton, 92.5 miles. There are now 42 miles of line completed, and it is expected to have all the work finished in time to handle this year's grain crop over the new branch. On the Missouri River Railway the Mandan North line, 53 miles, improvements are being made to the track from Mandan, N. D., to Sanger. Grading is finished from Glendive, Mont., northern along Yellowstone river, 55 miles, also the bridge over the Yellowstone river and track is now being laid. It is expected that work will be finished this autumn on second main track, and a change of line and grade from Huntley, Mont., to Billings, 12.63 miles. On the Bitter Root extension, 2.76 miles, in Montana, 1.65 miles of track is now in operation and the balance of the work has been postponed. Revision work is now under way to remove a few small humps and sags and to reduce the eastbound grade to 0.4 per cent. from Clark's Fork, Idaho, to Odgen, 7.62 miles. Work is expected to be finished this autumn, removing some bad curvatures along the shores of Lake Cocalalla, Idaho, and all the work to reduce curvatures and improve the line on 0.5 miles has been completed at Sipson. Grading has been finished and most of the steel is laid over the second main track from Mile Post 73 on the Idaho division, to Yardly, near Spokane, Wash., 7.9 miles. A contract for a bridge over the Spokane river has been let, and work is expected to be finished this fiscal year. Minor grading revision work will be completed from Moab to Thompson, 158 miles, and second main track is now in operation from Spokane to Wye, 194 miles. No work has been done on the Point Defiance line between Tacoma and Tenino, owing to the delay in securing necessary franchises. These negotiations have been completed, and it is expected to begin work during this fiscal year. Work has been pushed during the year on the second main track, and grade changes from Tenino to Vancouver. All of the grading is done and all track and bridge work is expected to be finished by November 15. W. L. Darling, chief engineer, St. Paul, Minn.

Oregon Southern.—Incorporated in Washington with $2,000,000 capital and headquarters at Seattle, the company plans to build from Ashland, Ore., northwest via Medford and Jacksonville to Grants Pass, thence north to Eugene, about 175 miles. A branch may eventually be built to Port Orford and other branches in Oregon and California. J. A. Doyle, Spokane, Wash., H. M. Farren, Boise, Idaho, and C. Radenbough, Corning, Cal., are the incorporators.

Oregon-Washington Railroad & Navigation Company.—To secure a new route across the Cascade mountains from North Yakima, Wash., west to Tacoma, and Seattle, the West Coast Railroad Co. was incorporated to carry out this work. A preliminary survey was made last summer and a portion of the line has been located. The new line is to connect with the Chicago, Milwaukee & Puget Sound a few miles south of Auburn. In crossing the Cascades, the line from the west will follow the White river to the mouth of the Greenwater river, thence up the Greenwater river to the Naches Pass and then down the Naches river to North Yakima. The lower portion of the line on the west side of the mountains, from Auburn to the mouth of the Greenwater river, about 35 miles, has been located with a maximum grade of 1.15 per cent. From the mouth of the Greenwater over the mountains two preliminary lines were run, one for a mixmum gradient of 3 per cent. and one for a maximum grade of 4 per cent. It is probable that the latter will be selected. Electric power is to be used on the steep grade, according to the plans of the company, and a number of power sites have been located. As located the curves were spiraled for a speed of 35 miles an hour with a maximum degree of curvature of 6 deg. The work on the west side of the mountains will be heavy, this includes a number of tunnels. The longest tunnel is to be at the lower end of the White river canyon and will be about 3,800 ft. long. A tunnel to be about 2.5 miles long is also planned at the summit, to facilitate an easy grade up the mountains. There will be two crossings of the White river, though both are easy. The new line will pass through Buckley, on the Northern Pacific, between Kanaskat and Puyallup. The country through which it will pass is very rich in both timber and coal, a great deal of that on the west side of the mountains never having been burned or logged. It is understood that the line will be built in the near future to provide an outlet for traffic from the Yakima valley to the Pacific coast. The route will be between 30 and 40 miles shorter than the present Northern Pacific line. R. E. Strahorn, vice-president, Spokane. (November 3, p. 932.)

Palm Beach, Okeechobee & Western (Electric).—Application will be made for a charter in Florida to build an electric line from Palm Beach, Fla., west to Fort Myers, about 140 miles. R. J. Martin, J. H. Borders, W. W. Marquis and J. Matthews, Kansas City, Mo., are interested.

Washington Trunk.—Incorporated in Washington with $5,000,000 capital, to build from Portland, Ore., northeast via Vancouver, Wash., to North Yakima, about 150 miles. It is understood that the line will cross the Cascade mountains at Klickitat Pass. The incorporators include C. C. Craig, of Hartman & Thompson, Portland; W. P. Conaway, of the Vancouver National Bank, and Elmer E. Waite, Vancouver.

West Coast Railroad.—See Oregon-Washington Railroad & Navigation Co.

RAILWAY STRUCTURES.

Brinkley, Ark.—The Chicago, Rock Island & Pacific has prepared plans for a new passenger station at Brinkley, to cost about $25,000. The main building will be 34 ft. x 61 ft., with a wing 19 ft. x 63 ft. on either side, of brick construction with steam heat and electric light.

Cottage Grove, Ind.—The State Railroad Commission of Indiana has ordered the construction of five railway stations as follows: One by the Cincinnati, Hamilton & Dayton, and another by the Chesapeake & Ohio, at Cottage Grove. The Lake Erie

& Western and the Grand Trunk are to build a joint station at Stillwell; Vandalia Railroad, at Macksville near Terra Haute, and the Chicago & Erie, at Bippus.

Johnstown, Pa.—See Morrellville, Pa.

Kansas City, Mo.—The Kansas City Terminal Company has let to Bernard Corrigan, Kansas City, the contract amounting to $350,000, for building the Burlington connection, together with bridge abutment and retaining walls. This connection extends from St. Louis avenue to Twenty-fourth street, and will enable trains arriving over the Hannibal bridge to enter the new union station. The work will include the excavation of about 200,000 cu. yds. of earth. (October 27, p. 861.)

The Chicago & Alton has let contracts to the Toledo Bridge & Crane Company for three 90-ft. turntables to replace 65-ft. tables at Kansas City, Mo., Slater, Mo., and Venice, Ill.

The Chicago & Alton is preparing plans for a new boiler shop, a machine shop 60 ft. x 64 ft. and a hot water well.

Morrellville, Pa.—An officer of the Pennsylvania Railroad writes that two ordinances for the elimination of two grade crossings in Morrellville and at Broad street in Johnstown, have been submitted to the city council. The Pennsylvania Railroad agrees to carry out the following work: Build an over-head bridge at Laurel avenue, of steel or concrete construction; a subway at Fairfield avenue; a pedestrian subway at Delaware avenue and raise the Brownstown bridge. The street railway company will pay part of the cost of these improvements.

New York City.—See an article on page 956 regarding the contracts for New York Connecting Railroad bridge work.

Oakland, Cal.—A contract has been given to E. G. Griggs, San Francisco, Cal., to build an addition to the freight car repair shop of the Western Pacific at Kirkham street, in Oakland. T. J. Wyche, chief engineer, San Francisco, Cal.

Oroville, Cal.—Plans are being made by the Northern Electric, it is said, for putting up a new passenger station at Oroville. The estimated cost of the station is $12,000. A. D. Schindler, general manager, San Francisco, Cal. (May 26, p. 1225.)

Ossining, N. Y.—A recent order of the New York Public Service Commission, Second district, provides that Secor road shall be carried over the grade of the railway on a steel viaduct, Main street and Quimby crossings are to be closed and discontinued, and at these places overgrade steel foot bridges, 7 ft. wide, are to be constructed. Washburn alley is to be closed and discontinued across the tracks of the railway company. Broadway is to be extended and carried over the tracks by a plate girder bridge with a roadway of 26-ft. and 4-ft. concrete sidewalk on the southerly side, and a continued roadway extension on the south end of the Broadway viaduct approach to Secor road will be constructed.

Pensacola, Fla.—The Louisville & Nashville is contemplating building a new passenger station at Pensacola. Tentative plans are being prepared, but no definite action has been taken.

Philadelphia, Pa.—The Pennsylvania Railroad announces that the company would proceed at once with the preparation of plans for the construction of a modern grain elevator at Girard Point. The new elevator will be of concrete construction, and, including the concrete grain bins attached to it, will have a capacity of 1,000,000 bushels. Grain driers, with modern machinery for the proper care of grain, will also be provided.

Richmond, Cal.—The Southern Pacific, it is understood, will build a terminal at Brooks Island, which is at the southern end of the city of Richmond. W. Hood, chief engineer, San Francisco, Cal.

Rhinelander, Wis.—The Minneapolis, St. Paul & Sault Ste. Marie has let the contract for building a new passenger station at Rhinelander. The structure will be of brick, one story high, with limestone trimmings and slate roof, and will cost approximately $25,000. Bell, Tyrie & Chapman, Minneapolis, are the architects.

Slater, Mo.—See Kansas City, Mo.

Venice, Ill.—See Kansas City, Mo.

Wilkie, Sask.—The Canadian Pacific is contemplating the erection of a 16-stall roundhouse and machine shops.

Railway Financial News.

Delaware, Lackawanna & Western.—This company has declared a dividend of 35 per cent., payable in stock of the Lackawanna Railroad Company, which will call for payment of about $10,600,000 of this 4 per cent. guaranteed stock. The Lackawanna Railroad Company was organized in 1908 to build a cut-off from Slateford, Pa., to Port Morris, N. J., 28 miles. This cut-off shortens the main line of the Delaware, Lackawanna & Western by 12 miles, the D., L. & W. guaranteeing 4 per cent. dividends which call for payment by the D., L. & W. of $425,000.

Iowa Central.—See Minneapolis & St. Louis.

Kansas City, Mexico & Orient.—This company has asked authority from the Kansas railway commission to issue $20,000,000 gold notes to pay for general construction in Mexico and southern Texas. When these notes are sold it is estimated that the company will have enough money to complete its lines in Texas and to complete the larger part of the lines in Mexico.

Middletown, Union & Water Gap.—A committee composed of Garrett T. Townsend, of Middletown, N. Y.; Newman Erb, Charles I. Henry and Ferdinand V. Sanford has been formed to protect the interests of the first mortgage bondholders. The interest due November 1, 1911, on these bonds is not paid. The road is leased and operated by the New York, Susquehanna & Western.

Minneapolis & St. Louis.—Committees acting jointly for the Minneapolis & St. Louis and the Iowa Central have agreed to recommend the lease of the Iowa Central to the Minneapolis & St. Louis, the M. & St. L. to issue $9,370,200 common stock, $1,917,500 preferred stock and $2,500,000 5 per cent. refunding and extension mortgage bonds to be exchanged for the property of the Iowa Central subject only to its funded and other debt, and from the bond sale $2,500,000 cash is to be provided for corporate purposes.

National Railways of Mexico.—Kuhn, Loeb & Co., Speyer & Co., Ladenburg, Thalmann & Co. and Hallgarten & Co., all of New York, have loaned to the National Railways of Mexico for one year $13,000,000. A former loan of $5,000,000 matures on December 1. The remainder of the money will be used for improvements, betterments and construction. The loan is secured by bonds of the National Railways.

Quanah, Acme & Pacific.—President Lazarus is quoted in the St. Louis *Republic* as saying: "We have sold the bonds of this company and disposed of part of the stock. I retain an interest in the company and will continue to manage its affairs. . . . Our traffic relations are made somewhat closer with the St. Louis & San Francisco, and that company will use our station and terminal at Quanah. The independent management of the company will remain as it is."

St. Joseph & Grand Island.—Suit has been brought in the district court of Clay County, Nebraska, asking for the appointment of a receiver for the St. Joseph & Grand Island and for an injunction preventing the Union Pacific from directing the expenditure of funds of the St. Joseph & Grand Island. The protective committee which brings the suit is said to represent about $1,500,000 first preferred stock. The complaint says that the surplus earned by the company has been spent for relaying 118 miles of track with 80-lb. rail and ballasting it with rock, which improvement of the property accrues to the Union Pacific, which uses this 118 miles as part of its main line, and to the common stockholders to the loss of the preferred stockholders who were entitled to this surplus as dividends. The Union Pacific owns a large majority of the common stock. Judge Lovett is quoted as saying: "We are applying to the St. Joseph & Grand Island the same policy of management that is observed in the conduct of affairs of the Union and Southern Pacifics throughout. We are managing the property exactly as we would if we owned every share of each class of the company's stock. The improvements made and being made on the property are not for the benefit of the Union Pacific, but to enable the St. Joseph & Grand Island to handle the business which the Union Pacific has to turn over to it."

Union Pacific.—See St. Joseph & Grand Island.

FIFTEENTH ANNUAL REPORT OF THE NORTHERN PACIFIC RAILWAY COMPANY.

Office of the
NORTHERN PACIFIC RAILWAY COMPANY,
St. Paul, Minnesota,
September 23, 1911.

To the Stockholders of the

Northern Pacific Railway Company.

The following, being the Fifteenth Annual Report, shows the result of the operation of your property for the fiscal year ending June 30, 1911.

INCOME ACCOUNT.

	1910.	1911.	Increase or Decrease.
Revenue From Transportation:			
Freight	$48,758,736.25	$43,332,918.23	—$5,425,818.02
Passenger	21,333,312.84	17,278,812.52	—4,054,500.32
Other revenue from transportation	3,671,816.80	3,456,962.01	—214,854.79
Totals	$73,763,865.89	$64,068,692.76	—$9,695,173.13
Revenue from Operation other than transportation	761,960.30	844,139.13	82,178.83
Total operating revenue	$74,525,826.19	$64,912,831.89	—$9,612,994.30
Per mile (average)	$12,927.67	$10,908.93	—$2,018.74
Operating Expenses:			
Maintenance of way and structures	$10,842,955.20	$8,065,462.47	—$2,777,492.73
Maintenance of equipment	8,992,137.09	7,911,231.46	—1,080,905.63
Traffic expenses	1,036,403.62	1,127,233.05	$90,829.43
Transportation expenses	24,045,197.09	21,601,477.48	—2,443,719.61
General expenses	1,070,712.33	1,024,356.05	—46,356.28
Totals	$45,987,405.33	$39,729,760.51	—$6,257,644.82
Per mile (average)	$7,977.24	$6,676.79	—$1,300.45
Net operating revenue	$28,538,420.86	$25,183,071.38	—$3,355,349.48
Per mile (average)	$4,950.43	$4,232.14	—$718.29
Operating Operations:			
Sleeping, parlor, observation, dining and cafe cars and restaurants	$602,474.89	$441,802.83	—$160,672.06
Total net revenue	$29,140,895.75	$25,624,874.21	—$3,516,021.54
Taxes Accrued:	3,621,999.80	3,296,797.49	—325,202.31
Per mile (average)	628.29	554.04	—74.25
Operating income	$25,518,895.95	$22,328,076.72	—$3,190,819.23
Other Income:			
Dividends and interest on securities, interest on deposits and miscellaneous	2,506,474.91	2,705,981.83	$199,506.92
Rentals received	1,289,252.04	2,027,352.75	738,100.71
Hire of equipment	160,578.51	607,094.46	446,515.95
Gross income	$29,475,201.41	$27,668,505.76	—$1,806,695.65
Deduct:			
Rentals paid	$509,927.90	[illegible]	$51,221.36
[illegible]	6,669,014.17	6,665,090.00	—3,924.17
[illegible]	17,360,000.00	17,360,000.00	
[illegible]	[illegible]	[illegible]	$47,297.19
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	61.71%	61.20%	.51%
Ratio [illegible]	4.86%	5.08%	.22%

Operating Operations.

Nov. 1, 1910. Missouri River Railway, Mandan, North Dakota, [illegible]

The revenue train load increased from 429.28 to 461.45 tons. The total train load, including company freight, increased from 523.65 to 553.12 tons.

The miles run by revenue freight trains was 9,771,713, a decrease of 2,267,880 or 18.84 per cent.

Passenger Business.

Passenger revenue was $17,278,812.52, a decrease of $4,054,500.32, or 19.01 per cent. from the previous year.

Mail revenue was $980,235.82, a decrease of $52,655.30 or 5.10 per cent.

Express revenue was $1,409,120.41, a decrease of $163,879.70 or 10.42 per cent.

Excess baggage and miscellaneous passenger revenue was $298,585.74, a decrease of $34,882.88 or 10.46 per cent.

The total revenue for persons and property carried on passenger trains was $19,966,754.49, a decrease of $4,305,918.20 or 17.74 per cent from the previous year.

The number of passengers carried was 9,262,853, a decrease of 377,141 from the previous year, and the number of passengers carried one mile was 759,276,059, a decrease of 217,496,034 or 22.27 per cent.

The miles run by revenue passenger trains was 11,380,355, a decrease of 1,194,552 or 9.50 per cent.

The rate per passenger per mile was .02276 and .02184 last year.

OPERATING EXPENSES.

CONDUCTING TRANSPORTATION.

The charges for transportation expenses were $21,601.477.48, a decrease of $2,443,719.61 or 10.16 per cent.

MAINTENANCE OF EQUIPMENT.

The charges for Maintenance of Equipment were $7,911,231.46, a decrease of $1,080,905.63 or 12.02 per cent.

LOCOMOTIVES.

Total number of locomotives on active list June 30, 1910		1,430
Additions:		
Pacific type passenger locomotives purchased		18
		1,448
Deductions:		
Sold	6	
Dismantled	1	
	—	7
Total number on active list June 30, 1911		1,441
In addition to those on the active list there are held for sale		26
Total locomotives owned		1,467

HAULING CAPACITY.

Active List.	Number.	Tractive Power. (Pounds.)	Total Weight on Drivers. (Pounds.)	Total Weight of Engines. (Pounds.)
Assignment June 30, 1910	1,430	43,807,900	197,858,542	250,163,502
Added during fiscal year	18	585,000	2,646,000	4,293,000
Total	1,448	44,392,900	200,504,542	254,456,502
Sold and dismantled	7	116,000	519,404	664,504
Total	1,441	44,276,900	199,985,138	253,791,998

The following statement shows the character and condition of the locomotives of the company on June 30, 1911:

Class. Arrangement	Owned June 30, 1910	Purchased, Received and Sold	Added	Owned June 30, 1911	Average Weight of Locomotive without tender in Service. Total	In Drivers	Average Tractive Power. Lbs.
[illegible]	3	1		2	24.57	16.75	8,100
[illegible]	206	2		204	60.83	60.83	25,381
[illegible]	9			9	68.50	68.50	20,500
[illegible]	130			130	54.38	44.84	18,155
[illegible]	143			141	88.77	76.08	37,440
[illegible]	2			2	72.51	63.27	34,800
[illegible]	127	3		124	44.77	28.40	13,880
[illegible]	202	1		201	79.96	50.48	20,120
[illegible]	4			4	93.00	75.00	38,500
[illegible]	6			6	84.30	48.85	21,550
[illegible]	124		18	142	142.56	71.38	31,817
[illegible]	130			130	192.25	70.75	33,300
[illegible]	220			220	190.35	101.68	40,300
[illegible]	22			22	170.70	150.72	64,940
[illegible]	4			4	418.08	201.90	80,540
[illegible]	4			4	69.52	69.52	29,250
Total	1,416		18	1,407	87.44	68.28	30,420

Condition	Number.	Per Cent.
Good	1,136	77.44
Fair	199	13.57
[illegible]	132	8.99
	1,467	100.00
[illegible]	21	1.43
[illegible]	94	6.40

EQUIPMENT.

On June 30, 1910, the company owned 1,119 passenger train cars, including 130 sleeping cars owned jointly with the Pullman Company; on June 30, 1911, it owned 1,161 passenger train cars, including 130 sleeping cars owned jointly with the Pullman Company, a net increase of 42. The number and [illegible] on page 40

On June 30, 1911, of the 1,161 cars owned 886 cars were not due to [illegible]

FREIGHT EQUIPMENT.

Comparative number and capacity of freight cars:

	1910		1911		Increase or Decrease.	
	Number.	Capacity (Tons of 2000 lbs.)	Number.	Capacity (Tons of 2000 lbs.)	Number.	Capacity (Tons of 2000 lbs.)
Box	24,357	880,887	23,787	865,700	*570*	*15,187*
Furniture	638	19,770	594	18,670	*44*	*1,100*
Refrigerator	1,562	39,675	1,566	41,425	4	1,750
Stock	2,618	61,250	2,579	58,095	*39*	*3,155*
Flat	8,614	291,030	8,400	288,555	*214*	*2,475*
Oil	18	475	18	475	...	....
Coal	5,193	216,955	5,353	229,655	160	12,700
Ballast and Ore	816	32,640	803	32,120	*13*	*520*
Totals	43,816	1,542,682	43,100	1,534,695	*716*	*7,987*
Percentage	....	.....	...	.....	*1.6%*	*.5%*
Average capacity per car	....	35.2	....	35.6	...	....

NOTE.—Figures in italics denote decrease.

Of the total number of freight cars on the road on June 30, 1911, only 1,132 or 2.63 per cent. were in need of repairs costing $5.000 or more per car.

In addition to equipment shown as on hand June 30, 1911, the following will be built at the Company's shops during the current year.

FREIGHT TRAIN CARS.

Box cars, 40 tons capacity 500

DEPRECIATION OF EQUIPMENT.

In accordance with the rules of the Interstate Commerce Commission the following amounts have been charged to operating expenses on account of estimated depreciation of equipment, viz.:

Locomotives	$784,138.20
Passenger cars	190,345.25
Freight cars	1,100.758.68
Work cars	41.742.08
Floating equipment	5,043.36
	$2,122,027.57

MAINTENANCE OF WAY AND STRUCTURES.

The charges for Maintenance of Way and Structures were $8,065,462.47, a decrease of $2,777,492.73 or 25.62 per cent.

The table in the report of the Comptroller, page 30, shows the distribution of this decrease under the respective accounts.

The following statements give particulars of the work done and show that the property has been well maintained.

PERMANENT WAY.

	1910.	1911.
New main line laid with 85 pound rail.....miles	2.40	....
New second track laid with 85 pound rail..... "	5.33	6.76
New second track laid with 90 pound rail.... "	45.23	54.59
New second track laid with 72 pound rail.... "	....	2.64
New third track laid with 72 pound rail..... "	....	1.38
New branch lines laid with new 90 pound rail.. "	....	12.26
New branch lines laid with 72 pound rail..... "	....	188.69
New branch lines laid with 56 and 60 pound rail "	....	2.57
Main line relaid with new 90 pound rail..... "	741.47	136.68
Main line relaid with new 85 pound rail..... "	31.16	....
Branch line relaid with new 90 pound rail.... "	9.00	....
Main line relaid with 66, 72 and 85 pound rail.. "	....	22.97
Second track relaid with new 90 pound rail.... "	36.06	10.80
Second track relaid with 85 pound rail..... "	....	1.35
Branch lines relaid with new 90 pound rail.... "	....	6.61
Branch lines relaid with 66, 72 and 85 pound rail "	....	100.45
Sidings and spurs constructed..... "	75.86	48.11
Track ballasted ..... "	420.13	341.51
Embankment widened ..... "	370.00	161.34
Cross-tie renewals, main line.....Ties	1,509,404	1,955,840
Cross-tie renewals, branch lines..... "	910,932	1,274,472
Timber bridges replaced by permanent structures and embankments, 84 in number, equal to...miles	5.75	2.14
Timber bridges renewed.....	40	72
Timber culverts replaced.....	101	107
New stock fence constructed.....miles	159.84	78.56
New snow fence constructed..... "	15.59	30.82

RAIL IN MAIN, SECOND AND THIRD TRACKS.

	Miles.	
	1911	1905
90-pound steel	1,108.62	.
85-pound steel	1,999.74	529.19
80-pound steel	2.52	2.10
76-pound steel	5.14	5.14
75-pound steel	...	2.82
72-pound steel	732.57	1,650.40
70 pound steel	41.07	46.65
66 and 67-pound steel	629.75	981.41
60-pound steel	214.71	227.06
56-pound steel	1,695.66	1,973.88
Other weights	10.92	18.29
	6,440.65	5,436.94

NOTE: 72-pound steel has been sold to proprietary and affiliated companies and used in important sidings and terminal yards.

BRIDGES.

During the year, 156 bridges were replaced and 10 abandoned. 72 bridges 11,923 feet in length were replaced by timber structures, and 7 permanent and 77 timber structures were replaced in permanent form, as follows:

Replaced by embankment	35 bridges, 7,764 lineal feet.
Replaced by truss, girder, I-beam and reinforced concrete trestle	49 bridges, 3,536 lineal feet.
Total	84 bridges, 11,300 lineal feet.

107 timber culverts were rebuilt; 36 in temporary and 71 in permanent form.

There are now under construction on operated lines 1,615 lineal feet of steel girder and I-beam spans; 1,364 lineal feet of steel truss spans; 1,400 lineal feet of reinforced concrete trestle; one 325-foot and one 200-foot steel draw spans and one 160-foot bascule draw span; also one steel highway viaduct 738 feet long.

BRIDGES AS THEY EXISTED JUNE 30, 1911.

		Aggregate Length.	
	No.	Lineal Feet.	Miles.
Steel, iron, stone and concrete permanent bridges	578	90,935	17.22
Timber and combination iron and timber structures	2,739	429,711	81.38
Totals	3,317	520,646	98.60

Total length of timber structures replaced by steel bridges, embankment, or in other permanent form from July 1st, 1885, when work was commenced, to June 30th, 1911, has been 120.27 miles.

STATION BUILDINGS.

New buildings and structures, or increased facilities, have been provided at the following stations:

Minnesota.
New Duluth
Boat Club Station
Coon Creek
Salida
Becker
De Lamere
Cloquet
Lake Park
Dilworth
Moorhead

North Dakota.
Mandan
Barney
Fargo
Magnolia
Dazey

Montana.
Park City
Terry
Big Timber
Butte
Patney
Red Lodge
Garrison
Plateau
Deborgia
Borax
Lookout
Trident
Clarkston
Orwell
Darby

Washington.
Ritzville
Toppenish
Bellingham
Ellensburg
Tacoma
Spokane
Hartline
Thomas
Auburn
Burnett
Byron
Halterman
Pasco
Scragg

Oregon.
Warren

SHOPS, ENGINE FACILITIES AND YARDS.

Buildings, tracks, turntables, or increased facilities have been provided at the following points:

Wisconsin.
Ashland

Minnesota.
Duluth
Brainerd
Saint Paul
Northtown
Staples

North Dakota.
Dickinson

Montana.
Glendive
Forsyth
Livingston

Idaho.
Wallace

Washington.
Fairfax
Hoquiam
Pluvius

FUEL STATIONS.

Additional or increased facilities have been provided at the following points:

North Dakota.
Dawson
Dickinson

Washington.
Tacoma
Lester

WATER SUPPLY.

Additional or increased facilities have been provided at the following points:

Minnesota.
Moose Lake
Rush City

North Dakota.
Richardton
Dickinson

Montana.
Forsyth
Sanders
Huntley
Clyde Park
Austin
Lothrop

Washington.
Ellensburg

BLOCK SIGNALS AND INTERLOCKING PLANTS.

Automatic block signals or interlocking plants have been installed and placed in service at the following points:

Minnesota.
Between Northtown Junction and St. Cloud.
Saint Cloud.
Manitoba Junction.
Staples to Dilworth.
Carman.
St. Anthony Park—St. Paul.
St. Paul—White Bear Line.

Montana.
Huntley and Billings.
Great Northern Junction.
Billings to Livingston.
Livingston.
Silver Bow.
Garrison.
Garrison to Missoula.
Laurel.

Washington.
Kalama to Vancouver.
Lewis River Bridge.

Oregon.
Willbridge to Portland.
Columbia River Draw Bridge.
Oregon Slough Draw Bridge.
North Portland Junction.
Willamette River Draw Bridge.
North Portland Jct. to Willamette River Draw Bridge.

On June 30, on important main line mileage of 2,485 there were 440.81 miles protected by automatic block signals and 913.74 miles protected by manual block.

DOCKS AND WHARVES.

The work at Duluth and Seattle, referred to in last year's report, has been carried to completion.

CHARGES TO CAPITAL ACCOUNT.

Upon requisition of the Executive Officers, approved by the Board of Directors, expenditures have been made during the past fiscal year for:

Real Estate, Right of Way and Terminals:		
At Superior, Wisconsin, real estate	$4,359.39	
St. Paul, Minnesota, real estate	2,967.85	
Minneapolis, Minnesota, real estate	12,541.73	
Laurel, Montana, terminals (Credit)	*5,966.62*	
Paradise, Montana, terminals (Credit)	*163.89*	
Sand Point, Idaho, terminals	1,510.60	
Spokane, Washington, terminals	6,010.75	
		$21,259.81
Branches, Line Changes, Grade Revisions and Second Main Track:		
One third interest in double track line Vancouver to North Portland, including bridges over Columbia and Willamette Rivers. (Two thirds owned by Spokane, Portland & Seattle Railway Co.) Additional charges	$50,962.91	
Edgeley-Missouri River line, North Dakota	7,900.64	
Pingree west line, North Dakota	347,992.13	
Turtle Lake extension, North Dakota	13,712.61	
Glendive-Helena cut-off, Montana	3,391.12	
Bitter Root Branch extension, Montana	27,453.50	
DeSmet to Paradise, Montana	12,568.65	
White Pine Hill, Montana, grade revision	9,082.03	
Ritzville-Ellensburg cut-off, Washington	14,129.74	
Sunnyside Branch extension, Washington	42,141.55	
Tacoma-Tenino line, Washington	29,978.29	
Gray's Harbor & Columbia River Railway, Washington	370.44	
Ocosta Branch extension, Washington	3,440.58	
Rights of way at Seattle, Washington, for change of line and new tracks	85,037.17	
St. Paul to Minneapolis, Minnesota, second main track	36,682.83	
St. Cloud to Rice's, Minnesota, second main track	286,963.28	
Philbrook to Staples, Minnesota, second main track	116,940.35	
Wadena to Lake Park, Minnesota, second main track	100.75	
Lake Park to Glyndon, Minnesota, second main track (Credit)	*263.12*	
Wheatland to Buffalo, North Dakota, second main track	591.91	
Alta to Berea, North Dakota, second main track (Credit)	*9,114.78*	
Bloom to Jamestown, North Dakota, second main track	77,314.03	
Huntley to Billings, Montana, second main track	285,291.62	
Billings to Laurel, Montana, second main track	80,252.42	
Livingston to Muir, Montana, second main track	454.54	
Bozeman to Logan, Montana, second main track	1,651.42	
Garrison to Missoula, Montana, second main track	20,516.42	
Missoula to DeSmet, Montana, second main track	141,599.13	
M. P. 73 to Yardley (Spokane), Washington, second main track	151,349.37	
Yardley to O. W. R. R. & Nav. Co. Crossing, Washington, second main track	12,243.37	
7th Ave. (Spokane), to Wins, Washington, second main track	132,611.94	
Marshall to Wins, Washington, second main track	3,561.16	
Auburn to Mecker, Washington, second main [illegible] (Credit)	*234.92*	
Tenino to K[illegible], Washington, grade revision [illegible]	1,932,732.73	
Kalama ot Vancouver, Washington, second main [illegible]	12,254.87	
North Portland to Portland City limits, Oregon, [illegible]	8,011.95	
[illegible] (Credit)	*17.92*	
		3,936,355.31
Additions and Betterments		
[illegible]	$[illegible]	
[illegible]	[illegible]	
[illegible]	119,[illegible]	
[illegible]	[illegible]	
[illegible]	[illegible]	
[illegible]	[illegible]	
[illegible]	30[illegible]	
[illegible]	138,027.29	
[illegible]	1,498.91	
[illegible]	[illegible]	
[illegible]	14[illegible]	
[illegible]	[illegible]	
[illegible]	160,[illegible]	
[illegible]	[illegible]	
[illegible]	6,[illegible]	
[illegible]	14,[illegible]	
[illegible]	16,[illegible]	
[illegible]	[illegible]	
[illegible]	404,[illegible]	
[illegible]	64,[illegible]	
[illegible]	146,[illegible]	
[illegible]	[illegible]	
[illegible]	401,[illegible]	
[illegible]	16,[illegible]	
[illegible]	[illegible]	
[illegible]	[illegible]	
[illegible]	[illegible]	
[illegible]	[illegible]	
[illegible]	[illegible]	
		1,[illegible]
Less Expenditures Charged to Other Accounts:		
[illegible]	[illegible]	
[illegible]	[illegible]	
[illegible]	[illegible]	
[illegible]	[illegible]	
		1,933,111.67
[illegible]		$7,[illegible]

In addition to the above amount added to the cost of the Northern Pacific Estate, advances have been made to sundry companies as follows:

Clearwater Short Line Railway Company	$98,758.97
Missouri River Railway Company	1,907,041.66
Western Dakota Railway Company	1,177,246.47
Shields River Valley Railway Company	5,239.63
Connell Northern Railway Company	568,764.65
Olympic Peninsular Railway Company	6.75
Kennewick Northern Railway Company	169.85
Bear Creek & Western Railway Company (Credit)	*4,829.38*
Northern Pacific Terminal Company of Oregon—account of Sinking Fund	*412,387.21
Advances account of sundry surveys	56,381.60
Total	$4,221,167.41
Less -	
Settlement of advances made to Spokane, Portland & Seattle Railway Company (and its subsidiary companies) by receipt of its securities	$29,818,997.95
Net reduction during the year	$25,597,830.54

*Northern Pacific contribution to the Sinking Fund taken up as an advance in accordance with requirements of the Interstate Commerce Commission.

CAPITAL STOCK AND DEBT.

There has been no change in the amount of capital stock outstanding during the year, viz.: $248,000,000.00.

Changes in Bonded Debt were as follows:

Prior Lien bonds purchased with Net Moneys of the Land Department as provided in Article Eight, Section 2 of Mortgage amounting to	$493,000.00
St. Paul & Northern Pacific Railway Co. mortgage bonds purchased with Net Land Receipts, as provided in Section 25 of mortgage, amounting to	134,000.00
Decrease in bonded debt	$627,000.00

During the year bonds held as Treasury Securities were sold to provide funds for general construction purposes—

Prior Lien bonds	$750,000
Northern Pacific-Great Northern Joint 4's	2,550,000
C. B. & Q. General Mortgage 4's	100,000
	$3,400,000

SPOKANE, PORTLAND & SEATTLE RAILWAY COMPANY.

The results of the operation of the Spokane, Portland & Seattle road (including the Astoria & Columbia River R. R., merged March 1, 1911) for the years ending June 30, 1910 and 1911 were:

	1910.	*1911.*
OPERATED MILEAGE.	*549.80*	*550.95*
Operating revenue	$4,334,278.84	$5,453,459.14
Operating expenses	2,855,323.85	2,662,122.37
Net operating revenue	$1,478,954.99	$2,791,336.77
Outside operations	8,570.71	5,729.37
Total net revenue	$1,487,525.70	$2,797,066.14
Less taxes	327,630.87	470,300.00
Operating income	$1,159,894.83	$2,326,766.14
Other income (rents, etc., received)	383,291.00	726,528.22
Gross income	$1,543,185.83	$3,053,294.36
Rents, interest, hire of equipment, etc	388,672.73	399,879.75
Balance	$1,154,513.10	$2,653,414.61

The gross earnings of this company on business exchanged with the Northern Pacific Railway Company for the fiscal year approximated, $1,725,000.

OREGON TRUNK RAILWAY.

The work of building the Oregon Trunk Railway has continued during the year, and at this date the road is graded to Bend, Oregon, 156 miles from Fallbridge, the point on the Columbia River where connection is made with the Spokane, Portland and Seattle Railway, and track is laid to Opal City, 126 miles. The bridges over the Columbia River at Fallbridge and over the Crooked River at Opal City are nearly completed, and it is expected that the track will reach Bend prior to November 1st next.

OREGON ELECTRIC RAILWAY COMPANY.

The results of the operation of this property for the year as given below, show a gratifying increase over the previous year:

	Last Year.	*This Year.*
Miles operated	71.68	71.68
[illegible]	$474,867 10	$616,079.79
Total operating expense	274,120.09	323,512.28
[illegible]	$200,747 01	$292,567 51
Taxes	11,450.00	30,403.03
[illegible]	$189,297 01	$262,164.48
[illegible]	1,942.45	5,239.62
[illegible]	$191,239.76	$267,404.10
Interest on bonds	100,000.00	100,000.00
[illegible]	$91,239.76	$167,404.10

[illegible] have been made to extend this line from Salem, Oregon, [illegible] Oregon, about 60 miles, and it is expected that the extension will be completed during the [illegible] year.

UNITED RAILWAYS COMPANY.

Work on this property has continued and it is now in operation between Portland, Oregon, and Banks, Oregon, a distance of 28 miles, occupying a fertile valley and adjacent to large bodies of very fine timber.

PACIFIC AND EASTERN RAILWAY.

During the year an extension of 22 miles was constructed, making a total of 33 miles now in operation, extending from Medford, Oregon, to Butte Falls, Oregon.

NOTE: All of these properties are owned, controlled and managed by the Spokane, Portland & Seattle Railway Company, the securities of which are owned one-half by your company and one-half by the Great Northern Railway Company.

NEW LINES, DOUBLE TRACK, GRADE REVISIONS AND LINE CHANGES.

MINNESOTA.

Saint Cloud to Rice's, Second Main Track, Line and Grade Change, 14.79 miles.

Grading was completed in 1910 and track will be completed ready for operation by October 15th. Grade is reduced to 0.3 in either direction, distance 0.43 miles and curvature 66° 7'.

St. Paul to Minneapolis (Line B), Freight Line, Second Main Track, 2.68 miles.

This work is now completed except a small amount of bridge work. The new track will expedite movement of business in, out and through the terminals at St. Paul and Minneapolis.

DAKOTA.

Bloom to Jamestown, Second Main Track, 4.99 miles.

Grading was finished in 1910 but on account of lessened volume of business work has been postponed.

Pingree to Wilton, 92.5 miles.

Grading for this branch was finished in 1910, but on account of business outlook work of finishing line was not begun until summer of 1911. At present time 42 miles of road are completed and the line will be ready to handle this year's grain crop and take in fuel and supplies.

Missouri River Railway, (Mandan North Line), 53 miles.

Track Mandan to Sanger is now being put in condition for handling crop which has turned out to be better than expected.

MONTANA.

Glendive East Line, from Glendive Northeastwardly along the Yellowstone River, 55 miles.

Grading on this line and bridge over Yellowstone River is completed and track is now being laid. Grain crop tributary to this line is good and country developing.

Huntley to Billings, Second Main Track, Line and Grade Changes, 12.63 miles.

All work on this will be completed this autumn.

Bitter Root Extension, 2.76 miles.

1.65 miles of track are in service and balance of work has been postponed.

IDAHO.

Tuscor, Line Change, 2.824 feet.

This work is completed.

Clark's Fork to Oden, Grade Revision, 7.62 miles.

This work will remove a few small humps and sags and reduce east bound grade to 0.4%.

Cocalalla, Line Change, 0.8 miles.

Some very bad curvatures along the shores of Lake Cocalalla are taken out by this change. Work will be finished this autumn.

Algoma, Line Change, 0.5 miles.

This work is completed and reduces curvature and improves line.

WASHINGTON.

Mile Post 73 on Idaho Division to Yardley near Spokane, Second Main Track, 7.9 miles.

Grading is all completed and much of track laid. Contract for bridge over Spokane River has been let and work should be finished this fiscal year.

Moab to Trent, Minor Grade Revisions, 2.93 miles.

This work is in progress and will be completed during this fiscal year, grades will be reduced to 0.4 in each direction.

Spokane to Wins, Second Main Track, 4.94 miles.

This track is now in operation.

Point Defiance Line between Tacoma and Tenino.

On account of delay in negotiations about some of the franchises necessary before construction work could be started, no work has been done. These negotiations have been completed and it is expected to begin work during this fiscal year.

Tenino to Vancouver, Second Main Track and Grade Changes.

This work has been pushed during the year, but on account of wet weather and the large number of trains operating between Portland and Tacoma the work has, of necessity, been slow. All of the grading is done and all track and bridge work will be finished by November 15th.

GENERAL.

The very marked business activity of 1909-1910 in the territory served by your company's lines began to decline in the autumn of 1910 and the volume of transactions of all kinds was less than during the previous fiscal year.

The grain crop in North Dakota and Minnesota was seriously damaged and the crop in Washington, Idaho and Oregon was less than usual.

Freight earnings decreased $5,245,818.02; $2,000,000 of this decrease was due to the smaller amount of grain handled, and $1,600,000 to the fact that nearly 10,000 less cars of lumber and shingles were moved, and $700,000 was due to a decrease in the earnings from long haul freight moving from the Mississippi River and points east thereof to Butte, Spokane, Seattle, Tacoma and Portland caused by less construction and expansion of general business facilities; and the same causes affected the earnings at other important towns and cities.

Earnings from operation of passenger trains decreased $4,305,918.20.

The absence during this fiscal year of events like the Alaska-Yukon-Pacific Exposition; the opening of the Flathead, Coeur d'Alene and Spokane Indian Reservations, coupled with a lessened business activity, diminished grain crops and new competition, all contributed to this large decrease in earnings.

Earnings for the year ending June 30th, 1909, for carrying persons and property on passenger trains were $20,117,706.98 compared with $19,966,754.49 for the past year.

The closing down of heavy construction work by railroads, affected the lumber business, and this, with the lessened grain output, reduced the purchasing power of the country and curtailed the movement of agricultural implements, merchandise and manufactured articles.

The crops in Minnesota and North Dakota are much better this autumn than in 1910 although not equal to a good year; the crops in Montana were never better, and there is a marked development of agriculture in the part of that state tributary to your Company's lines. The crops in Idaho, Washington and Oregon are good. The character of the business handled by the Company is changing with the growth of the country, there being a greater proportion of merchandise and short haul business than formerly. The average haul of all freight in 1906 was 342 miles, and this year 279 miles, the average distance traveled by each passenger in 1906 was 111.3 miles and this year 82 miles.

Operating expenses were reduced $6,257,644.82 of which $3,788,917.59 was in labor, and $2,468,727.23 in material and miscellaneous charges.

The arrangements under which your Company's main line is used by the Great Northern between Seattle and Tacoma, and by the Great Northern and Union Pacific between Tacoma and Vancouver, have worked advantageously to all parties and to the public. The work on the Tacoma passenger terminal was completed so far as it can be until the Point Defiance Line is built, and the Terminal is now in use by your Company, the Great Northern and the Union Pacific.

In the Gray's Harbor Country to which the Union Pacific and Chicago, Milwaukee and Puget Sound roads have built a joint line, arrangements were made for the use by those companies of some of your terminals, and by your company of some of their terminals, which it is thought will prevent duplication of facilities, and give the growing cities of Aberdeen, Hoquiam, and Cosmopolis better service.

During the year the Union Pacific System completed and put into operation a branch line of railroad through the Yakima Valley from the Columbia River to North Yakima.

On April 8, 1911, Honorable Walter H. Sanborn, United States Circuit Judge, handed down his decision in the Minnesota Rate Cases, sustaining the findings of the Special Master in Chancery, Ex Judge Charles E. Otis. As a result of this decision, on July 1, 1911, passenger rates in Minnesota were restored to the three cent per mile basis, which was the rate before May 1, 1907, when the two cent basis went into effect in obedience to an act of the Legislature of Minnesota. Also on the same day and in obedience to the decree of Judge Sanborn classified merchandise rates within Minnesota were restored to the basis in effect before November 15, 1906, when reductions ordered by the Minnesota Railroad Commissions became effective.

On June 22, 1911, the Interstate Commerce Commission announced decisions in cases involving the long and short haul clause of the commerce law as applied to Pacific rates compared with rates to Spokane and other points intermediate Missouri River and the coast. This order directs radical changes and reductions in the basis of freight rates between the Missouri River and all points east thereof and points in Montana, Idaho, Washington and Oregon short of the coast.

The report of the Comptroller gives further details of the transactions of the Company.

By order of the Board of Directors,

HOWARD ELLIOTT,
President.

INCOME ACCOUNT.

For the Fiscal Year Ending June 30, 1911.

Dr. To			*Cr.* By		
Operating Expenses:			**Operating Revenue:**		
Maintenance of way and structures	$8,065,462.47		Freight	$43,333,918.23	
Maintenance of equipment	7,911,231.46		Passenger	17,258,812.52	
Traffic expenses	1,127,233.05		Other	4,301,101.14	
Transportation expenses	21,601,477.48				$64,912,831.89
General expenses	1,024,356.05		**Outside Operations:**		
		$39,729,760.51	Sleeping cars	$405,094.36	
Taxes:			Parlor and observation cars	39,246.20	
State and county	$3,141,939.87		Dining and cafe cars (Deficit)	[illegible]	
U. S. Government Corporation Tax	154,857.62		Restaurants	93,931.27	
		$3,296,797.49	Stock yards	510.35	
Interest and Rentals:					$441,802.83
Interest on funded debt	$6,665,090.00		Rentals Received		2,027,352.75
Rentals of leased roads and terminals	556,845.73		Hire of Equipment		607,094.46
Other rentals	4,304.03		Miscellaneous Income		6,473.42
		$7,226,239.26	Dividends and Interest on securities owned and interest on deposits		2,699,508.41
Dividends:					
Nos. 52, 53, 54 and 55		17,360,000.00			
Balance carried to Profit and Loss		3,082,266.50			
		$70,695,063.76			$70,695,063.76

PROFIT AND LOSS ACCOUNT.
JUNE 30, 1911.

To		By	
Discount and commission on treasury bonds sold	$107,243.51	Balance to credit June 30, 1910, as per annual report	$71,166,410.53
Premium on funded debt purchased and cancelled	25,826.25	Balance of Income for year ending June 30, 1911, brought down	3,082,266.50
Settlement account of wreck in 1904	57,519.09	Interest on advances to Spokane, Portland & Seattle Ry. Co. from September 22, 1905, to June 30, 1910	3,679,549.06
Adjustment of rental wiht Astoria & Columbia River R. R. Co.	12,448.66	Sinking fund paid Trustee Northern Pacific Terminal Company Mortgage from September 1, 1896, to June 30, 1910	323,714.76
Balance of sundry accounts written off	7,675.12	Unclaimed wages—3 years old	25,547.47
Balance	78,074,261.88	Profit on operating property sold	7,486.19
	$78,284,974.51		$78,284,974.51
		By	
		Balance to credit of Profit and Loss as per balance sheet.	$78,074,261.88

NORTHERN PACIFIC RAILWAY COMPANY.

GENERAL BALANCE SHEET, JUNE 30, 1911.

ROAD AND EQUIPMENT (Northern Pacific Estate):				CAPITAL STOCK—Common	$248,000,000.00
Cost to June 30, 1907—				MORTGAGE, BONDED AND SECURED DEBT:	
Road, lands, etc.	$318,388,493.45			Mortgage Bonds (page 28)	$190,325,500.00
Equipment	37,295,670.07			Collateral Trust Bonds (Northern Pacific-Great Northern joint) total issue	$215,227,000.00
		$355,684,163.52		Less, Great Northern Railway Company's proportion	107,613,500.00
Cost since June 30, 1907—					107,613,500.00
Road (less Land Department net proceeds)	$40,995,699.48				297,939,000.00
Equipment	11,208,859.42				
Land Department current assets	4,003,505.20				
		56,208,064.10			
		$411,892,227.62			
Less reserve for accrued depreciation	10,089,366.86		$401,802,860.76		
SECURITIES:					
Securities of proprietary, affiliated and controlled companies—pledged, viz.:					
This company's one-half of $107,613,500 stock of Chicago, Burlington & Quincy Railroad Company pledged to secure payment of $215,227,000 joint bonds made and issued by this Company and the Great Northern Company to pay for said stock, costing	$109,114,809.76				
Other pledged securities	1,142,448.11				
		$110,257,257.87			
Securities of proprietary, affiliated and [illegible] unpledged		49,734,924.46	159,992,182.33		
OTHER INVESTMENTS:					
Advances to proprietary, affiliated and controlled companies for construction, equipment and betterments			26,529,957.78		
Total Capital Assets			$588,325,000.87	Total Capital Liabilities	$545,939,000.00
WORKING ASSETS:				WORKING LIABILITIES:	
Cash		$5,931,723.81		Traffic and car service balances due other companies	$885,996.27
Securities issued or assumed—held in treasury		16,248,000.00		Audited vouchers and wages unpaid	3,669,737.19
Marketable securities (other than those [illegible])		19,362,918.11		Miscellaneous accounts payable	6,598,474.25
Loans and bills receivable		53,317.13		Matured interest, dividends and rents unpaid	1,131,909.50
Traffic and car service balances due from other companies		990,122.28		Other working liabilities	269,204.53
Net balances due from agents and [illegible]		660,465.03			12,555,321.74
Miscellaneous accounts receivable		4,118,695.63		ACCRUED LIABILITIES NOT DUE:	
Material and supplies		6,058,227.33		Unmatured interest, dividends and rents payable	$4,850,891.13
		[illegible]		Taxes accrued (partly estimated)	1,825,013.05
ACCRUED INCOME NOT DUE:					6,675,904.18
Unmatured interest, dividends and rents receivable		[illegible]		DEFERRED CREDIT ITEMS:	
DEFERRED DEBIT ITEMS:				Other deferred credit items	153,451.56
[illegible]		$103,[illegible]		APPROPRIATED SURPLUS:	
[illegible] of Mer[illegible]		523,389.17		Invested in other reserve funds (Insurance Fund)	5,397,116.90
Cash and securities in Sinking and Re[illegible] Funds		199,459.73		PROFIT AND LOSS	78,074,261.88
[illegible] Insurance Funds		[illegible]	6,224,191.05		$648,795,056.26
			$648,795,056.26		

MORTGAGE DEBT JUNE 30, 1911.

[illegible] THE NORTHERN PACIFIC RAILWAY COMPANY [illegible] OUTSTANDING.

NAME.	Amount Outstanding	Date	Matures.	INTEREST. Rate.	When Payable.	Amount Charged Income for Fiscal Year.*
ISSUED.						
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	1996	4%	June, Dec.	323,200.00
ASSUMED.						
[illegible]	[illegible]	[illegible]	[illegible]	6%	Feb., Aug.	473,890.00
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Feb., Aug.	50,000.00
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	April, Oct.	100,000.00
St. Paul & Duluth R. R. first consolidated mortgage	2,000,000.00	1887	[illegible]	[illegible]	June, Dec.	40,000.00
[illegible]	[illegible]	[illegible]	1968	[illegible]	[illegible]	[illegible]
[illegible]	210,000.00	[illegible]	[illegible]	6%	Jan., July	12,600.00
[illegible]	500,000.00	[illegible]	[illegible]	[illegible]	March, Sept.	25,000.00
[illegible]	2,620,000.00	[illegible]	1935	4%	Jan., July	5,600.00
[illegible]	[illegible]					$6,665,090.00

[illegible] Pine Line Bonds [illegible] Coeur d'Alene Lien Bonds $7,760,000. Washington & Columbia [illegible]

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IT seems a long step from the activities of the early settlers in the West in offering every inducement to railways to build into their territory, to the efforts now being made by the railways to induce immigration into their territories, as typified by the land and industrial show which has just been held at New York. The show itself was in some respects like a great county fair, at which the pick of agricultural products from all parts of the United States are exhibited. Maine vied with Washington and Colorado in its display of potatoes. The apples of New York state were displayed across the aisle from the apples from Oregon. The opportunities and the agricultural possibilities of nearly every section of the country were "to advantage dressed." The broader meaning, however, of this great exhibit is the emphasis that it gives to the efforts that are being made by the railways of the entire country to develop an interest in agriculture along their lines; to introduce better methods of farming; and to help in the work of taking the immigrant out of the congested, unhealthy city and distributing him where he can do most good. Western roads, and especially land grant roads, were the original movers in this work. The eastern roads have followed suit; and now, as well illustrated by the land show, railways in every part of the country are making the industrial development of their territory a regular department of railroading. One of the companies which most recently entered this field is the New Haven, the work of whose industrial bureau is described in another column. Not only do the exhibits appeal to the desire of people to earn a substantial livelihood from farming, but they appeal to the imagination as well. The Great Northern, the Northern Pacific, the St. Paul and the Canadian Pacific all exhibit, beside products of the soil, pictures of the scenery in the territories in which they invite the home builder to settle. The exhibit indicates how closely the railways have co-operated with the government's department of agriculture in the movement to improve farming methods. It is also interesting to note, if we may draw general conclusions from a limited number of observations, how closely home to the farmer the railway company is able to get. The same farmer who throws away, without a second glance, a publication of the department of agriculture, will often drive ten miles to see a demonstration train showing the best breeds of cattle or the best methods for fertilization.

WILLIAM E. HARMON gave a lecture last week at Columbia University, in which he outlined a scheme of bringing labor and capital together by which "without destruction" he could "harmonize interests, neutralize antagonisms, and make the lion of industrialism and the lamb of organized capital pull the plow in double harness if the lion of labor does most of the work." He said that in brief his plan was to make the wage earner a capitalist and the capitalist, to a certain degree, his representative, pointing out that the president of the United States is the servant of all its citizens, and that the president of the United Steel Corporation is the representative of only 110,000 stockholders; the gross income of the United States Steel Corporation and the United States government being nearly equal. Mr. Harmon's idea is to form an American Mutual Investment Association which should sell securities to small investors, but, particularly, it should sell fractional interests in blocks of securities rather than specific securities. He illustrates this by assuming the selling capacity of the association in 1912 to be $50,000,000, which would be made up of contracts running an average of, say, five years. At the end of 1912 these contracts would all be combined under the head "consolidated syndicate" of 1912, and thereafter, as this money is received at the rate of something less than $10,000,000 a year, it would be invested in such securities as appealed to the trustees. The object of Mr. Harmon's plan is both to give the wage earner a more profitable form of investment than he now has, and to bring him so closely in touch with large corporate affairs that he would more fully sympathize with and understand the aims of large corporations and would also be a power in the management

of these corporations. In these two latter objects it would seem that Mr. Harmon's plan on the face of it fails. The wage earner who simply owned certificates of participation in a syndicate which owned stocks and bonds of railway and other corporations would be no nearer to the corporations themselves than is the depositor in a savings bank at present. It would be left to the trustees to decide what securities of what corporations to buy. The president of a corporation desiring to sell its securities to the Investment Association would have to appeal not to the general public, but to the trustees, and if he represented any interest, through the purchase of securities by the Investment Association, he would represent the interests of the trustees. This would be little, if any, different from the situation of the officer of a corporation which sold its securities largely to a life insurance company, and who represented the interest of those in control of the life insurance company, not of the holders of life insurance.

THE Special Committee on Relation of Railway Operation to Legislation has issued a report which we publish in another column, giving estimates of the cost of installing and maintaining automatic block signals on all the railway mileage of the country not now protected by such signals, and also of the cost of installing non-automatic signals on all the mileage not now protected by any scheme of signaling. Its figures, which are based on the experience of railways that already have installed signals, indicate that to equip with automatic signals all the mileage not now so protected would cost $286,492,976, and that it would cost $73,751,012 per year to maintain the additional signals, provide against their depreciation at the rate of 7 per cent. per year and pay 5 per cent. on the investment—which, of course, is as essential a part of the cost as either maintenance or depreciation. It is estimated that the cost of equipping with non-automatic signals the mileage not now so equipped would be $58,721,600. The automatic signals already in use have been installed on lines of relatively heavy traffic, and on such lines installations cost more than where traffic is lighter. It seems probable, therefore, that the estimate of the cost of equipping the rest of the country's mileage with automatic signals is too high. However, even if the cost of installing automatic signals everywhere would be only $1,000 a mile, it would be heavy—too heavy, in fact, to be justifiable. On many lines signals whose installation would involve a smaller initial cost would meet every need. If the committee's estimate as to the cost of automatic signals probably is too high, its estimate of the cost of non-automatic signals certainly is, as the bulletin indicates, too low, if under this heading are to be included only the better class of non-automatic systems. Probably it would cost nearer $500 a mile than $350—the figure given by the committee to provide controlled manual signals that [illegible] committee gives no figures regarding the probable cost of maintaining and operating non-automatic signals, but it is well known [illegible] accident record of the railways of the United States is a con- [illegible] accurately than any that heretofore have been available, and should receive due consideration from Congress when the subject of legislation to promote safety shall come before that body this winter.

THAT the Commerce Court refused to enjoin the Interstate Commerce Commission from enforcing its order prescribing a large number of reasonable maximum rates to Salt Lake City, and at the same time did temporarily enjoin the commission from enforcing its order requiring the railways to fix and maintain certain percentage relationships between their rates to the Pacific coast and to inter-mountain points, is probably significant. It seems to indicate that the court does not accept the commission's view that, under the law as amended by the Mann-Elkins act, it can compel the railways to base their rates to intermediate points on their rates to more distant points, when, as in these Pacific coast cases, it has been clearly shown and is conceded by the commission that the rates to the more distant points are controlled by water competition. The question involved is one of law. The commission has recognized that in the administration of the amended long and short haul clause it must be guided by other provisions of the interstate commerce act, which require its orders to be reasonable. The commission believes it is reasonable to require that the rates from eastern points of origin to intermediate points shall not be made more than certain percentages higher than those to the Pacific coast. The roads contend that this is not reasonable, because it would make it necessary, with every increase of water competition which pulled down rates to the coast, for them proportionately to reduce their rates to intermediate communities. The decisions of the Supreme Court under the original interstate commerce act indicate very strongly that it believes that any order requiring rates to intermediate points to be based on rates made to more distant points to meet water competition is inherently unreasonable, and the Commerce Court unquestionably will give great consideration to these decisions before it renders its final decision in the pending cases. Regardless of which way it decides, the litigation will be carried to the Supreme Court. This is not the first time that the Commerce Court has interfered with orders of the commission. It has entirely reversed it in several important cases. If because of this the public should be disposed to think that the court is applying the brake to the commission a little too hard, it should bear in mind that the commission itself is not a court, but an administrative body; that administrative bodies with the best of intentions, are apt to want to exercise more power than they possess, and are, therefore apt to conclude that they possess all the power they wish to exercise; and that it is as much the duty of the courts to define the authority of such bodies and keep them within proper limits as to give full effect to those of their orders which the courts shall find the law has authorized to be

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THERE is an interesting, and perhaps significant, statement in the syllabus of the Interstate Commerce Commission's report in the case of T. M. Sinclair & Co. v. Chicago, Milwaukee & St. Paul et al. This statement is that, "The commission is [illegible] power to order an increase in any rate." For some reason, neither this statement nor its equivalent appears in the opinion proper; and, of course, a statement in a syllabus which does not appear in the accompanying opinion has no weight as a precedent, but it may be that this expresses the commission's view of its powers. In its report "In the Matter of the Request [illegible] Reduced Rates on Packing House Products and Fresh Meats from Fort Worth, Tex., to Mississippi River Crossings and Points East Thereof," the commission held that it "has the power to suspend reductions in rates in any case where such suspension will operate to prevent unfair discrimination." This finding, when made, was accepted by some as [illegible] the commission to the view that it has the authority

where discrimination is involved to prevent a reduction or to compel an advance. As we pointed out then, however, the Hepburn act gave the commission only the authority, when it found a rate unreasonable or unduly discriminatory, to fix a reasonable *maximum* rate, and the Mann-Elkins act gives it only the power after it has suspended a proposed change in rates "to make such order in reference to such rates as would be proper in a proceeding initiated after the rate had become effective." Obviously, therefore, the commission cannot issue a final order prohibiting a proposed reduction in a rate unless it can order an advance in it after it has gone into effect; and, as after it has gone into effect the commission can fix only a reasonable maximum rate, it seems to follow that it cannot either issue a final order to raise a rate already in effect or to prevent a reduction. The Mann-Elkins act does authorize the commission to suspend "any new individual or joint rate pending investigation of its reasonableness," and perhaps all the commission meant by its statement in the Fort Worth case was that, while it cannot make a final order to prevent a reduction in rates or compel an advance, it can suspend either an advance or a reduction pending investigation. This subject is of interest and importance because, if the commission can under existing law order either a reduction or an advance, it can in any case equitably remedy unfair discriminations; while if it can only order rates reduced, or prevent their advance, it can equitably correct and prevent discriminations only in the comparatively few cases where one or more of a number of existing or proposed related rates is found unreasonably high. It seems most probable that if the question were presented to them, the courts would hold the commission cannot now raise any rate or prevent its reduction. The quotation we have made from the Sinclair case indicates, as already has been said, that this is the commission's own view. In these circumstances an attempt should be made to get Congress to pass legislation specifically empowering and requiring the commission to raise rates or prevent their reduction when it thinks that this is the equitable way to correct or prevent an unfair discrimination. Such an attempt would be supported by every man who really believes in giving the railways a "square deal."

STEEL POSTAL CAR DESIGN.

THE recent conference of a committee of railway mechanical and mail traffic officers with a committee representing the post office department, regarding the construction of steel postal cars, is the beginning of a work which will have an important and far reaching influence, not only on the future design of postal cars, but on that of steel passenger cars in general. The postal car embodies nearly all the essential elements of construction which are found in passenger cars, except the inside finish, and the discussions and decisions relating to those essential elements must have a direct bearing on the design of all steel passenger cars.

The work has begun under favorable conditions with an intelligent outline by the post office department, covering very fully and in detail the questions of construction and equipment which it is desired to settle and the standards to be adopted, while the railways are represented by a committee of men who have had large experience in steel car design and are fairly representative of the roads using the various types of modern passenger car underframes. One of the chief benefits to be derived from these conferences is that the relative merits of the different types of steel underframes for passenger cars must come under review in serious discussion, which will not be merely academic, but must lead to the adoption of some type of construction. It is to be hoped it will result in some important improvements over existing plans. The exhibition of these various plans, and tests of their comparative resistance when submitted to competent engineering analysis, must show a wide diversity; some of them will be found manifestly too weak, while others may be found unnecessarily strong and heavy.

As the federal government is restricting railway earnings, not only from freight traffic, but also from mail traffic, it cannot consistently require that any more dead weight shall be carried than is reasonably necessary for safety. The relation of weight to strength and stiffness in passenger train car construction must, therefore, receive rigid analysis. The impact due to heavy steel cars and large locomotives in collision is sufficient to destroy the ends of the strongest steel cars which have been built, as has been demonstrated by the behavior of the new steel Pullman cars, and the tendency is to add to the strength and increase the weight of the end platform and vestibule construction, thus adding to the overhanging load and increasing the tractive resistance of trains which are already too heavy for one very large locomotive to haul on ordinary schedules. There is scarcely any limit to which this tendency may be carried. It might be continued until we had passenger cars made of solid nickel steel oil tempered and strong enough to resist the impact of a shell from a 13 in. gun. By following the ordinary methods, and adding weight whenever lack of resistance is indicated by the result of collisions we might reach a point in the extravagant demand for safety where a 70 ft. car will weigh 100 tons. Four such cars would be the maximum that the most powerful steam locomotive could pull.

No other country has found it necessary to provide the margin of safety now found in the ordinary design of American steel passenger cars. The best foreign cars are very light, few of them weighing over 40 tons, and many of them, judged by American standards, being too weak for the fast schedules and heavy passenger traffic on European railways. This is demonstrated by the almost complete destruction of the car bodies when any extraordinary derailment or collision occurs on a European road. Here, then, we have two extremes, and American practice having already raised the weights of passenger equipment unreasonably, it should not be necessary to increase it further to meet imaginary requirements which may be brought out by the conferences of the railway experts with the postal authorities.

The action of very rigid, continuous, longitudinal members in an underframe in violent collisions has been such as to demonstrate that it is not the most desirable type of construction. Neither is the concentration of a rigid mass at the ends of the car now regarded as the best form of construction to safeguard the train as a whole, for in each case there is not sufficient movement of the mass to dissipate the energy of the blow, as it passes through the train, to a point where the underframe may not rise above that of another car and shear off the superstructure. A yielding resistance in each car will gradually cushion the blow and the total damage will be less, while the safety of the passenger has equivalent or greater protection.

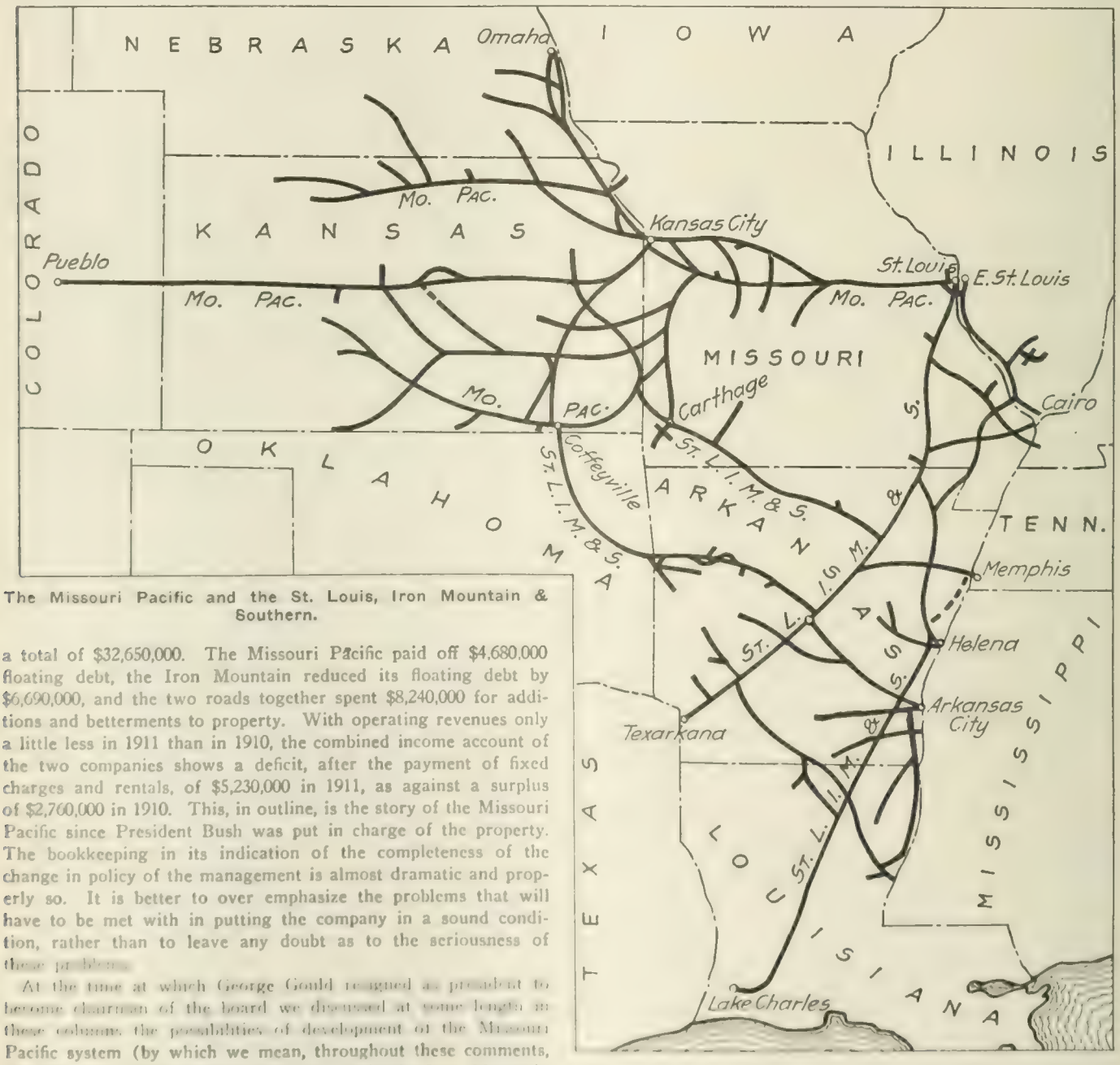
The use of block signals is extending so rapidly that the danger from collisions is not such as to warrant the use of extra heavy cars to safeguard in case of an occasional casualty, but the risk of derailment is one which cannot be so easily guarded against, as it is often caused by the carelessness of the engineman in not reducing speed at turnouts and on curves. The lateral strength of the superstructure of the cars, and the stiffness of the sides and the roof, are, therefore, phases of the subject which should receive more attention, as longitudinal strength and stiffness have heretofore been regarded as paramount and, naturally, have been most liberally provided for. Stronger side construction would naturally take advantage of the use of the whole depth from the window sill to the side sill for a deep girder to carry the principal portion of the load, and this would reduce the size and weight of the center sills and provide the more flexible construction needed. Because of the side doors, the full benefit of this type of side frame cannot be realized in postal cars, and it would be necessary to raise the door sill and carry the side girder below the normal line of the car side. The new design for postal cars may, therefore, differ from existing types, but sufficient experience has been obtained from those types to furnish ample suggestions for the new type. The aim should be to develop a design which will furnish maxi-

mum strength and stiffness for a given weight; and there should be strong insistence that present weights shall not be exceeded. The future work of the postal car committee will be followed with unusual interest, as it will virtually establish standards for the framework of passenger equipment in general, as well as for many construction details and materials.

In the above we have principally considered the excessive weight of American passenger cars; and if the committee will use its influence in checking the continual increase in the weight of steel cars, its work, for this reason alone, will be of lasting benefit to the railways and the public.

MISSOURI PACIFIC.

IN the fiscal year ended June 30, 1911, the Missouri Pacific and the St. Louis, Iron Mountain & Southern together operated 7,235 miles. The Missouri Pacific increased its funded debt outstanding by $19,760,000, and the Iron Mountain by $12,890,000,



The Missouri Pacific and the St. Louis, Iron Mountain & Southern.

a total of $32,650,000. The Missouri Pacific paid off $4,680,000 floating debt, the Iron Mountain reduced its floating debt by $6,690,000, and the two roads together spent $8,240,000 for additions and betterments to property. With operating revenues only a little less in 1911 than in 1910, the combined income account of the two companies shows a deficit, after the payment of fixed charges and rentals, of $5,230,000 in 1911, as against a surplus of $2,760,000 in 1910. This, in outline, is the story of the Missouri Pacific since President Bush was put in charge of the property. The bookkeeping in its indication of the completeness of the change in policy of the management is almost dramatic and properly so. It is better to over emphasize the problems that will have to be met with in putting the company in a sound condition, rather than to leave any doubt as to the seriousness of these problems.

At the time at which George Gould resigned as president to become chairman of the board we discussed at some length in these columns the possibilities of development of the Missouri Pacific system (by which we mean, throughout these comments, the Missouri Pacific Railway and the St. Louis, Iron Mountain & Southern Railway), and at that time we expressed the opinion that the geographical position of the property, its terminal facilities and its traffic possibilities entitled it to rank, both from the point of view of a railway man and from that of an investor, very much higher than it now ranks; in other words, that its troubles were due to mistaken financial policies, to mistaken policies of upkeep and to absentee landlordism. The first annual report made by Mr. Bush strongly tends to confirm at least that part of the opinion which has to do with the troubles of the company in the past. While the very interesting question as to how completely President Bush has been given unlimited power in the management of the property can only be answered in the future, there has been nothing made public during the year that would lead one to suppose that his authority had been given with any string attached.

The deficit of over $5,000,000 is directly accounted for by an increase of $5,780,000 in expenses; and the facts that expenses of maintenance of way and structures increased by $984,000, and the cost of maintenance of equipment by $596,000, are pretty surely a sign of more healthy management. An increase of $3-855,000 in transportation expenses, with a decrease in ton mileage carried, although with an increase in passenger mileage, needs some further explanation. Of course, an obvious enough explanation for part of this increase is the higher cost of labor and of fuel. Another explanation is that betterment of railway property made under traffic is likely to temporarily increase transportation costs. Certain increases, such as an increase from $411,000 to $989,000 for loss and damage to freight, and from

$265,000 to $903,000 for injuries to persons, are temporary and are quite possibly caused in good part by a new policy of settling these claims more promptly.

The mileage figures are not very full in the Missouri Pacific report, and especially, it may be mentioned, figures relating to locomotive mileage are for some reason omitted.

The total tons of revenue freight carried one mile amounted to 4,392,000,000 in 1911, a decrease of 6.5 per cent. from 1910; the total number of passengers carried one mile amounted to 488,000,000 last year, an increase of 6.2 per cent. over the year before. The passenger train mileage last year was 11,540,000, an increase of 5.3 per cent. over the year before, and the mileage of freight trains was 14,420,000, a decrease of 5.6 per cent. from the year before. The percentage of loaded car mileage to total car mileage was 71.5 in 1911 and 71.0 in 1910. The average train load of revenue freight in 1911 was 291 tons, or about three tons less than in 1910. There was 7 per cent. more company freight, however, in the train load, due probably to the betterment work that is being carried on. The Missouri Pacific gets a long average haul, although this haul was less by 3.2 miles in 1911 than in 1910. In 1911 the average was 225 miles. The average receipts per ton per mile last year were 8.5 mills, and per passenger per mile, 2.2 cents.

Of the total 19,490,000 tons of revenue freight carried last year, 22.1 per cent. was furnished by products of forests, 19.9 per cent. by manufactures and merchandise, 18.7 per cent. by agricultural products, 18.6 per cent. by miscellaneous freight, 16.6 per cent. by coal and coke, and 4.1 per cent. by animals and animal products. While the greater part of the Missouri Pacific's traffic is highly competitive, it is very diversified, and a quite extraordinarily small proportion of it is coal and coke, traffic that generally bears a low ton-mile rate. Furthermore, in 1911 there was a considerably larger proportion of lumber and of agricultural products carried than in 1910, while the proportion of coal and coke traffic to total tonnage was considerably less.

The accompanying map shows the geographical position of the Missouri Pacific, which, it may be pointed out again, includes the St. Louis, Iron Mountain & Southern, the two companies being operated as one system, although their financial exhibits are shown separately in the annual report. At St. Louis the Missouri Pacific has certain advantages in terminal facilities and traffic relations with some of the large shippers enjoyed by no one of its competitors. At Kansas City it has terminal facilities about equal to that of most of its competitors, and as part of a transcontinental route it delivers freight to the Denver & Rio Grande at Pueblo.

Of the $8,240,000 previously mentioned as spent last year for betterment to the property, $1,260,000 was spent for ballast, of which the road was badly in need; $1,640,000 for additional main track; $730,000 for terminal yards; $860,000 for shops, engine houses and terminals; $620,000 for bridges, trestles and culverts, and $570,000 for increased weight of rail. For the first time there was 100-lb. rail laid on the Missouri Pacific system, 165 miles being laid on the St. Louis, Iron Mountain & Southern between Poplar Bluff, Mo., and Hoxie, Ark.; Lindsay, Ark., and Argenta, and Dumas, Ark., and McGehee. There were 235 miles of new 85-lb. rail laid on the system, and about 100 miles were relaid with 75, 63 and 60-lb. rail, replacing lighter rail. At the end of 1911, of the total 7,187 track miles, there were, besides the 165 miles of 100-lb. rail, 2,203 miles of 85-lb. rail, a few miles of 80-lb. rail, 1,243 miles of 75-lb. rail, some 70 and 65-lb. rail, 512 miles of 62-lb. rail, 429 miles of 60-lb. rail, 1,987 miles of 56-lb. rail, and 471 miles of 54 and 52-lb. rail. While there still must be a good deal of mileage that will have to be laid with heavier rail in the near future, the rail situation does not appear to be as bad as that of the ballast. In 1911 927 miles was ballasted with rock, 324 miles with gravel, 71 miles with cinders and 211 miles with chats. This is a great deal of ballasting work to be done in one year, and shows probably that the management is ballasting track just as quickly as it can be done economically. At the end of June 30, 1911, of the total mileage, 4,925 miles were ballasted and 2,263 miles were unballasted. Of the ballasted track, on 313 miles rock has been used; on 2,113 gravel; on 998, cinders, and on 1,462, chats. The remaining 38 miles was ballasted with stone dust.

The policy of the management is well shown by the changes in the equipment account. During the year 69 locomotives were condemned and 74 added; 24 passenger train cars were retired and 40 added; and 1,163 freight train cars were retired and 2,042 added. For repairs of locomotives $4,230,000 was spent in 1911, as against $3,130,000 in 1910; $650,000 was spent for repairs of passenger train cars, as against $740,000 the year before; and $2,350,00 was spent for repairs of freight train cars, as against $3,060,000 in 1910. There was no depreciation charged on rolling stock in 1911, and only small sums were charged in 1910.

There is no combined balance sheet given for both the Missouri Pacific and the St. Louis, Iron Mountain & Southern. The Missouri Pacific, excluding the Iron Mountain, had at the end of 1911 $2,630,000 cash, no floating debt, and total working liabilities of $6,490,000. This compares with $2,280,000 cash on hand at the end of 1910 and a floating debt of $4,680,000, which is included in total working liabilities of $9,210,000. The company, however, had $30,160,000 marketable securities at the end of 1910, of which all but $860,000 were disposed of the next year. The St. Louis, Iron Mountain & Southern had at the end of 1911 $830,000 cash, owed the Missouri Pacific $5,900,000, and had total working liabilities, including the debt to the M. P., of $6,760,000. This compares with $1,140,000 cash at the end of 1910; $12,590,000 "miscellaneous accounts payable," which probably means in greater part debt to the M. P., and only $190,000 other working liabilities. The cash position of the two companies is not strong, and financing by the Missouri Pacific is likely to be rather expensive; but this financing is only one of the problems of rehabilitating the property and, we may assume, a way of carrying it out was planned by the banking firm of Speyer & Company before it formed its present connection with the management.

The Missouri Pacific has $20,000,000 5 per cent. 3-year notes falling due in 1914, secured by $9,800,000 D. & R. G. preferred, $15,000,000 D. & R. G. common, $5,000,000 Texas & Pacific common, $10,000,000 non-convertible first and refunding M. P. 5 per cent. bonds, and a 3-year 6 per cent. note of the St. Louis, Iron Mountain & Southern for $8,500,000. The company has an authorized issue of $175,000,000 first and refunding mortgage bonds, of which $29,800,000 are outstanding.

The table shows the principal figures for 1911 and 1910:

	1911.	1910.
Average mileage operated	7,255	6,777
Freight revenue	$37,629,213	$38,701,784
Passenger revenue	10,917,851	10,210,358
Total operating revenue	52,776,593	53,019,137
Maint. of way and structures	8,984,132	8,000,104
Maint. of equipment	8,083,501	7,687,429
Traffic	1,410,780	1,368,745
Transportation	22,745,409	18,889,986
Total operating expenses	43,329,936	37,547,372
Taxes	1,983,789	1,903,004
Net operating income	7,462,867	13,568,761
Gross corporate income	9,272,425	15,462,492
Net corporate income	*5,232,539	2,759,411

*Deficit.

NEW BOOKS.

American Society for Testing Materials Year Book for 1911. Secretary, Edgar Marburg, University of Pennsylvania, Philadelphia, Pa. Cloth, 6 in. x 9 in., 385 pages. Price $5.

The year book of the American Society for Testing Materials for 1911 has just been issued. It contains, in addition to the regular specifications for iron and steel in various forms, quite a number of special specifications for railway details, such as steel rails, steel axles, steel tires, staybolt iron, locomotive cylinders and car wheels. The specifications for wood and cement are exceptionally complete. The book contains a list of the members and technical committees, and other information on the American society and the International Association for Testing Materials. The information about the latter is important, because the sixth congress of the International Association will be held in the United States during 1912.

Letters to the Editor.

D. A. D. AND THE SUPPLY DEPARTMENT.

To the Editor of the Railway Age Gazette:

I note that "D. A. D." has handed in his rule book and keys, and left an opening on the run for some other fellow. I am not looking for the job, for after taking the through trip with his train of thought, I do not feel that I am big enough to hold it down. Furthermore, I have enjoyed the trip so much, and seen so much of which I approve, that it would be hypercritical to complain of the few low joints and slight jolts experienced on the way. At the same time, there are not many things in this world that look exactly the same when looked at from the East, as well as from the West.

D. A. D. has been rather severe on the supply department. I have never known a transportation officer who was not. I have been so myself many times. But I am still of the opinion that the supply man should look after supplies. It is true that the storekeeper will, if he is worth his wages, hold down his stock figures, compile his requisitions carefully, and often hand out material grudgingly. It is possible that he may even go a little too far along this line. But does the transportation and operating man never go too far? For instance, an ambitious assistant freight agent comes to the storekeeper to get two stoves to heat two palace horse cars that he has borrowed to carry loads that he has secured from a competitor. The value of these stoves equals two-thirds of the total revenue to be derived from the shipment. The storekeeper agrees to furnish the stoves at cost, and charge them to the proper account, but the agent does not want the amount to show, as it will make his little deal look like thirty cents. In fact, it will put a kink in his batting average, and he wants to keep that good even if his company must pay the price of admision. In the case cited the general manager, acting as umpire, rules the batter out; his batting is not winning the game.

To say that the division superintendent must beseech an underpaid storekeeper for fifty shovels in an emergency is surely a misnomer. In an emergency the storekeeper is more than thankful if his forethought has made it possible for him to hand out the shovels p. d. q. without waiting for any beseeching that will likely take the form of a wigging, and the placing of a responsibility on him that his one-third salary would hardly justify him in assuming. The superintendent gets the shovels; surely he does; for are not all the resources of the railway behind him in an emergency? But does he bother his head about them when the line is clear for that apple of his eye, the Cannon Ball Limited, that may, or may not, pay the expense of running? Not so that you would notice it. He leaves them as beneath his dignity to look after. And that is one reason why so many people have railway shovels in their back yards.

Of course, fifty shovels—or their value—are a small item in an emergency. But why not give the storekeeper authority to order them back to the storehouse? He is a small-salaried man, paid by [illegible] and he might save the amount of his own salary and a little bit of the superintendent's, if you would only be [illegible] but the mean best of his nature. Who throw a brick at him if he gets it into his head, after fifteen or [illegible] such as loading material and supplies, that he is a little better qualified to do just that than the man who has never done it at all, and whose "heredity and environment" have inclined him to regard the supply department as the common enemy?

D. A. D. says: "The reckless use of material because the [illegible] and [illegible] and it ought to be true if [illegible] but [illegible] I have had to experience of those refrigerator positions [illegible] I cannot say. I may try to make a part of [illegible] and [illegible] general superintendent, master mechanic, or other [illegible] material? The [illegible] supply department [illegible] with us. Why not make full use of him? He often dreams that he, even he, is a small cog-wheel in the machine that manufactures that intangible commodity, "transportation," and that he does his best to see that the same is manufactured at a price that will leave his company a small profit should be no reproach.

If you will allow me, I would like to go further into this, when the rush season eases up a bit. Storekeeper.

[We shall be glad to allow "Storekeeper" to go into the subject farther. The work of the supply department has not heretofore received as much attention and discussion as it deserves; and we should be glad to receive further communications regarding the problems it presents.—Editor.]

THE DEVELOPMENT OF THE RAILWAY REGULATING COMMISSION IN ENGLAND.

By W. M. Acworth.

In our Studies in Railway Economics* we have seen that traders and the public are entitled to claim from the railways reasonable rates, reasonable facilities, and the avoidance of unreasonable preferences. But we have also seen, in the first place, that the question whether rates, facilities, and preferences are reasonable or unreasonable is a question of fact in the individual case, requiring for its decision the application of business and commercial considerations; and, in the second place, that as to the principle by which reasonableness should be judged there is no agreement as between one country or another, or even as between different members of the same country. We have further seen reason to think that the railway manager—let me once more explain that I use the word manager as personifying and embodying the experience and organization of the whole system—is himself the best qualified person to decide what is reasonable. For in knowledge and experience he is unquestionably pre-eminent, and he is certainly not less likely to be impartial than anybody else. But we have also agreed that he cannot possibly be allowed to decide without appeal, for that would be to permit him sometimes actually to decide, and very often to appear to be deciding, cases in which he is personally interested. And, further, the cases that come before him are of such wide and far-reaching public importance, involving, as they often do, the taking up of one trade or district, and the setting down of another, that no one, except a public authority representing the nation itself, is competent finally to pronounce on it.

Another point has emerged from our discussion of the subject; we have seen that in England, where the tribunal of appeal is a law court, the court finds itself constrained to adopt a narrow view of its functions of revision. It has expressly disclaimed any concern with prudence, with generosity, and even with commercial and economic motives, and we have concluded that, if this narrowing of the view by the exclusion of points, which would not merely weigh, but would weigh predominantly with the wise manager, is necessitated—as it surely is—by the very nature of law court procedure, the moral is that a law court is not what is wanted as a tribunal of appeal.

It is worth while going back into ancient railway history to see how we have reached our present position. English law has relied on two methods to protect the public. As against unreasonable rates, in themselves excessive, parliament has enacted, with a vast expenditure of trouble and in exceeding detail, a series of statutory maxima. They began even before the days of railways in the old canal acts; they were modified and codified by the provisional orders of the years 1891-1892. Most of us who have reached middle age can remember the ludicrous fiasco of the latest attempt. After studying the early history, President Hadley recorded in 1885 his conclusions in the following words:—"Every careful student of the question from Morr[illegible] down to the committees of 1872 and 1882, has come to the conclusion that fixed maxima are of next to no use in preventing extortion." But the English Parliament, the English trader, and the English chambers of commerce, with

* Railway Age Gazette, Jan. 6, 1911, and following.

their contempt for the careful student and their belief in rule-of-thumb methods, paid no attention to a mere professor, and from 1885 to 1892 they spent, or caused to be spent, by the government, by the railway companies, and by the traders some hundreds of thousands of pounds in fixing a new series of maxima; and these maxima Parliament solemnly enacted as the rates which the railway companies should be "entitled"—as from January, 1893—"to charge and make." The railway companies, with a legal right which was unquestionable, and an unwisdom perhaps equally unquestionable, took their statutory powers seriously, and proceeded in some cases to exercise them to the full. And thereupon Parliament forthwith proceeded to eat its own words, to throw over for all practical purposes the new maxima worked out at enormous cost of time and money, and to enact that the maximum rates which the railway companies might charge should be, not the maxim of their new provisional orders, but the actual rates which they had been charging before those orders went into force. The statutory maxima still, however, remain in force for one purpose, namely, to tie the commissioner's hands and prevent them from authorizing the raising of rates in certain cases where it might be reasonable to do so. But at least we are entitled to hope that the theory of regulating railway rates by fixed maxima is finally dead. And, if one could only hope that the British public had learned by experience that the careful student sometimes understands things that are hid from the practical man, perhaps the price paid for the lesson would not have been too high.

But the fixing of maxima is only one side of public control. As early as 1845 the railway clauses consolidation act included among its provisions what is technically known as the equality clause, a clause which in substantially similar form had become common in private acts some years earlier. The equality clause in effect provides that, if all the circumstances are the same (distance, origin and destination, description, circumstances, etc.), rates shall be the same. Though it took about half a century before the fact was finally set at rest by a judgment of the House of Lords, the equality clause is only applicable in cases where all the circumstances are the same. And, in fact, they never are. So in 1854 the legislature went further, and enacted (if one may translate into ordinary language, the precise phraseology of a statute), that difference of treatment should be reasonably proportionate to difference of circumstance, that all traffic should be given reasonable facilities, and that no traffic should be subjected to any undue or unreasonable prejudice or disadvantage. By subsequent acts of 1873 and 1888 this Magna Charta of the railway customer has been extended and explained.

But to enact is one thing, to enforce another. The act of 1854 entrusted the enforcement of an ordinary law court, the court of common pleas, in spite of the protests of the judges that the matter was one which they were not qualified to deal with. And, indeed, Parliament itself appears to have had some sympathy with the judges, for it expressly provided that the court might employ engineers and barristers to conduct inquiries. Of this power the court does not appear ever to have availed itself. Their appreciation of their own limitations proved to be correct. There was a batch of litigation as soon as the act was passed; and then a lull; and before the general committee of the two houses in 1872 the traders' dissatisfaction with the tribunal was made evident. The upshot was the passing of a new act in 1873. The jurisdiction of the court of common pleas was taken away and transferred to a new railway commission. Throughout the act there is strong evidence of the desire of Parliament to get away from mere legality in the decision of railway questions. Two out of the three members of the commission (one of them being the chairman) were laymen, while the legal member had only the status of a judge of an inferior court. The commissioners were empowered to deal with complaints without requiring or permitting any formal proceedings. Assistant commissioners might also be appointed to make inquiries and reports, and, in some cases, to act as arbitrators; and the commission could call in besides the aid of assessors possessing technical knowledge. The scheme broke down. Neither assistant commissioners nor assessors were, I believe, ever appointed. The attempt to deal with complaints without formal proceedings failed. The commission was a court, and a litigant could hardly be expected to open his heart to his judge. Moreover, the commission was not only a court, but an inferior court, and writs of *mandamus, certiorari,* and prohibition rained down upon it. It was more than once restrained from exceeding its jurisdiction.* Proceedings before it tended not only to be ineffective, but actually, as almost every case was appealed, to be more rather than less expensive than before.

Once more the dissatisfaction of the traders led to a change in the law. If the commission was to be a court at all, it was evidently not enough of a court. So the act of 1888 provided for a new commission which is a court of record with all the powers, rights and privileges of a superior court. The two lay members are retained, but the third member is a judge of the high court. He presides, and his judgment on any point, which in the opinion of the commissioners is a point of law, is to prevail. Since 1888 the status of the commission court is sufficiently established. There have been but few appeals and they have been seldom successful. But the traders are still not satisfied. The procedure, they complain, is too expensive and too legal and technical. A report of the board of trade departmental committee of railway agreements and amalgamations, published within the last few months,† accordingly recommends that complaints should be decided on broad commercial considerations, and not in any narrow or technical manner, and that cases, where the amount in dispute is small, should be tried by the registrar, and not by the commission itself. Unfortunately a case which means 6s. 8d. to a trader may imply a principle involving thousands of pounds to a railway company. Unfortunately, too, the committee fails to indicate how the broad commercial considerations are to be brought within the scope of legal procedure, and how the court is to give effect to them. It would be about equally practical to suggest that an operating surgeon should recognize the importance of moral considerations.

The act of 1888 contains another provision, commonly known as the conciliation clause, which should be mentioned in this connection. This clause in effect provides that if any trader thinks he is being treated by a railway company in an unreasonable or oppressive manner, he may complain to the Board of Trade; and that board shall thereupon call on the company for an explanation, and endeavor amicably to settle the difference. The board is empowered to appoint any competent outsider to conduct the proceedings, but, so far as I am aware, this power has never been exercised. In practice, if correspondence fails to adjust the difference, the parties are brought face to face across a table at the Board of Trade office with one of the principal officers of the board in the chair. The procedure has undoubtedly met with a considerable measure of success, greater perhaps where the presiding officer has expressed his own opinions on the merits of the dispute, than where, as in other cases, he has confined himself to a position of mere neutrality. But the weakness of the procedure lies in the fact that it can only deal with the points that do not matter. The Board of Trade can only express an opinion, and, accordingly cases of any importance have to come before the railway commission. And with this in prospect it can hardly be expected that the defendants will disclose their case to their opponents prematurely.

The procedure of the Board of Trade was avowedly borrowed from the Massachusetts state railway commission. I venture to think that it has been spoiled in the borrowing, and that, with no change of the law, it might be made very much more useful than at present, if the Massachusetts commission procedure were more faithfully followed. The Massachusetts commission sits in public, makes its decision public, and relies on public

*No one familiar with American history in the matter can help noticing the apparent jealousy of the American court at the intrusion of railway commissions, both state and federal bodies partly executive, partly legislative, and partly judicial), within their domain. The attitude of the English courts towards the commission of 1873 sometimes looked as if it was tinged with the same feeling.

opinion for its enforcement. And on any great institution as much open to be shot at as a railway company, public opinion can usually enforce any reasonable decision. The Board of Trade tribunal sits in private, expresses its opinion, where it expresses an opinion at all, privately to the parties, and decently inters a purely formal record of the proceedings in a parliamentary report a year or 18 months afterwards.

TEXAS COMMERCIAL SECRETARIES ON THE TEXAS RAILWAY SITUATION.

Because of the stringent policy of railway regulation that long has obtained in Texas the railway situation in that state is always of special interest. That the sentiment is becoming widespread among the leaders of thought and business in the state that the state's railway policy is having disastrous results for its people and ought to be radically changed is shown by resolutions which recently were adopted by the Commercial Secretaries and Business Men's Association of Texas at its recent meeting at Dallas. That part of the resolutions relating to railways should have interest and significance for people in another state where a policy of dealing with railways after the Texas fashion is advocated, and is therefore reprinted hereafter in full:

"Railroading in Texas, so far as that term implies the promotion of new projects and the construction of new lines, is on its last legs, if not absolutely dead. People build railways, like everything else, to make money. For a number of years the railway companies of Texas, taken in the aggregate, have earned an average income of about 3 per cent. on the money invested. Nobody in Texas, or anywhere else, in the United States, wants to invest his money at 3 per cent.

"In general, Texas railway rates, if compared with similar rates in other states, are higher. The revenue collected by Texas railways on Texas traffic per ton mile, is about 25 per cent. higher than the average for all lines in the United States. But this favorable factor is more than offset by expensive conditions for maintenance of way and structures and by legal requirements, which run the annual expense of operating the railways in Texas up to about 75 per cent. of gross earnings, as against an average of about 63 per cent. throughout the United States. This discrepancy represented about $12,000,000 on the business of the Texas railways for the fiscal year ending June 30, 1911.

"We hold that the welfare of the state of Texas absolutely demands the further and rapid construction of railways. The mileage now existing in the state is, of course, fairly efficient to transport to the markets the products of the territories intersected by the same, which territories, however, constitute only a minor portion of the state's area. Production, of course, is limited in the main to the area served by the existing railways. We hold it to be the duty of the present generation to urge forward the construction of transportation lines in those undeveloped areas of the state, just as it was the duty and the work of our fathers and grandfathers to stimulate that railway development which now exists in the state, the benefits of which are being reaped by the present generation.

"We can see no reason why Texas should not expect to [illegible] progress ahead of the development which has occurred in other states the settlement of which began about the same time as in Texas, such, for instance, as Illinois. But Texas to attain a development corresponding with that of Illinois at the present time, of course, more public highways [illegible] railways, for the transportation of the people and their products, to correspond with the transportation facilities of Illinois. In Texas today there is only one [illegible] Texas can reasonably expect to attain a stage of development comparing favorably with that of Illinois at this time, she must, of course, increase her mileage four times or to 55,143 miles, an increase over the present mileage of 41,357 miles. Indicative of the effect of such abundant transportation facilities is to be noted that whereas the population of Texas by the last census averaged only one person for each 43 square acres of land, the population of Illinois averaged one person for each 6.3 acres.

"We do not believe that under existing circumstances in view of the high return earned by money invested in other lines of business the amount of money required to construct this additional mileage, or to construct any considerable additional mileage, can be attracted into such investment. The prospect of receiving 3, 4 or even 5 per cent. from a railway investment as a maximum of net return, and realizable only after the railway has been carried as an entirely profitless investment through the first several years of its construction and operation, is inadequate to entice the investment of new capital in a country, where according to statistics, the same money, if intelligently invested in manufactures will earn 17 per cent., in agriculture will earn 9 per cent., and in banking from 10 to 30 per cent.

"There have been instances where large sums of money have been invested in railways with the foreknowledge that the ultimate settled return on the capitalization would represent a low rate per cent. upon the aggregate of the securities sold, the investment being made, nevertheless, because of speculative features pertaining to the construction. It was the element of speculation, afforded by heavy land grants, and other such considerations, that in the early history of railroading in this state, when it was yet almost a wilderness, induced railway construction with such rapidity as likely will never again be witnessed in our history. But the present situation in Texas is such that the element of speculation, which still enters into almost all enterprises of every other character, is eliminated from railway construction. The stock and bond law of the state is so worded as to admit of the adopted interpretation which forbids the issuance of the securities of railway companies for an amount in excess of that valuation placed on the physical property by the railway commission, making no allowance for the fact that the new securities on a new railway cannot be sold at par. A glance at the list of securities of the principal railways of the country as quoted on the various exchanges, will disclose that the securities of many of the best old railways in the country are not even yet selling at par. The same law is so drafted that few of the existing railways of the state are permitted to issue and sell securities to obtain money for badly needed permanent improvements to be made on their lines.

"The people of Texas at large should come to understand that there is no relevancy between the amount of stocks and bonds of a railway outstanding and the rates chargeable by the railways for the transportation of freight and passengers, and therefore that the theory upon which our stocks and bond law was passed was a mistaken one and that in so far as the stock and bond law is hindering the financing or construction of new railways, or of betterments to old roads, it is not only idle and useless, but is a detriment to the best interests of the state.

"In the face of this situation, which is to say, the assurance that the average income will not exceed 3 per cent. on the established railways, and with all speculative features of profit in connection with the construction of new lines eliminated, we perceive, under existing circumstances, little prospect for a material increase in the railway mileage of the state.

"Some of the larger defects in our railway laws or in the [illegible] The railway commission of the state, charged with the duty of fixing a valuation on the railways of the state for limiting the issuance of securities and on which we predicate the freight and passenger tariffs which the roads are allowed to charge, at the close of the fiscal year

ending June 30, 1909, the last date for which the figures are available, values all of the railways of the state, being 12,487 miles, with all of their equipment, at only $212,794,585, or at the rate of $16,560 per mile. For the same year the state tax board assessed the value of the same properties at over $400,000,000, and they actually went on the tax rolls and paid taxes to the state on a valuation of $326,684,908, or at the rate of $25,425 per mile. Notwithstanding the shocking discrepancy between these figures in favor of the valuation made for the purposes of assessment, it is well known that neither valuation approximates correctness. The roads are bound by law, and even more by the rules of business, to keep and have kept their capital accounts showing their total disbursements for road and equipment. Their sworn reports indicate an actual cash disbursement to June 30, 1909, of $515,211,981, or an average of $40,100 per mile. While the cost of a railway does not necessarily represent its value, it is rarely the case that it is worth less at any time than its original cost. The valuation on the main body of the Texas railways was made by the railway commission in 1894 and 1895, which will be remembered as a period of general depression, and when in fact the railways of the state as a rule were in poor condition. A defect in the law fails to make provision for a revaluation at any time, and after the lapse of seventeen years everything in Texas has experienced remarkable enhancement except the commission's valuation of the railways, which according to the present law once fixed, is fixed for eternity.

"The rule laid down by the Supreme Court of the United States that railways are entitled to earn a fair return on the present value of their plants utilized in the public service, compels all courts to ignore the 1894 and 1895 valuation of the Texas railways, and it today is obsolete and ineffective except as regards the issuance of stock and bonds. In this connection it is calculated to perform and is performing a deadly and disastrous service. The principal roads of the state of Texas were constructed many years ago, at a time and under circumstances when railway companies in Texas were allowed by our law the same liberty of contract in financing their projects that was then universal, and still is practically universal elsewhere. For the purpose of constructing Texas railways there were issued and sold, and there now remain outstanding securities not including equipment trust obligations to the amount of about $32,100 per mile. The reasonableness of this capitalization must be conceded when compared with the average per mile prevailing on all of the railways of the United States, which is over $60,000 per mile. However, many years have now passed and many series of bonds issued in early days to get the money wherewith to build the Texas railways (at a time when Texas was almost frontier and needed railways as the very foundation for the construction of its new civilization), and which bonds were purchased in good faith and are now distributed into the hands of innumerable persons throughout this country and in Europe, are about to mature. It goes without saying that the railways have not been able to earn and set by a sufficient fund to pay any part of the principal of these obligations. Elsewhere than in Texas the matter of refunding same with a new mortgage and a new series of refunding bonds sufficient in amount to cover the principal of the bonds redeemed, although probably carrying a lower rate of interest, would be the natural and easy recourse of the railways; but, treating all of the railways of the state as a whole, it will be perceived that there is a discrepancy between the railway commission's valuation for stock and bond purposes of $16,560 per mile, and the amount of stocks and bonds outstanding, to the extent of $15,540 per mile. Any new mortgage executed upon these properties for the purpose of refunding these old maturing securities, being limited by the provisions of our stock and bond law, would therefore fall $15,540 per mile short of sufficing to refund and redeem these old issues of securities sold by Texas railways and now held in good faith by innumerable persons at the money centers of this and other countries.

"A repudiation of these obligations brought about thuswise by public statute, will strike a blow at the credit of all enterprises projected in this state sought to be financed without the state, that will stagger their credit for half a century. It will amount to confiscation of property running into many millions of dollars. It will be the final *coup de grace* to all projects for new railway construction, and it will not add one penny to the wealth of the state nor save one penny to any shipper or passenger using the railways of the state. The railway commission will not thereby be enabled to revise a single tariff downward. Those tariffs must be made with reference to the value of the property, and if the attempt were made to readjust them on the basis of any issue of securities so artificially diminished, the courts either of the state or of our nation would speedily restrain any such attempt. The honest citizenship of Texas, we are sure, has no desire to either aid or force the railway companies to repudiate bonds sold in good faith by a previous generation and now held in good faith by many creditors. It doubtless is true that many of these obligations were sold at less than par. Our railways then were new ventures of doubtful success; and, moreover, railway construction was then going forward throughout the entire United States, and competition for the necessary money to build them was keen. Results from the operations of the Texas railways since their construction, in general exemplify that where any purchaser of these original bond issues bargained to buy them at less than par he was not exercising undue prudence concerning his investment.

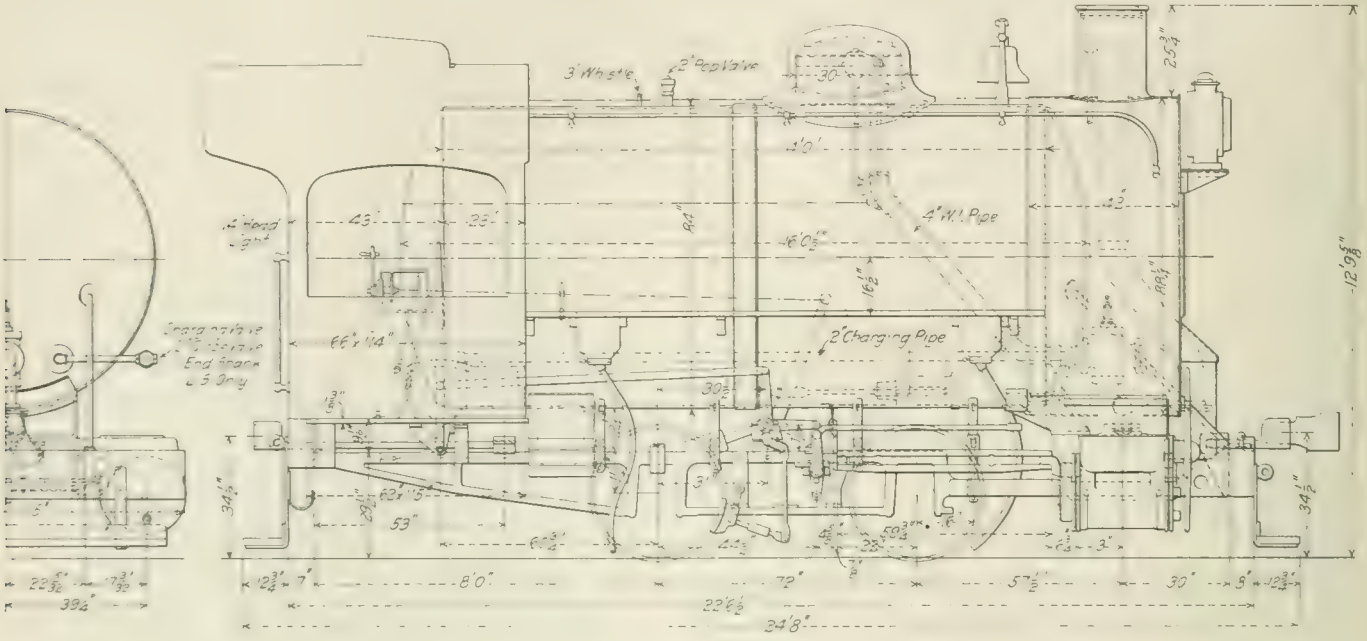
"We think these conditions should be rectified, not merely as a matter of justice to the railways but regarding the problem from the standpoint of men patriotically concerned for the state's further development. We believe that it would be wise for the public commission, the appointment of which is hereinafter recommended, to take into consideration the situation of the state with reference to its railways; that this commission hear parties at interest concerning the present situation; scrutinize the state's existing statutes and determine whether it would be practicable for the people of the state, through their legislature to so revise the railway laws, as again to stimulate and induce the construction of new railways and the betterment of existing railways on an extensive scale. The idea underlying this suggestion is: that within our observation all attempts made in this state during the last decade for construction of independent railway mileage, have almost invariably resulted in disaster to those attempting same; that the owners of the existing system lines have practically discontinued railway construction and are limiting all betterments to their properties to the minimum. All inquiries concerning the reason for such disasters to independent lines and for such policy on the part of system lines, lead to references concerning our statutes.

"The question to be studied is, does the state gain from those statutes such benefits in respect of control and regulation of existing railways as to compensate it for the discontinuation of railway construction? If so, it will, of course, be the part of wisdom for the state to adhere to its entire system of railway laws, many of which date back to the early days of railroading in the state, and some of which are palpably obsolete, just as they stand. If not, then it would be the part of wisdom for the state to ascertain what modifications of those laws would induce new construction; and if such modifications were found not inconsistent with the substantial welfare of the state as it now exists as regards the railways that now exist to adopt same, with the view not merely of producing an increased railway mileage, but of securing the great increase of development, production, population and wealth which invariably follow in the territory intersected by new railways."

FIRELESS LOCOMOTIVE.

Fireless, or steam storage, locomotives are practically unknown in this country, although they have been used extensively abroad, especially in logging camps. The advantages of this type of locomotive are its safety from starting fires; simplicity; economy in first cost over locomotives using storage batteries or compressed air; economy in the maintenance of boilers, since no boiler washing is required and there are no deteriorating effects due to extreme heat; and economy in operation. Only one man is required to operate the locomotive. The steam is generated in the power house of the plant at which the locomotive is used, and if the locomotive is charged while the plant is shut down, before starting up in the morning or during the noon hour, the steam used will not interfere with the operation of the power house. The loss due to radiation is slight, being only 3 to 4 lbs. per hour.

The Lima Locomotive and Machine Company, Lima, Ohio, has recently built one of these locomotives for the National Cash Register Company. The boiler is 84 in. in diameter, 16 ft. in length, and has a capacity of 530 cu. ft. It stores steam at a pressure of 155 lbs.; this is fed to the cylinders through a reducing valve at a pressure of 60 lbs. The tank is filled about half full of water and is then connected with a stationary boiler until the pressure equalizes. When this occurs, considerable steam will have been condensed and the water will have been raised to nearly the pressure and temperature of the steam in the boiler. As the steam is used the pressure falls, causing part of the water to change to steam. Under ordinary conditions the boiler will not have to be charged any oftener than the regular type of locomotive takes water. It will run from two or ten hours with one charge, varying with the amount of work done, two charges per day being a good average.



Steam Storage Locomotive.

Steam Storage Locomotive for the National Cash Register Company.

The cylinders are 18 in. in diameter and the stroke is 18 in. long; the diameter of drivers is 36 in., giving a tractive effort of 9,720 lbs. Due to the large cylinders the engine will move itself with only 3 or 4 lbs. pressure per sq. in. in the cylinders. The total weight in working order is 77,100 lbs., giving a factor of adhesion of 7.94. As the steam is used and the weight decreases this factor reduces to about 5.6. The driving wheel centers are made of cast iron and are 30 in. in diameter; the journals are 6 in. x 7 in.

The locomotive has a length over bumpers of 22 ft. 6½ in. and is 12 ft. 9⅝ in. high. It is similar to the fireless locomotives made at the works of A. Borsig, Tegel, Germany, and described in the *Railway Age Gazette* of July 10, 1908, page 468. It is heavier, however, by some 7,000 lbs., and has its cylinders located at the front, instead of the rear as in the German design. The tractive effort is 2,100 lbs. greater than any of the German locomotives mentioned in the article. However, the storage pressure carried by them is 180 lbs., or 25 lbs. greater than the American engine.

COST OF INSTALLING AND MAINTAINING BLOCK SIGNALS ON ALL AMERICAN RAILWAYS.

The Special Committee on Relations of Railway Operation to Legislation has issued the following bulletin, dated November 14:

On July 25 Circular No. 19 was issued, asking the railways for certain information with regard to installation of block signals, both automatic and non-automatic. Replies have been received from railways operating 85.2 per cent. of the total miles of track equipped with automatic block signals and 74.2 per cent. of the total miles of track equipped with non-automatic block signals. (See Table No. 1).

As a result of the information furnished, the details of which are given in tables 2 to 6, inclusive, the following is apparent:

Estimated cost of installation of automatic block signals on railway mileage not equipped		$286,492,976
Estimated annual cost of maintenance	$39,271,855	
Estimated annual depreciation at 7 per cent	20,054,508	
Estimated annual interest charge at 5 per cent	14,324,649	
Total annual cost		$73,751,012

It is also apparent that to equip with non-automatic block signals the mileage not now equipped will cost approximately $58,721,600. This latter figure should be accepted with great caution, in view of the great variety of devices included under the general term "non-automatic block." Undoubtedly a large number of reported installations of this character include the ordinary semaphore, operated by a telegraph operator, without any form of control, and since the estimated cost for future installations is based upon that reported for those already made it is believed that this figure is considerably less than the actual expense which would be involved.

No effort has been made to arrive at any figures for the installation of automatic stop devices, specified in H. R. 9330, in which the character of block is specified as one which will include automatic stoppage of trains in entering occupied blocks and automatic reduction of speed of trains entering side tracks.

The Block Signal and Train Control Board has not yet made a definite and positive recommendation for the use of an automatic stop. Since that board, which is empowered to investigate any satisfactory installation, has not been able to do so it is obvious that the device is still in the experimental state.

The prime essential of the automatic stop is its positive action under all conditions. Its use, therefore, for other than experimental purposes at the present time is manifestly an added element of danger.

Table 1.—Equipped with Block Signals December 31, 1910.

	Automatic. Miles of		Non-Automatic. Miles of	
	Road.	Track.	Road.	Track.
Total railways‡	17,711	9,307	53,588	63,506
Railways reporting	15,470	24,867	39,668	47,084
Per cent. mileage reporting	87.3	85.2	74.0	74.2

‡Reported by Block Signal and Train Control Board, 1911.

Table 2.—Cost of Installations Prior to 1911.

	Automatic.	Non-Automatic.
Miles of track covered	24,867	41,505
Total cost	$28,504,485	$10,286,026
Cost per mile of track	$1,146	$248

Table 3.—Installations 1911.

	Automatic. Miles of		Non-Automatic. Miles of	
	Road.	Track.	Road.	Track.
Miles equipped	2,315	3,393	1,182	1,262
Estimated cost	$4,180,568		$441,700	
Cost per mile of track	$1,232		$350	

Table 4.—Unequipped Mileage.

	1st Track.	2nd Track.	3rd & 4th Track.
Total mileage in country†	239,991	23,452	.....
Already signalled, automatic‡	20,026	10,874	1,695
Already signalled, non-automatic‡	54,739	10,028	.....
To be signalled, automatic	219,965	12,578	.....
To be signalled, non-automatic	165,226	2,550	.....

†Poor's Manual, 1911.
‡Block Signal and Train Control Board's figures, plus 1911 installation.

Table 5.—Cost of Equipping.

	Automatic.	Non-Automatic.
Total miles track unequipped	232,543	167,776
Estimated cost of installation, per mile	$1,232	$350
Total cost of installation	$286,492,976	$58,721,600

Table 6.—Maintenance of Automatic Block Signals.

Roads reporting	23
Number signal blades	23,254
Number miles track	9,474
Total cost of maintenance	$1,605,087
Cost per signal blade per year	$ 69.02
Cost per mile of track per year	$169.31
Signal blades per mile of track	2.47

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.

At the last session of the convention of the Association of Railway Electrical Engineers, the following officers were elected: President, F. R. Frost, electrical engineer, Atchison, Topeka & Santa Fe, Topeka, Kan.; first vice-president, D. J. Cartwright, electric engineer, Lehigh Valley, Phillipsburg, N. J.; second vice-president, C. R. Gilman, chief electrician, Chicago, Milwaukee & St. Paul, Milwaukee, Wis.; secretary, Joseph Andreucetti, assistant electrical engineer, Chicago & North Western. It was decided to hold the next annual convention at Chicago, and a semi-annual meeting will be held at Atlantic City on the day preceding the opening session of the Master Car Builders' convention. The following is an abstract of the report of the committee on train lighting.

ELECTRIC TRAIN LIGHTING.

Head End Practice.—The greatest extension in the use of the head end system, where special features have been involved, has been its introduction on the Baltimore & Ohio, where it has been installed on four through trains. Heavy grades restrict the operation of the turbines over several sections of the road, which, in connection with the varying make up of the trains during their runs, has necessitated large battery capacity per train and ability to charge the batteries at any time, regardless of the number of lamps burning. The standard 64-volt system is used with turbine equipments carried in the baggage cars and with five or six sets of 300 ampere hour batteries on a seven-car train. Each car, with the exception of the baggage and express cars, is equipped with a lamp voltage regulator. A standard make of regulator, as used in axle lighting, has been adopted. On baggage and express cars, on account of the few lamps installed not justifying the cost of a lamp regulator, a resistance is used which is cut in the lamp circuit while the batteries are being charged. A voltage of from 66 to 85 volts is maintained on the train line, depending on the amount of charging necessary. Tungsten lamps are used exclusively and an average life of 1,200 to 1,500 burning hours is being obtained, including breakage occurring in shipment, or installation. Special train electricians under the jurisdiction of a chief electrician are used to operate the equipments.

Further extension of the 60-volt system has been made on the

C. M. & St. P., though none of the other roads operating the 110-volt system have changed to the standard. Inasmuch as, in addition to the adoption of 60 volts as the standard voltage for the head end system by this association, this voltage has been recommended by the train lighting committee of the M. C. B. Association, and will undoubtedly be adopted this year by that association, it is hoped that the use of the 110-volt systems now in operation will soon be discontinued.

For through service the conditions favorable for the use of the head end system are large trains making long runs (at least ten hours) where the operating conditions and make up of the trains are such that the train, instead of the car, is the operating unit.

Turbine generator sets are recommended, and for through service should be located in the baggage car. The number of sets of batteries used depends on local conditions, but sufficient capacity should be provided to carry the lighting load until the nearest division point is reached, where repairs can be made, or the car may be replaced, in case of disablement of the generating equipment or the turbine car. The batteries should be so distributed that auxiliary light will not be needed while trains are being switched, or for cars dropped or picked up en route which are open to passengers while not connected to the train. The head end system of train lighting has been in use a sufficient length of time to demonstrate its reliability with proper equipment and methods of operation. The use of auxiliary lighting, other than electricity, is therefore not recommended, and only when the system is so operated that this can be done does the committee consider it on an equitable basis for fair comparison with the other systems of electric lighting.

Both rubber hose and metallic connections are used for the high pressure steam service between the locomotives and turbine cars. Data available is insufficient to determine definitely the relative reliability and cost of maintenance of the two kinds. Railways which have used both recommend the all-metallic connection as being more reliable and economical, though the results obtained with its use are not entirely satisfactory. The use of position locks on the couplers of the steam connections is recommended. There seems to be considerable room for development of an automatic coupler lock which will be simple and reliable.

The charging of batteries en route, as far as possible, is recommended. To insure batteries being kept in proper condition, gravity readings should be taken in connection with voltage readings at terminal stations and accurate records kept of their performance. With the head end system, especially where the charging of the batteries is dependent largely upon the judgment of the operators, the use of ampere hour meters, registering both charge and discharge, is strongly recommended. The ampere hour meter gives not only a ready indication of the condition of the battery, but provides accurate means for determining the amount of charge necessary.

Where tungsten lamps are used, and where it is necessary to do considerable charging of the batteries during the lighting hours, the use of lamp voltage regulators on each car is recommended. The regulators automatically maintain a constant lamp voltage, regardless of the train line or battery voltage, and at the same time do not require any changes in the connection of the standard three wire return loop train line, thus retaining the advantages of this system. The experience of a road which has used regulators in connection with its head end system for [illegible] has shown that the additional cost has been [illegible] by the increased [illegible] lamp life.

The use of train electricians versus baggagemen to operate the lighting equipment is a question affected greatly by local conditions. Where a large number of batteries per train are required, or where the train make up of cars supplied with batteries varies considerably during the trip, requiring close attention to the operation of the equipment to keep the batteries in proper shape, the use of train electricians is recommended as the best practice. Where baggagemen are used to operate the lighting equipment it is essential that they be trained to handle this class of work competently and that, as far as their work is concerned with the operation of the lighting equipment, they should come directly under the jurisdiction of the department responsible for the train lighting service.

Axle Lighting.—During the past year several chain drives have been in practical operation and the committee have been informed that the chain drive has proved itself worthy of consideration. The cost of application, including axle and generator sprockets, is about $50 per car as compared with a cost of $28 for pulleys and the best quality of belting. Where belts are used it is best to apply as long a belt as possible, thus permitting the ends to be trimmed from time to time, and affording a more secure fastening for the belt clamp where both ends meet. The proper belt tension has not been given due consideration by many; as a result the cost per car month is nearly three times as great on some roads as on others. The generator pulley should be as large in diameter as possible. A belt operating over a 12-in. pulley will give nearly 100 per cent. longer life than one operating over a pulley 8 in. in diameter.

Under normal conditions the cutting in speed should be 25 per cent. of the maximum train speed. No generators are built that can be properly regulated or controlled through a ratio greater than one to four. There are many advantages to be gained by operating the armatures at a minimum number of revolutions per minute. The belt speed is reduced, there is better commutation, less wear on brushes and bearings and there is less liability of hot boxes. During the past year the majority of the generators have been attached to the truck by the "four point" suspension, the design of which, however, can be improved to prevent the lateral movement of the generator and its support due to the movement of the truck in going over a curve or switch.

Fuses.—Engineers engaged in electric train lighting work, all report unsatisfactory service from the N. E. C. standard enclosed fuses, and with one exception do not favor its use. Troubles which have been experienced with this type of fuses are: Failure to indicate when blown; blowing at current values other than their normal ratings, both above and below; and open circuiting. Most of the engineers favor either the open link type of fuse or some special modification of that type. The committee recommends that the association through a proper committee, investigate this question during the coming year for the purpose of developing a suitable type of fuse which will meet the requirements of car lighting service. It is recommended that the fuse be of such design that it can be used in the same fuse holders as the N. E. C. standard enclosed cartridge fuses of the same capacities.

The committee was composed of A. McGary, chairman; W. C. Kershaw, E. A. Van Buskirk, L. S. Billew, D. J. Cartwright.

The Superior Committee on Railways at St. Petersburg, Russia, has expressed the desire that as the government cannot find the necessary funds to build the numerous desirable light railways for local development throughout the empire, private persons and local authorities should be invited to co-operate. Local authorities and others have been invited to suggest routes, and the response from the district of Karkhoff alone includes 67 more or less carefully considered projects, most of them without solid financial backing, but supported by bold traffic estimates. The committee has asked these promoters whether they are prepared to guarantee the traffic, and in case of deficit on traffic account, to pay the difference between their estimates and the amounts realized. A company is now being organized to build light railways and lease them out to local councils, etc. The promoters have in view particularly for the moment the following lines: Korotcha-Prokorovka, Novo-Siorgisk-Brailovska, and Starobielsk-Swatoff.

THE LONG AND SHORT HAUL INJUNCTION.

Atchison, Topeka & Santa Fe vs. U. S. of A. Opinion by Judge Mack:

These cases involve the constitutionality and interpretation of section 4 of the act to regulate commerce of February 4, 1887, as amended June 18, 1910 (36 Stat., 539), and the powers of the Interstate Commerce Commission thereunder. . . .

At the time of the amendment a number of complaints of unreasonable and unjustly prejudicial rates filed by commercial bodies of the so-called intermountain cities, such as Spokane, Washington; Reno, Nevada; and Phoenix, Arizona, were pending before the commission. Similar complaints had been filed and partial adjustments thereof made at various times, beginning with the year 1892. Because of the amendment, the commission refrained from finally determining the commodity rates to which these cities were entitled on west-bound traffic, believing that orders made under applications for relief, as provided in section 4, would obviate the necessity therefor.

Applications were duly filed in a form prescribed by the commission, which required carriers to state that the rate to the intermediate points should not be more than a certain number of cents per 100 lbs. per ton, per car, or per package, in excess of the rates to the farther point, in and by which applications the carriers asked to be allowed to maintain the Pacific coast terminal rates then in force, lower than the rates to intermediate points fixed by specified tariffs on file with the commission. After a full hearing and investigation two reports and orders were made. . . .

The first order provided that for the purposes of the disposition of the applications the United States should be divided into five zones (being the same as those specified in a Transcontinental Tariff on file). . . .

The order then proceeded . . . [to deny authority to maintain higher commodity rates from points in Zone No. 1 to intermediate points than to Pacific coast terminals, and to allow commodity rates from all points in zones numbered 2, 3, and 4, to points intermediate to Pacific coast terminals that are higher to intermediate points than to Pacific coast terminals, and to fix the relation of these rates.]

The second order is similar in all respects except that it refers only to Spokane and certain other intermountain cities, and expressly provides that the carriers shall comply therewith for a period of not less than two years.

The two suits brought in this court to enjoin the enforcement of these orders, respectively, were heard together. The same questions are presented in each of them.

First: We agree with the commission that section 4 of the act to regulate commerce as amended June 18, 1910, is constitutional. The commission concedes, and we concur therein, that if the first proviso in this section is to be literally construed and if, under such construction, no limit has been imposed upon and no standard given to guide the exercise of the commission's discretion in granting authority to depart from the rule forbidding a lesser rate for the long than for the short haul in the same direction and over the same line or route, the proviso would be unconstitutional as an unlawful delegation of legislative power. We concur, too, in the commission's view that if the proviso were for this reason illegal the entire section would thereby be nullified, inasmuch as both the context and the history of the act demonstrate that the proviso is an integral part of the section, and that a hard and fast rule absolutely prohibiting such a lesser rate would not have been enacted.

To determine, however, the true meaning of the proviso, the entire act must be examined. In the light of the other sections, and of the legislative and judicial history of the long and short haul clause, we are of the opinion that the guide to the exercise of the commission's discretion is to be found in the other sections of the act, thereby making the discretion to exempt carriers from the prohibition in fact not unlimited, and imposing upon the commission not merely the right but also the duty to grant such exemption whenever, on investigation, it shall find that no violation of any section of the act would thereby be involved.

If, therefore, the proposed rate, lower for the long than for the short haul, violates no provision of the fact, and if, in particular, it neither tends to produce an unreasonable rate for the short haul nor operates unduly to prejudice the short-haul point and unduly to prefer the long-haul point, it is the duty of the commission to grant exemption from the hard and fast rule laid down in the first clause of section 4.

Second. The orders sought to be enjoined do not establish absolute rates for either the long or short haul or prescribe the extent, in dollars and cents, that the short-haul rate may exceed the present or some definitely fixed long-haul rate, but they do establish a relation between *any* long-haul rate that the carrier may put into effect and the short-haul rate, determining that from zone one the western short-haul rate shall not exceed the long-haul rate, and that from zones two, three, and four, the short-haul shall not exceed the long-haul rate by more than 7 per cent., 15 per cent., and 25 per cent. respectively.

The commission found specifically that the Pacific coast rates from part of this eastern territory were forced by water competition, and that the rates from other parts were forced by market competition; for example, that the railroads based the New York-Seattle rate on the ocean competition and that they granted the same rate from St. Paul to Seattle in order to enable St. Paul to compete with New York in the Seattle market.

Under the fourth section as originally framed, it was decided (*E. T., etc., Ry. Co.* v. *I. C. C.,* 181 U. S., 1, and cases cited therein) that carriers might, in the first instance and without application to the commission, make the rate less for the long than for the short haul, if, in fact, the circumstances and conditions were not substantially similar, taking their chances on a subsequent determination by a court that they had erred in so doing and had thereby violated the law. They could, however, and in many instances did, apply to the commission for the authority. After the section was construed as not requiring such an application in the first instance, the carriers, it was often charged, abused their privilege by making the rate for the long haul less than for the short haul, although the circumstances and conditions were substantially similar; this charge was, in any event, one of the causes that led to the amendment of the section whereby the clause "under substantially similar circumstances and conditions" was eliminated therefrom. The practical change thereby produced in section 4 was to compel the carriers to make application to the commission if they desired to continue this practice.

The violation of the long and short haul rule is, however, only one instance—a most striking and irritating one, it is true—of the preference and prejudice which, when undue, is prohibited by section 3. Any violation of the original fourth section would necessarily involve a violation of the third section and, *e converso,* if the lesser rate for the long haul than for the short were not in violation of the third section it could not be in violation of the original fourth section. In *E. T., etc., Ry. Co.* v. *I. C. C., supra,* the court held that when it is established that the rates charged to the shorter distance point are just and reasonable in and of themselves, and that the lesser rate for the longer haul is not wholly unremunerative and has been forced upon the carriers by competition at the longer distance point, it must result that a discrimination springing alone from a disparity in rates can not be held to be, in legal effect, the voluntary act of the carriers, and that therefore the provisions of the third section will not apply. The prohibition of the third section, it was said, is directed against undue preference arising from the voluntary and wrongful act of the carriers, and does not relate to acts the result of conditions wholly beyond the control of such carriers; the lesser rate for the long haul could not produce an unjust preference under the third section when the competitive conditions at

the longer distance point which had caused the lesser rate would produce the same preference, even though the carrier were forbidden to meet the competition. For example, as Seattle can get its supplies from New York by water, and Spokane, because of its location, can not do so, Seattle can not be said to be unduly favored merely because the rail carrier, in order to meet the water competition, charges a lesser rate from New York to Seattle through Spokane than from New York to Spokane, provided the Spokane rate is reasonable per se and the Seattle rate not unremunerative. And so, too, if the St. Paul-Seattle rate is reduced to a point less than reasonable per se although not unremunerative, to meet the New York-Seattle rate in order to enable the St. Paul merchants to compete with New York merchants at Seattle, Spokane could not complain merely because this rate is made less than the St. Paul-Spokane rate. In each of these cases Spokane is not unduly prejudiced, because if the lower rail rate to Seattle were forbidden Seattle would nevertheless, by reason of its location, be able to secure its supplies by water, and would therefore in the nature of things have the advantage over Spokane.

While the primary question in the E. T., etc., Ry. Co. case, supra, was as to the right of the carriers, in the first instance and without application to the commission, to make lesser rates for the long than for the short haul, inasmuch as the original complaint charged a violation of both the third and the fourth sections, the court necessarily considered section 3, and held that it could not be violated by making a lesser charge for the long than for the short haul, if the long-haul rate was forced by competition and was not unremunerative.

This construction of section 3 was not dependent upon the clause in section 4 which, by the amendment of 1910, has been stricken out. It was based upon the language of section 3 itself, which forbade not any preference but only an undue preference, and upon the determination that, in the nature of things, there could be nothing undue in a preference which was caused by the natural geographical situation, and which would continue even if there were no railway carriage. The amendment to section 4, therefore, has not changed the construction of section 3, and it follows that no unjust prejudice to Spokane and other interior points can now be predicted merely on the fact that the rate from any of the eastern territory is less to the Pacific coast terminals than to the intermediate points.

The commission also found, however, that the present Pacific coast rates from zone one had not been proven by the carriers, upon whom the burden was laid, to be less than reasonable *per se*. Assuming that they were fully reasonable *per se*, the commission would have the power to refuse exemption from the long and short haul requirement, for under these circumstances any higher rates to intermediate points could be condemned as unreasonable and thus in violation of section 1 of the act.

But the order of the commission as to this territory is not limited to a denial of the applications in the form in which they were presented, that is, to a denial of the maintenance of the then prevailing rates to the coast concurrently with higher rates to the interior points. It forbids the carrier to maintain *any* coast rate lower than the contemporaneous intermediate rate from these points. In [illegible] competition under penalty of losing the business would not be in [illegible]

[illegible] mines the relation of the short-haul rates to *any* coast rates that might be established by the carriers. It makes illegal a rate from Chicago to Spokane more than 7 per cent. higher than an unreasonably low but remunerative Chicago-Seattle rate forced by competition, even though the Chicago-Spokane rate be reasonable *per se* and not in violation of any provision of the act.

Is the commission empowered to make such an order? It is urged that even if it must grant an application for relief, when the lower long-haul rate involves no violation of the act, nevertheless it may determine the extent of the exemption and therefore it may fix the relation of rates.

But to sustain the constitutionality of the proviso in section 4 it must be read as imposing the duty on the commission not only to grant exemption from the hard and fast rule when thereby no section of the act is violated, but also to grant such exemption to the extent that no section of the act is thereby violated; that is, the carrier is entitled under the act to be granted authority to charge as much less as it please for the long haul than for the short haul, provided the commission shall first determine that it does not thereby violate any other provision of the law. In granting authority to make an absolute long-haul rate lower than some short-haul rate, the commission would have the power and the duty to prevent a violation of section 1 and, by virtue of its authority to determine reasonable rates, to fix the short-haul rate.

Doubtless the commission could, moreover, in order to prevent a violation of section 3, make relative rates in so far as this might be necessary to prevent an undue preference. For while, under the decision in *E. T., etc., Ry. Co.* v. *I. C. C.*, supra, undue preference could not be predicated merely on the fact that the rate was less for the long than for the short haul, when the former was forced by water, market, or any kind of competition, it might be predicated thereon if the short-haul rate were not likewise based upon the same competition in so far as and to the extent that it ought fairly to be influenced thereby. . . .

But neither the equality of rates on shipments from zone 1 nor the relation between the rates on shipments from the other zones, as fixed in the order of the commission, can be sustained upon any such considerations. In so far as the commission attempts thus to determine the relation of the long and short haul rates, irrespective of absolute rates, it goes beyond any authority that has been vested in it, for it is not in the power of the commission to say that 100 per cent., 107 per cent., or any given percentage of an unknown less than reasonable rate to the coast is necessarily a maximum reasonable and non-discriminatory rate from the same point of origin to an interior point.

The practical effect of the commission's order is either to compel a blanket rate from the entire east to the entire west, or to prevent the carriers from getting all the business which they now secure without loss by making rates which enable merchants to meet market competition. For example, if the forced New York-Seattle rate is $1, the St. Paul-Seattle rate can not be made higher by the St. Paul carrier, unless it gives up the benefit of business which market competition at Seattle might bring to it. As long as it charges no one else an unreasonable rate, and as long as it does not carry under cost, it is entitled to grant St. Paul the market competitive rate of $1. Under the order, its rate to Spokane in that event could not exceed $1, while the New York carrier could charge $1.25. The latter, however, would also have the right to enable New York to meet St. Paul competition in Spokane. To do this it would have to reduce the New York-Spokane rate to $1. The result would be either to compel a blanket rate from all points east of St. Paul to all competitive points west of St. Paul or to force the carriers to give up some business which could be carried without loss to themselves or damage to anyone else. The commission's [illegible] order, moreover, does not even secure to Spokane the market competition of St. Paul and New York, since it empowers the railways to charge a higher rate from New York, which might exclude New York from the Spokane market.

In a word, unless some through business is given up, the ef-

fect of the orders would be to put Spokane and other interior points on an equality with Seattle and other Pacific coast points, at least from zone one,—a position to which they would not be entitled under all circumstances in view of their relative locations, the former four hundred miles more or less in the interior, the latter on the coast.

It follows that the motions to dismiss the petitions must be denied and that writs to enjoin the enforcement of the orders, pending the final determination of the cases, must be issued. And it is so ordered.

Judge Archibald, concurring:

It is conceded that if the right to approve or disapprove of an application by a carrier to charge more for a shorter than for a longer haul is left by the fourth section of the interstate commerce act, as it is at present amended, to the uncontrolled discretion of the commission, the section is invalid; also, that the proviso taken as it reads in terms confers such unlimited discretion; and that the section is only therefore to be saved in case a guide is found in other provisions of the statute. . . .

Undoubtedly the statute is to be taken as a whole and the different sections read together, but I fail to see how this helps out the matter. By the first section it is prescribed that all charges for any service rendered or to be rendered by carriers subject to the act in the transportation of passengers or property shall be just and reasonable, and every unjust and unreasonable charge is prohibited and declared unlawful. This does no more than enact the common into the federal law, and neither adds to nor detracts from the rights of such carriers, except as it inferentially recognizes their right to a just and properly remunerative rate, in prohibiting an unjust and unreasonable one. But how does this assist the commission in any given case whether to enforce or relieve the carrier from the greater short than long haul charge prohibited by the first part of the section in question, or what direction or guide to that end does it afford? No doubt it insures to the carrier that the short-haul charge shall be reasonably remunerative where it has not been voluntarily abandoned, although the commission in the order made has entirely disregarded this. But that is only half of the problem to be solved, if, indeed, it is that much. The point is that it affords no guide in determining when a disparity between the short and the long haul shall be permissible, which is the question which in each case is to be decided by the commission. But it is further said that at this juncture the third section comes in, and authorizes a less charge for a long than for a short haul, provided an undue or unreasonable preference or advantage does not result to any person or locality over any other. But this provision of the statute is not permissive, but prohibitive. It forbids in brief any undue discrimination, as the first forbids unjust or unreasonable rates, or the fourth the particular kind of discrimination against which it is leveled. It may be, correlatively or by inference, that a right to discriminate is recognized when it can be done without injustice or prejudice. But how again does this afford a guide to the commission in determining when a greater short than long haul charge shall be sanctioned? The fourth section in express terms declares that except as extenuated by the action of the commission a greater short than long haul charge is per se a discrimination and advantage which is unjust and undue, and not to be tolerated. And how is it possible, then, to say that a prohibition against what is undue furnishes a guide or rule in determining when it shall result that, that which so on its face is to be regarded as undue shall no longer be so? There shall be no undue discrimination, says the third section. A greater short than long haul charge is an undue discrimination, says the fourth. At what, then, do you arrive by combining the one with the other? Or where is here to be found the criterion or standard, which is to enable the commission to say when and under what circumstances that which it is bound otherwise to say is an unjust and undue preference or advantage of one locality over another is not so? All the guide there is, is its say-so. But if it rests merely on that the enactment is confessedly void, and the action of the commission has nothing to sustain it. And that is the only conclusion which I can reach with regard to it. It is held good by the court for the reasons given by the commission, but to this I can not agree, and feel compelled in consequence to give expression to the views which I entertain to the contrary. There are at least such grave doubts with regard to the validity of the section that the question might well be passed by at this time, there being other grounds upon which the invalidity of the action of the commission may be rested.

For there can be no reasonable doubt that, assuming that the fourth section is valid, the orders of the commission go far beyond the power conferred by it. The authority given by the proviso is upon application of the carrier in *special cases* after investigation to permit the charging of less for longer than for shorter distances, the commission having the right from time to time to prescribe the extent to which the carrier may be relieved from the absolute prohibition against this, which is otherwise imposed upon it. There must thus in each instance be an application by a carrier, and a special case which entitles the carrier to relief—whatever that may mean—must be set up and made out. And this fixes the limits of the commission's authority. Its duty is to investigate what is so brought before it, and, if a case warranting it appears, to approve the application; or if not, to refuse it. The commission can not go on if it does not approve and make rates, or lay down rules by which they shall be made, upon its own initiative. The carrier in making application for approval does not submit or subject itself to any such exaction. The right to inaugurate to this extent still remains with the carrier the same as before the amendment. The authority assumed by the commission here is not to be implied from the right to prescribe the extent to which from time to time the carrier may be relieved, in the words of the statute. This refers to the special case in each instance which the carrier is required to make out in order to get the approval of the commission, and is necessarily confined to it. In this respect the phraseology of the section is not changed, and it never by any previous construction was carried outside of this, nor is there anything now which requires it. It may be that the applications made by the carriers here for the approval of existing long and short haul tariffs, blanketing the country, went beyond the statute. But if that was the case, the proper course to pursue was to throw them out upon that ground. The mere fact that they were in this form gave the commission no authority to go on and prescribe rates by the wholesale. The orders in controversy extend to the entire continent from east to west, saving only a comparatively small section in the southeast, which is reserved for subsequent consideration. This can not by the broadest construction of the law be brought within it. By no device can the whole United States be made a "special case" nor can the commission upon any just conception of its powers, lay down a hard and fast rule which shall apply to every long and short haul case wherever originating or whatever its destination from east to west across the country. Nor is this saved by the establishment of zones with varying percentages. As pointed out in the opinion of the court, this entirely disregards the right of the carriers to have considered what in each instance is a reasonable rate between points involved. It also overrides the established right of the carriers to make a less than reasonable rate to and from competitive points from whatever cause that competition arises. And it is an attempt to overcome the advantages possessed by coast over inland cities in the face of what nature has provided. All this is fully discussed in the opinion of the court, in which I fully concur, and to which I can add nothing of consequence. For these reasons, without regard to any others, the orders of the commission were clearly invalid, and an injunction against them is properly to be granted, the motion to dismiss being necessarily overruled as the consequence. But I can not see my way to go beyond this and declare the fourth section valid, on which, if anything is to be said, my opinion is to the contrary.

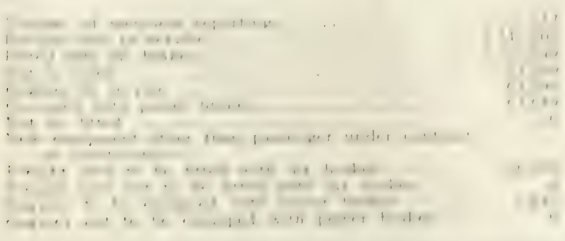
AMERICAN RAILWAY ASSOCIATION.

The fall session of the American Railway Association was held at the Blackstone Hotel, Chicago, Wednesday, November 15. There were present 175 members, represented by 182 delegates. The executive committee reported that the membership now comprises 348 members, operating 256,676 miles, an increase of 303 miles. The associate membership now comprises 99 members, operating 5,084 miles; increases of 15 members and 523 miles.

The executive committee has appointed a standing auditing committee for the ensuing two years, or until its members' successors are elected, consisting of the following: J. A. Taylor, controller, Central of New Jersey; C. P. Crawford, controller, Erie, and J. W. Orr, assistant to controller, Pennsylvania Lines West. B. F. Bush, president of the Missouri Pacific, has been elected a member of the executive committee to fill a vacancy.

The committee on transportation submitted several questions and answers concerning practice under the standard form of detour agreement, which were duly approved by the association. The committee said that it has under consideration a general revision of the Standard Code of Train Rules, and in that connection said that it desires the views and criticisms of the members of the association respecting the present code. It also reported that under date of July 28, 1911, a circular letter was issued to the members of the association, requesting three copies of the train rules on their respective roads. Replies thereto have been received from 329 memberships and 67 associate members. Arrangements have been made by the committee to obtain a complete compilation of this information, showing the railways which have adopted the Standard Code and any and all modifications thereto now in effect on the various roads members of the association.

A progress report was presented by the committee on Maintenance. It is said that, as mentioned in its report of April 18, 1911, the sub-committee on Standard Dimensions of Box Cars and Standard Clearances issued a circular, No. 1022, dated June 14, 1910, asking for information necessary to be obtained in dealing with right-of-way clearances. It also issued a second circular, No. 1118, asking for information as to the maximum dimensions of box cars. The two circulars were addressed to 344 members and 84 associate members. Replies to Circular No. 1022 have so far been received from 269 members and 33 associate members, and to Circular No. 1118, from 240 members and 16 associate members. The number of roads from which replies have not been received are of sufficient mileage and equipment to warrant the committee delaying the ultimate report, as additional replies are being received from time to time. It also reported that E. C. Carter, chief engineer, Chicago & North Western, has been elected chairman of the committee. The committee included in its report a summary of replies received to Circular No. 1120, showing the number of freight cars fitted with air brakes and engines equipped with power brakes in use as of July 1, 1911, as follows:



The committee on Relations between Railroads presented several amendments to the car service rules, which were approved by the association. On its recommendation, the association [illegible] under the provisions of car service rule 11, in order that this information may be published therein." The committee included in its report interesting statistics representing freight car performance and car surpluses and shortages. The committee also submitted a compilation which was made under its direction respecting freight cars owned, cost and maintenance for the year ending December 31, 1910.

The committee on Safe Transportation of Explosives and Other Dangerous Articles reported the Interstate Commerce Commission's regulations for the transportation of dangerous articles other than explosives, effective October 1, 1911. It also submitted the proposed amendment to the Interstate Commerce Commission's regulations for the transportation of explosives, which are to be promulgated by the commission at a later date.

The committee on Electrical Working reported that the committee's work has been in endeavoring to establish a standard location for the electrical connections between electrically operated cars and standards for overhead crossings of electrical light and power lines. The various sub-committees considering these subjects have done considerable work, but were not able to present final reports. The committee therefore reported progress on the work which it has in hand.

The Grand Trunk, the New York, New Haven & Hartford and the St. Louis & San Francisco were elected members of the committee on the Safe Transportation of Explosives and Other Dangerous Articles. The Illinois Central and the Long Island were elected members of the committee on Electrical Working. J. M. Gruber, general manager, Great Northern, and C. W. Kouns, general manager, Atchison, Topeka & Santa Fe, were elected members of the committee on Nominations. The association decided to hold its next meeting in New York City on May 15, 1912.

The railways supporting the Special Committee on Relations of Railway Operation to Legislation met just before the American Railway Association and confirmed the nomination of the following members of the committee for the ensuing year: W. J. Jackson, vice-president and general manager, C. & E. I., chairman; F. O. Melcher, vice-president, Rock Island Lines; J. C. Stuart, vice-president, Erie; C. A. Wichersham, president and general manager, Atlanta & West Point.

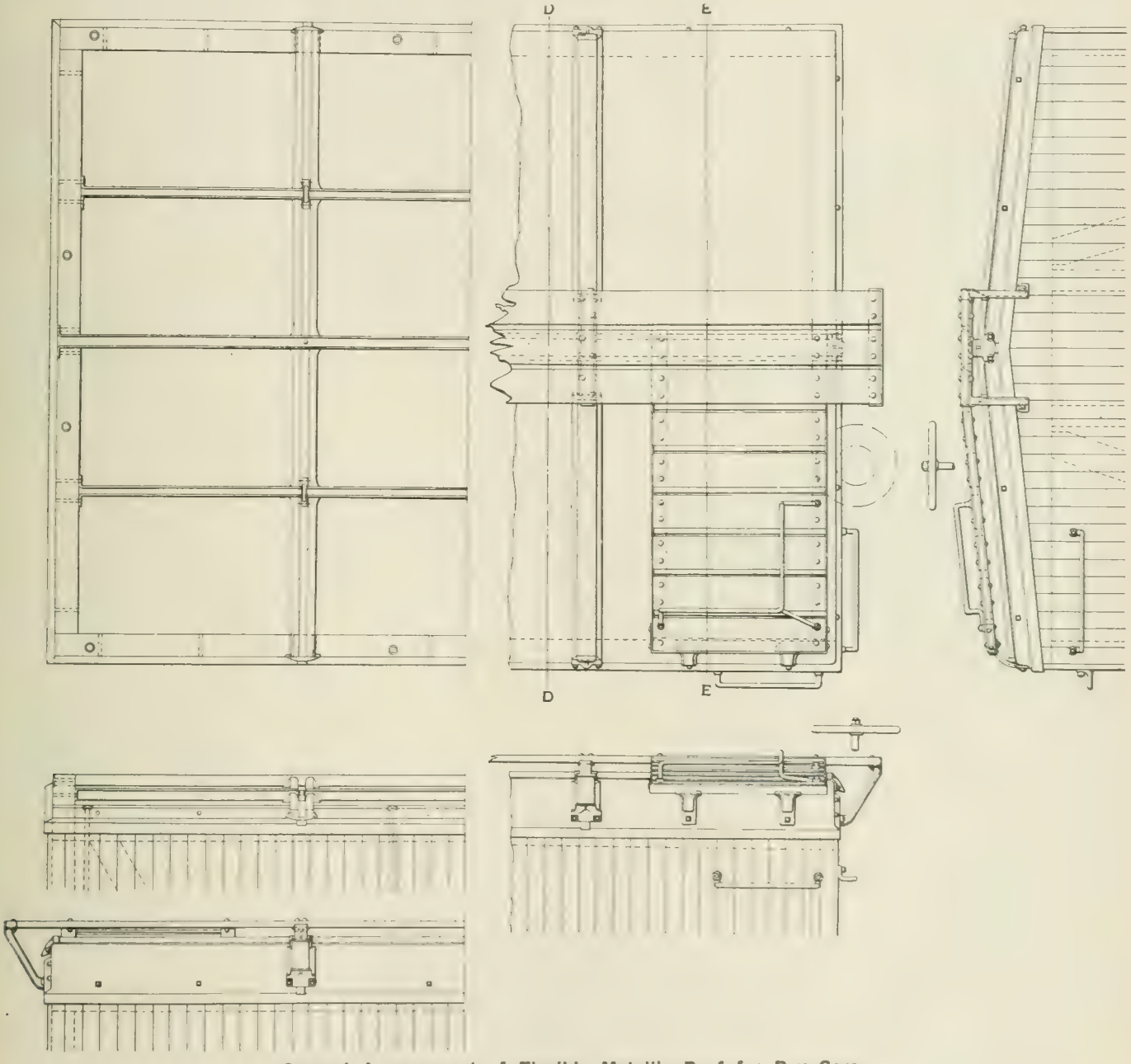
FOREIGN RAILWAY NOTES.

The legislature of the state of Sao Paulo, Brazil, has authorized the construction of a line between Itiacy and Campinas. This line will connect all the lines of 3 ft. gage of the states of Minas Geraes, Sao Paulo, Goyaz, Matto, Grosso, Parana, Rio de Janeiro and Espirito Santo with Rio Grande do Sul and the republics of the River Plata and Paraguay on the southern frontier.

The Peruvian Corporation, which controls about 65 per cent. of the Peruvian railways, acquired in July, 1910, the exceedingly important Guaqui La Paz Railway, running from the southern extremity of Lake Titicaca to La Paz, Bolivia, and forming a connection with the Southern Railway of Peru by lake steamers. The corporation previously operated this road under lease, and the ownership now greatly strengthens its hold upon the Bolivian trade in competition with Chilean railways from Arica and Antofagasta, Chile, to La Paz. This corporation has been granted the right to make studies of the Bay of Matarani in southern Peru, with a view to submitting plans for the construction of a harbor, port and railway as a water terminal of the Southern Railway to Arequipa and La Paz. The Peruvian Corporation has also undertaken to carry out for the government's account a survey from the Cuzco extension of the Southern Railway to the navigable waters of the Madre de Dios river. Under the contract the corporation has for three years after the completion of the survey the preferential right to construct a railway with a federal guaranty of interest on the capital employed and a grant of about 7,910 acres per mile of line constructed.

FLEXIBLE METALLIC ROOF FOR BOX CARS.

A flexible metallic roof has been designed for use on either wooden or steel box cars by the Franklin Railway Supply Company, New York, the idea being to provide a roof more flexible than wood, and one that will have a longer life. It is constructed of metal throughout, and the various members of the roof and frame interlock in such a manner as to prevent them from shifting. The supporting frame is not only of sufficient strength to carry the roof, but also to tie the sides and ends of the car together. The use of steel throughout reduces the fire hazard and provides a more substantial and permanent construction.

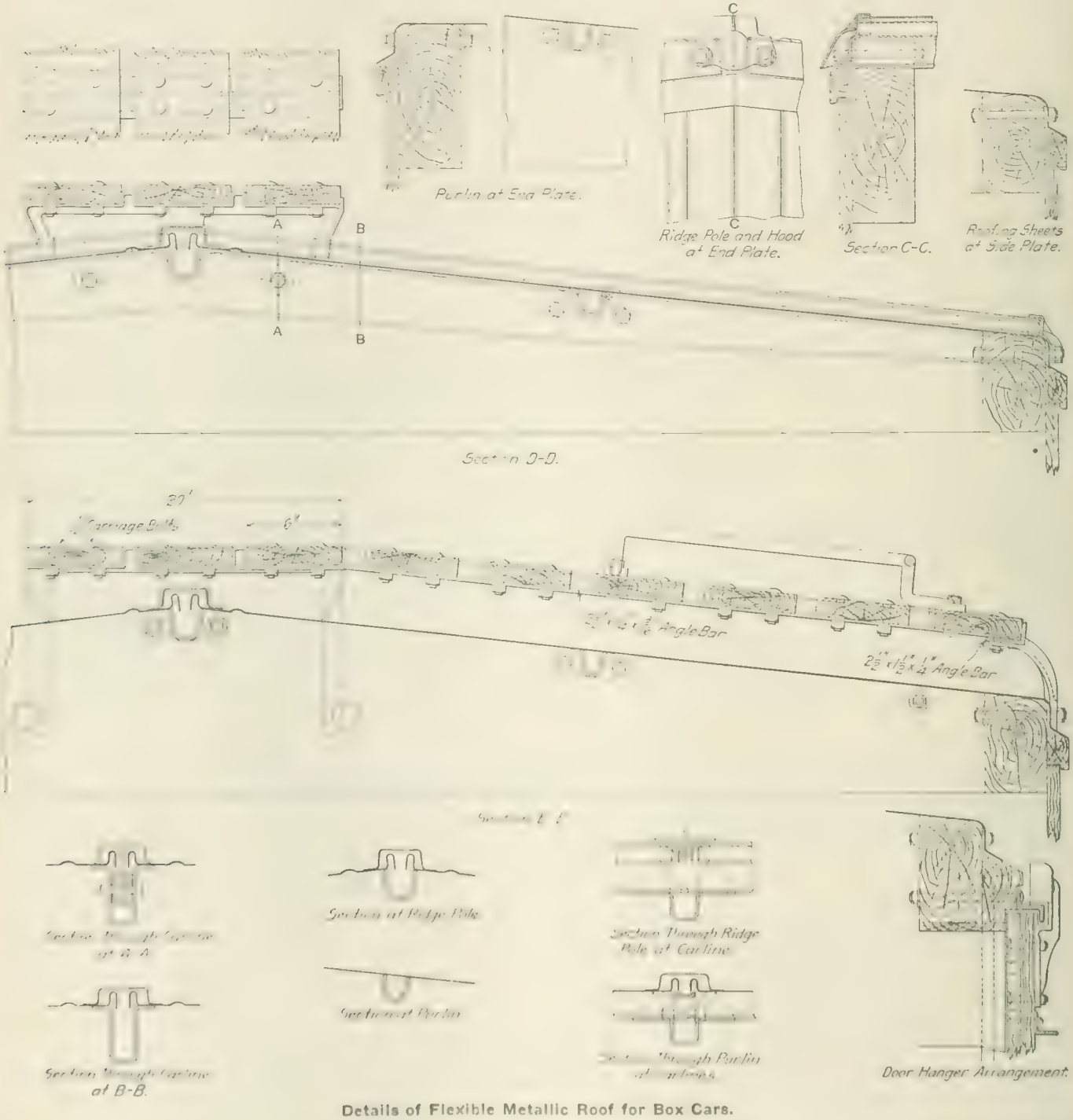


General Arrangement of Flexible Metallic Roof for Box Cars.

The roof sheets are given ample flexibility independent of the joint, and are surrounded by troughs or gutters formed by the U section ridge pole and carlines. Caps cover the gaps between the sheets, and any water which may enter under the caps and work its way up and over the turned-up edges of the roofing sheets falls into the troughs and is carried to the sides or the ends of the car by gravity. For this purpose the carlines extend through the side plates and the ridge pole through the end plates. As all of the parts which are exposed to the atmosphere are galvanized, and since the air can freely circulate through the ridge pole and carlines, excessive corrosion is not liable to take place. Furthermore, any foul or moisture ladened air which may accumulate in the car may escape to the outside atmosphere through the openings at the sides of the ridge pole and purlins where they enter the carlines. The roof may be applied by the usual laborers generally employed on this class of work. If the ridge pole, purlins or carlines become distorted through wreck or fire, they can usually be straightened and used again, and if they should be distorted beyond reclaiming, the salvage will amount to something, whereas if they were of wood they would either be shattered or burned. The total weight of the roof is approximately 2,500 lbs.

The roofing sheets rest directly on the side and end plates, the steel carlines, the steel purlins and the steel ridge pole. They are made from 1-16 in. galvanized steel plates. The edges of the sheet, which are adjacent to the carlines and ridge pole, have upturned and then downturned edges extending slightly below the top face of the carlines and ridge pole. The edges of the sheets at the sides and the ends of the car are turned down over the side and end plates. They have large radii at the bends, and

the lower ends of the sheets are flared out to lap over the top edges of the fascia boards. The sheets are secured at the eaves and the ends of the car by square-necked collar bolts which pass through the downturned flanges and the sides and end plates of the car. These bolts are provided with collars to prevent any water following the bolts through the side plates and into the car. The roofing sheets are held down at the carlines and ridge pole, but are not rigidly secured. The running board saddles are carlines; thus the entire weight of the saddles, running boards and any weight passing over them is taken directly by the carlines, and as the saddles are placed at a fixed distance above the carlines, the roofing sheets cannot become bound or pinched. The saddles are provided with pockets for receiving the ends of the carline and the ridge caps. A web extending down from the underside of the saddles at the center engages with the top edges of the ridge pole, thereby holding the pole in place in the


Purlin at Side Plate.
Ridge Pole and Hood at End Plate.
Section C-C.
Roofing Sheets at Side Plate.
Section D-D.
Section at Ridge Pole
Section Through Ridge Pole at Carline
Section at Purlin
Door Hanger Arrangement.

Details of Flexible Metallic Roof for Box Cars.

[illegible] of metallic iron and are arranged for three [illegible] carlines. It is provided, running board saddles can be provided with [illegible] that the boards may be attached by wood screws.

Metallic iron hoods are placed at the ends of the carlines [illegible] prevent the entrance of dirt and cinders, but they are also arranged to allow the water to flow from the trough of the carlines. The carline hoods are also arranged so as to hold the [illegible] in place at the eaves of the car. The hoods are at-

tached by the same two horizontal bolts which are used for fastening the carlines, thereby making a metal to metal connection. There are malleable iron hoods at the ends of the ridge pole to prevent the entrance of cinders or other foreign matter, but they are designed so as to permit the flow of water from the trough of the ridge pole. The ridge pole hoods are arranged to hold the ridge caps in place at the ends of the car. The hoods are attached by the same two horizontal bolts which are used for fastening the ridge pole. The carline and ridge caps are made from 1-16 in. galvanized steel plates pressed to the required shape. They are fastened by their outer ends being fitted into pockets in the carline hoods, and their inside ends into pockets in the running board saddles. Ample clearance is provided between the caps and the upturned edges of the roofing sheets in order to take care of the movement of the sheets. The intermediate ridge caps are secured by their ends fitting into pockets in the running board saddles. The end caps are fastened by their outer ends fitting into pockets in the malleable iron ridge pole hoods, and their inside ends into pockets in the running board saddles. Sufficient space is allowed between the caps and the turned-up edges of the roofing sheets to provide for the necessary movement of the roofing sheets.

The carlines are of pressed steel and have a U-shape section. They extend through the side plates, the plates being gained to receive them, which places the top edges of the carlines on the same plane as the side plates. The ends of the carlines are turned down, and the carlines are fastened by two horizontal square-necked collar bolts passing through this turned-down portion and the side plates of the car. The same bolts which are used for attaching the carlines are also used for securing the roofing sheets and the carline hoods at these points. The carlines taper from the ridge pole to the side plates, and the top edges are depressed to receive the ridge pole and the purlins. They are attached to the side plates so as to give the minimum fascia width, thus providing the maximum car clearance at the eaves. The fascia boards project beyond the ends of the carlines and the carline hoods, thereby protecting them from being raked by projecting obstacles. The ridge pole and the purlins are rolled steel bars and are also U-shaped in section. They pass over the carlines at the depressed sections, thus placing their upper edges on the same plane as the top edges of the carlines. The sides of the purlins are cut out where they pass through the carlines to receive the purlin-carline keys. A hole is placed at the bottom of the ridge pole and purlins, where they intersect the carlines, which forms a drain from these members to the carlines. The top edges of the ridge pole and the purlins are flush with the top of the end plates. The ridge pole extends through the end plates, which are gained to receive it, but the purlins only extend to the inside face of the plates. Both the ridge pole and the purlins are flanged out at their ends and are fastened by two horizontal bolts which pass through these flanged-out portions and the end plates. It will be seen that the end plates are placed between the flared-out ends of the ridge pole and the purlins, thus providing a strong end-plate attachment. The purlin-carline keys are made of drop-forged steel. They pass over the top edges of the purlins at the carlines, the purlins being cut out to receive them; the keys are attached to the carlines by two horizontal bolts which pass through the walls of the carlines. This arrangement anchors the purlins to the carlines.

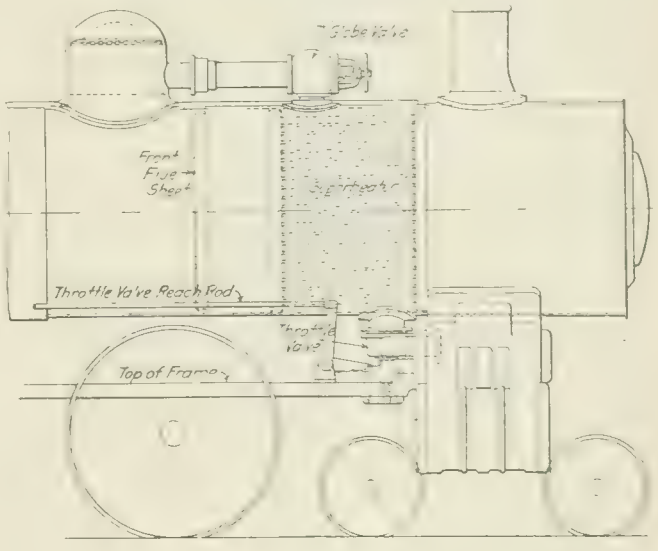
The running board side and end extension supports are also made of rolled steel angle bars. It will be noted that the weight of the running board extensions and any one passing over them is not placed upon the roofing sheets. The fascia boards extend beyond the brackets, which protects them from being raked off.

The minister of industries and public works of Chile has approved the final plans for the construction of a railway from Cajon to Llaima. The distance to be covered by this line will be 28 miles.

EXTERNAL LOCOMOTIVE THROTTLE.

An external throttle valve has been designed and patented by W. F. Buck, superintendent motive power of the Atchison, Topeka & Santa Fe, to overcome the disadvantages of the common inside valve. It was designed primarily for use on locomotives equipped with superheaters, but is equally applicable to locomotives using saturated steam. Views of the throttle and its connections as applied to a locomitive equipped with the Buck-Jacobs superheater are shown in the accompanying illustrations. The throttle is secured beneath the superheater on the outside of the boiler shell. Above the superheater outside the shell is a large globe valve, which is connected to the dome by a pipe. Short steam pipes lead from the throttle to the cylinder saddle casting. The throttle is operated by a bell crank connected to a reach rod leading to the cab. A Pacific type locomotive equipped with this throttle has given excellent results in both freight and passenger service. The locomotive starts more easily and the response to the movement of the throttle valve is more sensitive than with the ordinary type of throttle. No difficulty has been encountered from accumulations of water of condensation.

The throttle is supported by a cast steel saddle which is riveted through its upper flange to the boiler shell; the throttle box is bolted to the lower flange of the saddle, and a steam tight



External Throttle Applied to Buck-Jacobs Superheater.

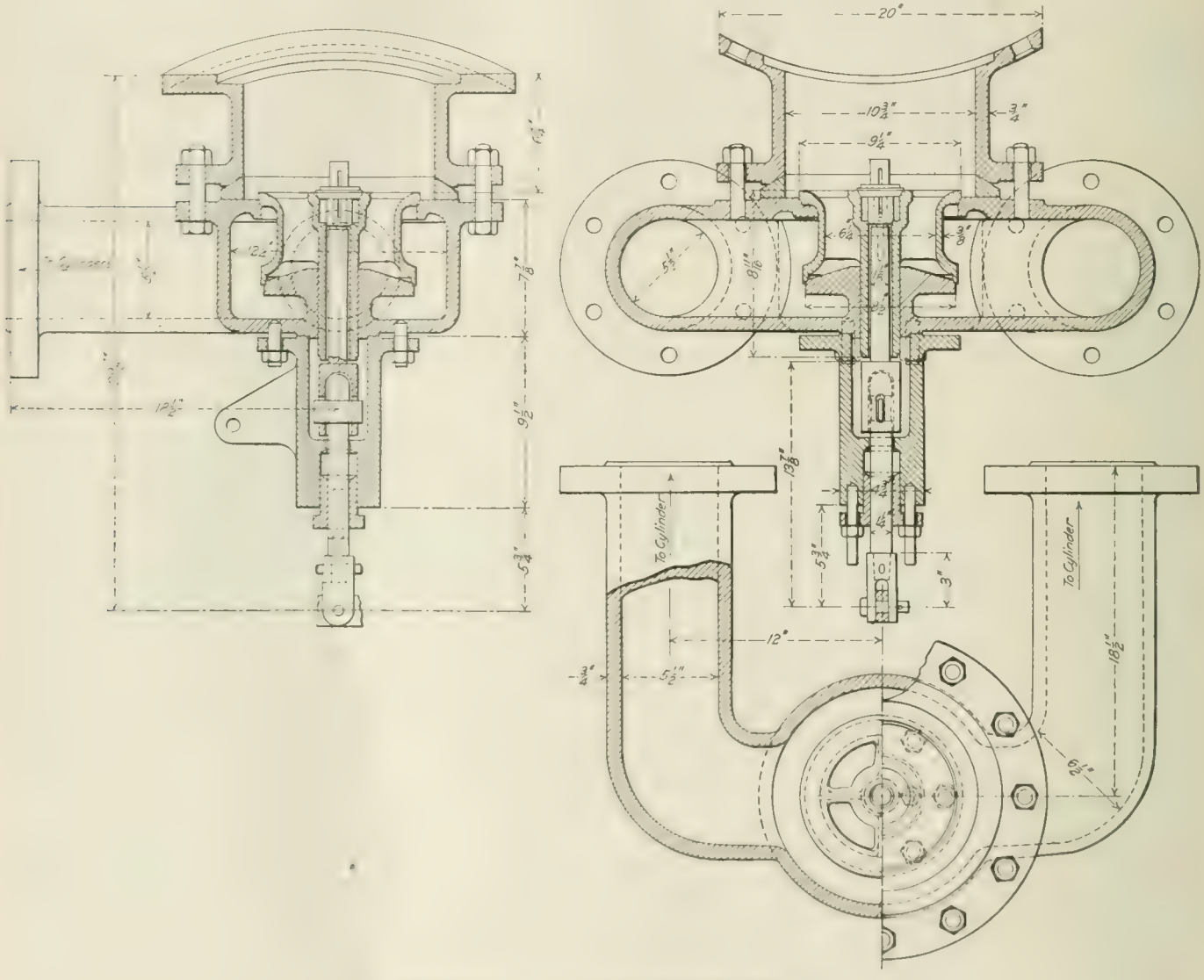
joint is made between the box and saddle by the usual form of ball joint ring. The throttle is controlled by a stem passing through a packing gland beneath the throttle box. The steam enters the throttle through the saddle and passes to the channels in the cylinder saddle casting through two steam pipes cast in one piece with the throttle box. In the case of a smoke-tube superheater the saturated steam may be led to the superheater header, either by an external pipe from the dome, or by the usual inside dry pipe. Superheated steam may be led from the header to the throttle by two steam pipes, similar to the common form of smoke box steam pipe.

The external throttle is readily accessible for inspection and repairs at all times. The joints are outside of the boiler shell where steam leaks may be quickly detected and where repairs may be made conveniently. They are removed from the intense heat of the smokebox, and in the event of a leak the steaming qualities of the locomotive are not affected. The accessibility of the throttle has many advantages. Repairs can be made to the throttle while the boiler is under steam pressure, as the globe valve near the dome may be closed, thus shutting off steam from both the throttle and the superheater.

When an inspection is to be made of a boiler equipped with the common arrangement of throttle, it is necessary for the

engine house foreman to send a machinist to remove the dome cap and take out the throttle valve, standpipe, etc., so that a boilermaker can get into the boiler. This work is not only expensive, but consumes much time, and is particularly undesirable because of its being necessary to break the joint between the standpipe and the dry pipe. With the external throttle it is merely necessary to remove the dome cap to enter the boiler, as there are no other parts which interfere, and no extra work is necessary.

With either the smokebox or smoke-tube superheater there is a large volume to be filled by steam passing from the dome to the cylinders. With the external throttle the superheater is al-



Buck External Locomotive Throttle Valve.

ways filled with steam and because of the small volume in the short pipes between the throttle and the cylinders the locomotive responds to the movement of the throttle more quickly than with the old form of throttle. This is particularly advantageous in spotting locomotives on turntables, in engine houses and at water stations; also in coupling with cars, especially when it is [illegible] to make a careful coupling, as such stops frequently [illegible] application of air which is detrimental to the air brake equipment. There is no stuffing box, gland or packing for the rod in the cab. With the external throttle superheaters are always charged with dry steam ready for delivery direct to cylinders. The engine is, therefore, quicker in starting and the superheater and its joints are protected from the effects of the hot gases.

FOREIGN RAILWAY NOTES.

Traffic on the Baro-Kano Railway, in northern Nigeria, is developing more rapidly than was anticipated. In July, the first month after the opening of the line to Zaria, $16,000 was taken in cash. The line from Zaria to the Bauchi plateau will probably be completed as far as the Kogin Rahanna river, about 95 miles, before the end of the year. When the bridge over the river has been completed there will be no further serious obstacle except heavy earthwork on the extension to Ngell.

During 1912 the Russian ministry of ways and communication proposes to make surveys for a new line which will run from Orel, about 200 miles south of Moscow, to Narva, on the Gulf of Finland, and passing through Believ and Staraia Russa. This line will traverse a district, which for the most part is poorly served by railways, and will afford the Orel and Trans-Orel districts a communication with St. Petersburg, which will be from 43 to 50 miles shorter than the existing route via Moscow.

The minister of transportation and public works of Brazil has approved the plans for the extension of the Goyaz Railway from Ipamory to Antas, a distance of 159 miles, the first-named station being 122 miles above the initial station of the road. In another order further plans for the extension of the same railway from Perdicao to Palestina have been given final approval. This section of the line is to be 263 miles in length and will cost $2,100,000 to build, according to specifications now accepted.

Maintenance of Way Section.

CONTRIBUTIONS should be sent in promptly for the contest on Construction Kinks, which will close November 25. Descriptions of all devices or methods for handling to advantage any feature of construction or reconstruction work, except those relating to bridge and concrete work, will come within the limits of this contest. Prizes of $25 and $15 will be awarded for the two best contributions, and all others accepted will be paid for at our regular space rates.

NINE contributions were received in the contest on Methods of Collecting Cost Data Through the Maintenance of Way Department. The judges, Leroy Kramer, assistant to the second vice-president of the Chicago, Rock Island & Pacific; C. W. Hotchkiss, general manager, Chicago, Indiana & Southern; and G. H. Bremner, engineer, Illinois district, Chicago, Burlington & Quincy, awarded the first prize to E. R. Lewis, division engineer of the Michigan Central, Bay City, Mich., and the second prize to E. B. Fithian, assistant engineer of maintenance, Missouri Pacific, Little Rock, Ark. Other papers accepted and published in this issue were contributed by F. L. Burrell, C. & N. W., Fremont, Neb.; E. Cumberledge, L. V., South Easton, Pa.; J. A. Roland, C. & N. W., Missouri Valley, Ia.; E. M. Grime, N. P., Glendive, Mont.; P. H. Hamilton, St. L. & S. F., Pittsburg, Kan.; J. F. M'Nally, A. T. & S. F., Chanute, Kan.

NOW that the heavier maintenance work for the year is drawing to a close and the forces will soon be reduced to a winter basis, it is a good thing to look back over the past season's work and note wherein there has been improvement over that of previous years. The necessity for retrenchment in many parts of the country has required strict economy and afforded a strong incentive for working out changes and improvements in handling maintenance work. There are probably but few officers in charge of such work who cannot look back on some improvement made in their departments during the past year. These may consist in better arrangements for handling a particular kind of work, improved organization of the gangs, the use of new equipment or of new tools, etc. A prize of $25 will be paid for the best article describing such an improvement, and $15 will be paid for the second best article. All other contributions accepted for publication will be paid for at our regular space rates. It is not necessary that the person who submits the article should have been responsible for the improvement himself, but, wherever possible, we suggest that the author give credit to the parties responsible for it. The beneficial results secured from the improvement should be stated. All papers should be in the hands of the Civil Engineering Editor of the *Railway Age Gazette*, 417 South Dearborn street, Chicago, not later than December 25.

THE article on Rolling Loads on Bridges, by Mr. Greiner, which appears elsewhere in this issue, is of interest to all railway bridge engineers. The question of the amount of increase over the present engine loading which should be provided for in bridge design is a vital one. As the writer states, bridge engineers are becoming more and more unwilling to predict the limits to which such loadings will increase, for the past history of bridge design has witnessed the surpassing of one after another of these limits, and the end does not seem in sight. For this reason, the conclusions of the author, that an E-50 loading is heavy enough to carry safely in regular unrestricted service the heaviest locomotives that can be safely operated without a complete revision of present standard clearances, will not be accepted by many engineers. Granting, with the author, that heavier power is probable on high grade divisions, many men will hesitate to say that such equipment will not be placed on low grade divisions. The belief that an E-50 loading is not heavy enough for modern design and does not sufficiently discount the future is evidenced by the fact that a large number of bridge engineers are designing for heavier loadings, as shown in Mr. Greiner's article. These men would not feel justified in adopting the heavier loading with the increased expense for material if they did not believe they were necessary to provide for the loadings likely to be placed on the structure before the expiration of its normal life. The prominence and standing of the author in his profession properly give his article on this important subject much weight and prestige. It is to be regretted that the American Railway Engineering Association makes no provision for a discussion of the papers presented in the bulletins, as is the practice with the American Society of Civil Engineers and other large engineering societies, for the discussions frequently are as valuable as the papers, and they provide opportunity for the presentation of different ideas on the same subject. As many prominent men differ from Mr. Greiner, and as there is no opportunity for discussion through the channels of the association before which the paper was presented, it is to be hoped that our readers will feel disposed to discuss this subject in the columns of the *Railway Age Gazette*.

AT this season of the year on many roads the heaviest part of the track work has been completed and the track forces are devoting their efforts to getting everything in shape for the approaching winter. Ties have long since been put in, rail has been relaid, the ballast is in and dressed, tiling and ditching has been finished, all additions and betterments are out of the way, and section men are applying their energies to preparing for cold weather. The extra gangs have been reduced or laid off, and the work trains have been put out of commission. It is to be regretted that all roads are not in this condition. It is an unfavorable commentary, except in localities where winter is seldom severe, for a large number of ties to be going into the track at this season, in some cases being put in by extra gangs, and for gangs to be putting in ballast and doing other work which might better have been done in the middle of the summer. Much better results are secured if all the ties are put in in May or June, so that the rail can be laid in June, July and August, the tie spacing following closely behind. In this way all this class of work can be completed by September 15, or by October 15 at the latest. There is no true economy in postponing work in the spring, even though the close of the fiscal year on June 30 may make a good showing desirable; nor is it advisable to allow the work to drag through the summer until the fall, with the result that the fall work is retarded in its turn. On the other hand, it is not wise to cut down the regular section gangs until the fall work is entirely completed, although the tendency is to reduce these forces as soon as the heavy work is out of the way. There are always soft spots where the extra gangs have tamped the ballast unevenly to repair and small swings in the alinement to straighten out. If left undone these will become more serious, and after the track is frozen it will cost $10 to do what $1 will do in good weather. Much shimming and lining during the winter can be lessened or avoided entirely by getting the track in good shape before it freezes. Now is also the time to see that all brush and obstructions are cleared away from the culverts and bridges; that ditches are properly cleaned; that outlets as well as the ends of the tile are opened up; to get snow fences ready, and to inspect fences, crossings and cattle guards to see that they are in proper shape. Furthermore, there is always a great deal of work to be done in the way of cleaning up the ties, rail and scrap along the right-of-way, of putting in coal at the stations and of doing the many miscellaneous jobs that are turned over to the section men. The winter

is hard enough on railways when they are in the best condition, and the additional cost of doing work in frozen track easily offsets any savings from early and unwise reductions in the section forces during the fall. If they are allowed to get the track in good condition before it freezes the forces can then be largely reduced during the winter without serious detriment to the track.

COST DATA FOR THE SECTION FOREMEN.

EXPENDITURES for maintenance of way and structures are over 20 per cent. of the total operating expenses of the railways of the United States. This class of expenditures has not in the past been supervised as closely as those composing the other two big items in operating expenses—conducting transportation and maintenance of equipment. The general and division officers give the subject close attention; but the attention usually given to it by officers below the superintendent, and particularly those below the roadmaster, supervisor or master carpenter, is commonly very much less. The section foreman, who actually spends the money, seldom has been taken into consideration in this study of possible economy. Rather, he is commonly encouraged, at least tacitly, to use all the labor and material he can get to maintain his track and bridges in the best condition. The successful foreman of the past has been, perhaps, chiefly characterized by his ability to secure material and men from his superior officer; he has known that if the track rode well the matter of cost would seldom be mentioned to him. This same attitude has been common among roadmasters and master carpenters. The quality of the track has been the main consideration, and there has been comparatively little incentive to economy. Now, important economies are possible in the maintenance department; and it seems obvious that here as elsewhere when the condition of track is considered there should equally be considered what it has cost to put it in that condition. The best foreman is not necessarily the one who has the best track; he is the one who MOST ECONOMICALLY keeps up the best track.

Furnishing price lists of the various articles commonly used is one means of educating foremen to consider the money value of the material in their charge. Another means is to encourage them to keep records of the cost of the various kinds of work done that they may more fully realize the relative importance of the various jobs. Good results are obtained by furnishing them with the unit costs of similar work done by other foremen under similar conditions. In this way there may be developed a salutary rivalry in securing efficiency and economy.

To impress on the foremen the value of the tools they are using several roads now advise them regularly as to their cost either by circular or by inserting the data in a material book. It is not necessary that these price lists be revised monthly to show minor variations. If they are corrected perhaps once a year they will be sufficiently accurate for this purpose. When the foreman realizes the cost of the material he is ordering his natural tendency is to be more thrifty in his orders. Likewise, when he realizes the size of his daily payroll he is more apt to work the cost of which is not constantly considered is likely to

done. The equally general practice of demanding explanations if the actual cost of the work exceeds by a small percentage the estimated cost often causes unit prices to be used in the estimates which are somewhat above the actual costs for such work. Indeed, on some roads arbitrary prices for all the common units of work are definitely fixed by instructions from headquarters, no allowance being made for local conditions; the local officers being indirectly given to understand that they are expected to charge out the authorized amounts to a given job, although to do so it may be necessary to transfer other charges to this account which have no connection with the authorized work. Such practice seems adapted to cause, not economy, but extravagance.

On most roads data is collected in the general offices of the cost of certain maintenance operations, such as steam shovel work, ballasting and rail laying, for the information of the higher supervising officers. But these reports are usually filed and no one but these officers see them. Such reports also cover but a small part of maintenance work. A good many roadmasters, supervisors and master carpenters have devised simple methods of working up data for the various details connected with their work and are furnishing these figures to their foremen with very good results, as described in the papers submitted in the contest on cost data, which are given elsewhere in this section.

Besides securing unit costs of the work he is doing, it is also advantageous to provide the section foreman with the costs of the work done by fellow foremen. For such a system to be successful the officer in charge must possess the foremen's confidence in his fairness. The possession of such figures shows the supervising officer who are his expensive men and will naturally lead to his devoting more time to showing them how they can improve their methods and reduce their costs.

One of the principal objections to the giving of comparative cost data to section foremen is that it may create a tendency to slight work in order to make low cost records. This can be prevented by proper supervision by the roadmaster or master carpenter; and undoubtedly increased watchfulness on their part will be requisite. Cost data is frequently quoted or used without adequate knowledge of the conditions governing the particular work from which it was derived; and therefore its use by section foremen should be confined to localities similar and preferably near to those where the work on which it is based has been done. Then the traffic, rail, ballast, climatic conditions and class of labor dealt with, are generally the same. The curvature and condition of the roadbed may vary from one section to another, but the roadmaster who is familiar with these conditions is able to equate for them.

In comparing the cost data of adjoining foremen the units selected as a basis should be carefully considered. In some cases the units may be selected in detail, as the cost of tie renewals, etc., with good results. Such a method was described by W. G. Dungan in the issue of the *Railway Age Gazette* of July 21, and should be successful where the satisfactory co-operation of the men is secured. Should there be any tendency toward transferring charges from one item to another to make a better showing it might be necessary to require the men to account for their entire payroll. Where records of but part of the work are kept it is difficult to prevent such juggling of accounts. On the other hand, if a comparison is based on the cost of maintenance per mile no opportunity is given for such transfers, but the benefits of comparison of details are not gained. A roadmaster on one western road followed the system for two years of making comparisons based on the cost of maintenance per mile of track per month. Immediately after the first of each month he prepared a statement showing the amount spent for both labor and material on each mile of track during the previous month. Then, carrying this statement with him, he made a trip on a motor car over the division, noting carefully the condition of each section. On his return to the office about the fifth day of the month he prepared a statement to be sent to each foreman, in which he ranked the foremen in the order of the improvement made on their sec-

tions, considering the money spent per mile. Knowing that their ranking was based both on the general condition of the track and right-of-way, and on the amount spent to secure this general condition, the foremen entered so heartily into the work that within a few months it would frequently happen that different ones would advise the roadmaster that they could spare one or two men for a few days if they were needed elsewhere; in other words, when they got their track up in good condition they endeavored to reduce their costs. If such co-operation could be secured everywhere large savings could be made.

With the aim of learning how many roads have in either general or local use methods to provide cost data of their work for their foremen, a letter was sent by the *Railway Age Gazette* to a number of leading roads, asking regarding their practice in this respect. A study of the replies received from 34 typical roads indicates that 25 have no such system in use and no plans for any, while four are giving the subject careful consideration and endeavoring to work out some satisfactory plan. Four others, including the New York Central Lines and the Missouri Pacific, have methods in use similar in a general way to those described.

A contest on the subject of cost data was announced by us which closed October 1. Eight papers submitted in this competition are printed in this issue. A number of them describe methods in use locally under the supervision of the contributors, while those of Mr. Hamilton and Mr. McNally discuss practices which are used on many of the larger roads in keeping records of their larger work only. We desire to learn of any other methods that are in use and have proved successful, and will welcome contributions describing them.

NEW BOOKS.

History of Bridge Engineering. By Henry Grattan Tyrrell, C.E., Chicago. Published by the author, Chicago. Cloth, 6 in. x 9 in. 479 pages. 328 illustrations. Price, $4.00.

This traces the development of bridge building from the time when logs were thrown across streams by primitive man to the building of modern reinforced concrete arches. The gradual development of this branch of engineering is traced through the Persian, Roman, mediaeval and renaissance periods to the middle of the eighteenth century. From this time bridges, including stone, pontoon, aqueduct, wooden, cast iron and steel structures are traced by types. The gradual development of the steel bridge is discussed under the different types of designs, including the simple truss, tubular and plate girder, suspension, cantilever, arch, trestle and viaduct. The final chapter is fittingly devoted to reinforced concrete bridges.

The book is interestingly written and well arranged, and contains frequent sketches and photographs of the different steps in the development of the various types. Largely non-technical in character, it is also of much interest to all civil engineers.

Rock Drilling. By Richard T. Dana and W. L. Saunders. John Wiley & Sons, New York. Cloth, 6 in. x 9 in. 319 pages. 127 illustrations. Price, $4.00.

The purpose of the author was to collect in convenient form reliable and up-to-date information concerning the different factors entering into a study of rock excavation, and especially of the best methods of arrangement of the different types of drilling apparatus. Most of this data was gathered by the Construction Service Company and has not before appeared in print. The book gives extensive data records regarding the actual cost of rock excavation on many of the larger projects under way or recently completed. Especial attention is given to the methods of handling rock work on the Hopatcong cut-off of the Delaware, Lackawanna & Western as typical of drilling on land, while the methods adopted on the work connected with the improvement of the channel of the St. Mary's river are described in detail as illustrating subaqueous drilling.

COMPARISON OF METHODS OF LOADING GRAVEL.

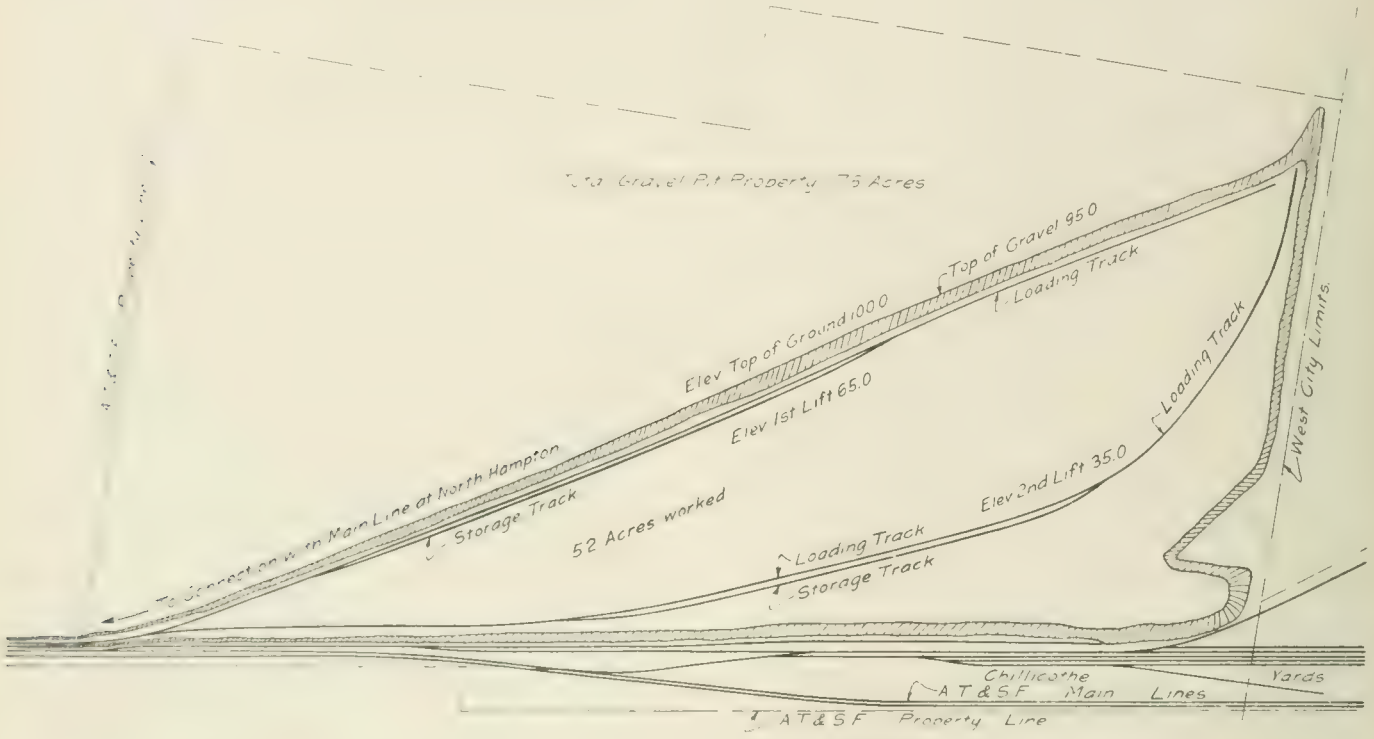
The kind of material used as ballast by a railway is determined, first, by the materials available within reasonable distances; and, second, by the service demanded of the track. Broken stone, gravel, slag, burned clay, sand and cinders are each applicable to certain conditions. Sharp and angular crushed stone will carry heavier loads and is best for a line of dense traffic. However, its high first cost, and the fact that it can only be secured in certain parts of the country, greatly limit its use. The cost of maintaining rock ballasted track is also greater, because of the difficulty of working in it. Slag can be secured only at steel works, and its use, therefore, is limited to vicinities where that industry is carried on. Burned clay is employed quite extensively in certain parts of the middle west and southwest, in the gumbo or heavy soil countries. Sand and cinders are largely used along lines having light traffic and give good service in such places. Gravel, however, is the material most widely adopted for ballast on both main and branch lines. It is quite widely distributed in one form or another over the country and can be secured comparatively cheaply. It is most commonly taken from pits located on the banks of streams or along glacial moraines. In these pits the quality of the gravel varies greatly, ranging from a clean stone to a mixture of sand and gravel combined with a large proportion of clay. Very frequently it contains an iron oxide which causes it to cement or combine in large masses that have to be broken up before loading. This cementing of the gravel is very detrimental to its use under the track, as it binds in place and becomes difficult to work, while clay is equally objectionable, because it causes churning under the ties when wet.

Gravel is loaded in several ways, depending on local conditions and the amount of ballast needed. When only small amounts are required cars are frequently loaded by hand or by wagons or scrapers dumping through traps. There are also several mechanical devices, such as the Torrey loader, which are frequently used in loading small quantities of ballast. When larger amounts are required the most common method is to load cars with a steam shovel working along a high bank. It often happens, however, that gravel beds are close to streams and but little, if any, above the water level. In such cases the steam shovel is not applicable, and a dredge or bucket excavator of some type is necessary. Again, it sometimes happens that the only supplies of gravel available are mixed with such a proportion of dirt or fine material as to render them unfit for ballast in their natural state, and it is possible to remove this objectionable material by washing at a cost less than would be required to secure other satisfactory ballast.

In opening a steam shovel pit a definite plan of operation should be decided on before excavation is begun, and the track lay out, as well as the location of the first shovel cuts, should be carefully determined. In an effort to secure the maximum shovel output from the start, the pit is often so cut up that economical operation later is impossible. The shovel should not be allowed to make the first cut at a grade exceeding the maximum grade allowable for an engine to pull a string of cars out of the pit. Neither should it be allowed to cut in and out of the face of the bank, but, if necessary, short and irregular cuts should be taken at first in order to finally secure a long, straight face to work against. When once this face is in good shape the increased output will justify the early delay and higher first cost of operation.

Where a pit is in continuous service it will usually be found economical to keep a small track gang in it to maintain the track in a safe condition and to throw the loading track into the bank following each cut of the shovel. While the tendency is to do as little work as possible on such tracks, it is necessary that they be kept in serviceable condition and that bad spots be promptly picked up, because an engine or car derailed will tie up the entire pit until it is put back on the track again. Sufficient motive

power and equipment should be provided so that the shovel will not have to wait for cars, and the storage yard for loaded and empty cars should be near the shovel and conveniently reached in order to reduce the switching delays to a minimum. It is usually advisable for one engine to do all spotting of cars for the shovel, although at the Sheridan (Ill.) pit of the Burlington, where the storage yard is some three miles distant from the pit, two engines alternately spot and haul their cars to the storage yard. Arrangements should be made to furnish water to the shovel and locomotives without delay. Extra locomotive tanks or tank cars are frequently used, but these require switching as well as hauling to some water station to be filled at night. Unless near some water station where water can be piped to the pit it will usually be found economical to erect a small tank and a temporary pumping plant. Water can ordinarily be secured by driving well points down into the gravel. Such a plant requires but a small outlay and practically all the material can be recovered for other use when the pit is closed down.



Layout of A. T. & S. F. Gravel Pit at Chillicothe, Ill.

An example of a well laid out gravel pit is that of the Atchison, Topeka & Santa Fe at Chillicothe, Ill., a plan of which is here shown. This pit has been in service about 20 years, and located at the summit of the Union Pacific crossing, the continental divide, so a down grade haul is secured in both directions, and trains can be loaded to maximum tonnage. This feature alone results in a great economy to the road. The gravel is of such a quality that the main line of the Union Pacific is ballasted with it all the way to the eastern terminal at Omaha, a distance of 550 miles.

Orange Peel Excavator in Vandalia Gravel Pit at Terre Haute, Ind.

over 4,000,000 yds. of gravel have been removed. The gravel is rather fine, but it is clean, sharp and very uniform, and does not cement or churn. The stripping averages between 4 and 5 ft. The pit is located one mile west of the roundhouse and water for the shovel is piped from that point. Until recently a shovel worked on the north face against a bank varying from 30 to 60

Clam Shell Loading Gravel at Chillicothe Pit of the Rock Island.

ft. in height, and the loads were delivered to the storage yard on top of the bank by the spotting engine, the shovel remaining idle until the engine returned with a string of empty cars. During the past summer a new plan of operation was adopted, by which the pit is now worked on two levels. The shovel working along the north bank, which is about three-quarters of a mile

Clam Shell Excavator in Rock Island Gravel Pit at Chillicothe, Ill.

long, now cuts about 30 ft. below the surface of the gravel, while the second level is 30 ft. lower than the first. The storage tracks have been moved down into the pit and the grade of the tracks entering the pit at the west end has been reduced so that the road engines now pull their trains directly from the pit. In this way the delays to the spotting engine are greatly reduced and the output of the shovel is increased accordingly. When only one shovel is working, as is the case most of the time, it works on the lower level, where there is a supply of gravel sufficient to last for some time without further stripping. With this arrangement two and even three shovels can be worked in the pit should the necessity arise. It is estimated that $3,000 is saved monthly in the operation of the pit by this rearrangement and the reduction of grade at the entrance. One 95-ton Bucyrus shovel loads daily about 106 cars, averaging 33 yds., at a cost of about 5 cents per yd., including the cost of the land, stripping and interest on equipment. This figure is considerably below the average of other gravel pits, which will probably be nearer 10 to 12 cents per yd., and is due to the favorable conditions that exist at this pit. Gravel is hauled from Chillicothe for all the Santa Fe lines from Chicago as far west as Kansas City.

BUCKET EXCAVATOR PITS.

Another method of loading gravel is illustrated by the Vandalia pit, a short distance west of Terre Haute, Ind., where an orange peel excavator is used. At this pit the surface of the gravel is but 4 or 5 ft. above the Wabash river, which is a short distance away, and for this reason but little gravel could be secured by a steam shovel. The gravel is of good quality, and is the best in that vicinity. Because of these advantages in a locality where good gravel pits are scarce, it was decided to go be-

Gravel Washing Plant of the Union Sand & Gravel Company, Memphis, Tenn.

low the water level. The excavator shown in the photographs was built by the local division forces from plans furnished by the Hayward Company. The boilers and machinery are housed on a platform 20 ft. wide by 45 ft. long. Above this house is the operator's cab, in which the control levers governing all the operations of the excavator are located. The bucket is of 2½ yds. capacity, and is supported from the end of a 65-ft. steel boom on a 1¼-in. cable. It works to a depth of 35 ft. below the water level, or about 40 ft. below the surface of the gravel, and cuts a strip 50 ft. wide. The house rests on 10-in. rollers 8 ft. long, which in turn are supported on six 12-in. by 12-in. timbers. As the bank caves down in front of the excavator the machine is drawn back 14 ft. at a time by the spotting engine, to which a cable fastened to the house is attached. In this way practically no time is lost in moving. About 25 cars are loaded at each setting. About eight cars are loaded per hour, making an average of about 2,000 yds. daily, when two locomotives are used, as was done last year. The cars were stored at the connection with the main line at Macksville, about two miles distant, and one locomotive hauled while the other spotted cars at the excavator. This season a smaller amount of gravel was required and but one locomotive was used, reducing the output to 50 cars per day. Eight men, including the foreman, engineer, fireman and watchman and four laborers, are required to operate the excavator. In addition, one team is

used to drag the timbers around behind the plant and do miscellaneous work. Last year over 275,000 yds. of gravel were loaded in addition to over 100,000 yds. of stripping removed by steam shovel. The cost of this stripping, including supplies, track work and repairs to equipment, was 4 cents per yard of gravel, while the gravel cost 8 cents per cubic yard loaded and placed at Macksville. This cost is somewhat below the average cost of loading with the steam shovel, considering that the cost of hauling two miles to the storage yard is included. It is impossible to separate the cost of hauling from that of the spotting at the excavator in the data given, but the combined cost of work-train service amounts to 3.8 cents of this 8 cents.

An arrangement somewhat similar to that at Terre Haute is in use at the Rock Island pit at Chillicothe, Ill., where conditions similar to those at Terre Haute exist. Here the surface of the gravel is about 6 ft. above the level of the Illinois river, which is near by. At this pit a clam shell excavator made by the Interstate Engineering Company and mounted on a 25-ft., be inclined to accept the figures with some hesitancy, but an analysis of the method of operation will indicate that a low cost of operation is to be expected. This type of equipment has not been generally used for the loading of gravel, although it has been used for handling coal and cinders. An advantage of the machine is that it can be put to good use during the winter in the handling of coal and cinders, and no money is thus tied up in idle equipment. It can also be used advantageously to load gravel for concrete or ballast where the quantity required does not justify the employment of a steam shovel, or where the material may be needed at irregular intervals.

GRAVEL WASHING PLANTS.

In some sections of the country the available supply of gravel is mixed with such a large proportion of clay or other foreign substance that it is worthless in its natural condition. At other places the only gravel to be had is river gravel, which contains a very large percentage of sand. In such cases it may be more economical to wash the dirt and fine material out and secure a gravel of the required coarseness than to use stone or other material procured from a distance. Such conditions exist along the lines of the Illinois Central and the Yazoo & Mississippi Valley south of Memphis. Accordingly, about five years ago the officers of these roads began to investigate the use of washed gravel, and finally decided to use it. They secure this gravel from four different plants, all privately owned and located at Memphis, Tenn.; Greenville, Miss.; Profit Island, La., and Brookhaven, Miss. The first three obtain their supply from the Mississippi river, while at Brookhaven a pit gravel is washed.

Hopper and Belt Conveyor at Southern Gravel & Material Company Plant, Brookhaven, Miss.

The plant of the Union Sand & Gravel Company at Memphis is in a general way typical of the river gravel washing plants. It is located on the east bank of the Mississippi river, about four miles south of Memphis, at a point where Nonconnah creek empties into the river. The material is pumped from the river about two miles up stream by a suction dredge, which loads it into barges. These barges are towed to the washing plant, and

there unloaded by a 5-yd. clam shell bucket traveling along the inclined runway shown in the photograph. This runway is composed of two I-beams and is supported on the four-post steel tower. As originally built the clam shell traveled the entire length of the runway and deposited the gravel directly onto the washing table. This has since been changed and the bucket drops the material into a hopper 18 ft. x 18 ft. x 12 ft. deep, located under the steel tower, from which the gravel is carried to the washing table by a 36-in. belt conveyor. This change shortened the length of travel of the bucket one-half, and materially increased the capacity of the entire plant, so that it now requires but a little over an hour to unload a barge. An 8-in. stream of water is thrown on the washing table, which is 12 ft. square and inclined on a slope of one foot in three. One foot below the lower end of the washing table, the first of the screens is located, and the gravel passes off the table directly onto these screens. The screens are so inclined that the material which does not pass through slides off into chutes leading to storage bins, which have a capacity of four cars each. Three grades of sand and five of gravel are collected for commercial use, while the ballast gravel is made by mixing gravel with 30 per cent. of sand, to comply with the specifications of the road. Cars are run under the different storage bins and loaded by opening small traps in the bottom of the bins. About two minutes are required to load each car. The entire plant is under the control of the operator located in the tower, the top of which is just visible over the shed in the foreground, from which point he can oversee the operation of the entire plant. Including this operator, the foreman and one man at the washing table to prevent blockades, 14 men are required to operate the washery. One engine is kept busy spotting cars at the plant and hauling them two miles to the Y. & M. V. main line. The ballast gravel from this plant is hauled a maximum distance of about 125 miles, until it comes within the limits of haul of the Greenville gravel. The plant was first put into operation in 1906, and washes about 1,800 yds. of gravel and sand daily.

A gravel washing plant operating under different conditions is that of the Southern Gravel & Material Company at Brookhaven, Miss. At this point the gravel is secured from a large pit. This material had been used for ballast as it came from the pit for years, but it contains a large amount of dirt and cementing material, causing it to churn badly in the track. There is such a large amount of cementing material in the upper 10 ft. that it is necessary to loosen it with powder before loading it with a shovel. This pit was turned over to this company by the railway about three years ago and a washing plant was erected. The gravel is loaded into standard gage hopper bottom cars by steam shovels working in the pit, and unloaded into the concrete hopper shown in the foreground in one of the photographs. The gravel is elevated to the washing table, about 87 ft. above the hopper, on a 36-in. belt conveyor. A stream of about 1,200 gal. of water per minute is turned on the table and the gravel is washed through conical screens of increasing fineness, sloping at such an angle that the material remaining on the screens falls into the proper bins. It is drawn from these bins through chutes into the cars which are spotted by means of an endless cable. About 40 cars of materials are washed daily, the ballast being mixed in the same proportions of sand and gravel as at Memphis. Two locomotives are required, one to spot cars at the shovel and one at the washery. A force of nine men is required to operate the plant, in addition to those on the engines and at the shovel.

As the washing plants are privately owned and operated, and the material is sold to the railway companies by contract, it is impossible to secure complete figures of the increase in cost of this material over the bed run. However, the cost will closely average from 40 to 50 cents loaded on cars, or about three to four times the average cost of loading directly by a shovel. There is an advantage in the privately owned plants, in that they can so grade their material as to find sale for all of it for use in various roofing and construction work, and that not used as ballast is sold instead of being discarded. For this reason the railway can very probably purchase this material cheaper than it can wash it.

Washed gravel is much cleaner and more uniform than the average bank run and will not support vegetation. It is, however, harder to hold track to line on river gravel, because of its tendency to roll, and as it does not compact it does not furnish sufficient resistance to the lateral movement of the track.

Gravel Washing Plant of the Southern Gravel & Material Company.

The work of surveying the Kochui Railway in China from a point on the French railway near the port of Mengtze, in the province of Yunnan, to the tin mines at Kochui, which has been in progress for several months under an American engineer, has now been completed. The work was greatly retarded by unfavorable weather. The railway is to be 33 miles long and will be an outlet for the constantly increasing products of these mines from Goyllarisquisca to Huancayo, and from Cuzco to Puno, which now employ 18,000 men.

MAINTENANCE COST DATA COMPETITION.

FIRST PRIZE.—COMPARATIVE COSTS OF TRACK MAINTENANCE.

BY E. R. LEWIS,

Division Engineer, Michigan Central, Bay City, Mich.

With the idea of providing each foreman with the prices of the materials used by him and also introducing a healthy spirit of rivalry the following plan has been adopted on the Northern division of the Michigan Central: Each roadmaster is provided with a current price list of material and tools, also with a supplementary sheet of unit weights, measures and costs designed to facilitate rapid calculations of prices of small quantities of materials usually quoted in hundred weights, tons, kegs or feet board measure. These price lists are altered or renewed from time to time to suit the market changes and new standards. Each roadmaster is also supplied with a copy of a monthly comparative report showing in detail the cost of maintenance of each mile of each section on the entire division, the territory of each roadmaster being on a separate sheet, separately totaled and averaged. He thus obtains the actual comparative cost of maintenance of each mile of track under his own jurisdiction, and that of his fellow roadmasters for the foregoing month, in the following detailed order: Name of roadmaster; number of section; actual mileage of main, side, yard, industrial and other tracks, turnouts, switches and crossings in separate columns; number of miles of main track to which the total actual mileage of the section is equivalent; number of laborers employed; total cost of labor employed; cost of once-used material; cost of new material; cost of tools and equipment, including repairs; cost of track ties (separate account); cost of tie plates (separate account); total cost of labor and materials; total cost of each mile of main track or its equivalent; total of each of the foregoing items on all sections of each roadmaster's territory and average cost per mile of main track.

The cost of rails is purposely omitted because the supply and renewal is not governed to any great extent by acts of the foremen or roadmasters.

Track construction or alteration and all work not included in maintenance is handled by orders based on detailed estimates and plans furnished from the division office to roadmasters and foremen as authority for projected work. Such material as is not available from stock is requisitioned by the roadmaster or foreman through the division office. Monthly detailed reports showing progress of the work in hand under all such orders is required from foremen and sent from the division office to the assistant chief engineer.

The actual costs of such items as ballasting, fence building and any other continuous and general work being done by various gangs is scrutinized weekly from labor reports and comparisons noted to those concerned. Monthly meetings of the roadmasters with the division engineer are held in the division office when questions relative to costs are discussed. Particularly are the current comparative reports of costs per month per mile on each section and each roadmaster's territory looked into. The details of all comparatively excessive expenditures are considered and noted together with the circumstances under which the costs were [illegible] by the roadmasters concerned.

Each roadmaster confers with his foreman concerning the report on the roadmaster's territory on his first inspection trip after the monthly meeting. A copy of this report is placed in the hands of each foreman. It is not considered necessary or advisable in this connection, to call section foremen to division headquarters for conference, but it is designed to have the roadmasters and the material clerk meet the foremen and men resident in or near the several principal towns at convenient times to explain the meanings and intents of the reports in detail.

The division engineer spends three days per month on this work. Each roadmaster occupies an equal time on it, and the clerical force spends ten days' work for one clerk compiling, typing and distributing reports.

The increase in economy on the division during the few months the methods described have been in force, has been marked and substantial results are assured. Experience along this line has, however, proved the danger of too great pressure for increase of economy. The entire organization of employees must be educated to observe values and to keep expenses to a certain discreet minimum well within the bounds of safety.

SECOND PRIZE—METHODS OF KEEPING COST DATA IN MAINTENANCE OF WAY WORK.

BY E. B. FITHIAN,

Assistant Engineer of Maintenance, Mo. Pac., Little Rock, Ark.

One of the best reports in general use on the Missouri Pacific for providing information concerning unit costs of various kinds of ordinary maintenance work was the "8" report, shown herewith. It presented in as concise a manner as possible, the expenditures for various kinds of work on each section, and with a little careful study the division engineer and roadmaster were able to analyze the work and its cost on each five miles of the territory. Wherever the expenditure on any particular class of work

THE MISSOURI PACIFIC RAILWAY COMPANY,

ST. LOUIS, IRON MOUNTAIN & SOUTHERN RY. CO.

FOREMAN'S REPORT OF WORK DONE FOR WEEK ENDED SATURDAY_____ 19

Division. . Section No._____ or Extra Gang No._____

	Amount
A—Total hours Foreman and Laborers for week	
B—Hours used by Extra Gangs on New Work. (Do not include hours used laying rail or ballasting under this item.)	
C—Hours used on Main Track line and surface	
D—Hours used putting in Ties	
F—Hours used in laying Rail	
F—Hours used putting in Ballast	
G—Hours used Ditching	
FOLLOWING MATERIAL USED AND WORK DONE	
H (Include Switch ties. Counting each switch tie as one tie.) Number of Ties put in Main Track	
I (Include Switch ties. Counting each switch tie as one tie.) Number of Ties put in Side Track	
J—LINEAL feet of Rail laid	
K—LINEAL feet of Track Ballasted	

.....Foreman.

Headquarters .....

NOTE—Extra Gang Foreman must also use this Form to report material used and work done by their forces, and will show the number of the section on which the work is done.

Foreman with all out this Form Saturday evening and mail by first mail to Division Engineer.

A B C Report.

was found to be unusual, the division engineer or roadmaster could readily locate the exact point to go on the ground to make a careful study of the situation, and could then take proper steps to bring this class of work to normal condition. For instance, on one section it was found that patroling of track was above the average of other sections, and the division engineer in going into the matter found that although the section headquarters were within the section limits, the foreman and laborers lived

two miles outside of section limits, because the foreman happened to own his home at that point. On other sections it was found that line and surface of main track was above normal, and investigation brought out the facts that this was chiefly due to lack of ballast, loose bolts, bad drainage and other similar conditions. This report is also valuable as a study in comparing the cost of work on one roadmaster's territory as against the territory of another roadmaster, where general conditions are about the same. For instance, line and surface of main track on one roadmaster's territory may be a large per cent. in excess of another territory where conditions are similar. Again patroling on one territory may be greatly in excess of that of another territory, where common knowledge of conditions would justify the opposite conclusion; and a careful study would show that the roadmaster was at fault and in keeping his men running from point to point to pick up some little defect that would wait until their work took them to that vicinity. The expenditures of going to and from work will average about 12 per cent. of the labor charges on track maintenance, and as this is an expenditure from which the railway company derives no benefit, it should be given very careful study with the object of reducing it to the lowest possible minimum.

Another report in common use, is the "A. B. C." report a copy of which is attached. From this report the roadmaster can keep in touch with his labor situation and with the unit cost of tie renewals, rail renewals and ballast renewals on each section. When any foreman's costs vary to any extent from the average his attention is called to what others are doing in the same line. The division engineer compiles the same information with respect to each roadmaster's territory and can then make a study of the results accomplished on each section, or on each roadmaster's territory.

In connection with the "A. B. C." report, I made up a brief report under the following headings, in order to create some rivalry and interest among the roadmasters, and also to give myself at a ready glance the situation each week:

Comparative Statement of Forces Worked and Allowed and Ties Renewed for Week Ending ——

District.	No. of men. Allowed.	No. of men. Worked.	Ties renewed. Hours.	Ties renewed. Ties.	This month. Ties renewed to date.	This month. Allowance for month.
1	95	103	1,600	1,720	4,000	7,000
2	103	99	2,280	2,000	4,600	9,000
3	87	86	970	1,020	2,900	6,000
4	92	91	1,800	2,420	3,900	6,500
Total	377	379	6,650	7,160	15,400	28,500

When several gangs are ballasting I have found a weekly report under the following headings, not only interesting and valuable data to the division engineer in assisting him to keep in touch with his work and its progress, but also a good thing to give the roadmaster to circulate among his foremen, to give them a knowledge of what they are accomplishing, and also what the other men are doing.

Progress of Ballasting Work for Week Ending ——

Ex-gang.	No. of hours worked.	Feet of track ballasted.	Feet per man per day.
No. 1	2,400	8,400	35
No. 2	1,800	6,840	38
No. 3	2,100	8,400	40
Division	6,300	23,640	37.5

A similar report for rail laying gangs is also productive of good results, and should be headed as follows:

Progress of Rail Laying for Week Ending ——

Ex. gang.	No. of hours worked.	Feet of rail laid.	Feet of rail per man per day.	No. of switches laid.
No. 1	2,100	31,500	150	1
No. 2	6,000	60,000	100	4
No. 3	3,600	43,200	120	2
Division	11,700	134,700	115	7

In addition to the above we keep a record of expenditures against each structure. In the fall of the year, an inspection is made of each structure itemizing the work to be done, giving an estimate of cost to do the work, segregating it into material and labor. Each structure is listed in geographical order giving the cost of the proposed work separated as above, and as the work is done, it is entered up on the sheet under the month the work is done, and when the foreman advises the work as 100 per cent. complete, the items are carried across and the total compared with the estimate. As all the estimates are made from the same unit data of cost, the bridge and building supervisor can readily detect which carpenter foreman is getting the results for the money expended, and if the report is properly followed, it often leads to corrections that results in economy to the railway.

MISSOURI PACIFIC SYSTEM.

Record of Section Labor for _____ and _____ Inclusive.

_____ Division. _____ Roadmaster.

_____ To _____

Section Number and Location	Period	Sub-Accounts																		
		Track Maintenance					Applying Track Material				Roadway Policing						Remove Snow and Ice	Flood Damage	General Cleaning	
		Total	M Track Line and Surface	S Track Line and Surface	Gauging	Respacing	Rails	Ties	Ballast	Other Material	Patrolling and Watching	Care of Roadway	Refuse Material	New Tracks	Bank Protection	Filling			Cleaning Right of Way	Cleaning Tracks
	Month.																			
	Year.																			
	Month.																			
	Year.																			
	Month.																			
	Year.																			
	Month.																			
	Year.																			
TOTAL.	Month.																			
	Year.																			
AVERAGE PER MILE.	Month.																			
	Year.																			

"81" Report.

COMPARATIVE COST DATA RECORDS.

BY J. A. ROLAND,
Roadmaster, Chicago & North Western, Missouri Valley, Ia.

Comprehensive cost data and comparative statements of work performed by trackmen, furnished to them at least once each month, create a very noticeable spirit of rivalry among these men, which results in more efficient service and decreased unit cost.

I enclose copies of blanks, which I used very successfully, for several years. One of the blanks represents section foremen's weekly work reports, and the other a recapitulation of the amount,

character, and cost, both total and unit, of the work performed on each section for the entire month. This latter statement was compiled from the section foremen's weekly reports and a copy sent to each foreman immediately after the end of the month.

Section Foremen's Weekly Time Reports; Chicago & North Western.

These reports also furnished considerable data, which was used, in the preparation of reports required by the superintendent and other offices, and was a labor saver for the section foreman, as other reports were thereby eliminated.

In addition to these reports and statements, blanks were provided to specifically cover certain other work, such as cleaning stock yards, mowing grass and weeds on right-of-way, etc., for which it did not appear practicable to provide room in the weekly blank.

I found, during the time this system of reports were in use, that a great majority of the foremen, awaited the arrival of the comparative statements, with much interest; and in many instances, when these reports were late in reaching the foremen inquiries were made for them.

A number of years ago I prepared blanks which were used very successfully for several years. One of these reports gave the distribution of time for the force each week, as well as the amount of work performed.

It is impracticable, however, for roadmasters to attempt to maintain a system of reports of this kind, without the assistance of a clerk, and when the system is once inaugurated it should be continued to obtain the best results.

The unit cost of track work has gradually increased in recent years. This increase is, at least, partly due to the deficient class of labor with which the railroads are afflicted at the present time, and is also the result of the lack of knowledge, on the part of foremen, as to the amount of work which should be accomplished in a given time, with a certain number of men, and of information as to amount of work actually being performed on other parts of the line, under similar conditions with the same number of men.

These periodical statements and reports, injected interest and enthusiasm in the work, which is absolutely essential to its successful prosecution, and served the purpose of establishing records, by the hustling foremen, for those afflicted with inertia to compete with.

SIMPLE METHOD OF INDICATING TIME DISTRIBUTION IN BRIDGES.

BY E. M. GRIME,

Supervisor, B. and B., Northern Pacific, Glendive, Mont.

The amount of work handled by the bridge and building department on any division of a railway may vary greatly from year to year, depending on business conditions and whether it is the policy to make many permanent improvements or to simply maintain the property up to the usual standard. It is desirable to keep the fixed charges for office expense down to a minimum at all times and also about constant. It is therefore necessary to

Time Report for Determining Unit Costs.

[illegible] that their reports will come to the office [illegible] that but a slight calculation will be required to [illegible] the cost of any particular work as soon as it has [illegible]

Where the work is all of the same nature, such as the carpenter [illegible] building, the driving of piles for a bridge, the framing of a timber trestle or the erection of a steel structure, it is an [illegible] for the foreman to make an intelligent report from [illegible] and the information on file in the office, the unit cost [illegible] readily determined. When building a concrete culvert,

or abutments and piers for a bridge it is a more difficult matter for the foreman to make a report which will enable the office man to readily determine the cost of labor on the various parts of the work, such as dry excavation, wet excavation, forms, reinforcing steel, concrete, backfilling, etc. The foreman should be given some kind of a form to follow so that he will not be burdened with a great amount of bookkeeping when he should be devoting his time to important details of the work in progress. To accomplish this I have given my foremen the following outline for use in designating the several kinds of work in the small daily time book: Dry excavation, "D"; wet excavation, "W"; carpenter work on forms, "F"; handling gravel, including unloading from cars, wheeling to mixer, etc., "G"; handling cement in and out of storage and to mixer, "P"; pumping water or any work in connection with your water supply, "L"; placing reinforcing steel, "S"; concrete, including mixing, wheeling to place, spading, protecting from frost, etc, "C"; any other items which cannot logically be placed under any of above heads, "X."

Now assume that Frank Jones, laborer, works ten hours on the 23d of August; Three hours of this time he was working on dry excavation, two hours on wet excavation, one hour shoveling gravel and four hours wheeling concrete. The time book would show opposite his name under this date; 3 *d*, 2 *w*, 1 *g*, 4 *c*. This, of course, is an extreme case, as ordinarily a man will not work on more than one or two different kinds of work during the day.

At the end of the month, or when the work is completed, it is an easy matter for the foreman to add up the hours of work for each man under each heading and thus have an accurate distribution of his time to the various parts of the work and likewise the sum of all the hours in each class gives the total distribution and cost, and the foreman's time can then be distributed in proportion

In connection with this the foreman is instructed to give the following information:

1. Distance from base of rail to surface of ground before starting excavation.
2. Thickness of first and each succeeding stratum of material encountered and nature of same.
3. Total depth to bottom of excavation.

From the plans of the structure and the usual inspections while the work is in progress it is then an easy matter to determine the volume of each kind of excavation, the cubic yards of concrete, weight of steel, feet board measure of forms, etc., and the matter of getting the unit costs of any particular structure requires but a short calculation. A sample page herewith shows how this method can be adapted to the ordinary time book, but if one were to handle a large amount of this class of work it would be best to have a special time book printed, giving the various letter headings.

A comparison of figures of this kind from several foremen will readily show the weak points in any foreman's organization, taking into account, of course, the natural conditions at each particular piece of work. The practice of furnishing to all the foremen the unit cost data on all the work in progress tends to make each foreman strive to improve his own work and bring the unit costs down to a minimum and the cost figures obtained are exceedingly valuable when making up estimates for new work.

MONTHLY PAYROLL SHOWING UNIT COSTS.

BY E. CUMBERLEDGE,
Division Accountant, Lehigh Valley, South Easton, Pa.

The possession of unit costs of track maintenance must be equally as beneficial to a good organization as the unit costs of operation, but this feature appears to have been almost entirely overlooked up to this time, possibly due to a knowledge of the inferior quality of the labor on which we would have to rely for the basis of our calculations. Today the plea of those in charge of maintenance of roadway is that too much clerical work and too many records are required of the section foremen, causing a tendency on his part to neglect the work for which he was employed, that of supervising the maintenance of track. This contention, although well taken is partially removed where assistant section foremen are engaged, and my opinion is that we should insist on obtaining data bearing on primary maintenance operations at the time gang foremen submit their payrolls. A form of time sheet can be readily devised which will give in addition to the payroll and distribution, the amount of work done on certain items on which unit costs are desired. A report of this kind could also be used to advantage in another direction. Every section foreman makes monthly reports showing the material used on maintenance work and experience in the past has taught that the tendency is for the foremen to overlook reporting certain material used, as rail, splices, bolts, nutlocks, etc., with the result that when inventory is taken, the book record of stock is in excess of the record of material on hand, but with the payroll referred to and the foreman knowing it to be the basis of establishing his efficiency he will be determined to report all material used which would be checked against his record of stock disbursements, and so avoid any explanation necessary should the inventory produce either overage or shortage in material.

This record obtained from, say 50 section foremen one day after the close of each month, could be readily drawn off in comparative form, material used checked with disbursement records, unit costs computed, and the required copies made and forwarded to all foremen and interested officers by one clerk in 15 hours. Good results are unquestionable, for comparison of efficiency if known by the foremen compared, breeds competition or an incentive on the part of one to outdo the other. However, when making this comparison conditions under which work was carried out must be carefully considered and furthermore the supervisor must be ever alert otherwise low immediate costs may result in more disastrous expenditures at a later date. This feature could, however, be just as readily handled as in the operating department where the knowledge of unit costs has proved beneficial without detriment to service.

Another practice which I know has helped in reducing maintenance costs, is to place extra laborers under the jurisdiction of the section foreman when occasion arises, instead of placing extra gangs on a section subject to direction from an extra gang foreman. An extra gang foreman and his men are what might be termed floaters. They lay rail today on section 10, and the foreman's only object is to get it down. Tomorrow he is on section 40, where he has the same object mainly in view, with the result that shortly after the extra gang has left, the section foreman is obliged to leave his current work to reline the track the extra gang foreman had taken no interest in, since he felt that his responsibility ended when he and his gang left the vicinity. Work done and done well is more likely to be obtained by this suggested practice. Low costs depend on the efficiency of the man in charge, and to assist in determining this efficiency unit costs must be obtained.

DIFFICULTIES OF USING COMPARATIVE COST DATA.

BY P. H. HAMILTON,
St. Louis & San Francisco, Pittsburg, Kan.

On this railway the roadmasters report direct to the superintendent. Each roadmaster receives a monthly allowance for track maintenance and he is required to keep his expenditures within that amount. Before giving the foremen their allowances the roadmaster sets aside what he estimates will cover the material that the foremen will use. He divides the balance up among the foremen in proportion to what he thinks they will need, referring to the record of previous expenditures for labor, and to his knowledge of existing track conditions on the various sections. They are cautioned about the excessive use of material and use only what is necessary to keep their track in shape, always releasing scrap material. If a foreman finds it necessary to use an unusual amount of material he notifies the roadmaster, who

arranges to take care of this expenditure so as to keep within his allowance. Some foremen having the same amount of track as others are allowed more labor on account of local conditions, such as poor drainage, light rail, poor road bed, etc., which necessitate additional work.

Each foreman is required to make a weekly report to the roadmaster showing the total amount expended for labor, and showing the material used and released. The cost of the material used is figured out in the roadmaster's office, so that the roadmaster knows how much has been spent on his sub-division during the week, and is in this way able to keep within his allowance. The roadmasters wire this information to the superintendent's office, where it is combined and the superintendent knows how the cost of track maintenance is running, and he is able to keep within his allowance.

At the end of the month, when the accounts are closed, a comparison is made showing the average cost per mile of track (exclusive of rail and ties) on each roadmaster's sub-division. No accurate information is secured if these figures are accepted as final. For each district the traffic, weather conditions, grades, location, and other important local conditions must be taken into consideration in making the comparison or the figures will amount to nothing.

It is the same way with the roadmaster and his sub-division. If he takes straight figures as his rule for comparison of the work of the different section foremen he will not be able to get any benefits. One foreman may have a much harder section to keep up. Possibly he has light rail, and as heavy equipment running over it as the foremen with the heavy rail. His section may run through marshy country where he is troubled with soft spots and sinks, while another section runs through prairie country where the track is laid on a solid foundation. Possibly the class of labor he gets is poor; and there may be numerous other conditions that he has to contend with that the other foremen have not. All of these things must be taken into consideration. When this is done it is hard to decide which foreman is doing the cheapest and best work; and the personality of the man usually becomes the deciding point.

In the roadmaster's office a recapitulation of the foremen's labor distribution is made out each month showing the number of hours charged to the various accounts as prescribed by the Interstate Commerce Commission, and this recapitulation is compared with the previous month and the corresponding month the year before.

These statements are filed for future reference, and a comparison of any two sections can be made at any time. At different times we have had the section foremen send in daily statements showing the number of hours charged to various kinds of work and the amount of work done. These reports, however, did not produce any good results, as we had to rely on the foreman's honesty as to the correctness of his report. I do not mean to insinuate that the track foreman is any more dishonest than any other class of men, but it is easy for him to "fudge" his reports a little. For instance, he can charge to account No. 6-c the extra time that he used in putting in a number of ties, making his charge to account No. 6-b-2 agree with the other fellow's. The roadmaster has no way of finding out the correctness of the charge to account 6-c. Neither can he check the charge to 6-a when a gang is not getting out of face. We have also found that daily comparative statements have a tendency to make the section foreman careless as to the quality of the work that he turns out; as quantity, not quality, is what he is after. He forgets all about the quality of his work in his zeal to out-do the other foremen; and as it is impossible for the roadmaster to inspect all of the section foremen's work it brings bad results. With an extra gang it is different. Where such a gang is engaged in one line of work for several days at a time it is an easy matter to keep a check on what the foremen are doing as well as on the cost of their work by having them send in daily reports.

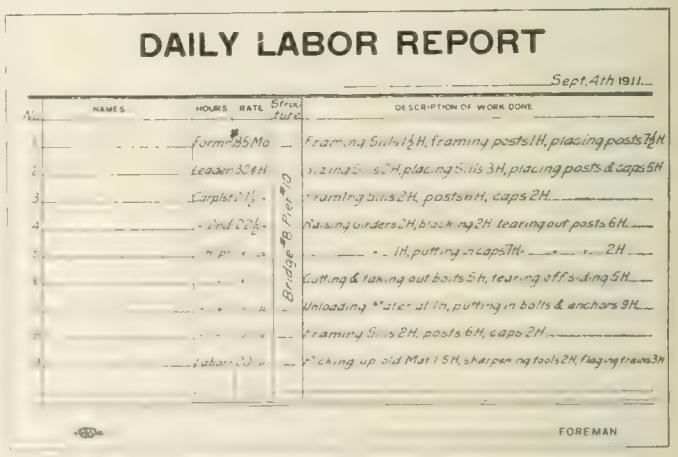
COST DATA IN THE BRIDGE DEPARTMENT.

BY F. L. BURRELL,

General Foreman, Bridges and Buildings, C. & N. W., Fremont, Neb.

I have followed the plan for several years of having the foreman of each gang make a daily labor report of work done on a form 6 in. wide by 9 in. long. Space is allowed on this form for the number, name and classification of each employee; rate of pay; total hours worked; structure upon which he is employed, and detail of the time employed on each part of the work. This requires an extra amount of work by the foreman, who is, however, better enabled to keep track of the cost of the work and the men employed. It also forces him to make a comparison of the men under him, and he soon finds out which man is doing the most efficient work.

The plan is of benefit to the head of the department, when conflicting duties prevent personal inspection, as it allows him to see each day just what has been done and how far along the work has progressed. It also enables him to decide, in a measure, whether or not the foreman is competent to judge the ability of the men under him. A foreman may be a good worker, but a poor judge of the ability of his men to do efficient work. This method puts him in direct touch with the work of the men individually, and he cannot fail to see that all are doing their part in an intelligent manner. If he sees that one man is all motions and makes little headway he begins to study him; and, if


DAILY LABOR REPORT

Sept. 4th 1911.

No.	NAMES	HOURS	RATE	Struc. ture	DESCRIPTION OF WORK DONE
1		Form 195 Mo		Bridge #8 Per #10	Framing Sills 1½H, framing posts 1H, placing posts 2½H
2		Leader 30	4H		Framing Sills 2H, placing Sills 3H, placing posts & caps 5H
3		Carpist	1½		Framing Sills 2H, posts 1H, caps 2H
4		Asst	22½		Raising Girders 2H, blocking 2H, tearing out posts 6H
5					1H, putting in caps 1H 2H
6					Cutting & taking out bolts 5H, tearing off siding 5H
7					Unloading Material 1H, putting in bolts & anchors 9H
8					Framing Sills 2H, posts 6H, caps 2H
9		Labor	30		Picking up old Mat'l 5H, sharpening tools 2H, flagging trains 3H

FOREMAN

Bridge Work Labor Report.

a good foreman, he will show the man a better way to do the work. If his efforts are not appreciated it is his duty to remove the man.

It has been my practice to have the men gather at the district headquarters every Sunday morning, unless they were too far away, to talk over the work of the past week. In the course of the discussion the attention of one man may be called to the fact that his work has been pretty expensive; and he is shown the daily reports from another man who has a bridge of the same height, and a gang of the same number of men at the same rate; who has done the work at a cost of from 10 to 12 per cent. less. He is then shown that he has not been paying as much attention to the details as he should; and perhaps has been trying to do too much of the work of the men, while they stood around watching him. This report also shows, for instance, that a 30-cent man was excavating for the purpose of stubbing a pile when he should have been up on the bridge framing the stringers which were to be replaced, and the foremen's attention can be drawn to the matter of proper organization.

All the foremen can now tell very closely what it will cost to do any unit of work of their respective classes of trestle, concrete or steel bridge work. They have gone so far as to keep detailed statements in special books, showing what each man under them has done in the past three years; and they frequently call my

attention to some step taken by a certain employee, to make the work cost more or less than usual.

As these reports are sent in daily, the office clerk makes his monthly distribution of labor from day to day; at the end of the month the labor distribution has been made, and is ready for the auditor. The foremen are given the prices of the class of lumber that is used in their work, and as they use the material they make the estimates of the cost of the structure, and can tell very closely whether or not they have done a reasonably economical piece of work.

So far as the keeping of the record of the cost of the labor is concerned, this does not require a large amount of time or clerical work. While the foreman is keeping the men in line he notes the work they are doing and sets it down.

METHODS OF PREPARING COST DATA IN MAINTENANCE WORK.

BY J. F. M'NALLY,
Assistant Superintendent, A., T. & S. F., Chanute, Kan.

We have in use a mimeograph blank on which the extra gang foremen wire in to the roadmaster each night the amount of work done that day, the different operations being designated by letters to reduce the amount of telegraphing. With this report the superintendent, roadmaster or general foreman can tell just what the gang is doing and what it is costing to perform the work. By handling the work in this manner it is not necessary to wait to get the information from the auditor's office, as it is impossible to secure the information from his office until after the time books have been checked by the superintendent's office and registered up by the auditors. If the work is completed about the 10th of the month the superintendent or roadmaster can check over their ledger in a short time and obtain the desired information as to cost of the work.

These blanks have proved very satisfactory and enable the men in charge of the work to keep a close check on the amount of work done each day. We have just completed laying and surfacing 100 miles of new 90-lb. rail on the Southern Kansas division and we found these blanks very beneficial to us in keeping a check of the cost per mile. At the end of each day's work our foremen of the steel and surfacing gangs would fill out this report and wire it in to the division headquarters, and we would have the information in the general superintendent's office the following morning.

It is surprising to note the interest that these extra gang foremen take in increasing their daily output of work, as each foreman tries to see if he cannot do a little more that day than the others. We sent each extra gang foreman a statement at the end of each week showing the amount of work performed that week, giving number of feet of steel laid or surfaced and ties inserted and spaced.

We experienced some little difficulty with our foremen, when we first put this report into effect, on account of the tendency to crowd their men and slight their work, as each one would try to make a little better showing than the others. It became necessary to caution the roadmasters to personally watch the work and see that it was not slighted. I think that it is a great benefit to all foremen who have charge of large gangs to send them a report each week of the amount of work they have accomplished.

Bulletin No. 49 of the University of Illinois Engineering Experiment Station, just issued by Professor A. N. Talbot and Assistant Professor H. F. Moore, contains a detailed record of tests of nickel-steel riveted joints. The investigation included tests in tension and in alternate tension and compression. The bending of rivets, the deformation of the joints and the slip on the plates, the yield point of the joints, and the ultimate strength of the riveted joints, were noted.

ROLLING LOADS ON BRIDGES.*

J. E. GREINER,
Consulting Engineer.

Coincident with the introduction of a particularly heavy type of locomotive is always the question as to whether bridges are being constructed of sufficient strength to safely carry this heavy engine and its possible future development. This same question has been cropping out time and time again during the past thirty years or more, and the answer has heretofore frequently been evidenced by the construction of somewhat stronger bridges, but in many cases to an extent merely sufficient to anticipate the increasing weight of rolling stock for a very brief period.

During each successive revision of the specifications it was believed that the practical limits of locomotive weights and car capacities had been fully anticipated, but the fallacy of this belief has been demonstrated so frequently that now few engineers feel inclined to assert, with any degree of confidence, at what point or at what time this development will have reached its limit. It is apparent that we have not yet passed the period of expansion and development, and the question as to whether the structures now being built are of sufficient strength depends entirely upon future development in the type and weight of the rolling stock and the accuracy with which the designer has anticipated this development.

HEAVIEST LOCOMOTIVES.

Since about 1835, when the first bridge was built for carrying trains, locomotives have developed from the miniature 4-wheel grasshopper weighing less than 22,000 lbs. to the enormous 24-wheel articulated type weighing 616,000 lbs.

About 20 years ago the heaviest engine in service on the Baltimore & Ohio was a consolidation weighing about 134,000 lbs.; at the present time this road has articulated engines weighing 463,000 lbs. Similar increases have taken place quite generally on other roads.

The heaviest locomotives in actual service on 36 American railways are given in Table 1, which table also indicates contemplated increases.

TABLE 1.—HEAVIEST LOCOMOTIVES IN ACTUAL SERVICE ON 36 AMERICAN RAILWAYS.

	Locomotives in Service.		Under Consideration.	
Railway.	Type.	Weight, Lbs.	Type.	Weight, Lbs.
N. Y., N. H. & H.	Pacific	[illegible]	Pacific	[illegible]
B. & M.	Pacific	[illegible]	[illegible]	[illegible]
N. Y. C. Lines	Pacific	266,100	[illegible]	[illegible]
Erie	Consolidation	260,100	Mikado	305,000
P. R. R.	[illegible]	[illegible]	[illegible]	[illegible]
L. V.	Pacific	[illegible]	[illegible]	[illegible]
P. & R.	Consolidation	222,000	[illegible]	[illegible]
B. & O.	Mallet	[illegible]	[illegible]	[illegible]
N. & W.	Mallet	400,000	[illegible]	[illegible]
C. & O.	Mallet	[illegible]	Mallet	400,000
Virginian	Mallet	[illegible]	[illegible]	[illegible]
S. A. L.	Consolidation	212,000	[illegible]	[illegible]
Southern	Mallet	[illegible]	[illegible]	[illegible]
A. C. L.	Consolidation	171,000	[illegible]	[illegible]
L. & N.	Consolidation	224,000	[illegible]	[illegible]
Wabash	Consolidation	[illegible]	[illegible]	[illegible]
B. & L. E.	Consolidation	254,000	[illegible]	[illegible]
I. C.	Consolidation	223,000	Mikado	280,000
Pere Marquette	Consolidation	217,000	[illegible]	[illegible]
M., St. Paul & S. S. M.	Pacific	253,800	[illegible]	[illegible]
C. & A.	Mallet	323,400	[illegible]	[illegible]
C. & N. W.	[illegible]	[illegible]	[illegible]	[illegible]
Great Northern	Consolidation	216,600	[illegible]	[illegible]
C., M. & St. P.	Mallet	260,500	[illegible]	[illegible]
C., B. & Q.	Mallet	354,500	Mallet	463,000
A., T. & S. F.	Consolidation	616,000	[illegible]	[illegible]
C., R. I. & P.	Consolidation	238,900	[illegible]	[illegible]
N. P.	Mallet	435,200	[illegible]	[illegible]
M. P.	[illegible]	251,000	Mallet	[illegible]
S. P.	Mallet	437,000	[illegible]	[illegible]
St. L. & S. F.	Mallet	[illegible]	[illegible]	[illegible]
M. K. & T.	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	Mikado	[illegible] lbs.
[illegible]	Mallet	261,900	[illegible]	[illegible]
C. N.	Consolidation	181,400	Consol.	[illegible]
N. Ry. of M.	Mallet	338,000	[illegible]	[illegible]

The increases from the 22,000-lb. grasshopper used on the Baltimore & Ohio in 1835 to the articulated type weighing 463,000

*[illegible] Annual Convention of the American Railway Engineering Association. Copyrighted by the author.

lbs. has been rapid and remarkable, and is illustrated by the following data, which shows the heaviest engines in actual service on the Baltimore & Ohio Railroad from 1835 to date:

Type.	Date.	Weight.
[illegible]	[illegible]	[illegible],000 lbs.
[illegible]	[illegible]	[illegible],600 lbs.
[illegible]	[illegible]	90,800 lbs.
[illegible]	[illegible]	105,200 lbs.
[illegible]	[illegible]	[illegible],600 lbs.
[illegible]	[illegible]	[illegible],200 lbs.
[illegible]	[illegible]	[illegible],600 lbs.
Consolidation	1888	125,000 lbs.
[illegible]	[illegible]	[illegible],000 lbs.
Consolidation	1892	134,200 lbs.
[illegible]	[illegible]	[illegible],800 lbs.
[illegible]	[illegible]	[illegible],000 lbs.
[illegible]	[illegible]	[illegible],500 lbs.
[illegible]	[illegible]	[illegible],500 lbs.
[illegible]	[illegible]	[illegible],000 lbs.

The above shows an increase from 133,000 lbs. in 1890 to 463,000 lbs. in 1911, which is about 248 per cent. in the past 21 years. There are much heavier engines in use on other roads.

The maximum axle load in 1835 was 5,500 lbs., while at present it has gone beyond 65,000 lbs., with limit not yet reached.

BRIDGE SPECIFICATION REQUIREMENTS.

The specification loading for bridge design as now in use by the various railways is given in table 2, which table also gives the impact allowances and permissible unit-stresses. The simplest manner of comparing these various specified loadings, including their different impacts and unit-stresses, is by reducing them to an equivalent loading on the basis of the American Railway Engineering Association specifications. These specifications provide for a consolidation type of engine known as Cooper's E-40, E-50, E-60 series, depending upon whether the weight on each driving axle is 40, 50 or 60,000 lbs. The equivalent loading given in the sixth column of table 2, therefore, means that the specified loading, impacts and unit-stresses, as adopted by the various railways, are practically equivalent in their effects on bridges to the Cooper's E series loading noted, when used in connection with the American Railway Engineering Association specifications.

[illegible] Bridge Specification Loadings.

Railway.	Engine. Type.	Weight 1,000 lbs.	Impact.	Tensile Unit.	Equiv. Loading.	Proposed Changes
[illegible]	[illegible]	60.0	[illegible]	[illegible] M	E-65	10%
N. Y., N. H. & H..	[illegible]	270.0	A.R.E.A.	16,000	E-60	
[illegible]	[illegible]	270.0	"	16,000	"	
B. & L. E.....	"	270.0	"	[illegible]	"	
[illegible]	"	[illegible]	"	16,000	"	
[illegible]	"	270.0	"	[illegible]	"	
G. N.	"	270.0	"	16,000	"	
[illegible]	Artic	468.0	"	16,000	"	
[illegible]	[illegible]	252.0	Special	[illegible] D	"	
[illegible]	[illegible]	291.0	[illegible]	Special	"	
[illegible]	[illegible]	488.0	[illegible]	16,000	"	
[illegible]	[illegible]	247.5	A.R.E.A.	15,000	"	
[illegible]	[illegible]	[illegible]	[illegible]	Special	E-57	
N. & W.....	[illegible]	275.0	Special	15,000	"	
[illegible]	[illegible]	270.0	A.R.E.A.	17,000	"	
C., M. & St. P....	E-55	247.5	[illegible]	[illegible]	"	
[illegible]	[illegible]	247.5	A.R.E.A.	16,000	E-55	
[illegible]	[illegible]	247.5	"	[illegible]	"	
[illegible]	[illegible]	247.5	"	[illegible]	"	
[illegible]	[illegible]	247.5	"	[illegible]	"	
[illegible]	[illegible]	247.5	"	[illegible]	"	
Nat. Rys. of M...	[illegible]	270.0	[illegible]	Special	"	
[illegible]	[illegible]	225.0	[illegible]	[illegible]	"	
N. Y. C. Lines....	E-60	270.0	A.R.E.A.	18,000	E-53	
B. & M.....	[illegible]	[illegible]	A.R.E.A.	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	16,000	[illegible]	E-60
Wabash	[illegible]	[illegible]	[illegible]	16,000	"	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	E-55
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	225.0	[illegible]	[illegible]	[illegible]	
M., St. P. & S. S. M	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	232.0	A.R.E.A.	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
L. V.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	225.0	A.R.E.A.	[illegible]	[illegible]	
[illegible]	Consol	[illegible]	[illegible]	16,000	[illegible]	
[illegible]	Pacific	292.0	Special	16,000	[illegible]	Mallet

This table also shows changes under consideration by a number of railways. It will be observed by reference to the table, column 6, that elevent roads are building bridges for a strength practically equal to E-60 bridges, four for E-57, seven for E-55, one for E-53, eleven for E-50, four for loads under E-50 and one for loads over E-60. Of those roads which are now designing bridges for E-50 or under, two propose the change to E-60 and three to loading in excess of E-50 in the near future.

It may be reasonably assumed that the specifications in force, or the proposed changes, represent the views of the engineering departments of the various railways relative to the sufficiency of the present requirements for meeting future conditions, and on this assumption—one road considers E-65 insufficient, 13 roads consider E-60 sufficient, 15 roads consider E-55 sufficient, and ten roads consider E-50 sufficient.

In order to determine the relative effects, on bridges, of the various heaviest types of engines in service and the usual specification E-50 and E-60 class, the maximum shearing and bending stresses produced by each type were calculated for spans ranging from 10 ft. to 100 ft., all locomotives, excepting the articulated types, being considered as running double-headers drawing a train of 5,000 lbs. per foot of track. On the assumption that the maximum stress produced by E-50 class is represented by unity, the proportional maximum stress produced by the various locomotives on bridges under 100 ft. is given in table 3.

It is fortunate for our bridges that the stresses produced by the heaviest engines are not in direct proportion to the weight as compared with E-50 type. For instance, the 24-wheel articulated engine weighs 174 per cent. more than E-50, but produces increased stresses varying from 15 per cent. to 33 per cent. The 20-wheel articulated type weighs 112 per cent. more, while the stresses are increased only from 1 per cent. to 14 per cent. Other engines which weigh considerably more than the E-50 produce stresses ranging from 83 per cent. to 116 per cent. of those caused by the E-50, and the excess stresses are mostly in very short spans. The above refers to spans under 100 ft. For greater lengths the stresses will in many cases be less, and in no case will they be in excess of those mentioned above.

[illegible] Relative Stresses Produced by Heaviest Locomotives—Spans 10 Ft. to 100 Ft.

Class.	Actual Weight.	Proportional Weight.	Proportional Stress. From	To
E-50	225,000	1.00	1.00	1.00
Atlantic	214,800	0.96	0.83	1.15
Prairie	244,700	1.09	0.88	1.03
Consolidation	260,100	1.16	0.99	1.14
12-wheel	262,000	1.17	1.00	1.14
Decapod	267,000	1.19	0.96	1.07
Pacific	270,000	1.20	0.93	1.08
Mikado	305,000	1.36	1.02	1.16
12-wheel articulated...	334,500	1.49	0.98	1.15
10-coupled	361,000	1.60	1.00	1.26
20-wheel articulated...	478,000	2.12	1.01	1.14
[illegible] articulated .	[illegible]	[illegible]	[illegible]	[illegible]
24-wheel articulated...	616,000	2.74	1.15	1.33
12-wheel electric motor	300,400	1.33	0.83	0.98
16-wheel electric motor	320,000	1.42	0.84	0.93

CAPACITY OF BRIDGES.

All [illegible] know that properly designed bridges, as well as steel hopper cars, may be loaded considerably beyond their [illegible] capacity, and that they will carry a definite amount of overload regularly and continuously without requiring any [illegible] attention that usually best well under ordinary good maintenance conditions. This capacity for overload provides to a large extent for future increases and developments.

We know from numerous tests and long experience that [illegible] properly designed and constructed of proper material and with members proportioned in accordance with specifications equally as good as the standard adopted by the American Railway Engineering Association, so long as maintained in good condition, will safely withstand an overload of 50 per cent. [illegible] any traffic or speed restrictions; that such a bridge [illegible] be subjected to an occasional overload considerably in excess of 50 per cent., without speed restrictions; and if the

speed is regulated, the bridge will stand an occasional overload of 100 per cent. Therefore, it should be clearly understood by the operating officials of railways that a bridge of the nominal E-50 capacity, that is, one designed for Cooper's E-50 loading in accordance with the American Railway Engineering Association's standard specifications, will not reach its full regular traffic capacity until the different classes of engines now in service shall have about the weights given in table 4, and an E-60 bridge not until these engines have increased to the extent shown in table 5.

An examination of these tables will show that the regular service capacity of an E-50 or an E-60 bridge will take care of engines having an increased weight over those now in service to the following extent:

Types.	E-50.	E-60.
16 and 24-wheel articulated	12 per cent.	34 per cent.
10-coupled	19 per cent.	43 per cent.
Mikado, 12 and 20-wheel articulated, Atlantic, Consolidation, 12-wheel type	30 per cent.	56 per cent.
Pacific and decapod	39 per cent.	67 per cent.
Prairie	[illegible]	75 per cent.
Electric	53 to 61 per cent.	84 to 94 per cent.

The capacity of these classes of bridges when subjected to occasional loads or to regular loads operated under restricted speed will be considerably in excess of that indicated above. For an example, an E-50 bridge with an overload of 75 per cent. which, when the bridge is in good condition and up to the American Railway Engineering Association Standard in design, is perfectly safe for occasional loads or regular loads under restricted speed, will carry engines weighing in excess of the engines now in use to about the extent indicated below:

16 and 24-wheel articulated engines	30 per cent.
10-coupled	39 per cent.
Mikado, 12 and 20-wheel articulated, Atlantic, Consolidation and 12-wheel type engines	52 per cent.
Pacific and decapod	62 per cent.
Prairie	70 per cent.
Electric	79 to 88 per cent.

It will be seen from the above that loads which strain an E-60 bridge to its *regular service capacity* can be operated *occasionally* over an E-50 bridge, and *even regularly when speed is restricted.*

HAVE PRESENT BRIDGES SUFFICIENT STRENGTH?

In view of past experience, it is perhaps reasonable to assume that some of the heavy types indicated in table 4 as developing the full regular service capacity of an E-50 bridge may probably be operated regularly over heavy grade divisions, but experience with the present heaviest locomotives does not indicate that still heavier types will be proper and economical on low-grade divisions. But suppose they should be operated regularly on all divisions, whether high or low grade, then an E-50 American Railway Engineering Association specification bridge will have ample capacity to take care of them.

Table 4.—Full Regular Service Traffic Capacity for E-50 Bridges Based on an Overload of 50 Per Cent.

Locomotives.	Weight.	Wheel Base.	Average Axle Load.	Percentage of Increase.†
Cooper's E-75	337,500	23.00	75,000	50.0
*Atlantic	280,000	30.79	82,400	31.0
Prairie	356,300	34.25	82,600	46.0
Consolidation	342,300	26.50	75,600	32.0
12-wheel	344,800	27.08	73,000	32.0
Decapod	374,300	29.83	66,400	40.0
Pacific	375,000	35.20	81,700	39.0
Mikado	394,200	35.00	77,900	29.0
12-wheel articulated	436,200	30.66	72,600	30.0
10-coupled	429,800	43.50	71,700	19.0
20-wheel articulated	629,000	59.80	70,800	32.0
16-wheel articulated	552,000	40.17	62,800	12.0
24-wheel articulated	695,000	65.92	62,000	13.0
12-wheel electric	460,000	38.50	78,800	53.0
16-wheel electric	516,000	44.22	64,500	61.0

*The Atlantic type applies to spans under 15 ft.; for greater spans the weight of this class of engine would run over 60 per cent. in excess of the heaviest type now in service.

†Percentages of increase in column 5 represent the approximate increase in weight of locomotives and driving loads in excess of the maximum weights now in actual use.

It is less reasonable to assume that the still heavier types of table 5 required for developing the full regular service capacity of an E-60 bridge will ever be operated even on high-grade divisions, unless gage of track is increased and greater clearances made, both laterally and vertically, in tunnels and bridges, and the right-of-way probably also increased, or, in other words, unless all present standards are abandoned and the railway practically reconstructed.

Table 5.—Full Regular Service Traffic Capacity for E-60 Bridges [illegible]

Locomotives.	Weight.	Wheel Base.	Average Axle Load.	Percentage of Increase.†
Cooper's E-90	405,000	23.00	90,000	50.0
*Atlantic	336,000	30.79	98,800	57.0
Prairie	427,600	34.25	99,100	75.0
Consolidation	411,000	26.50	90,700	58.0
12-wheel	413,500	27.08	87,600	58.0
Decapod	449,400	29.83	79,500	68.0
Pacific	450,000	35.20	98,000	67.0
Mikado	473,000	35.00	93,500	55.0
12-wheel articulated	523,800	30.66	87,100	56.0
10-coupled	515,800	43.50	86,000	43.0
20-wheel articulated	754,800	59.80	85,000	58.0
16-wheel articulated	662,500	40.17	75,400	34.0
24-wheel articulated	834,000	65.92	74,400	35.0
12-wheel electric	552,000	38.50	94,600	84.0
16-wheel electric	619,200	44.22	77,400	94.0

*The Atlantic type applies to spans under 15 ft.; for greater spans the weight of this class of engine would run over 90 per cent. in excess of the heaviest type now in service.

†Percentages of increase in column 5 represent the approximate increase in weight of locomotives and driving-axle loads in excess of the maximum weights now in actual use.

But suppose such types can be constructed and placed in operation without changing standard gage and clearances, they surely would not be operated regularly on low-grade divisions, and if their regular operations should be confined to high-grade divisions, then E-50 bridges on low-grade territory would have ample capacity to enable these types being transferred to and from these high-grade territories.

It appears, therefore, that an E-50 bridge is a good and economical type and provides for increased loading above the heaviest now in service to a sufficient extent to justify the railways which consider it a proper standard on all divisions until such time as conditions require practically a complete reconstruction of the railway.

It is, of course, admitted that an E-60 bridge is heavier, stronger and stiffer than an E-50 bridge. It will stand more abuse and more neglect, but it will cost from 12 per cent. to 15 per cent. more for its construction. While a number of roads have adopted this class of bridge for all divisions and others are contemplating its adoption, the justification therefor is not apparent in many cases. The mere fact that one or two roads started a somewhat radical change by building E-60 bridges should not in itself be sufficient excuse for other roads to do likewise. This tendency toward the adoption of E-60 loading is perhaps influenced more by precedent than by good, sound reason and judgment, and is being stimulated by the bridge companies, who profit by a greater tonnage of metal used in construction.

The writer hopes it will not be inferred that he condemns E-60 bridges as unreasonably heavy and extravagant and, therefore, not consistent with economical construction. They are better bridges than the E-50 class, and those who are in a position to justify them in paying more for the stronger structure, or who honestly believe this reserve strength will be required in the future, should not be classed with the extravagant, since at the most it is a case of foresight and judgment.

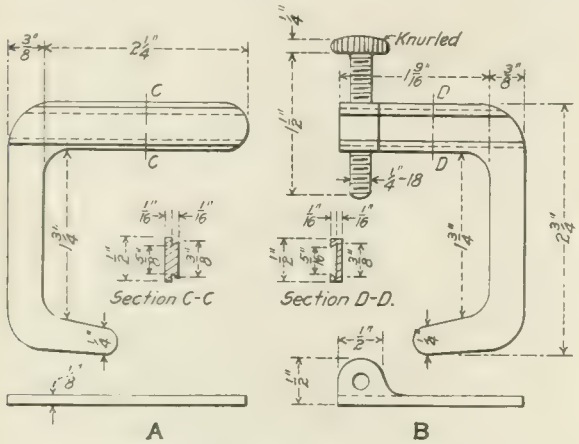
While E-60 bridges are stronger than those of E-50 class, it is probable that if the weights of engines ever increase to an extent sufficient to develop their capacity, many of these bridges, as now being constructed, will not have sufficient clearance to enable such excessively large locomotives to be safely operated. If, therefore, E-60 bridges are constructed, it would be well to provide a lateral clearance of at least 8 ft. from the center of track and an overhead clearance of not less than 25 ft. above top of rail, in which case there will be some possibility of operating over them the excessively large locomotives required to develop their strength.

Those roads which prefer stronger bridges on account of severe and heavy service on high grades could reasonably adopt the E-60 as standard for high-grade divisions and E-50 for low-grade divisions.

ADJUSTABLE CLAMP FOR HOLDING TAPE LINE ON BALL OF THE RAIL.

BY C. C. LEECH.

This adjustable clamp was made originally for the use of track supervisors, and has been found very convenient for measuring rails, frogs and crossings. It is especially convenient for the use of inspectors working in the frog shops, where it eliminates the necessity of calling the second man in order to



Clamp for Holding Tape to Rail.

secure accurate measurements. The construction is clearly shown in the sketch. Parts A and B dovetail together, fitting over the ball of the rail when pushed together. The set screw is then turned till it brings pressure on the end of the tape, holding it securely while the desired measurements are being taken either parallel to or across the rail.

ENGINEERING ARTICLES SINCE OCTOBER 20.

The following articles of special interest to engineers and maintenance of way men, and to which readers of this section may wish to refer, have appeared in the issues of the *Railway*

The Design of Railway Bridge Abutments, an abstract of Bulletin 140 of the American Railway Engineering Association, by J. H. Prior, assistant engineer of the Chicago, Milwaukee & St. Paul, Page 839, October 27, 1911.—Mr. Prior's treatment of reinforced concrete abutments is the most complete analysis of this subject that has been prepared recently. His familiarity with the subject makes the article of especial value, and the detail with which he has gone into designs, quantities and costs makes the data included of practical use to designing engineers.

An abstract of the government report on the Fort Wayne derailment, which showed the partial responsibility of the track department in the Pennsylvania wreck on August 13, was published in the issue of October 27, page 836.

engineers in the construction work were described in an illustrated

A resume of the preliminary report of the Chicago Subway

Methods adopted in the construction of the Detroit River work are given in considerable detail in connection with this description.

A short illustrated article describing the Hell Gate bridge of the New York Connecting Railroad over the East river at Ward's and Randall's islands appears on page 956 in the issue of November 10.

GUARD RAILS REINFORCED WITH CONTINUOUS JOINTS.

The proper maintenance of guard rails opposite frogs in a yard requires a large proportion of the time of the section forces, especially during the winter. In general, no tieplates are used under the guard rail, even though they may be placed on both sides of it. The running rail usually cuts down into the tie and is soon below the guard rail, which is then subjected to severe hammering from passing wheels. During the winter the collection of ice and snow tends to tip the rail out of position. Also, engines are used in the yards for several weeks after they have been sent in from the line, because of worn drivers, and in this condition they break many filler blocks and bolts.

Because of these difficulties the arrangement shown in the photograph is being used on five or six guard rails which are subject to very hard service in the Aurora (Ill.) yard of the Chicago, Burlington & Quincy. All ties under the guard rail are tie-plated under both the running rail and the guard rail, or-

Guard Rail Reinforced with Continuous Joints.

dinary tieplates being sheared at an angle and two being used on each tie; also two pairs of Continuous joints are bolted through both rails and the regular filler blocks. In this way both rails are maintained at the same level and much greater rigidity and strength are secured, the rail and guard rail acting practically as one section. Some of these guard rails have now been in use about one year, and have required practically no attention, even during the winter. A somewhat similar arrangement has been in use in the yards of the Terminal Railroad Association of St. Louis for some time. The rail braces shown in the photograph are not necessary, but the foreman was reluctant to leave them off while trying out this plan. This device was washed

POLE PRESERVATION.

A method of preserving poles for a short distance above and below the point which is to be set at ground level has been tried recently in Chicago. A portable machine carries a steam boiler, a closed oil tank containing steam coils for heating the preserving oil, and an air-tight canvas band which encases the pole at the zone to be treated. The pole

steam is turned on the machine from an adjacent platform and two

The band is then passed around the pole by a movement of the hand wheel and a clamping bar wedged against the band. Air pressure is applied to the edges

The machine

TRANSITION CURVE USED ON THE LAKE SHORE.

While there are many forms of spiral or transition curves in use today which differ radically in their methods of mathematical deduction, the resulting curves in general approximate very closely to each other. In practice the principal points of superiority of certain curves over others lie mainly in the readiness with which they are understood and applied in the field. To meet with general use among field engineers, many of whom are not technical men, the transition curve must be easily understood and the offset or deflection values must be readily secured, either by simple computations or directly from tables.

As an example of a simple transition curve capable of quick use in the field, that used by the Lake Shore & Michigan Southern is here given, together with a description of the method followed in working out the two problems most commonly encountered, in fitting a transition curve to the end of an existing curve and placing such a curve at the point of change of degree of a compound curve.

In fitting a transition curve to the end of an existing curve, the end of the circular curve approaching the main tangent is fixed so that it will become tangent at the beginning of the curve (B. C.) or the end of the curve (E. C.) to T', a line parallel to the main tangent and at a distance inside of it equal to the offset (O), the total offset at the beginning or end of a curve corresponding to the length of the transition curve (2N) which it is desired to use. This offset is obtained from the table by assuming the half length of spiral (N) and by knowing the degree of curvature of the circular curve to be fitted. With the transit at the beginning or end of the curve, points are set on the circular curve at intervals of 25 ft. from the instrument to the end of the spiral, and from a point on the main tangent opposite the beginning or end of the curve at the same interval on the main tangent. Then the offsets (O') corresponding to those distances (M) taken from the tables and multiplied by the degrees of the circular curve will give measurements from these points (M) previously set on the circular curve and on the tangent to corresponding points on the transition curve at which stakes are driven to define the points on the transition curve.

To fit the transition curve to the point of change of degree of curvature in a compound curve, determine the point of compound curve (P. C. C.) and fit the curves both ways from it so that at this point of compound curve they will lap past at a distance apart equal to the offset (O), the total offset at this point corresponding to the length of transition curve (2N), which it is desired to use. This offset is obtained from the table by assuming the half length of transition curve (N) and by a knowledge of the difference of degree of curvature of the two parts of the compound curve. With a transit at the ends of these curves opposite the point of compound, points are set on the circular curves at intervals of 25 ft. from the instrument on each curve for a distance equal to the half length of spiral. The offsets (O') corresponding to these distances (M), taken from the table and multiplied by the difference between the degrees of curvature of the two circular curves, give measurements from the points (M) to the corresponding points on the transition curve at which stakes should be set to define its position.

TABLE OF OFFSETS AND EXPLANATION

O = Total Offset — O' = Offset at any point "M" from either end of Transition Curve.

D = Degree of Circular Curve — A = Angle thrown out from Circular Curve = Angle of Transition Curve.

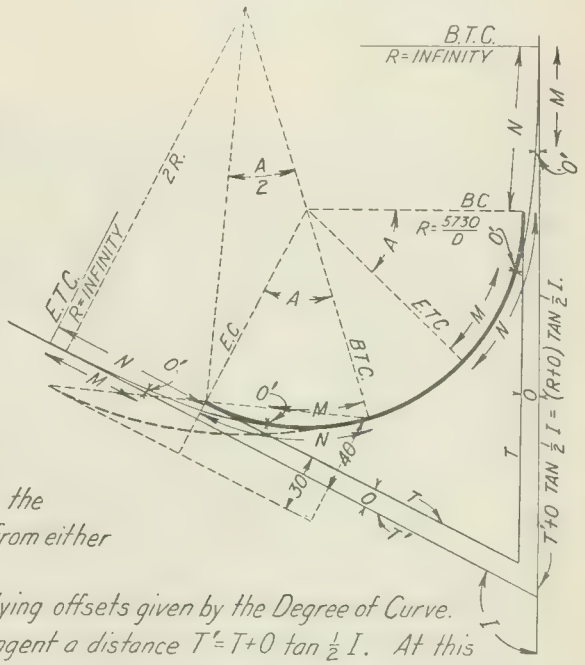
$O = \frac{3820 \sin^2 \frac{1}{2} A}{D} = \frac{N^2}{6R}$

$O = \frac{M^3}{N^3} \frac{O}{2}$

$N = \frac{1}{2}$ Length of Transition Curve $= \frac{A}{D}$

N	O	Offsets O' for successive values of M. M = Distance from end of Curve											
		25	50	75	100	125	150	175	200	225	250	275	300
50	0.073	0.005	0.036										
100	0.291	0.002	0.018	0.061	0.145								
150	0.654	0.002	0.012	0.041	0.097	0.189	0.327						
200	1.164	0.001	0.009	0.031	0.073	0.142	0.246	0.390	0.582				
250	1.818	0.001	0.007	0.025	0.058	0.114	0.196	0.312	0.465	0.663	0.909		
300	2.618	0.001	0.006	0.020	0.048	0.095	0.164	0.260	0.388	0.552	0.758	1.008	1.309

Transition Curve Table.



Above Table gives offsets for connecting a One Degree Curve with a Tangent by adding 50', 100', 150', 200', 250', 300' to each end of the Curve. Offsets are given for each 25' (Measured along Curve) from either end of Transition Curve to its middle point.

Offsets for any Curve other than one Degree are found by multiplying offsets given by the Degree of Curve.

To lay out a Transition Curve, measure from Vertex along the Tangent a distance $T' = T + O \tan \frac{1}{2} I$. At this point make an offset "O" obtained from the second column in above table corresponding to the desired value of "N" (increased length of curve as shown in first column of Table) to the B.C. of circular curve. Locate the E.C. of circular curve in the same manner and run in the curve from B.C. to E.C.

The middle point of this offset will be the middle point of the Transition Curve. Measure from this middle point a distance N as above, to the point B.T.C on the Tangent and to the point E.T.C. on the circular curve.

From the two ends of the Transition Curve thus established lay off intermediate points on the transition curve by offsets from the Tangent and circular curve respectively as found from the Table for given distances "M" from these ends of the curve.

The Burlington is placing 9 ft. ties under the joints on a short stretch of main track near Downers Grove, Ill., for experimental purposes. The rail is laid with staggered joints and on 8 ft. ties otherwise, the additional length of the tie being laid on the joint side to give the increased bearing at the joint.

REPLACEMENT OF THE RACCOON MOUNTAIN TUNNEL ON THE NASHVILLE, CHATTANOOGA & ST. LOUIS.

In connection with the construction of second track which the Nashville, Chattanooga & St. Louis is now carrying on from Chattanooga, Tenn., to Shellmound, a short tunnel is being replaced by an open cut. This line passes through some very rough country a short distance out of Chattanooga, and is built largely on side hills, although at this point it passes over a saddle. The line was originally built in 1852 with an open cut across this divide, but was in operation only a short time until a succession of slides came in. Track was laid over these slides and traffic maintained, while the work of removing the material was prosecuted vigorously. These slides were moved in benches, as many as three tracks being in the cut at one time in several instances. Very little progress was made in this way, as new slides kept coming into the cut as fast as the other material was removed, and an investigation of the hill side showed that the earth was broken into a series of ridges or benches for a distance of 1,000 ft. up the slope. A dry wall was then built on each side of the cut, and, although this wall held, the slide over-topped it and covered the track 10 ft. deep without injuring the wall in any way. Following this experience a tunnel was built between these walls in 1858 and filled over with earth so that the slides could pass over it. After this tunnel was constructed very little further sliding occurred, and a highway has since been built over the top of the tunnel, as shown in the photograph.

Raccoon Mountain Tunnel, Showing Buttress Walls.

When the present work was started it was decided to remove the tunnel at the east end of the cut, leaving the tunnel and the walls intact as a protection for emergency use. In addition to eliminating the tunnel, this work improves the alignment of the south end of the tunnel. In connection with the excavation, buttress walls were constructed along the open cut side of the tunnel at an angle of 30° to support the dirt from the slope on the south side. An investigation showed that the soil on the north side was of such a character that no buttress walls would be necessary on that side. The slides have ceased going into the cut and extended, except a small one at the west end, which was stopped by a row of piles and retaining wall. The completed contract of the tunnel will be removed from a 1.5 per cent. grade, over 13,000 cu. yds. of over 120,000 yds. were taken out before the cut was completed.

This work is being done under the direction of Hunter Macdonald, chief engineer; C. H. Johnson, engineer of construction; and R. A. Milan, resident engineer, to whom we are indebted for the opportunity to secure the above information.

COMMITTEES OF THE ROADMASTER'S ASSOCIATION.

The following men have been appointed members of the different committees of the Roadmasters' and Maintenance of Way Association for the ensuing year:

Foreign Labor.—Coleman King (N. Y. C. & H. R.); P. J. McAndrews (C. & N. W.); Geo. M. Greene (C. R. I. & P.); J. W. Fletcher, Jr. (Car. & N. W.); C. C. Johnston (L. & N.) W.); A. B. Richards (L. E. & W.); B. A. West (A. T. & S. F.).

Stone Ballast from the Crusher to the Track.—Fred B. Adams (P. & R.); John D. Boland (U. P.); A. M. Clough (N. Y. C. & H. R.); Henry Kleine (C. & A.); D. Foley (M. C.); Wm. A. Brandt (C. & N. W.); Michael Deltgen (C. & N. W.).

How to Secure Foremen—Organization of Section—Length of Section.—P. M. Dinan (L. V.); L. A. Lewis (P. & R.); J. A. Roland (C. & N. W.); John Barth (C. C. C. & St. L.); Carl Buhrer (L. S. & M. S.); J. P. Corcoran (C. & A.); T. F. Donahoe (B. & O.); J. E. Wilkinson (C. & N. W.); Bruce James (C. & E. I.).

Under What Department Should Construction Work Be Handled to Obtain Best and Most Economical Results?—M. Burke (C. M. & St. P.); T. H. Hickey (M. C.); James Sweeney (C. & E. I.); Thomas Thompson (A. T. & S. F.); A. E. Muchotte (C. R. I. & P.); M. Donahoe (C. & A.); Geo. Barnoske (C. M. & St. P.).

Tools and Improved Appliances.—W. F. Emery (P. & P. U.); J. E. McNeil (A. T. & S. F.); James Burke (Erie); J. S. McGuigan (St. L. S. W.); A. G. Hart (S. P.); W. R. Thompson (Cent. of Ga.); Wm. Shea (C. M. & St. P.).

Arrangements.—Geo. D. Gifford (N. Y. C. & H. R.); T. H. Hickey (M. C.); Abel Grills (G. T.); L. W. Hanselman (N. Y. C. & H. R.).

In addition, a paper on deterioration of spikes and angle bars in preserved ties will be presented by W. M. Camp, and there will be a general discussion of the topics, The Plates vs. Guard Rail Design for Holding Track to Gage, and The Best Method of Inspecting Track for the Following Year.

General News Section.

Employees of the Lake Erie & Western have been forbidden all intoxicating liquors, whether on or off duty.

The Santa Fe Railway has reduced the working time at its San Bernardino, Cal., shops to 45 hours a week. This is 15 hours less than the schedule of a month ago. The present reduction, it is said, will be the last.

A number of rumors have been in circulation recently to the effect that W. S. Tinsman will retire as general manager of the First district of the Rock Island and that, in consequence, various changes in the official personnel of that road will be made. These reports are officially denied and it is stated that there is no foundation for them.

Telegraph operators, towermen and agents on the New York Central have been granted an increase in wages of from 10 to 15 per cent. The Southern Railway has increased the pay of several hundred clerks. The increases range from 5 per cent. for employees who have been in the service but a short time, to 15 per cent. to those who have seen five years or more service. The same company's telegraph operators will be granted an average increase of about 15 per cent.

The New York Public Service Commission, First district, has made application to the state controller for an appropriation of $1,000,000 as the state quota of the expense of grade crossing elimination in New York City for the ensuing year. In 1909 and 1910 the commission requested appropriations of $600,000 for each year, and in both cases the legislature appropriated only $250,000. There are more than 400 grade crossings in the limits of the city of New York, and while the commission has already ordered elimination work which will cost more than $2,000,000, there is still a large amount to be done. The law provides that the state pays one-quarter, the city one-quarter, and the railway one-half.

The Lake Shore & Michigan Southern has in experimental use between Toledo and Cleveland two sets of the Morkrum rapid printing telegraph, the two being worked duplex on a single grounded wire. In outward appearance these instruments are somewhat similar to other rapid printing systems heretofore in use, the sending apparatus having the appearance of a typewriter. The distance between Toledo and Cleveland is 113 miles. The Morkrum apparatus has been successfully used for several months on telegraph circuits over 200 miles long, where messages have been sent all day at the rate of more than 100 an hour. The Lake Shore contemplates introducing the apparatus on a number of circuits.

The Pennsylvania Railroad has received a simple superheater Mallet locomotive from the American Locomotive Company, which is being broken in and will be thoroughly tested. The design is an attempt to get the most powerful locomotive possible, consistent with the rather narrow over-all cross-section, which has made necessary the use of simple cylinders. An interesting feature, which will develop in time, will be to see how the simple type Mallet with a superheater will compare with the compound type with and without a superheater. The engine has 27 in. x 28 in. cylinders, 56 in. drivers, and carries a boiler pressure of 160 lbs. It has a tractive effort of 93,000 lbs., and a total weight of 483,000 lbs. Of this 23,500 lbs. is on the leading truck, 435,500 lbs. on the drivers and 24,000 lbs. on the trailing truck. The tender weighs 186,400 lbs.

As announced in our Elections and Appointments columns, Oliver Rowe, inspector of transportation, Union Pacific and Southern Pacific, died at Cheyenne, Wyo., November 14, from effects of burns received in a butting collision between a passenger train and a freight on the Union Pacific at Rock River, Wyo., on October 28. The freight train, after setting out cars at Rock River, had backed on the passing track, which is situated between the eastbound and the westbound main tracks. The passenger train was approaching Rock River well under way, with automatic block signals in the proceed position. The brakeman of the freight train became confused as to the switches, and instead of closing the passing track switch leading from the westbound main, he opened the passing track switch leading to the eastbound main, directly in front of the passenger train and too late to avoid a collision. The engineman and the fireman of the passenger train and one passenger were killed, others being more or less seriously injured, and 40 being slightly hurt.

Illinois Central's Attitude Toward Striking Employees.

T. J. Foley, assistant general manager of the Illinois Central, in a letter referring to the strike situation on that road, states that it is the definite policy of the road not to recognize any federation such as proposed by the leaders of the present strike, and that it is not opposed to unionism, but that employees will be permitted a voice as to those things that directly affect working conditions. Continuing he says:

"Realizing that the strike inflicted upon this company September 30 was as much an injustice to the great majority of our employees as to the company, in that their leaders compelled an illegal and unjustifiable compliance with such order, for the reason that the federation created an uncontrollable condition of those who were disposed to be conservative and played into the hands of those who desired the strike for ulterior and questionable purposes; we are willing to take back those who have not been implicated in acts of violence against the company or its employees, so far as there may be vacancies. It is not the intention to change the rates of pay, and the men now in our service, or who may hereafter be employed, will be treated with the absolute fairness that has characterized the management of this company heretofore in dealing with its employees. None will be displaced so long as they desire to remain in our service, except for good cause, and all will be protected in their rights indefinitely to the utmost extent of our ability, which has been pretty clearly demonstrated as amply sufficient.

"We feel that we have an asset in our old employees who have that feeling of loyalty essential in the conduct of any business. We shall give those who return the greatest consideration. They will not be discriminated against.

"In all sincerity, we desire to add that the bulletins put out by many of the strike leaders as to the conditions are false and intended to mislead. The business of this company is being conducted in a satisfactory manner. There are plenty of honorable mechanics and laborers who have had a sufficiency of misleading and labor turmoil who are now looking out for their personal welfare and that of their families. Many of them have had similar experience elsewhere and are profiting thereby in endeavoring to once more locate themselves permanently in a position that will assure them a competence. These men are very carefully selected and are being employed at the rate of about 100 per day; consequently, we cannot hold out any inducement to former employees over any extended period."

Safety Committees on the Baltimore & Ohio.

With a view to promoting safety of travel and protecting its employees from personal injury in the discharge of duty, the Baltimore & Ohio Railroad has appointed a safety committee. The committee, which began work November 1 with General Manager Thompson as chairman, is composed of general officers of the road, including A. Hunter Boyd, Jr., assistant general attorney; J. W. Coon, assistant to general manager; Earl Stimson, chief engineer maintenance of way; C. W. Egan, general claim agent; Dr. S. B. Bond, chief medical examiner; and W. L. Robinson, shop expert of the mechanical department. Divisional safety committees have also been appointed as auxiliaries, headed by division superintendents as chairmen and composed of division officials, including trainmaster, division engineer, division claim agent, agents of important freight terminals, medical examiner, secretaries of the Young Men's Christian Association, an employee from each shop to represent shopmen, engineman to represent enginemen, conductor to represent trainmen, and yardmaster to represent yard employees.

The central committee will meet on the first of each month, while the divisional committees will convene the middle of the month. The divisional committees are to lay before the central committee such matters as will tend to bring about improvements

in the safety and efficiency of operation and protection to employees and the public.

The chairmanship of the auxiliary committees is vested in the superintendents for a period of six months, the plan providing for a progression to the office so that each member may serve as chairman. This same organization is carried out in the committee of general officers, with the exception of the vice-chairmanship, which is permanent.

Employees while serving on the safety committee of making investigations are exempt from other duty so that their time may be devoted to a study of the work of the committees. While so engaged the men are allowed full pay and expenses.

General Manager Thompson, in issuing the circular outlining the work of the safety committee, says: "We desire each of our employees to act as a Committee of One to see that everything possible is done to prevent accidents, and the suggestions of the men should be solicited through the divisional committeemen. It is my personal desire that all the division officers shall take an interest in this question of safety. Any suggestion that may occur to any employee which he feels will advance this work will be carefully considered."

Saving the Pennies.

The efforts that railway managers are making to stop waste in small things as well as in great ones are illustrated by a circular entitled "Office Economies," which S. M. Felton, president of the Chicago Great Western, has sent to all office employees of this road. The circular, which has for a sub-title, "How You Can Help Save the Pennies," is as follows:

Appeal having been made to employees in all other branches of the service for co-operation in the effort to reduce expenses, we reach one where the easiest and at the same time some of the greatest economies can be practiced. It has been demonstrated that by exercising judgment and care in the ordering and use of office stationery and supplies you can accomplish much toward the desired end. The items where savings can be effected may seem insignificant in themselves, but when considered in the aggregate they represent an annual amount equal to more than your month's salary.

A few suggestions along these lines are:

Letterheads.—In addressing letters to the various departments of the road if plain paper is used instead of printed letterheads a large reduction in printing bills will result.

Where a letter is spoiled before being completed, if the sheet of paper is laid aside and used as scratch paper instead of being thrown in the waste basket, the full value of using it will be obtained and less scratch paper will have to be ordered from the stationer.

Carbon Paper.—Experiments show that from one sheet of carbon paper one hundred legible copies can be made. Carbon paper deteriorates with exposure and the least possible number of sheets should be ordered at one time. Use each sheet until an equivalent of one hundred copies is made and you will obtain its maximum degree of service.

Rubber Bands and Erasers.—The price of rubber is continually increasing, and these articles represent the most expensive of office supplies. Do not waste rubber bands. An eraser fastened to your typewriter or desk by a card (or rubber band to give elasticity) will not only be found to be a timesaver, but will prevent the possible actual loss of the eraser.

Envelopes.—Where more than one letter is sent to the same person each day an envelope should be addressed and left open until mailing time, so as to avoid using several envelopes for taking care of mail that could be enclosed in one. Large envelopes cost more than small; and where a small envelope will answer it should be used, even though it is not on your desk.

[illegible] them only where the railway man will not serve the purpose.

[illegible]

[illegible]

[illegible]

[illegible]

not true. While we are allowed a certain number of free messages, all above that are charged for at regular rates, and each year we are compelled to pay a considerable sum for excess telegraphing. Therefore, all messages sent via commercial lines should be carefully censored in order to reduce the number of words to a minimum. Messages sent over our own wires should be brief. Mail service should be used in preference to telegraph whenever possible to do so without detriment to the company's interest.

Wrapping Paper and Cord should not be wasted. Frequently they can be used a second or third time. By saving paper and cord from packages received in your office your requisitions for these articles will be very few.

Gas and Electric Light.—In these items a very large saving can be made. It is not necessary to turn on all lights at once; use only what are required, and turn them off when leaving the office or when you can see just as well without their use.

Drinking Water.—This is not furnished free of cost, as is generally supposed. It is aimed to supply the offices with the purest and freshest of water. When it is considered that several hundred gallons are used each month for drinking purposes, it can readily be seen that the cost is large. Draw only enough water at a time that will be consumed and avoid throwing any on the floor or in the waste bucket.

Towel Service.—This is likewise an expensive item, and by being economical in the use of towels a considerable saving can be made.

Watch the little things—the big ones will take care of themselves. One hundred pennies make one dollar, and dollars saved are dollars earned. There are many ways in which you can earn your salary; let the economical use of the articles enumerated above be one of them.

The University of Illinois and the Railways.

Dean Goss, of the Engineering College of the University of Illinois, addressed the St. Louis Railway Club on the above subject on November 10. The work of the University of Illinois along railway lines frequently has been mentioned in these columns. Dean Goss referred to some matters which are new to most readers:

The school of railway engineering and administration is developing on its engineering side many interesting problems. For example, a knowledge of the forces which must be applied to maintain the motion of railway trains is a matter of fundamental importance in many of the problems of the railway. The University of Illinois was almost a pioneer in this field of research. In conjunction with the Illinois Central and the Cleveland, Cincinnati, Chicago & St. Louis, it designed and constructed a series of dynamometer cars, each new design overcoming defects which had appeared in its predecessor. The third car of the series has now been in successful operation for the past three years and it has served in the development of the most accurate array of data concerning train resistance which has thus far been published.

Professor Schmidt found in his experiments that the resistance of trains expressed in pounds per ton varied not only with the train speed but also with the weight of the individual cars of which the train was composed. At like speeds the resistance of a train composed of cars weighing 75 tons each was made less than the resistance of trains weighing 20 tons each. These experiments likewise demonstrated that atmospheric temperature also has an important influence on train resistance. His results have, therefore, been corrected for the influence of atmospheric temperature, and they are presented in such form as to make clear the influence of car weight. The discrepancies existing among the results of previous experiments are largely due to the neglect of the influence of car weight and atmospheric temperature. He has found, for example, that at 30 miles per hour the resistance is 4½ lbs. per ton for trains composed of [illegible] 20 tons each, the resistance is 10 lbs. per ton at [illegible] (See Bulletin No. 43 of the Illinois Engineering Experiment Station.) He is now in the process of determining the effect on train resistance of changes in atmospheric temperature below 30 deg. F. and also the effect of different degrees of curves in the track. This accomplished, he will have completely solved the train resistance problem in its application to [illegible] American freight car equipment, and his work will be

permanent so long as the present type of freight-car equipment continues to exist.

Another important line of investigation has led to the development of a system, not entirely original, for detecting defects in track bonds on electric lines. An electric test car has been equipped with apparatus designed to record automatically the conditions of every bond it passes over. The record gives the electrical resistance of the joint, in comparison with the resistance of a short length of solid rail. The results are registered on a web of paper which unrolls as the car proceeds, a half-inch length of paper corresponding to a rail length. In action the car is allowed to proceed at a moderate speed, the record for each joint being made automatically as it is passed, while an attendant operating a push-button controls a supplemental record representing the location of the numbered line poles as they are passed. An examination of the record enables one at once to pick out and locate the imperfect bonds. The test car has the form of an interurban car, the interior being fitted up with the instruments necessary to make it a laboratory. It is designed for the instruction of students and for the solution of problems of interest to the electric traction interests. In the near future Professor Schmidt hopes to continue with this car work already well advanced for the purpose of determining the tractive power necessary to handling such cars on track having different degrees of curvature.

The university is giving generous attention to problems underlying the design of railway equipment.

A standard Master Car Builders' drop testing machine has been installed, which is designed especially for use in testing couplers, coupler knuckles and draft gears, but is available for use in testing materials of many different sorts. The machine consists of a hammer weighing 1,640 lbs., sliding in two upright guides 50 ft. in height, between which it is allowed to fall upon the test specimen supported by a massive anvil resting upon a foundation through the medium of heavy springs. By the use of this machine students are instructed in the process of making the proof tests of the Master Car Builders' Association and are enabled to gather impressions concerning the severe treatment which must be withstood by couplers, draft gears, bolsters, axles and other details entering into the construction of freight cars.

Another detail in car design which of late has demanded serious attention is the brake shoe. There has been installed a brake shoe testing machine possessing equivalent characteristics to those of the original Master Car Builders' machine, but one which in its details is a much more serviceable machine. It consists primarily of a shaft carrying a fly-wheel and standard car wheel, which may be either steel or cast iron. The shaft is driven at any desired speed by means of an independent engine. By reason of the presence of the fly-wheel there is available at the surface of the car wheel, when in motion, the same amount of energy as is impressed upon one wheel of a 60,000-lb. capacity car in service under like speed conditions. The shoe to be tested may be applied to the wheel with any desired pressure up to a maximum of 24,000 lbs. The tangential pull of the shoe, which develops when the shoe is thus applied to the moving wheel, is transmitted to a dynamometer, where it is recorded upon a moving paper chart. By these means the coefficient of friction of any shoe may be determined under different conditions of speed and shoe pressure. The machine likewise serves to permit the determination of shoe wear and wheel wear under any condition that may be prescribed.

The last legislature appropriated to the university $200,000 for a building and equipment for its college of engineering. The trustees have determined that the building shall be devoted to transportation interests, and in the working out of plans it has seemed best to provide for a group of buildings. These are to consist of a main portion 65 ft. by 188 ft., having three working floors. This building is to be fireproof throughout. It will contain the offices, recitation and drawing rooms and some minor laboratories of the railway engineering department. In connection therewith there will be erected an electric test-car laboratory and a steam locomotive testing laboratory. The proposed locomotive laboratory will be housed in a building which is to be 45 ft. by 115 ft. It is to contain a wheel foundation of not less than 70 ft. in length, which is sufficient to accommodate the largest Mallet compound locomotive yet constructed, with a liberal margin for future developments. Upon this foundation are to be mounted the supporting wheels, the dynamometer and all other accessory apparatus. The arrangement will be such that any steam locomotive may be brought to the laboratory, mounted upon these supported wheels, and operated for an indefinite period under any condition of speed and load that may be prescribed. When thus operated the performance of every part may be made the subject of careful study; that is, it will be possible to study the efficiency of the process which goes on in the firebox, the fuel consumption, the evaporative efficiency of the boiler, the draft action, the power developed in the cylinders and the thermal action which takes place there, the power developed at the draw-bar and, in fact, information which may be needed to settle any question that may arise concerning the precise performance of the particular locomotive under examination. It is not the purpose of the university to purchase a locomotive. Arrangements have been made with a great railway company which are satisfactory to the university authorities whereby a locomotive of such type as may be mutually agreed upon will be made available for the use of the laboratory for periods corresponding with the college year. Under this arrangement the laboratory will have the advantage of being able frequently to change the type and the characteristics of the locomotive to be experimented upon. A locomotive having served its purpose at the plant will go into actual service, and its place will be taken by another of a newer type. It is hoped that all of the facilities which are to be brought about through the construction of the transportation building and the locomotive laboratory will be available for service in the fall of 1912.

Use of Acetylene on Trains.

The following bulletin has been issued by the Special Committee on Relations of Railway Operation to Legislation:

"A bill introduced into the House of Representatives, June 15, 1911, provides as follows:

"That it shall be unlawful for any common carrier engaged in interstate commerce by railroads to use or produce acetylene on any car of its line used in interstate transportation of passengers. Any corporation violating this provision shall be subject to a penalty of ten thousand dollars for each offense. An officer of any common carrier engaged in interstate commerce by railroad authorizing or permitting the use or production of acetylene on any car on the line of said common carrier used in interstate transportation of passengers shall be fined not more than five thousand dollars or imprisoned not more than five years, or both."

"On July 24, 1911, a circular was sent to all railways, asking for such information as was necessary to form an accurate opinion as to the extent to which existing equipment would be affected.

"It was pointed out that in construing the safety appliance act the courts have held that a locomotive handling trains in which interstate traffic is being carried is a car within the meaning of the law.

"Replies to this circular were received from 192 companies operating 224,999 miles. Of these, 125 companies, operating 94,673 miles, had no equipment of this kind; 61 companies, operating 130,326 miles, reported the following:

1. Number of locomotives equipped with acetylene headlights.	3,565
2. Number of passenger equipment cars lighted with acetylene exclusively	1,233
3. Number of passenger equipment cars lighted with acetylene in addition to some other form of lighting	896
4. Number of passenger equipment cars equipped to produce acetylene for lighting	1,000
5. Number of passenger equipment cars equipped with tanks for acetylene gas	1,625

"Of the total locomotives equipped with acetylene headlights, 3,088, or 87 per cent., are operated by twelve railways, and of the total number of passenger cars equipped to use or produce acetylene, 1,976, or 93 per cent., are operated by ten railways. All of the other railways reporting have less than 25 cars or locomotives so equipped."

Railway Business Association.

The speakers at the third annual dinner of the Railway Business Association, which will be held at the Waldorf-Astoria, New York, on November 22, will be Gov. Emmet O'Neal, of Alabama, and Walker D. Hines, chairman of the executive committee of the Atchison, Topeka & Santa Fe. The president, George A. Post, will preside. A feature will be the presence of numerous presidents of trade bodies in the principal cities of the country.

The general subject of discussion will be a "taking account of

stock" of regulatory laws. What is the value and efficiency of existing statutes? What is there in existing statutory machinery which in the light of experience should be discarded? What is yet needed to make regulaton comprehensive?

FOR ADEQUATE RAILWAY EARNINGS.

It is proposed in the third annual report of the general executive committee of the association, which has been mailed to the members, that the association shall urge in nation and state a propaganda of adequate railway earnings with the makers of political party platforms. The report says in part: "Federal and State Commissioners are evidently anxious to be regarded as solicitous for the financial stability of the transportation companies. In the atmosphere thus created our work now is to encourage the development of co-operation, frank and above-board, between the rate-regulating tribunals and men of affairs in the establishment of principles and policies affecting revenues."

American Society of Mechanical Engineers.

The annual meeting of the American Society of Mechanical Engineers will be held in New York, December 5-8. On the first day, there will be registration in the afternoon, and the presidential address and the reception in the evening. On the morning of the second day, there will be a business session; in the afternoon, a professional session and a ladies' reception; in the evening, a lecture. On the morning of December 7 there will be a professional session; in the afternoon, an inspection of the *Olympic* and excursions; in the evening, a reunion at the Hotel Astor. On the morning of December 8 there will be a professional session; and in the afternoon, an excursion to the Brooklyn Navy Yard.

American Society of Civil Engineers.

At the meeting of the American Society of Civil Engineers, November 15, two papers will be presented for discussion, as follows: A Reinforced Concrete Stand-Pipe, by W. W. Clifford, Jun. Am. Soc. C. E., and Retrogression in the Tensile Strength of Cement, by J. M. O'Hara, Assoc. M. Am. Soc. C. E. These papers were printed in the *Proceedings* for September and October, respectively.

New York Railroad Club.

At the next regular meeting of the New York Railroad Club, to be held November 17, the paper will be on Tool Steel, by W. B. Sullivan, Philadelphia, Pa. It will be illustrated with lantern slides.

MEETINGS AND CONVENTIONS.

... names of secretaries, dates of next ... meetings, and places of meeting.

[illegible]

American Association of General Passenger and Ticket Agents.—W. C. [illegible]

American Association of Freight Agents.—R. O. Wells, East St. Louis, [illegible]

[illegible]

American Railway Association. W. F. Allen, 75 Church St., New York.

American Railway Bridge and Building Association.—C. A. Lichty, C. & [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

American Society of Mechanical Engineers. Calvin W. Rice, 29 W. 39th St., New York.

Association of American Railway Accounting Officers.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.

Association of Railway Claim Agents.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 22, 1912, Los Angeles, Cal.

Association of Railway Electrical Engineers.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago.

Association of Railway Telegraph Superintendents.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.

Association of Transportation and Car Accounting Officers.—G. P. Conard, 75 Church St., New York; December 12-13, Louisville, Ky.

Canadian Railway Club.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.

Canadian Society of Civil Engineers.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

Car Foremen's Association of Chicago.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

Civil Engineers' Society of St. Paul.—D. F. Jurgensen, 116 Winter St., St. Paul, Minn.; 2d Monday, except June, July and Aug., St. Paul.

Engineers' Society of Pennsylvania.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

Engineers' Society of Western Pennsylvania.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

Freight Claim Association.—Warren P. Taylor, Richmond, Va.; annual, May 15, Buffalo, N. Y.

General Superintendents' Association of Chicago.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

International Railway Congress.—Executive Committee, rue de Louvain, 11 Brussels; 1915, Berlin.

International Railway Fuel Association.—D. B. Sebastian, La Salle St. Station, Chicago.

International Railway General Foremen's Association.—L. H. Bryan, Brown Marx building, Birmingham, Ala.

International Railroad Master Blacksmiths' Association.—A. L. Woodworth, Lima, Ohio.

Iowa Railway Club.—W. B. Harrison, Union Station, Des Moines, Ia.; 2d Friday in month, except July and August, Des Moines.

Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York; annual convention, May 14-17, Pittsburgh, Pa.

Master Car Builders' Association.—J. W. Taylor, Old Colony building, Chicago; annual convention, June 17-19, Atlantic City, N. J.

Master Car and Locomotive Painters' Association, of United States and Canada.—A. P. Dane, B. & M., Reading, Mass.; next annual convention, second week in September, 1912.

New England Railroad Club.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

New York Railroad Club.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

Northern Railway Club.—C. L. Kennedy, C., M. & St. P., Duluth, Minn; 4th Saturday, Duluth.

Omaha Railway Club.—H. H. Maulick, Barker Block, Omaha, Neb.; second Wednesday.

Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

Railway Club of Pittsburgh.—C. W. Alleman, P. & L. E., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

Railway Industrial Association.—G. L. Stewart, St. L. S. W. Ry., St. Louis, Mo.; annual, May 12, 1912, Kansas City, Mo.

Railway Signal Association.—C. C. Rosenberg, Bethlehem, Pa.

Railway Storekeepers' Association.—J. P. Murphy, Box C, Collinwood, Ohio.

Richmond Railroad Club.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

Roadmasters' and Maintenance of Way Association.—L. C. Ryan, C. & N. W., Sterling; September, 1912, Buffalo, N. Y.

St. Louis Railway Club.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

Society of Railway Financial Officers.—C. Nyquist, La Salle St. Station, Chicago.

Southern Association of Car Service Officers.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.

[illegible] & Southwestern Railway Club.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

Toledo Transportation Club.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

[illegible] Club of Chicago.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.

Traffic Club of New York.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

Traffic Club of Pittsburgh.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

Train Despatchers' Association of America.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.

[illegible] Club of Buffalo.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

[illegible] Club of Detroit.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.

Traveling Engineers' Association.—W. O. Thompson, N. Y. C. & H. R., [illegible] N. Y. August, 1912.

Western Canada Railway Club.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

Western Railway Club.—J. W. Taylor, Old Colony building, Chicago; 3d [illegible] each month, except June, July and August.

[illegible] Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Wednesday in month except July and August, Chicago.

[illegible] Passenger Association.—E. J. Anders, B. & O., Baltimore, Md.; [illegible] Chicago.

Traffic News.

A five-masted sailing vessel has been launched at Bordeaux, France, which is the largest sailing vessel in the world. It is 426 ft. over all.

A temporary injunction has been granted restraining the Missouri Railroad & Warehouse Commission from reducing intrastate rates on iron and steel. The injunction was granted by the federal circuit court.

The Central Passenger Association lines, following the example of those belonging to the Western Passenger Association, have decided not to make any reduced rates for the Thanksgiving, Christmas or New Year's holiday season.

While the official date of the opening of the Panama Canal has been set for January 1, 1915, it is the intention to allow vessels to use the canal just as soon as practicable. It is believed that this can be accomplished during the latter half of 1913.

A fund of $1,325 has been raised by the North Carolina Furniture Manufacturers' Association to pay the expenses of preparing and defending a petition to the Interstate Commerce Commission for lower rates on furniture from the South to the Pacific coast.

Shippers have presented to the Winnipeg Board of Trade of Canada a petition asking for the establishment of a western branch for the Canadian Board of Railway Commissioners, claiming that at present western Canadian shippers were not getting entirely fair treatment.

A reduction of about 3 cents per 100 lbs. in the rates on potatoes from Brainerd, Minn., and other points in Crow Wing county, to the Missouri river, has been announced by the Northern Pacific to take effect December 1. The rate to Kansas City territory is reduced to 25½ cents and to Omaha territory to 24 cents.

The Lehigh Valley has established a car float service between its terminals in Jersey City and the Wallabout basin in Brooklyn. The schedule of these car floats is arranged so that freight received at the Wallabout basin in Brooklyn before 4 o'clock will be sent out the same evening on the "symbol train" (fast freight) from Jersey City.

Following the failure of Pitt Brothers & Company, of Baltimore, the Kirwan Brothers Grain Company went into bankruptcy, and certain officers of the company have been charged with obtaining money from Baltimore banks on forged bills of lading. It is said that these forged bills of lading were stamped similar to that used by the railway companies on their genuine bills of lading.

The Boston Elevated Railway has filed a petition with the Massachusetts railway commission asking for a franchise to permit it to carry freight, express matter, baggage and newspapers in Boston. It is suggested that the Boston Elevated may develop a considerable interchange of freight with the Bay State Street Railway, which controls a number of street railway lines north and south of Boston, and which has freight branches in a number of towns.

The Long Island has announced that it will take off about seven trains on its main line and a number of trains on branch lines beginning November 15. The company gives as its reason a large deficit, due to the expense of handling passenger traffic at the western end of Long Island with both steam motive power and electricity. The company estimates that this curtailment in train service will mean a saving of about $500 a day, and about 50 men will be laid off.

The National Civic Federation has sent out to about 20,000 manufacturers, farmers, merchants, lawyers and labor leaders a list of 11 questions in regard to their attitude on the Sherman anti-trust law. Among these questions is one asking whether an interstate trade commission, with powers over corporations not unlike the powers now held by the Interstate Commerce Commission over railways, is favored. Another question is as to whether railways should be allowed to enter into agreements affecting rates subject to the approval and regulation of the Interstate Commerce Commission. The circular also asks whether the repeal of the Sherman law is favored.

The New York, Ontario & Western has announced that on December 1 it will restore its old rates on westbound freight. These old rates were slightly lower than the rates on the Pennsylvania, the Philadelphia & Reading and other "standard" roads, and were raised to a parity with other trunk lines some time ago. It is said that both the Erie and the Delaware, Lackawanna & Western are to meet this reduction by reducing their own rates to the same extent.

At the annual meeting of the stockholders of the Pullman Company, Chicago, John S. Runnels in his presidential statement said that during the fiscal year, ended July 31, there had been an increase of 9 per cent. in the number of passengers using Pullman accommodations and an increase of 7 per cent. in the number of miles run. The total payroll of the company is $9,663,997. The business of the company is dull at present and only 6,400 men are employed.

The Pennsylvania Railroad is to run on November 20 to 25, a farmers' special through the Delaware-Maryland-Virginia peninsula, and, on November 27 and 28, a similar train over the Pope's creek branch, in central Maryland. The peninsula farmers' special will make about 50 stops during the six day trip. Every well defined center will be visited. The Pope's creek branch train will make 12 stops in the two days. Railway officers, co-operating with the state agricultural authorities of the several states will have charge of the trains.

Negotiations have been resumed before the Interstate Commerce Commission and the Canadian railway commission looking toward the establishment of an international commission to regulate international freight and passenger rates. Judge Mabee, chairman of the Canadian commission, and Mr. Knapp, then chairman of the Interstate Commerce Commission, held conference on this question before Mr. Knapp was appointed to the Commerce Court. Canadian papers say that it is understood that Commissioner Prouty has drawn up a plan for an international commission, which is to be submitted to Prime Minister Borden.

New Line for Guatemala Railway.

The Guatemala Railway Company will, within a few months, start construction work on a line which will run from Zacapa, Guatemala, in a southerly direction through Chiquimula, Quezaltepeque and Concepcion and through Metapan, Salvador, and Texestepeque, to Santa Ana, in all about 105 miles. Contracts will be let immediately. Most of the work will be difficult. The maximum grade will be 3 per cent., and the maximum curve will have a radius of 318 ft., compensated. There will be no trestles, but there will probably be one 500-ft tunnel. This road will carry coffee, corn, lumber, cattle, etc.

Commissioner Prouty on the Sherman Law.

In an address before the Congregational Club of Brooklyn recently, Commissioner Prouty discussed the Sherman anti-trust law and gave his reasons for thinking that it has not been a success. These reasons may be summed up by saying that it is destructive, not constructive, and leads to endless uncertainty. He then outlined the method by which he thought the problems of trust regulation should be undertaken. He said in part as follows:

"Up to the present time the trust problem has been political, the whole subject as a practical question has never been intelligently studied, nor is there today adequate information on which to reach a conclusion. If this problem is ever to be properly dealt with it must be taken out of politics and treated in a non-partisan fashion.

"It seems to me this could best be done by creating an administrative commission, which should bear somewhat the same relation to the anti-trust act which the Interstate Commerce Commission bears to the act to regulate commerce.

"I am aware that there is a widespread prejudice against interference in business matters by government commission. It is felt that we have too much law already and that what business needs is less rather than more. No better way of exer-

cising the necessary governmental interference has been found than by an administrative commission, properly constituted.

"The first duty of this commission, and its main duty at the outset, should be to investigate and report. It should be given the fullest power to obtain information both by private and public proceedings and to make that information public. It should report to Congress the result of its investigations and its conclusions as to further legislation. I believe that a commission of broad-minded men, competent to understand and deal with the situation, would in time make plain the true nature of the question and the proper remedy; that by a gradual evolution there would come about a general understanding as to what ought to be done.

"But while the principal duty of this commission at first should be the seeking of information and the acquiring of a correct notion of the task before it, I also think that from the very first it should be invested with certain administrative duties. It should stand as the representative of the public, should receive and investigate complaints and should prosecute, through the department of justice, violations of the act.

"Provision should be made against unfair competitive methods and this commission should be charged with the duty of enforcing those provisions. It should be given authority to make within proper limits orders which would secure a compliance with the statute.

"It will finally become apparent that the supervision and regulation of big business is an administrative and not a judicial function. These trusts cannot be controlled by the courts, nor by court methods. Here, again, the history of the regulation of railways is most significant. For more than a quarter of a century the English people attempted to supervise and regulate the operations of their railways through the courts. The result was failure, and finally the attempt was abandoned and a commission was created.

"The United States had the same experience. For twenty years it was sought to administer the act to regulate commerce by judicial decree. Experience showed the futility of the attempt; it was abandoned and the commission was given administrative authority."

The New Haven's Industrial Bureau.

Manager W. H. Seeley, head of the industrial bureau established six months ago by the New York, New Haven & Hartford, with headquarters at Boston, has made a report covering the work of the bureau for that period. Under the title "The New England Lines' Industrial Bureau," it aims at the development of any form of industry likely to feed traffic to the New Haven system, but special attention is given to farming. It is the first railway enterprise of the kind in New England. It is under the supervision of the New York, New Haven & Hartford, the Boston & Maine and the Maine Central, being in general charge of Vice-President Campbell of the New Haven.

After referring to the fact that the enterprise is one of several for the present and future co-operative development of New England, Manager Seeley continues:

[illegible] which deals directly with 2,500 freight and ticket agents; 1,500 or more chambers of commerce, boards of trade, business men's associations, selectmen, granges, village improvement societies and other organizations, and is in direct touch with the state departments of agriculture, and the agricultural colleges of the New England states.

[illegible] miles of branch lines. More than 200 industrial sidetracks and [illegible] have been [illegible] by the bureau [illegible] of providing storage and giving the New England agriculturalist an opportunity to reach New York with his apples, potatoes, vegetables, butter, cheese, poultry, dairy and other farm products.

"The New England Lines' provided space at the recent American Land and Irrigation Exposition held in New York, for a New England exhibit. The exhibit proved beyond question that it is possible to raise apples in New England equal to the best, which was further corroborated by the Maine Corn & Fruit Show recently held at Portland, Me., in which the Maine Central was interested and which was a revelation of what is produced in Maine.

"The bureau recently secured a favorable option on 36,000 acres of farm and timber land in Maine, a portion of which the Maine Central will use for an experimental farm under the supervision of the bureau, with a view to colonizing the property at a later date.

"One of the things which is receiving attention and which the bureau expects to accomplish is the establishing of several plants for the supplying of ground lime rock to the farmers at a figure that will enable them to use large quantities of it, which will prove of genuine benefit to the New England farmer.

"Arrangements have just been consummated with the *Connecticut Farmer*, of New Haven, Conn., to take over the *New England Farms*, formerly published by the Boston & Maine and the Maine Central. Many thousand copies of this paper will be distributed throughout New England."

Frisco-Gould Traffic Agreement.

On Wednesday it was announced that possibly the Texas & Pacific and the St. Louis, Iron Mountain & Southern would refuse to carry out the traffic agreement made with the St. Louis & San Francisco, by which the Frisco was to use the tracks of the other roads to connect its New Orleans, Texas & Mexico division with its Kansas City, Fort Scott & Memphis division. It is understood that both railway companies believed that the traffic agreement would be of value to them, but that the difficulty lay in raising funds for such improvements as were agreed on in the contract—that is, 85-lb. rail, rock ballast, sidings, stations, bridges, etc. This traffic agreement was described in the *Railway Age Gazette of* June 2, p. 1286.

General Review of Crop Conditions.

The United States department of agriculture gives the following general review of crop conditions: The harvests of 1911 have been practically completed and preliminary estimates made of the production of most of the important crops, from which it appears that the aggregate production of crops in 1911 is approximately 7.9 per cent. less than the crops of 1910, and about 0.4 per cent. less than the average annual production of the preceding five years.

The preliminary estimates of production in 1911, with comparisons, of such crops as have been estimated quantitatively by the bureau of statistics, with their average farm prices on November 1, 1911, and November 1, 1910, are as follows:

CROPS.		Production (000 omitted). 1911 Preliminary.	1910.	Av. 5 Yrs. 1905-1909.	Price (a). Nov. 1, 1911.	Nov. 1, 1910.
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	61.7	58.6
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	91.5	90.5
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	43.8	34.9
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	84.9	55.3
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	84.1	71.6
Buckwheat	bu.	17,051	17,239	15,366	73.0	65.9
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	210.6	229.4
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	76.3	58.7
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	$14.62	$11.96
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.....	.....

The production of other crops in 1911, expressed in percentage of the average production in recent years (not compared with full crop) is estimated as follows:

Apples, 126.3; pears, 110.8; watermelons, 105.1; grapes, 102.7; cantaloupes, 101.8; peanuts, 99.3; asparagus, 97.7; alfalfa, 96.1; beans, 95.1; kafir corn, 95.0; cranberries, 94.0; tomatoes, 93.9; cabbage, 93.0; raspberries, 91.0; onions, 89.7; millet, 87.2; strawberries, 83.6; blackberries, 83.5; cloverseed, 82.6; millet seed, 82.1; peaches, 80.3; hemp, 78.2; clover hay, 68.1.

Yield per acre compared with average yield, sorghum, 102.0; sweet potatoes, 101.2; hops, 90.4; broom corn, 85.1.

Condition, compared with average conditions, at or near time of gathering:

Sugar cane, 109.8; cotton, 106.9; lemons, 103.9; sugar beets, 102.6; oranges, 101.6; rice, 99.0.

This year's total crop production in each state, based upon preliminary estimates, is given below; the first figure after each state indicates its total crop production in 1911, relatively, as compared with 1910, 100 representing last year's production; the second figure indicates production in 1911, relatively, compared with the average production in years 1905-09, 100 representing the average production for the five years:

STATES.	Production 1911 compared with 1910.	Production 1911 compared with 1905-09.
Maine	87	102
New Hampshire	86	101
Vermont	96	111
Massachusetts	85	93
Rhode Island	89	94
Connecticut	83	98
New York	89	97
New Jersey	80	94
Pennsylvania	84	92
Above division	86	96
Delaware	88	98
Maryland	87	93
Virginia	83	98
West Virginia	81	87
North Carolina	96	116
South Carolina	101	121
Georgia	115	122
Florida	112	115
Above division	99	113
Ohio	92	100
Indiana	89	99
Illinois	84	98
Michigan	94	105
Wisconsin	111	97
Above division	91	99
Minnesota	84	92
Iowa	82	91
Missouri	77	90
North Dakota	213	93
South Dakota	56	56
Nebraska	80	75
Kansas	76	73
Above division	83	83
Kentucky	84	99
Tennessee	95	112
Alabama	111	126
Mississippi	107	114
Louisiana	106	112
Texas	96	106
Oklahoma	70	76
Arkansas	103	125
Above division	96	107
Montana	149	198
Wyoming	101	154
Colorado	88	82
New Mexico	136	161
Arizona	128	125
Utah	94	96
Nevada	112	206
Idaho	124	150
Washington	127	115
Oregon	103	113
California	93	108
Above division	108	120
United States	92.1	99.6

INTERSTATE COMMERCE COMMISSION.

The commission has suspended further until May 14 the new regulations and rules regarding the absorption of charges at Galveston, Tex., by the Galveston, Harrisburg & San Antonio.

Reparation Awarded.

Whaley-Warren Lumber Co. v. Carolina, Clinchfield & Ohio. Opinion by the commission:

Damages caused by defendant's failure to properly route a shipment of lumber from Dungannon, Va., to Boston, Mass.

Carolina Portland Cement Co. v. Chesapeake & Ohio et al. Opinion by the commission:

Rate of 22½ cents per 100 lbs. for transportation of cement in carloads from Fordwick, Va., to Hope Mills, N. C., found to have been unreasonable so far as it exceeded 19½ cents per 100 lbs. (21 I. C. C., 533.)

STATE COMMISSIONS.

The Railroad Commission of Texas has granted the application of the Paris & Mount Pleasant for permission to charge 30 cents per ton on slack coal from Paris to Ragland. The special rate is made for coal for municipal consumption.

The docket of the Railroad Commission of Texas for November includes a hearing on the proposition to treat the St. Louis Southwestern and its leased line, the Stephenville, North & South Texas as one railway; and also a hearing on the proposition to cancel all special rates on crude oil and fuel oil in carloads.

The railway commission of California has begun its work of physical valuation of steam and interurban electric railways, and as a preliminary step has ordered all arilway companies to file maps and profiles of their property within 90 days. The work will be under the immediate charge of R. A. Thompson, chief engineer of the commission.

The Connecticut Utilities Commission has ordered the Connecticut Company, which is the holding company for the New York New Haven & Hartford's street railway properties in Connecticut, to produce its books to show the business done on the Hartford & Manchester trolley line in the first half of 1911. This is the first ruling of this kind made by the new commission.

The Railroad Commission of Louisiana has received a petition from the Alexandria Progressive League complaining that there is no uniformity in class rates between Alexandria and points in Louisiana on the lines of all the railways doing a business in that state, and the petition asks that the commission order the railways to put in effect the rates which are advocated by the Shreveport Chamber of Commerce except where lower rates are now in effect, which lower rates shall be continued in force. The Alexandria Progressive League thus becomes an intervener in the Shreveport Chamber of Commerce case, which has been mentioned heretofore in these columns.

Representatives of several Chicago railways recently conferred with the Illinois railway commission on the following request which was submitted by the roads: "That in cases where two or more carriers have lines between common points in this state and the line of one of such carriers is shorter than the other, then the carrier or carriers having such longer line between any two such common points may continue present rates or meet rates subsequently established by the carriers having the shorter line." The commission announced that after a petition embodying this request has been presented to it an order conforming with the request will be issued, with the proviso that the commissioners will reserve the right at any time to investigate any rate. A shipper at Waukegan, Ill., who has to pay on his merchandise 3.8 cents per 100 lbs. by rail from Chicago to Waukegan and 8 cents per 100 lbs. by boat, asked the commission to issue an order directing the boat company to reduce its rate. It was contended on behalf of the boat line that it transports merchandise more rapidly and could not afford to meet the rail rate. The case was taken under advisement.

New York: Extending Facilities to a Competitor.

The New York Public Service Commission, Second Division (state) has decided that a charge made by the Western Union Telegraph Company to the Postal Telegraph & Cable Company for the words constituting the originating address and date on a telegram transferred by the latter to the former company is unreasonable and discriminatory. The Western Union accepts transferred messages for transmissions and delivery from the Postal to points not reached by the Postal and charges the Postal its ordinary local rate for the transmission of the message from the point of transmission to the point of destination plus an additional charge for the name of the originating point and date. The name of the originating point and date usually constitute, under the rules in force for counting, four or five words. The commission says that the Western Union, by this method of charging for the name of the originating point and the date of transferred messages, necessarily receives more for its services than it would in the case of the message originating with it at the transfer point.

It is not possible to assign any reason for this distinction except the desire of the Western Union to suppress competition at competitive points. The Postal assigns reasons why it desires to conduct its business at competitive points by the use of transferred telegrams, which are entirely satisfactory and legitimate from its point of view; it is obviously to the advantage of the Western Union, as is shown by the charge which it makes and by the notices which it sends out to prevent competition of the Postal at these points.

The commission says that clearly a public service corporation must extend precisely the same facilities to a competitor as it does to the entire world. It can make no distinction between those offering it business. It must charge them alike and serve them alike. If it is its practice to serve the immense majority of its business without a charge for the name of the originating point and the date, and it obtains its compensation for the service in fixing the rate for the words in the body of the message at such an amount as will afford it a proper remuneration for transmitting all the message contains, that rule must obtain the same with competitors as with ordinary individuals. No satisfactory reason has been offered in support of the rule.

REVENUES AND EXPENSES OF RAILWAYS.*

MONTH OF AUGUST, 1911. (SEE ALSO ISSUES OF OCTOBER 13 AND 20.)

Name of road	Mileage operated at close of month	Mileage operated during month	Gross earnings (or revenues) from transportation	Operating expenses: Maintenance of Way and structures	Maintenance of Equipment	Traffic	Transportation	General	Total	Net operating revenue (or deficit)	Outside operations, net	Taxes	Operating income (or loss)	Increase (or decr.) compared with last year.
[illegible]	[illegible]	[illegible]	$ [illegible]	$ [illegible]	$12,780	$8,133	$ [illegible]	$5,133	$117,884	$8,749	$2,851	$13,926	$ 4,314	$ 5,970
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4,996	84,666	62,991	[illegible]	65,163	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF SEPTEMBER, 1911.

Name of road.	Mileage operated at end of period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
		Freight.	Passenger.	Total, inc. misc.	Maintenance: Way and structures.	Maintenance: Of equipment.	Traffic.	Transportation.	General.	Total.					
Alabama & Vicksburg	142	$85,635	$41,852	$137,257	$20,599	$27,201	$3,863	$43,795	$5,187	$100,645	$36,612	- $26	$4,600	$31,986	— $3,917
Alabama Great Southern	309	265,397	99,236	398,461	35,892	90,730	10,076	120,656	8,616	265,970	132,491	- 207	15,048	117,236	5,329
Arizona Eastern	366	111,138	32,218	151,476	29,706	9,900	2,323	40,738	4,931	87,597	63,879	636	12,560	51,905	- 5,185
Atchison, Topeka & Santa Fe	7,613	4,890,377	1,884,271	7,359,334	1,202,553	1,134,796	168,018	2,069,788	163,199	4,738,354	2,620,980	.....	317,871	2,303,109	- 408,136
Atlantic Coast Line	4 5 1	1,723,917	619,996	2 6,739	340,540	382,464	37,424	830,749	72,752	1,663,929	862,810	.....	107,000	755,810	149,609
Baltimore & Ohio System	4,453	6,305,287	1,505,245	8,279,300	1,099,786	1,410,220	149,481	2,638,424	156,114	5,454,026	2,825,274	— 71,401	245,887	2,508,286	— 95,829
Baltimore & Ohio Chicago Terminal	27		3,266	139,654	35,511	14,585	1,064	52,329	8,453	111,942	28,012	849	18,706	10,655	7,029
Bangor & Aroostook	627	255,561	70,635	340,370	44,479	29,538	3,919	88,236	11,677	177,849	162,521	.....	9,250	153,271	34,972
Bath Ry. Coast Line	1			219,610	15,191	26,532	439	77,091	5,900	125,153	94,457	.....	5,500	88,957	8,323
Bessemer & Lake Erie	203	918,094	43,133	970,787	81,686	133,923	12,764	203,103	8,086	438,862	531,895	.....	7,000	524,895	85,616
Boston & Maine	2,232	2,741,849	1,717,046	4,250,386	728,089	566,181	47,426	1,951,516	90,653	3,383,865	866,421	17,670	178,826	705,805	4,867
Buffalo & Susquehanna	265	140,041	9,662	154,335	31,803	28,040	1,513	57,657	6,095	125,108	29,227	.....	2,600	26,627	- 17,591
Buffalo & Susquehanna, Pref.	91	43,067	11,675	56,875	6,235	26,703	549	23,050	2,317	58,854	1,979	— 113	1,100	- 3,492	5,739
Buffalo, Rochester & Pittsburgh	572	717,912	103,895	847,252	114,468	168,314	8,864	262,470	16,262	570,378	276,874	305	17,000	260,179	- 81,321
Buffalo, Rochester & Pittsburgh	46	7 ,729	13,607	93,787	9,883	17,630	654	38,477	2,309	68,953	24,834	.....	2,000	22,834	- 2,470
Canton, Cincinnati & Ohio	38	149,215	16,084	177,685	12,032	21,695	5,051	34,161	7,792	80,731	91,954	109	8,000	84,063	40,995
Carolina, Clinchfield & Ohio of S C	17	9, 9	1,730	10,864	418	69	939	2,440	488	4,354	6,510	.....	500	6,010	3,642
Central New England	276	235 535	34,177	281,812	59,832	19,045	1,376	69,311	2,237	151,791	131,521	102	9,000	122,623	17,493
Central Vermont	311	221,265	1 9,991	377,879	43,9 0	53,947	6,882	155,108	9,453	269,310	108,069	1,026	13,700	96,896	- 13,733
Charleston & Western Carolina	340	139,659	29,568	167,899	30,318	18,321	2,877	53,498	3,870	108,884	59,015	.....	5,000	54,015	14,113
Chesapeake & Ohio Lines	2,241	2,313,892	571,003	2 0,857	409,058	519,183	45,832	806,803	60,823	1,811,699	1,108,658	9,183	93,100	1,024,741	19,620
Chicago & Alton	1,095	845,507	396,612	1,338,728	198,061	253,155	40,070	446 569	31,273	969 068	369,660	- 2,136	36,500	331,024	1,743
Chicago & Eastern Illinois	1 75	1,066 02	267,367	1,3 1,992	172,949	257,806	27,401	442,199	30,857	941,212	416,780	910	38,500	377,370	— 33,592
Chicago & Erie	60	3 3,365	68 0 0	481,097	93 512	86,066	21,964	199,707	9,736	410,485	71,512	.....	16 0 0	55,062	— 20,985
Chicago & Northwestern	7 784	4,44 106	1,90 7	6,966,113	985 076	851,819	102,543	2,484,626	117,593	4,511,657	2,454,456	2,662	275,000	2,18 ,118	136,961
Chicago, Burlington & Quincy	9,674	5,301 06	2,118 06	8,0 1,80	967,156	1,251,880	146,307	2,322,666	180,443	4,898,4 1	3,186,384	— 23	264,412	2,9 1,739	10,007
Chicago Great Western	1,426	8 4,158	2 6,621	1,107,117	153,030	143,836	47,301	426,131	36,687	806, 85	400,832	134	33 037	3 8, 9	65,077
Chicago, Indianapolis & Louisville	3 9	6 ,747	30,376	3 5,340	36 60	57,901	7,211	109,472	7,713	219,107	90,133	1,150	13,900	77,383	58 909
Chicago, Indianapolis & Louisville Pref.	6 6	3 4,091	167,008	599,149	74,741	74,599	16,450	193,542	14,586	373,898	225,251	.....	23,500	201,751	3,808
Chicago, Milwaukee & Puget Sound	1,6 8	1,088 3 5	2 7,164	1,369,364	168,149	137,597	47,178	492,961	18,882	804,767	564,597	27,004	79,333	51 ,268	10,937
Chicago, Milwaukee & St Paul	7,811	3,3 3 0	1,1 6 174	5,9 6 67	1,109,469	8 3,596	116,098	2,257,062	96,888	4,463,113	1,499,154	15,470	240,563	1,274,061	- 64,116
Chicago, Peoria & St Louis	155	100,791	30,574	139,090	20,212	30,854	7,103	60,074	5,747	123,990	15,100	.....	4,300	10,800	7,883
Chicago, Rock Island & Pacific	7,471	3,510,773	1,8 7,987	5,697,410	914,113	719,658	157,189	2,049,707	140,878	3,981,345	1,716,065	10,633	206,775	1,498,678	- 17,148
Chicago, St Paul, Minneapolis & Omaha	1,543	871,642	475,5 8	1,4 3,785	2 3,692	137,004	29,815	486,903	28,837	905,751	518,034	2,330	67,803	45 ,671	- 150,197
Chicago, Terre Haute & Southeastern	381	134 000	19,150	156,368	24,055	22,210	2,785	44,989	6,692	100,731	55,637	286	8,700	47, 3	—
Cincinnati, New Orleans & Texas Pacific	337	662 105	147,630	849,035	72,717	165,354	19,878	226,510	16,800	501, 59	347,796	716	21,00	3 6,7 3	7
Cincinnati, Hamilton & Dayton	1,014	645,195	169,991	915,971	95,586	144,458	20,909	359,650	17,306	637,909	278,062	.....	40,816	237,246	1,043
Cincinnati, Southern	48	97,375	21,135	124,606	22,117	20,479	2,158	42,680	2,886	90,640	33,986	.....	5,700	28,286	653
Cleveland, Akron & Columbus	344	831,819	76,069	3, 8 001	50,846	53,951	4,075	106,890	5,477	221,239	106,761	.....	21,000	85,761	17,176
Cleveland, Cincinnati, Chicago & St Louis	1,010	1,766,949	742,301	2,743,121	296,885	376,818	70,956	952,856	49,920	1,747,435	995,686	— 1,457	100,000	894,229	211,845
Colorado & Southern	817	147,970	31,579	194,111	23,612	31,745	7,023	78,516	5,196	146,3 2	47,789	84	8,000	39,873	6,378
Colorado & Southern	1,194	503, 4	156,307	707,595	93,547	134,264	10,393	207,712	21,821	467,737	239,958	— 1,389	24,700	213,868	- 67,470
Colorado & Wyoming	102	193,610	63,144	268,731	43,042	30,010	4,945	76,931	8,300	163,129	105,602	394	5,141	100,855	- 16,452
Delaware & Hudson Co. & R. R. Lines	1 1	1,5 0,339	3 0,2 1	1,893,876	137,050	257,355	27,192	5 6,798	46,112	1,064,807	829,069	3,814	50,576	774,899	133,586
Delaware, Lackawanna & Western	7 0	2,1 5,489	75 074	3, 2,480	440,618	483,583	66,650	888,268	68,138	1,947,887	1,344,933	46,694	178,000	1, 3,047	165,977
Denver & Rio Grande	1,6 0	1,6 0,096	569 28	2,306,536	335,471	365,900	55,584	748,785	47,391	1,553,134	753,412	2,691	73 000	683,103	- 8,691
Denver, Northwestern & Pacific	3	4 0 1	33 00	12 ,8 5	15,013	15,001	2,139	36,665	3,147	71,995	50,872	.....	3,000	47,870	3,131
Detroit, Toledo & Ironton	3	68 78	30 07	105,551	20,332	13,608	2,012	31,284	2,449	69,715	35,836	— 83	8,100	26,913	— 83 36
Detroit, Toledo & Ironton	341	138 19	15 18	161,150	27,482	23,199	2,915	73,814	5,708	133,148	28,302	- 179	7,578	0,895	2,797
Detroit & Mackinac	1 1	1 1 873	26 33	1,046,738	87,173	57,633	871	148,650	9,227	303,854	742,884	4,040	41,168	704,746	- 42,165
Detroit, Monroe & Southern		1 1 1	3,13	1,063 05	97,841	72,707	2,235	143,294	10,905	3 6,982	736,023	10,643	18,38	703, 8	58,470
Duluth, South Shore & Atlantic		19 63	161 07	3 1,79	46 10	26,345	8,312	101,385	6,818	19 ,360	118 919	3 8	15 0 0	103 47	7,384
El Paso & Southwestern Co.		45 11	75,3 4	56 70	8 3 7	8,616	11,2 4	157,163	21,305	356,915	206,615	— 1,13	11,076	1 4, 6	— 24,736
Erie	1	79 7		3 5 4	80 8	146,873	3,952	22 ,8 9	14,340	468,932	369,652		16 5	3 , 7	13 657
Erie	1 3	3,207 7	8 1,053	4,36 ,518	673,000	712,302	93,084	1,339,8 0	81,730	2,900,396	1,462,13	10,570	163,0 6	1, 8,856	— 85 180
Fonda, Johnstown & Gloversville	1 3	11 07	7 1 7	1 8,0 5	55 57	47,913	3,889	9 ,5 4	8,341	207,954	6,011		15 60	9,158	— 17 750
Georgia & Florida	1 6	731 7	3 3,664	1,02 ,801	108 099	115 033	28,8 9	3 3,813	24,693	600,398	4 2,303	4,42	30 11	387,134	50,112
Georgia	7 7	22 061	78,931	321, 32	24,767	37,960	10, 72	116,104	7,455	196,558	1 4,664		2,100	1 2,564	5 ,372
Grand Rapids & Indiana	1 2	25 34	6 ,391	499 107	41,161	66,52	10,880	172,160	13 17	307 870	191 532	49	2 ,964	168 617	36,963
Great Northern	7 43	4 79	1	6,549 356	643,934	578,960	107,412	1,537,949	125,152	2,992,297	3,557,059	31,923	278 503	3,310,179	530,106
Gulf & Ship Island	3 7	11	3 176	168,578	23 174	30,317	2,896	42,939	8,116	107 73	60,846		3,716	57,130	6,805
Gulf, Colorado & Santa Fe	1	74	1 4	1,052, 5	193 966	144,600	26,961	370 659	28,6 3	768 78	283 367		38 61	1 7,606	— 30 880
Hocking Valley & West Side	1	7 617	3 84	114 1	15,168	9,610	1,784	33,111	3,165	63,198	51,713		4,116	47, 7	13 039
Illinois & Texas Central	2	45	15 44	66 0 7	56,113	68 55	18,6 2	203,7 4	18,6 3	365 7 4	30 331	— 1,047	14 5	3 6 99	50, 2
Illinois Central	1 1	3,34	1, 5,160	5 82 64	8 3,738	1,07 ,700	114 57	1,766,845	135 00	3,913 50	1,240 14	7,187	230 97	1,001 730	-276 687
Iowa Central	7	251,074	52,884	317 687	31,470	45,369	6,836	128,11	8,317	233,306	94,481	.....	9,648	84,433	13 054
Kanawha & Michigan	168			233,516	25,556	30,955	2,839	92,885	6,270	158,505	75,011	9,160	5,500	78,671	45,399
Kansas City Southern	2	5 4,3 8	141,3 3	780 150	79 501	103 754	27,097	259,973	28,7 2	499,05	281,138		34,61	246,5 6	- 61,768
Lake Erie & Western	6	3 0 0	9 7	5 7,698	5 ,3 3	78,633	13,836	174,881	10,725	336 357	171,341		19,886	151,455	27,287
Lake Shore & Michigan Southern	1	3,70 ,9 7	1,106,659	4,8 - 141	503 700	525,474	74,857	1,311,640	72,639	2,487,810	1,900,331	4,475	135,000	1,769,805	3 4,4 8
Lehigh & Hudson River	6	117,775	5,2 4	125,302	20,386	16,349	1,165	40,767	4,583	83,250	42,052	.....	3,500	38 552	— 2,409
Lehigh Valley	1,420	2,810,023	4 7 186	3,413,193	385,300	601,065	89,517	1,118,256	64,698	2,258,926	1,154 67	— 13,399	105,700	1,035,668	21,803
Long Island	398	298,107	697,016	1,035,767	109,210	115,586	13,448	432,986	21,199	692,429	343,338	94,859	53,553	384,614	81,929

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF OCTOBER, 1911—(CONTINUED.)

Name of road	Mileage	Maintenance of Way and Structures	Maintenance of Equipment	Traffic	Transportation	Miscellaneous operations	General	Total	Taxes	Net operating revenue (or deficit)	Outside operations, net	Taxes	Operating income (or loss)	Increase (or dec.) comp. with last year

REVENUES AND EXPENSES OF RAILWAYS.

THREE MONTHS OF FISCAL YEAR, 1912.

Name of road.	Mileage operated at end of period.	Operating revenues			Maintenance		Operating expenses				Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
		Freight.	Passenger.	Total, inc. misc.	Way and structures.	Of equipment.	Traffic.	Transportation.	General.	Total.					
Alabama & Vicksburg	142	$223,253	$134,748	$387,246	$66,357	$76,786	$11,315	$128,302	$15,804	$298,564	$88,682	$85	$13,800	$74,967	—$48,875
Alabama Great Southern	309	691,821	331,343	1,118,949	123,372	235,205	31,372	342,093	25,768	757,810	361,139	—699	44,544	315,895	17,287
Arizona Eastern	366[1]	349,871	94,168	471,807	72,156	32,911	7,406	125,169	19,048	256,690	215,117	694	21,960	193,851	37,876
Atchison, Topeka & Santa Fe	7,613[2]	13,939,197	5,775,698	21,415,054	3,784,204	3,522,110	454,692	6,109,546	472,393	14,342,945	7,072,109	.....	866,882	6,205,227	—1,556,464
Atlantic Coast Line	4,501[3]	4,536,400	1,872,639	6,901,957	1,016,532	1,147,961	119,480	2,470,134	211,655	4,965,762	1,936,215	.....	321,000	1,615,215	114,443
Baltimore & Ohio System	4,433	18,073,720	4,425,570	23,890,972	3,115,882	4,214,918	474,098	7,719,437	487,464	16,011,799	7,879,173	—138,137	726,287	7,014,749	—108,401
Baltimore & Ohio Chicago Terminal	77	—	8,903	406,819	106,568	49,047	2,913	157,256	16,759	332,543	74,276	2,496	54,619	22,153	—10,928
Bangor & Aroostook	627[4]	600,697	191,440	841,892	144,513	98,724	12,236	240,128	37,590	533,191	308,701	.....	27,750	280,951	41,500
Belt Ry. Co. of Chicago	21	—	—	664,332	46,279	76,632	1,984	226,658	17,837	369,390	294,942	.....	16,500	278,442	—7,912
Bessemer & Lake Erie	93	2,759,196	130,448	2,917,907	246,485	416,083	29,648	606,829	24,326	1,323,371	1,594,531	.....	21,000	1,573,531	236,616
Boston & Maine	2,224[5]	6,396,884	5,054,082	12,398,266	1,934,641	1,561,305	129,812	5,262,077	263,278	9,151,113	3,147,153	73,540	523,058	2,697,635	—342,002
Buffalo & Susquehanna R. R.	265	410,561	28,881	456,710	92,728	81,595	4,214	159,212	19,615	357,364	99,346	.....	7,800	91,546	19,582
Buffalo & Susquehanna R.	91	126,863	37,281	169,617	17,405	81,186	1,571	68,769	7,849	179,780	- 10,163	- 244	4,400	—14,607	- 40,996
Buffalo, Rochester & Pittsburgh	572	2,114,088	341,779	2,536,264	396,785	457,028	30,132	768,441	49,711	1,703,097	834,167	1,029	51,000	784,196	—149,933
Butte, Anaconda & Pacific	46	[illegible]	39,283	178,048	28,655	52,140	[illegible]908	115,857	7,035	208,565	7[illegible]483	.....	6,000	66,483	—24,706
Canadian Pacific Lines	236	457,305	48,063	511,035	35,515	65,337	15,534	10[illegible]037	23,303	241,776	279,309	1,137	22,000	258,446	134,813
Canadian Pacific Lines in Me.	7	[illegible]435	4,307	29,482	1,345	226	2,824	7,456	1,279	13,121	16,161	.....	1,500	14,661	8,505
Central New England	276	653,880	101,357	793,779	155,350	59,257	3,846	205,249	7,155	430,857	362,922	203	27,000	336,125	80,600
Central Vermont	471	656,794	364,344	1,110,690	138,010	144,706	23,759	469,511	24,924	800,970	309,720	3,091	35,700	277,111	52,188
Charleston & Western Carolina	340	350,552	160,148	453,862	87,715	60,978	8,123	151,984	13,090	320,390	133,472	.....	15,000	118,472	34,127
Chesapeake & Ohio Lines	2,[illegible]	6,[illegible]84[illegible]	1,638,871	8,687,078	1,105,990	1,572,497	158,165	2,458,836	186,359	5,481,777	3,205,301	17,351	279,300	2,943,352	5,273
Chicago & Alton	1,0[illegible]37	2,345,022	1,230,045	4,056,083	629,885	639,603	116,791	1,306,383	94,041	2,786,703	1,269,380	—8,441	109,500	1,151,439	—20,374
Chicago & Eastern Illinois	1,[illegible]28	2,86[illegible]	82[illegible]89	3,[illegible]480	486,049	699,342	[illegible]096	1,[illegible]94,910	122,792	2,683,189	1,275,291	- 3,765	115,500	1,156,026	—42,487
Chicago & Erie	[illegible]69	[illegible]0,[illegible]5	20[illegible]41	1,[illegible]1,038	233,856	[illegible]21,94[illegible]	63,618	576,431	[illegible]8,[illegible]45	1,147,744	[illegible]03,294	.....	43,838	159,456	—65,121
Chicago & North Western	7,[illegible]53[illegible]	[illegible],[illegible]7[illegible]8	5,[illegible]1,[illegible]46	19,[illegible]7,[illegible]65	2,851,[illegible]7[illegible]	2,430,063	36[illegible],001	7,363,[illegible]13	351,[illegible]01	13,368,653	6,504,932	9,990	805,000	5,669,922	—75,072
Chicago, [illegible] & Quincy	[illegible],[illegible]4[illegible]	13,[illegible]0[illegible],[illegible]3	6,[illegible]46,[illegible]80[illegible]	[illegible],[illegible]44,[illegible]78	3,381,[illegible]15	3,8[illegible],987	411,695	6,8[illegible],194	557,611	15,036,[illegible]01	8,108,926	25,237	793,[illegible]37	7,290,452	303,514
Chicago Great Western	1,[illegible]4[illegible]	[illegible],[illegible]4[illegible]47	[illegible]88,[illegible]81	3,[illegible]71,[illegible]06	472,[illegible]25	464,967	143,775	1,[illegible]83,[illegible]52	106,340	[illegible],[illegible]86,109	985,457	493	99,111	866,839	45,973
Chicago, Indiana & Southern	[illegible]0[illegible]	[illegible]7,[illegible]50	91,[illegible]40	8[illegible],611	129,[illegible]42	183,181	[illegible]3,610	3[illegible],110	[illegible]4,576	685,959	20[illegible],652	2,012	41,700	162,964	98,479
Chicago, Indianapolis & Louisville	[illegible]4[illegible]	1,[illegible]7[illegible],[illegible]50	477,[illegible]83	1,[illegible]9[illegible],351	227,388	235,[illegible]32	54,457	560,140	46,502	1,[illegible]18,769	640,582	.....	67,500	573,082	— 6,510
Chicago, Milwaukee & Puget Sound	[illegible]6[illegible]0	3,[illegible]8[illegible],[illegible]33	743,[illegible]05	4,[illegible]64[illegible],[illegible]8	[illegible]92,574	393,551	160,356	1,[illegible]39,106	51,340	[illegible],[illegible]90,[illegible]27	1,737,501	68,581	237,999	1,568,083	- 18,420
Chicago, [illegible] & St. Paul	[illegible],[illegible]1	10,[illegible]84,[illegible]03	4,[illegible]91,[illegible]26	16,[illegible]01,[illegible]65	3,055,513	2,317,872	315,119	6,354,111	283,411	12,330,036	4,171,[illegible]39	34,081	720,[illegible]31	3,486,089	—1,333,103
Chicago, Peoria & St. Louis	[illegible]8[illegible]	[illegible]0[illegible],[illegible]80[illegible]	105,203	444,841	[illegible]0,607	89,351	[illegible]1,939	178,959	16,575	367,431	67,110	.....	12,900	54,210	1,269
Chicago, [illegible] & Pacific	7,[illegible]8[illegible]1	[illegible],[illegible]64,[illegible]74	5,[illegible]0[illegible],718	16,[illegible]0[illegible],481	2,[illegible]83,511	2,[illegible]53,717	473,[illegible]35	6,[illegible]37,[illegible]67	419,349	11,[illegible]67,[illegible]79	4,[illegible],[illegible]02	—30,199	[illegible]70,[illegible]05	3,[illegible]73,398	—476,586
Chicago, St. Paul, Minneapolis & Omaha	1,7[illegible]	[illegible],[illegible]0[illegible],[illegible]47	1,343,[illegible]44	[illegible],[illegible]05,[illegible]40	717,[illegible]57	464,[illegible]79	81,[illegible]69	1,[illegible]11,[illegible]85	89,[illegible]07	2,[illegible]67,[illegible]97	1,[illegible]37,[illegible]43	5,506	193,841	938,908	—422,524
Chicago, [illegible] & Western Indiana	[illegible]7[illegible]	[illegible]88[illegible]6	[illegible]0,[illegible]56	[illegible]58,[illegible]37	[illegible]75,[illegible]66	[illegible]75,[illegible]76	[illegible]8,[illegible]35	[illegible]31,[illegible]61	[illegible]1,[illegible]80	[illegible]31,[illegible]17	[illegible]4[illegible],[illegible]40	[illegible]0	[illegible]6,[illegible]00	[illegible]0,[illegible]32	—
Cincinnati, New Orleans & Texas Pacific	[illegible]37	1,[illegible]70,[illegible]55	468,[illegible]91	[illegible],[illegible]06,[illegible]05	[illegible]17,[illegible]70	[illegible]36,[illegible]74	58,[illegible]51	666,[illegible]70	51,608	1,[illegible]29,[illegible]73	[illegible]76,[illegible]32	1,[illegible]21	65,[illegible]00	[illegible]1,[illegible]53	—40,168
Cincinnati, Hamilton & Dayton	1,[illegible]03[illegible]	1,[illegible]95,[illegible]9	5[illegible],[illegible]98	[illegible]76,644	[illegible]97,[illegible]60	[illegible]4,[illegible]16	58,[illegible]08	1,[illegible]88,[illegible]70	56,[illegible]31	1,[illegible]99,[illegible]35	[illegible]67,[illegible]19	.....	116,853	750,[illegible]67	182,072
Cincinnati, Indianapolis & Western	[illegible]45	[illegible]63,[illegible]07	[illegible]7,[illegible]34	[illegible]58,[illegible]92	[illegible]69,[illegible]60	[illegible]9,[illegible]06	[illegible]8,[illegible]79	[illegible]23,[illegible]19	[illegible]8,[illegible]87	[illegible]79,[illegible]01	[illegible]8,[illegible]91	.....	16,[illegible]00	[illegible]2,[illegible]91	—13,226
Cincinnati, Lebanon & Northern	[illegible]44	[illegible]47,[illegible]91	[illegible]4,[illegible]69	[illegible]58,[illegible]49	[illegible]61,[illegible]70	[illegible]5,[illegible]42	[illegible]1,[illegible]84	[illegible]10,[illegible]55	[illegible]6,[illegible]00	[illegible]65,[illegible]51	[illegible]05,[illegible]98	.....	[illegible]0,[illegible]00	[illegible]45,[illegible]98	— 16,845
Cincinnati, Northern & Chicago, Ohio & St. Louis	[illegible],[illegible]0[illegible]	[illegible],[illegible]1[illegible],[illegible]79	[illegible],[illegible]75,[illegible]07	[illegible],[illegible]13,[illegible]76	[illegible]85,[illegible]08	[illegible],[illegible]05,[illegible]80	[illegible]55,[illegible]03	[illegible],[illegible]25,[illegible]19	[illegible]58,[illegible]35	[illegible],[illegible]88,[illegible]67	[illegible],[illegible]67,[illegible]83	[illegible],[illegible]77	[illegible]90,[illegible]00	[illegible],[illegible]78,[illegible]94	[illegible],[illegible]66,[illegible]17
Cincinnati, [illegible]	[illegible]3[illegible]	[illegible]7[illegible]6[illegible]	[illegible]0[illegible],[illegible]15	[illegible]30,[illegible]44	[illegible]7,[illegible]76	[illegible]9,[illegible]69	[illegible]1,[illegible]66	[illegible]09,[illegible]13	[illegible]6,[illegible]00	[illegible]08,[illegible]39	[illegible]1,[illegible]74	[illegible]59	[illegible]4,[illegible]00	[illegible]7,[illegible]46	[illegible]0,[illegible]40
Cincinnati, [illegible]	[illegible]1[illegible]	[illegible],[illegible]48,[illegible]13	[illegible]66,[illegible]92	[illegible]87,[illegible]59[illegible]	[illegible]6,[illegible]92	[illegible]5,[illegible]22	[illegible],[illegible]51	[illegible]96,[illegible]19	[illegible],[illegible]18	[illegible]06,[illegible]02	[illegible]70,[illegible]90	.....	[illegible]9,[illegible]00	[illegible]61,[illegible]50	[illegible]7,[illegible]49
Cincinnati, [illegible]	[illegible]3[illegible]	[illegible]3[illegible],[illegible]03	[illegible]08,[illegible]64	[illegible]9[illegible],638	57,[illegible]21	48,069	8,[illegible]42	97,[illegible]87	7,978	[illegible]8,697	100,941	1,914	24,751	781,044	—28,047
Indiana, [illegible] & Western	44[illegible]	[illegible]5,[illegible]13	[illegible]0,[illegible]6[illegible]	[illegible]1,[illegible]700	84,[illegible]93	57,007	8,[illegible]53	[illegible]0[illegible],599	[illegible]6,[illegible]48	[illegible]69,[illegible]00	[illegible]3,[illegible]00	[illegible]21	[illegible]3,584	60,037	[illegible],[illegible]98
Illinois & Iowa Railroad	[illegible]9[illegible]	[illegible],[illegible]17,[illegible]47	[illegible]8,[illegible]30	[illegible],[illegible]14,[illegible]07	[illegible]06,[illegible]09	[illegible]76,[illegible]06	[illegible],[illegible]95	[illegible]31,[illegible]83	[illegible]9,[illegible]69	[illegible]18,[illegible]62	2,[illegible]95,[illegible]45	15,593	[illegible]1,[illegible]33	1,[illegible]59,[illegible]05	—4[illegible],[illegible]22
Illinois Southern	[illegible]3[illegible]	[illegible],[illegible]04,[illegible]76	[illegible],[illegible]4[illegible],[illegible]05	[illegible],[illegible]8[illegible],[illegible]4	[illegible]30,[illegible]67	[illegible]27,[illegible]40	6,[illegible]86	[illegible]30,[illegible]42	[illegible]5,[illegible]63	[illegible],[illegible]09,[illegible]96	[illegible]1,[illegible]98	[illegible]72	[illegible]4,[illegible]93	[illegible]34,[illegible]23	[illegible]7,[illegible]53
Indianapolis Southern	[illegible]6[illegible]	[illegible]48,[illegible]53	[illegible]0[illegible],[illegible]79	[illegible]0[illegible],[illegible]17	[illegible]44,[illegible]35	[illegible]3[illegible],[illegible]40	[illegible]1,[illegible]84	[illegible]0[illegible],[illegible]99	[illegible]1,[illegible]80	[illegible]46,[illegible]33	[illegible]4,[illegible]20	[illegible]1,[illegible]74	[illegible]6,[illegible]00	[illegible]1,[illegible]46	[illegible]0,[illegible]74
Iowa Central	[illegible],[illegible]4[illegible]	[illegible],[illegible]0[illegible],[illegible]4[illegible]	[illegible],[illegible]4[illegible],[illegible]4[illegible]	[illegible],[illegible]7[illegible],[illegible]4[illegible]	[illegible],[illegible]53,[illegible]51	[illegible],[illegible]39,[illegible]71	[illegible]5,[illegible]04	[illegible],[illegible]33,[illegible]64	[illegible]4,[illegible]80	[illegible],[illegible]39,[illegible]21	[illegible],[illegible]04,[illegible]23	[illegible],[illegible]77	[illegible]0,[illegible]00	[illegible],[illegible]7[illegible],[illegible]00	[illegible],[illegible]0[illegible],[illegible]0[illegible]
Kanawha & Michigan	[illegible]0[illegible]	[illegible]3[illegible]	[illegible]7[illegible]	[illegible]0,[illegible]04	[illegible]0,[illegible]74	[illegible]6,[illegible]52	[illegible],[illegible]86	[illegible]33,[illegible]85	[illegible],[illegible]77	[illegible]46,[illegible]33	[illegible]3,[illegible]71	.....	[illegible],[illegible]75	[illegible],[illegible]96	[illegible],[illegible]74
Kansas City Southern	[illegible],[illegible]4[illegible]	[illegible],[illegible]0[illegible],[illegible]4[illegible]	[illegible],[illegible]4[illegible],[illegible]4[illegible]	[illegible],[illegible]7[illegible],[illegible]4[illegible]	[illegible],[illegible]53,[illegible]51	[illegible],[illegible]39,[illegible]71	[illegible]5,[illegible]04	[illegible],[illegible]33,[illegible]64	[illegible]4,[illegible]80	[illegible],[illegible]39,[illegible]21	[illegible],[illegible]04,[illegible]23	[illegible],[illegible]77	[illegible]0,[illegible]00	[illegible],[illegible]7[illegible],[illegible]00	[illegible],[illegible]0[illegible],[illegible]0[illegible]
Lake Erie & Western	[illegible]0[illegible]	[illegible]3[illegible]	[illegible]7[illegible]	[illegible]0,[illegible]04	[illegible]0,[illegible]74	[illegible]6,[illegible]52	[illegible],[illegible]86	[illegible]33,[illegible]85	[illegible],[illegible]77	[illegible]46,[illegible]33	[illegible]3,[illegible]71	.....	[illegible],[illegible]75	[illegible],[illegible]96	[illegible],[illegible]74
Lehigh & Hudson River	[illegible]0[illegible]	[illegible]3[illegible]	[illegible]7[illegible]	[illegible]0,[illegible]04	[illegible]0,[illegible]74	[illegible]6,[illegible]52	[illegible],[illegible]86	[illegible]33,[illegible]85	[illegible],[illegible]77	[illegible]46,[illegible]33	[illegible]3,[illegible]71	.....	[illegible],[illegible]75	[illegible],[illegible]96	[illegible],[illegible]74
Lehigh Valley	[illegible],[illegible]4[illegible]	[illegible],[illegible]0[illegible],[illegible]4[illegible]	[illegible],[illegible]4[illegible],[illegible]4[illegible]	[illegible],[illegible]7[illegible],[illegible]4[illegible]	[illegible],[illegible]53,[illegible]51	[illegible],[illegible]39,[illegible]71	[illegible]5,[illegible]04	[illegible],[illegible]33,[illegible]64	[illegible]4,[illegible]80	[illegible],[illegible]39,[illegible]21	[illegible],[illegible]04,[illegible]23	[illegible],[illegible]77	[illegible]0,[illegible]00	[illegible],[illegible]7[illegible],[illegible]00	[illegible],[illegible]0[illegible],[illegible]0[illegible]
Long Island	[illegible]0[illegible]	[illegible]3[illegible]	[illegible]7[illegible]	[illegible]0,[illegible]04	[illegible]0,[illegible]74	[illegible]6,[illegible]52	[illegible],[illegible]86	[illegible]33,[illegible]85	[illegible],[illegible]77	[illegible]46,[illegible]33	[illegible]3,[illegible]71	.....	[illegible],[illegible]75	[illegible],[illegible]96	[illegible],[illegible]74
Louisiana & Arkansas	[illegible],[illegible]4[illegible]	[illegible],[illegible]0[illegible],[illegible]4[illegible]	[illegible],[illegible]4[illegible],[illegible]4[illegible]	[illegible],[illegible]7[illegible],[illegible]4[illegible]	[illegible],[illegible]53,[illegible]51	[illegible],[illegible]39,[illegible]71	[illegible]5,[illegible]04	[illegible],[illegible]33,[illegible]64	[illegible]4,[illegible]80	[illegible],[illegible]39,[illegible]21	[illegible],[illegible]04,[illegible]23	[illegible],[illegible]77	[illegible]0,[illegible]00	[illegible],[illegible]7[illegible],[illegible]00	[illegible],[illegible]0[illegible],[illegible]0[illegible]
Louisiana Western	[illegible]0[illegible]	[illegible]3[illegible]	[illegible]7[illegible]	[illegible]0,[illegible]04	[illegible]0,[illegible]74	[illegible]6,[illegible]52	[illegible],[illegible]86	[illegible]33,[illegible]85	[illegible],[illegible]77	[illegible]46,[illegible]33	[illegible]3,[illegible]71	.....	[illegible],[illegible]75	[illegible],[illegible]96	[illegible],[illegible]74

REVENUES AND EXPENSES OF RAILWAYS.

THREE MONTHS OF FISCAL YEAR, 1911 (CONCLUDED).

	Mileage				Operating expenses					Net operating revenue (or deficit).	Out side operations, net.	Taxes.	Operating income (or loss).	Increase (or decrease) compared with last year.
	Operated.	Passenger.	Freight.	Miscellaneous.	Maintenance of ways and structures.	Maintenance of equipment.	Traffic.	Transportation.	General.	Total.					

COURT NEWS.

The United States Supreme Court in an opinion by Justice Lurton has affirmed the judgment of the Supreme Court of Kentucky imposing a tax on all the steamships of the Southern Pacific Railroad Company that are in use for transporting passengers and freight, exempting only barges, lighters and the craft that remain permanently in certain ports. The Southern Pacific Railroad is a corporation organized under the laws of the state of Kentucky, and under special act of the Kentucky legislature which chartered it the company is required to retain an office and maintain a domicile in the state. The court holds that on such movable property as steamships, which have no regular domicile, the property shall be subject to taxes under the laws of the domicile of the owner.

The Commerce Court has ruled that the Chicago Junction Railways is a common carrier, subject to the regulation of the Interstate Commerce Commission, but that the Union Stock Yards & Transit Company of Chicago, and the Union Junction Railways & Union Stock Yards Company are not common carriers. The court says that the Interstate Commerce Commission, insofar as it held the lessor company merely as lessor to be a common carrier, was not justified. The court says that the Stock Yards Company cannot be treated as a common carrier merely because it receives two-thirds of the net revenues of the Junction company, or because its auditor acts for both companies. Judge Archibald dissented from the finding that the Junction railway was a common carrier. In his opinion the loan of tracks of the Junction railway to trunk line carries, hauling by their own motive power through trains, east or west, is not exercising any of the functions of a common carrier, even though it take tolls therefor, any more than a turnpike road on which people travel, or a toll bridge, or a canal which, without doing any towing, merely maintains a waterway for public use is a common carrier.

The Supreme Court Overrules the Commission in the Elevator Cases.

The United States Supreme Court has overruled the Interstate Commerce Commission in its refusal to permit railways to make an allowance for the elevation of grain at Missouri river points.

The chief contention that first brought the case before the commerce commission was that an allowance made by the Union Pacific to Peavey & Co., grain dealers and operators of elevators, amounted to a rebate.

The original complaint was made by the Chicago Great Western, the C., B. & Q. and the A., T. & S. F. The petitioners alleged that the Union Pacific entered into a contract with Peavey & Co., under which the latter company erected grain elevators at Council Bluffs, Iowa, and at Kansas City for the transfer of grain for the public from incoming cars of the Union Pacific to outgoing cars of the connecting lines at these terminal points, and for this service the Union Pacific agreed to pay Peavey & Co. 1¼ cents per 100 lbs.

The complaining railways alleged that the facts were that "the elevators of Peavey & Co. were not built for such purposes, and never had, to any considerable extent, if at all, thus transferred grain for the public, but were built and had been used solely and exclusively for their own use in the grain trade."

The commission held that Peavey & Co. would profit unjustly by the allowance of the Union Pacific. The Circuit Court on appeal overruled the commission.

In its decision the Supreme Court held that the order of the commission reducing the allowance for elevation, to the cost of the service, namely, three-fourths of a cent, should be allowed to stand. The court also allowed to stand the so-called Peavey order of 1909, in so far as it confined the allowance to grain reshipped within ten days. Except as to these two points, the decree of the United States Circuit Court for Western Missouri in regard to the elevator charges was affirmed.

Associate Justices McKenna and Hughes dissented from the above opinion.

In announcing the opinion of the court Justice Holmes made the remark that "the law does not attempt to equalize the fortunes of men."

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

G. M. Bosworth, vice-president of the Canadian Pacific at Montreal, Que., will hereafter have supervision of the telegraph, the hotel, and the sleeping, dining, and parlor car departments, and the chiefs of these several departments will report to him.

David R. Burbank, who has been elected secretary of the Illinois Central, with office at New York City, as has been announced in these columns was born on September 15, 1871, at Henderson, Ky., and was educated at the University of Minnesota. He began railway work on May 1, 1894, as a clerk on the Illinois Central and in November, 1906, he was appointed assistant secretary of that road, which position he held at the time of his recent appointment as secretary, as above noted.

William Burnett Scott, whose election as vice-president and general manager of the Union Pacific, with office at Omaha, Neb., was recently announced in these columns, was born August 18, 1862, at Hamilton, Ont. He was educated at Walkers' Academy at Guelph, Ont., and began railway work in 1873 as a messenger boy on the Grand Trunk Railway at Guelph. He was then consecutively freight clerk of the same road at Guelph and telegraph operator at Toronto; train despatcher of the Canadian Pacific at Winnipeg; chief despatcher and trainmaster on construction of the Great Northern between Minot, N. D., and Helena, Mont., and superintendent of telegraph of the Chicago Great Western. For seven years from 1890 he was trainmaster of the Atchison, Topeka & Santa Fe at Chicago, and was then for five years superintendent of the Gulf, Colorado & Santa Fe at Temple, Tex. He has been with the Harriman Lines since 1902, first as superintendent of the Galveston, Harrisburg & San Antonio at San Antonio, Tex. In June, 1904, he was appointed general superintendent of the Houston & Texas Central, and a year later was appointed assistant director of maintenance and operation of the Harriman Lines, with office at Chicago. Following the recent reorganization of the Harriman Lines he was chosen vice-president and general manager of the Union Pacific as above.

W. B. Scott.

Operating Officers.

E. E. Stoupt has been appointed trainmaster of the Southern division of the Chicago Great Western, with office at Des Moines, Iowa.

G. V. Thompson has been appointed car distributor of the Bangor & Aroostook with office at Bangor, Maine, succeeding J. H. Cavanaugh, transferred to other duties.

W. T. Hall, assistant superintendent of the Houston & Texas Central at Houston, Tex., has been appointed division superintendent, with office at Ennis, Tex., succeeding M. Sheehan, resigned.

F. S. Rockwell, trainmaster of the Chesapeake & Ohio at St. Albans, W. Va., has been appointed superintendent of the Cincinnati division, with office at Covington, Ky. W. F. Echols succeeds Mr. Rockwell.

D. J. Malone, assistant superintendent of the Southern Pacific at Odgen, Utah, has been appointed assistant superintendent of the Utah division of the Oregon Short Line, with office at

Salt Lake City, Utah, succeeding George Ross, assigned to other duties.

L. K. Marr, general yardmaster of the Pennsylvania Railroad at New York, has been appointed trainmaster, with office at New York, succeeding H. C. Bixler promoted, and his former position has been abolished. C. D. Kober, instructor at New York, has been appointed assistant trainmaster, succeeding to the duties of Mr. Marr.

L. H. Phetteplace, superintendent of the Carolina, Clinchfield & Ohio, at Erwin, Tenn., has been appointed general superintendent in charge of operation and maintenance, with office at Erwin, and the master mechanic and car service agent who have heretofore reported to the general manager will, in future, report to the general superintendent.

James A. McCrea, general superintendent of the Long Island Railroad at New York City, has been appointed general manager, succeeding to the duties as general manager, previously performed by President R. Peters. H. W. Thornton, assistant general superintendent at Long Island, succeeds Mr. McCrea. A portrait of Mr. Thornton and a sketch of his railway career were published in the *Railway Age Gazette* of March 3, 1911, p. 431.

C. Christie, superintendent of the St. Lawrence division of the New York Central & Hudson River with office at Watertown, N. Y., who was recently granted leave of absence on account of ill health, as has been announced in these columns, has been appointed special representative of the transportation department, with headquarters at Albany, and will perform such duties as may be assigned to him by P. E. Crowley, assistant general manager, at Albany.

Guy Adams, manager of mail traffic of the Chicago, Rock Island & Pacific, the St. Louis & San Francisco and the Chicago & Eastern Illinois, effective January 1, has been appointed manager of mail traffic of all the Frisco Lines, including the two latter roads and the St. Louis, Brownsville & Mexico, the New Orleans, Texas & Mexico, the Fort Worth & Rio Grande, the Beaumont, Sour Lake & Western, the Orange & Northwestern, the Louisiana Southern and the Paris & Great Northern, with offices at Chicago, St. Louis and Washington.

H. B. Green, who has been appointed superintendent of the Baltimore & Ohio, at Wheeling, W. Va., began railway work on June 1, 1880, on the Cleveland, Lorain & Wheeling division of the Baltimore & Ohio at Medina, Ohio, and four years later he became telegraph operator at the same place. In April, 1887, he was promoted to agent and operator, and in May of the following year was again promoted to agent and yardmaster at Ulrichsville, and in October, 1898, he was transferred to Cleveland in the same capacity. On December 1, 1901, he was appointed general yardmaster at Cleveland, and was later division agent, and then assistant trainmaster. In April, 1906, he was appointed trainmaster of the Cleveland division, of the same road. Mr. Green was promoted to assistant superintendent at Cleveland on May 25, 1911, which position he held at the time of his recent appointment as superintendent, as above noted.

Traffic Officers.

J. C. Williams has been appointed traffic manager of the Akron, Canton & Youngston, with office at Akron, Ohio.

James W. Flannery has been appointed commercial agent of the Georgia Southern & Florida, with office at Cincinnati, Ohio, succeeding George H. Wilcox, promoted.

W. J. Lloyd, who has been acting general agent at Denver, has been appointed traveling agent at that place.

Walter E. Blachley has been appointed district agent of the freight and passenger departments of the Union Line of the Pennsylvania Lines, with office at Winnipeg, Man. Keith Watson has been appointed passenger and freight solicitor, with office at Winnipeg.

Ingersoll Goodwin, city passenger agent of the Chicago & Alton and the Toledo, St. Louis & Western at Chicago, has been appointed special passenger agent, with office at Chicago, succeeding H. A. Hilbourne, resigned. H. A. Crowe succeeds Mr. Goodwin.

G. P. Molloy has been appointed traveling freight agent of the Texas & Pacific, with office at New Orleans, La. W. M. Bottorff, soliciting freight agent of the Frisco Lines at Dallas, Tex., has been appointed soliciting freight agent of the Texas & Pacific, with office at Dallas.

E. C. Runte, city passenger agent of the Louisville & Nashville at New Orleans, La., has been appointed district passenger agent, with office at New Orleans. The office of division passenger agent at New Orleans, from which J. K. Ridgely has recently been promoted to assistant general passenger agent, has been abolished.

C. S. Bather, assistant to the freight traffic manager of the St Louis & San Francisco at St. Louis, Mo., has been appointed general freight agent of the Texas City Transportation Company and the Texas City Terminal Company, with office at Texas City, Tex., succeeding R. E. Tipton, resigned to accept service with another company.

George H. Clark has been appointed division freight agent of the New York Central & Hudson River and the West Shore, with office at Utica, N. Y., succeeding Angus S. Gamble, Malone, N. Y., assigned to other duties, and Wreford L. McCarty has been appointed division freight agent at Corning, N. Y., succeeding Edward F. Kershner, resigned.

Garland Tobin, traveling passenger agent of the International & Great Northern at Houston, Tex., has been appointed southwestern passenger agent of the Missouri Pacific and the St. Louis, Iron Mountain & Southern, with office at San Antonio, Tex., succeeding W. E. Fitch, resigned to become district passenger agent of the International & Great Northern at San Antonio.

Herbert Thompson, who has been appointed assistant general freight agent of the Erie Railroad, with office at Buffalo, N. Y., as has been announced in these columns, was born on February 6, 1880, at New York City, and was educated at St. Paul's School, Concord, N. H. He began railway work in September, 1897, with the Erie Railroad and held various positions in the general freight department, until he became chief clerk in October, 1904. He was promoted to chief of tariff bureau in 1907, and two years later was made assistant to the general freight agent, which position he held at the time of his recent appointment as assistant general freight agent of the same road.

Arthur S. Learoyd, who was appointed general freight agent of the Delaware, Lackawanna & Western, with office at New York City, as has been announced in these columns, was born on August 14, 1873, at Taunton, Mass. He graduated from Harvard University in 1895, and in July of that year began railway work with the Fitchburg Railroad, now a part of the Boston & Maine, at Worcester, Mass. From 1895 to 1898, he was in the local station service at Worcester, Mass., and from 1899 to 1900 was traveling freight agent. He was appointed chief clerk to the traffic manager of the Delaware, Lackawanna & Western in January, 1901, and the following May was appointed division freight agent of the same road, and since 1907 was assistant general freight agent of that company.

Robert D. Pusey, whose appointment as general passenger agent of the Louisville & Nashville, with office at Louisville, Ky., [illegible] was born February 28, [illegible] and began railway work in April, 1893, with the Pittsburgh, [illegible] when that road was [illegible] the same changed to the Northern Ohio, he was transferred to Indianapolis, where [illegible] the accounting department. For three years

from January, 1901, he was in the office of the general passenger agent, and he was then appointed chief clerk. He left the Lake Erie & Western to become assistant general passenger agent of the Louisville & Nashville in September, 1910, from which office he has just been promoted.

John S. Wood, whose appointment as assistant general freight agent of the Lehigh Valley, with office at New York, has been announced in these columns, began railway work in 1888 in the division freight office of the Grand Trunk at Hamilton, Ont. He held various clerical positions at that place and was then transferred to Montreal, Que. In December, 1892, he went to the Lehigh Valley as a clerk in the freight department, and from February, 1899, to January, 1904, was soliciting freight agent, then division freight agent of that road at Buffalo, N. Y. From May, 1906, to August, 1910, he was assistant general freight agent of the Lehigh Valley at New York, and was then out of railway work to November, 1911, when he returned to the service of the Lehigh Valley and resumed his former position as assistant general freight agent.

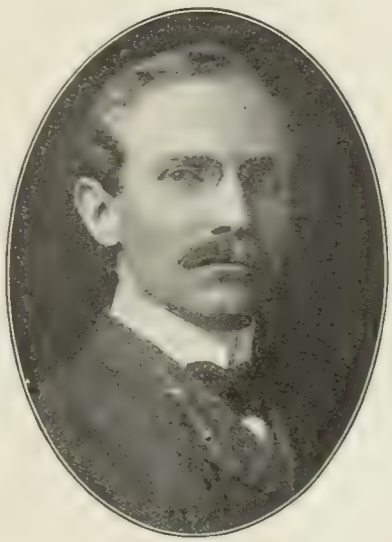
John H. Crawford, whose appointment as freight traffic manager of the Delaware, Lackawanna & Western, with office at New York City, as has been announced in these columns, was born on December 23, 1861, and was educated in the common schools of Burlington, Iowa. He began railway work in 1876 in the operating and traffic departments of the Chicago, Burlington & Quincy, and from 1886 to 1891 he was contracting freight agent of the same road at St. Louis, Mo. He was then appointed general agent of the Lackawanna line at the same place, and from 1897 to July, 1900, was general manager of the same line at Chicago. From July, 1900, to March, 1903, he was general eastern freight agent of the Delaware, Lackawanna & Western, at New York. Mr. Crawford was appointed general freight agent of the same road in March, 1903, and at the time of his recent appointment was assistant freight traffic manager of that road at New York.

William F. Griffitts, whose appointment as assistant general passenger agent of the Delaware, Lackawanna & Western, with office at New York City, has been announced in these columns, was born on March 2, 1871, at Philadelphia, Pa., and was educated in the common schools. He began railway work in November, 1887, as a clerk, and for ten years was on different roads, on what was then known as the Burlington Route, now the Chicago, Burlington & Quincy, as clerk, rate clerk and chief rate clerk. He then became chief rate clerk, and afterwards chief clerk in the passenger department of the Kansas City, Pittsburg & Gulf, now a part of the Kansas City Southern. In August, 1899, he was appointed chief rate clerk of the Delaware, Lackawanna & Western, and on January 1, 1905, was made chief clerk in the passenger department, which position he held at the time of his recent appointment as assistant general passenger agent of the same road.

Frank J. Watson, who has been appointed assistant general freight agent of the Grand Trunk, with office at Montreal, Que., as has been announced in these columns, was born on January 12, 1866, and was educated in Toronto schools and colleges. He began railway work in 1884, as secretary to the assistant general freight agent of the Northern & Northwestern Railways, now part of the Grand Trunk, and was later secretary to the general freight agent of the same roads. In 1899, he was appointed waybill inspector of the Grand Trunk, and since that time has been in the continuous service of that company. From 1891 to 1892 he was traveling freight agent of the Western division, and then for four years traveling freight agent of the Eastern division. From 1896 to 1897 he was chief clerk in the freight department of the Southern division, and division freight agent of the Northern division, and was then appointed division freight agent of the Eastern division of the same road.

James B. Keefe, whose appointment as assistant general freight agent of the Delaware, Lackawanna & Western, with office at New York City, has been announced in these columns, was born on November 28, 1865, at Brockport, N. Y., and was educated in the high schools. He began railway work in April, 1881, on the Iowa Central as a telegraph operator, and was later agent and operator on the Chicago & Northwestern. He was then train despatcher and later chief claim clerk. From 1889 to 1891 he was with the Cleveland, Cincinnati, Chicago & St. Louis, and the Chesapeake & Ohio in the freight claim department, and then went to the New York & New England, now a part of the New York, New Haven & Hartford, as general yard master at Boston, Mass. In 1893 he became general agent of the Union Pacific at Colorado Springs, Colo., and the following year was traveling freight agent on the Pacific coast, and later general western freight and passenger agent at Denver of the Texas & Pacific. In 1896 he was appointed train despatcher of the Mexican Central, and was later assistant to the superintendent of that road at San Luis Potosi, Mex., since which time he has been consecutively general yardmaster of the New York, New Haven & Hartford at Boston, Mass., chief clerk to the general claim agent of the Missouri, Kansas & Texas and traveling freight agent of the Oregon Short Line. Mr. Keefe went to the Delaware, Lackawanna & Western in 1900, as telegraph operator and general yardmaster at Buffalo, N. Y. He was later traveling freight agent at Buffalo, and at the time of his recent appointment was division freight agent of the same road at Scranton, Pa.

George A. Cullen, whose appointment as passenger traffic manager of the Delaware, Lackawanna & Western, with office at New York City, has been announced in these columns, was born at St. Louis, Mo., and began railway work with the Wabash Railroad. He was later a rate clerk in the passenger department of the Missouri Pacific, and in 1895 was made chief rate clerk and rate sheet compiler of the Southern Passenger Association at Atlanta, Ga. In 1896 he was appointed chief clerk in the passenger department of the Plant System at Savannah, and later in the same year was appointed chief clerk of the Western Passenger Association at Chicago. Two years later he became general agent of the same association in charge of the immigrant bureau at New York. Mr. Crawford went to the Delaware, Lackawanna & Western in 1900, as general western passenger agent at Chicago, and in 1906, was appointed general passenger agent of the same road at New York, which position he held at the time of his recent appointment as passenger traffic manager.



G. A. Cullen.

Engineering and Rolling Stock Officers.

George H. Ballantyne has been appointed division engineer of the Western Pacific, with office at Elko, Nev., succeeding J. H. Knowles, promoted.

G. W. Cuyler has been appointed general foreman of the Rock Island Lines at Cedar Rapids, Iowa, succeeding T. Kilpatrick, resigned to go to another company.

W. C. Stone has been appointed foreman of the car department of the Missouri Pacific, with office at De Soto, Mo., succeeding V. M. Robinson, resigned to accept service with another company.

A. B. Enbody, road foreman of engines of the Central Railroad of New Jersey, at Mauch Chunk, Pa., has been appointed assistant master mechanic of the Lehigh and Susquehanna division, with office at Mauch Chunk.

H. C. Manchester, superintendent of transportation of the Maine Central at Portland, Me., has been appointed superintendent of motive power and equipment of the Delaware, Lackawanna & Western, with office at Scranton, Pa., succeeding T. S. Lloyd, resigned. Effective December 1.

Ward Crosby, principal assistant engineer of the Carolina, Clinchfield & Ohio, at Johnson City, Tenn., has been appointed chief engineer, with office at Johnson City, succeeding to the

duties as chief engineer of M. J. Caples, vice-president, general manager and chief engineer, resigned to go to the Chesapeake & Ohio, as has already been announced in these columns. (See an item under Operating Officers.)

J. F. Deems, general superintendent of motive power, rolling stock and machinery of the New York Central Lines at New York City, having resigned, as has already been announced in these columns, that position has been abolished. Each superintendent of motive power and rolling stock on the various lines in the system will have full charge of his department, reporting to their general managers. R. B. Kendig, general mechanical engineer, will, in future, report direct to the president. R. T. Shea, general inspector of piece work, and C. W. Cross, superintendent of apprentices, retain their present positions.

Purchasing Officers.

H. W. Hoffmeister, storekeeper of the Cincinnati, Hamilton & Dayton at Indianapolis, Ind., has been appointed storekeeper at Ivorydale, Ohio, succeeding C. B. Figgins, resigned. H. K. Martin succeeds Mr. Hoffmeister.

G. H. Robison, general storekeeper of the Oregon Short Line at Pocatello, Idaho, has been appointed assistant general manager, in charge of purchases and supplies, with office at Salt Lake City, Utah, succeeding A. E. Hutchinson, resigned to become purchasing agent of the Southern Pacific at Portland, Ore. T. A. Martin succeeds Mr. Robison.

OBITUARY.

F. H. Graves, a Chicago banker and president of the White Pass & Yukon Route, died of heart disease at Ottawa, Ont., on November 13.

Oliver Rowe, inspector of transportation of the Union Pacific and Southern Pacific, died at a hospital in Cheyenne, Wyo., on November 14, from injuries received in a train accident which occurred on October 28.

George L. Thayer, district passenger agent of the Missouri, Kansas & Texas, at New York City, died of heart disease on November 14, at New York. Mr. Thayer was born at Newport, R. I. in 1856. He was for a time with the Fall River Line, which operates a steamship line from New York to New England points, and then had charge at Ellis Island of the transportation of immigrants. His next position was on the Indiana, Illinois & Iowa, at St. Louis, Mo. He then went to the Missouri, Kansas & Texas, and came to New York in 1897.

William H. Taylor, master mechanic of the New York, Susquehanna & Western, at Stroudsburg, Pa., died suddenly while on a journey on November 9, at the Delaware, Lackawanna & Western station at Hoboken, N. J. Mr. Taylor was born at Belfast, Ireland, in 1845, and two years later he came to America. He was educated in the public schools, and was for five years at the Cooke Locomotive Works at Paterson, N. J., and after completing his trade he went to the Central Railroad of New Jersey, remaining with that company for 11 years as engine despatcher and roundhouse foreman. He went to the N. Y. S. & W. as train despatcher at West End, Jersey City, and when the shops were changed from Paterson to Stroudsburg, Mr. Taylor went to the latter place as master mechanic. Mr. Taylor had been in the employ of the New York, Susquehanna & Western since 1885.

Charles A. Reed of the firm of Reed & Stem, architects, died [illegible] years. Mr. Reed had been designing railway stations for the [illegible] with the terminal improvements of the New York Central & [illegible] made the plans for the new Grand Central Terminal. Reed & [illegible] the New York Central Lines, including one at Detroit, another at Utica, and a third at Yonkers. The firm has designed over 100 railway stations, including the large union station now under construction at Norfolk, Va.; also stations for the Great Northern, the Northern Pacific, the Chicago Great Western, the Michigan Central and the Norfolk & Western.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Norfolk & Western is in the market for 25 locomotives.

The Missouri Pacific has ordered 1 Mallet locomotive from the Baldwin Locomotive Works.

The Pennsylvania Railroad has ordered 3 Mallet locomotives from the Baldwin Locomotive Works.

The Illinois Central, as mentioned in the *Railway Age Gazette* of November 10, has ordered 10 Pacific type locomotives from the Baldwin Locomotive Works. The dimensions of the cylinders of these locomotives will be 25 in. x 26 in., the diameter of the driving wheels will be 75-in., and the total weight in working order will be 239,000 lbs.

CAR BUILDING.

The Missouri & North Arkansas is making inquiries for 100 forty-ton flat cars.

The Cambria & Indiana has ordered 300 hopper cars from the Cambria Steel Company.

The Grand Trunk has ordered 1,000 hopper cars and 1,000 box cars from the Pressed Steel Car Company.

The Texas & Pacific Coal Company, Thurber, Texas, has ordered 100 gondola cars from the Pressed Steel Car Company.

The Delaware, Lackawanna & Western has sent 1,000 miscellaneous freight cars to the American Car & Foundry Company to be reinforced with steel underframes.

The Southern Railway has ordered 1,200 gondola cars from the Pressed Steel Car Company, 500 gondola cars from the Mt. Vernon Car Manufacturing Company, and 500 box cars from the Lenoir Car Works.

The Baltimore & Ohio has ordered 2,000 box cars and 2,000 all-steel gondola cars from the Standard Steel Car Company, 2,000 all-steel gondola cars from the Cambria Steel Company, 1,500 composite gondola cars from the Pressed Steel Car Company, and 500 box cars from the Mt. Vernon Car Manufacturing Company.

The New York Central Lines have ordered 1,500 all-steel hopper cars from the American Car & Foundry Company, and 350 gondola cars from the Standard Steel Car Company, and is now in the market for 1,000 box cars and 114 passenger cars. This company has placed orders for 10,000 box cars, including 2,000 mentioned in the *Railway Age Gazette* of October 27, and the 3,000 for the Pittsburgh & Lake Erie, mentioned in the *Railway Age Gazette* of November 3. The total order was placed as follows: 5,000 with the American Car & Foundry Company; 3,000 with the Pressed Steel Car Company, and 2,000 with the Pullman Company. These cars will be distributed as follows: Pittsburgh & Lake Erie, 3,000; Lake Shore & Michigan Southern, 3,000; New York Central & Hudson River, 2,000; Michigan Central, 1,500; Cleveland, Cincinnati, Chicago & St. Louis, 500.

IRON AND STEEL.

The Central of New Jersey has ordered 10,000 tons of rails from the Pennsylvania Steel Company.

The Louisville & Nashville has ordered 50,000 tons of rails from the Tennessee Coal, Iron & Railroad Company.

[illegible] of rails from the Illinois Steel Company, and 30,000 tons from the Colorado Fuel & Iron Company.

General Conditions in Steel.—Orders continue to come in at about the same rate and the Steel Corporation is still operating at about 75 per cent. of its capacity. Although rail and plate buying has shown large increases during the past week, the orders in [illegible] very similar to October as regards earnings, for the production

Supply Trade News.

The American Locomotive Company, New York, has received an order from the Paulista Railway, San Paulo, Brazil, for one steam shovel.

The New York, New Haven & Hartford is having 21 locomotives of various types, including Pacific, Atlantic, ten-wheel, and mogul, fitted with superheaters for experimental purposes. The Locomotive Superheater Company, New York, will furnish the superheaters.

The Pennsylvania Tank Car Company, Sharon, Pa., has been formed with $50,000 capital to make, rebuild and repair tank cars. G. F. Wood-Smith, Frick building, Pittsburgh, is president and general manager. It is expected that the construction of the plant will soon be under way.

George Franklin Pond has been made manager of the Philadelphia, Pa., territory of the Wheeler Condenser & Engineering Company, Cartaret, N. J., with office in Philadelphia. Walter G. Stephan has been made manager of the Cleveland, Ohio, territory of the same company, with office in Cleveland.

The General Electric Company, Schenectady, N. Y., has received an order from the Haskell & Barker Car Company, Michigan City, Ind., for one motor generator set, 97 induction motors and a switch board. The Haskell & Barker Company is remodeling its entire electrical equipment and is changing from alternating current to direct-current, motor drive.

Maximilian M. Schneider for the past 11 years chief designer of the Pullman Company, Chicago, died at his residence in that city on November 12. Mr. Schneider was born in Tolz, Bavaria, April 1, 1857. His father was chief forester of Bavaria for a number of years, and his mother was a relative of the eminent French chemist, Lavoisier. Mr. Schneider graduated from the University of Munich, where he received his engineering education, and later studied three years in scientific schools in Paris. He served with distinction in the Franco-Prussian war and was decorated with the iron cross by King William for his bravery at the battle of Gravelotte. For a number of years before going to the Pullman Company he was employed in Chicago by the Crane Company as constructing engineer. In recent years he has been the chief designer of the Pullman Company and was responsible for important improvements in Pullman cars. In addition to his unusual attainment as an engineer, Mr. Schneider displayed considerable ability as an artist and sculptor. His most notable work was the design of steel sleeping cars. He was able not only to make the plans for the underframe, but also the designs for the inside finish, whether of woodwork or of metal, the lamps, the metal trimmings and also the color scheme for the decoration. Perhaps his most exhaustive work in car design was the finish for the entire Pullman train exhibited at the Trans-Mississippi Exposition held in St. Louis, Mo., in 1904.

M. M. Schneider.

The Jerguson Manufacturing Company, Boston, Mass., has made the Joseph M. Brown Company, Chicago, its representative in Illinois, Missouri, Minnesota and Michigan for Klinger type water gages and spare glasses. Dravo, Doyle & Company, Pittsburgh, Pa., have been made the representatives of the same company in Pennsylvania, Ohio, Maryland, Delaware and West Virginia for the same products.

The U. S. Metal & Manufacturing Company, New York, has recently taken over the general sales agency in the United States for Texoderm, a material used for coach seat upholstering, made by the Sillcocks-Miller Company, South Orange, N. J. This company has also taken over the selling agency, in the southern and middle western states, for gears and pinions made by the Tool Steel Gear & Pinion Company, Cincinnati, Ohio.

The American Blower Company, Detroit, Mich., has filed an application for a charter for the Canadian Sirocco Company, Windsor, Ont. This company has acquired about four and one-half acres, and will proceed at once with the construction of the erecting shop, 50 ft. x 200 ft., steel and concrete construction; also the office building. The foundry building will probably be started in the spring. This company will hold the exclusive patent rights for the manufacture in Canada of Sirocco fans and blowers. The Canadian Sirocco Company will also make the full line of the American Blower Company's products, consisting of fans, blowers, heating, ventilating, drying apparatus, steam engines, steam traps, etc.

The Hyman-Michaels Company, Chicago, has been formed to take over the relaying rail and scrap iron business of the Block Pollack Company, Cincinnati, Ohio, in Chicago and St. Louis, Mo., and the Pollack Steel Company, Cincinnati, will have charge of the Pollack business in Cincinnati, as was mentioned in the *Railway Age Gazette* of November 10. The Hyman-Michaels Company has taken over property valued at $500,000 and has assumed all the obligations of the old company at Chicago and St. Louis. It has a capitalization of $250,000. Isaac Block is president, Joseph Hyman is first vice-president, and Joseph Michaels is second vice-president and secretary, with offices in the Peoples Gas building, Chicago.

TRADE PUBLICATIONS.

Derails.—The Hayes Track Appliance Company, Richmond, Ind., has published an illustrated leaflet on its double-end Hayes derails, showing the different models and sizes.

Denver & Rio Grande.—The passenger department of the Denver & Rio Grande has published a booklet entitled The Lands of Utah, which contains a description of Utah's agricultural development and gives special mention of the private and government reclamation projects now under way and completed. The booklet is illustrated with orchard and dairy scenes and contains an up-to-date map of Utah.

Coaling Stations.—The Roberts & Schaefer Company, Chicago, has issued bulletin No. 23, describing installations of the Holmen or balanced bucket type locomotive coaling stations built by that company. These stations are built of wood, steel or concrete and have a storage capacity of from 80 to 1,000 tons and an elevating capacity of from 40 to 125 tons per hour. The booklet contains some very good reproductions of photographs and line drawings of stations in use throughout the United States and Mexico.

Power Transmission Machinery.—The Jeffrey Manufacturing Company, Columbus, Ohio, has published a very full 150-page catalog on Jeffrey power transmission machinery. It describes and gives full information on the various products of this company. It gives the standard methods of key seating, and shows the sizes and dimensions of couplings, hangers, blocks, counter shafts, belt tighteners, clutches and quills. A feature is made of the Jeffrey improved split iron pulley, a complete list of the Jeffrey gears is given, and useful information on a number of other subjects is included. Prices are given.

Asbestos, Magnesia and Electrical Supplies.—The H. W. Johns-Manville Company, New York, has issued a remarkably full 350-page catalog of its large line of products, most of which are made of asbestos, magnesia or indurated fiber. These products include pipe and boiler coverings; packings; cements; roofings; waterproofing materials; heat, cold, sound and electrical insulators; Transite asbestos wood; Transite smoke jacks; Ceilinite insulation; conduit for pipes or wires; fuses; Linolite electric lamps and accessories, rubber valves, etc. The catalog is illustrated, contains full descriptions, list prices and a complete index.

Railway Construction.

New Incorporations, Surveys, Etc.

Alabama, Tennessee & Northern.—This road has been extended from York, Ala., to Ward, 9 miles. Wm. Toxey, chief engineer, York, Ala.

Arizona Eastern.—A new branch, called the Chandler branch, has been opened for business from Chandler Junction, Ariz., south to Bowen, 11.6 miles. L. H. Long, chief engineer, Tucson, Ariz.

Bangor & Aroostock.—The company has asked for authority to secure 2.74 acres of land by the right of eminent domain for yard space at Grand Island, Me. Permission is also asked to construct a spur track, 1,800 ft. long, from a point near Perham station to the mills of the Perham Lumber Company. M. Burpee, chief engineer, Houlton, Me.

Beaumont, Waco & Northern.—Incorporated in Texas with $75,000 capital, to build between Beaumont and Waco. J. F. Keith, president; C. S. Vidor, vice-president and treasurer; J. G. Reaves, vice-president and general manager, and B. S. Woodhead, secretary; Beaumont, Tex.

Belle Fourche & Spearfish (Electric).—Incorporated in South Dakota with $5,000 capital, and headquarters at Belle Fourche, S. D. The plans call for building from Belle Fourche, in Butte county, south to Spearfish, in Lawrence county, about 15 miles. The incorporators include A. A. Moodie, B. Sebastian, F. E. Harris and F. E. Duba, all of Belle Fourche.

Brownwood, North & South.—See St. Louis & San Francisco.

Cambria & Indiana.—This road has been opened for business from Rexis, Pa., to C. & I. Junction, 19.8 miles. T. E. Dunn, superintendent, Vintondale, Pa.

Canadian Northern Ontario.—The Trenton division has been opened for business from Toronto, Ont., east to Trenton, 111 miles. A. F. Stewart, chief engineer, Toronto, Ont.

Cement Tolenas & Tidewater.—Incorporated in California with $500,000 capital to build from Cement, Cal., southwest to tidewater, near Suisun, about 5 miles. R. B. Henderson and A. B. Plair are directors.

Central Arkansas & Eastern.—See St. Louis Southwestern.

Chicago, Milwaukee & Puget Sound.—An officer writes regarding the work to be carried out on the Idaho & Western, between Spokane, Wash., and Coeur d' Alene, Idaho, that work is now under way on the uncompleted section between Atlas and Coeur d' Alene, which was deferred pending adjustments of right-of-way matters. The work is being completed under a former contract by H. C. Henry. E. J. Pearson, chief engineer, Seattle, Wash. (November 3, p. 1911.)

Chicago, Rock Island & Pacific.—An officer writes that grading work has just been started on the Malvern & Camden, from Malvern, Ark., south to Camden, 59 miles. The C. H. Sharp Construction Co., Kansas City, Mo. has the contract. There will be two steel bridges, each 50-ft. long. Maximum grades northbound, will be. 7 per cent., and southbound, 1 per cent. J. B. Berry, chief engineer, Chicago, Ill. (June 9, p. 1180).

Clear Lake.—According to press reports, a contract has been let to Elliott & Axman, San Francisco, Cal., for grading 6.5 miles between Hopeland, Cal., and Lakeport. C. M. Hammond, president, Upper Lake.

Clinton & Oklahoma Western.—According to press reports, contracts have been made for an extension from Butler, Okla., west to Cheyenne, about 30 miles, and work is to be started at once. G. V. McClure, chief engineer, Oklahoma City, Okla. (June 30, p. 1713.)

Colorado & Southern.—The Fort Collins district on the Northern division has been extended from Wellington, Colo., north to Cheyenne Junction, Wyo., 34.2 miles. H. H. Cowan, chief engineer, Denver, Colo. (October 6, p. 690.)

Denver & Pacific.—According to press reports the company is planning to extend this road from Eureka, Nev., north to Palisade, 84 miles. G. B. Abbott, superintendent, Palisade.

Flathead Interurban.—Contracts have been given to L. L. Davis, and to J. A. Roe, to build a section of this line between Whitefish, Mont., and Kalispell. Work is to be started at the Kalispell end. A. L. Jaqueth, engineer in charge. (November 3, p. 931.)

Florida East Coast.—This company has opened for business a new branch from Maytown, Fla., south to Chulota, 23 miles. The line is to be extended s uth to Lake Okeechobee, 130 miles from Maytown, with a branch from this line at Whittier south to Bassenger, 30 miles. The Kissimmee Valley Construction Company, Jacksonville, has the contract. A. L. Hunt, engineer, St. Augustine, Fla. (September 8, p. 493.)

Fort Worth & Southwestern.—Incorporated in Texas, with $400,000 and office at Fort Worth. The company plans to build from Fort Worth southwest through the counties of Tarrant, Johnson, Somervell, Erath, Hamilton, Coryell, Lanpasas, San Saba, Llano, Mason, Gillespie, Kimble, Kerr, Bandera, Edwards, Uvalde, Kinney and Mavrick, to Eagle Pass, about 350 miles. The incorporators include W. D. Morton, J. P. Farr, Glenrose; J. M. Goldstein, Milford; W. E. Harrison, W. B. Paddock, Fort Worth; D. C. Morris, Walnut Springs, and M. W. Shuler, Waco.

Gainesville & Western.—An officer writes that contracts are to be let at once for building from Gainesville, Ga., north to Robertstown, 35 miles. Work is now under way, clearing the right-of-way and getting out ties. There will be a 150-ft. steel bridge. R. M. McCombs, president, Bank of Commerce building, St. Louis, Mo., and J. F. Brooks, chief engineer, Cleveland, Ga.

Grand Trunk.—A new line has been opened for business on the Penetang sub-division from Birch, Ont., north to Tay on the Lindsay and Midland sub-division, 8.9 miles. H. G. Kelley, chief engineer, Montreal, Que.

Grays Harbor Railway & Power Co. (Electric).—This company has plans made, it is said, to build from Cosmopolis, Wash., to a point on Willapa Harbor, Wash. Extensions are also to be made at Aberdeen and at Hoquiam. H. B. Zimmerman, manager.

Gulf, Florida & Alabama.— This company has bought from the Southern States Lumber Company 52 miles of standard gage road, part of which is now under construction, running from Cantonment, Fla., north via Pensacola to Local, Ala. This is to form part of a through line between Pensacola, Fla., and Jasper, Ala. G. A. Berry, chief engineer, Pensacola. (November 10, p. 975.)

Iberia, St. Mary & Eastern.—An officer is quoted as saying that work is being pushed on the line from New Iberia, La., southeast to Berwick City, opposite Morgan City, about 50 miles. It is expected that the work will be finished to Charenton, 21 miles, about December 1, and that all the work will be finished by May, 1912. F. M. Welch, president, New Iberia. (July 21, p. 158.)

Idaho & Western.—See Chicago, Milwaukee & Puget Sound.

Indianapolis, Crawfordsville & Western Traction.—According to press reports this company is planning to build a 40-mile connecting link between existing electric lines in Indana. C. E. Morgan, general manager, Crawfordsville, Ind.

Intercolonial.—A new branch has been opened for business from Ferona Junction, N. S., west to Sunny Brae, 12.5 miles. W. B. McKenzie, chief engineer, Moncton, N. B.

Iowa Central.—An officer is quoted as saying that an extension is to be built from Albia, Iowa, to St. Louis, Mo., 115 miles. The Minneapolis & St. Louis, is also to build an extension to the Canadian border. It is understood that the latter will be built north from Leola, S. D. R. G. Kenly, chief engineer, Minneapolis, Minn.

Jefferson & Northwestern.—An officer writes that this company, which was organized to build from Jefferson, Tex., on the Texas & Pacific and the Missouri, Kansas & Texas, north to Linden, 14 miles, thence via Lanama to Camp, 31 miles, with a branch from Linden northeast to Linden, 5 miles, has completed work to Linden. H. B. Montgomery, chief engineer, Jefferson.

Joliette & Lake Manitou Colonization Railway.—This company, which was granted a charter to build from Montreal,

Que., and through the county of Joliette, to a connection with the National Transcontinental Railway (Grand Trunk Pacific), about 217 miles, has surveys made. The contract to build the line has been given to the British Canadian Construction Company, Ltd., Ottawa, Ont. According to the terms of the contract 60 miles is to be finished and in operation by December, 1912, and the rest of the line completed by December, 1913. Construction work is now under way between Joliette and St. Emele d L'Energie, and several miles has been graded. A larger number of men and teams are at work on the line. It is the intention to continue the rock work during the winter on the section where the line crosses the Laurentian mountains. The headquarters of the company are at Ottawa. J. A. Patten, chief engineer, St. Felix de Valois, Que.

Kansas City & Memphis.—An extension has been built from Cave Springs, Ark., to Clear Creek, 11 miles. M. Hays, chief engineer, Rogers, Ark. (September 22, p. 575.)

Kansas City, Mexico & Orient.—This road has been extended from Barnhart, Tex., west to Big Lake, 19 miles. W. W. Colpitts, chief engineer, Kansas City, Mo. (October 20, p. 815.)

Maine Central.—Permission has been given this company to change the route of the proposed two-mile extension from Mainstream, Me., to Harmony. The new location utilizes 1,700 ft. of public road, which will have to be re-built in a new highway location. It is understood that the work will be carried out this year. T. L. Dunn, chief engineer, Portland, Me.

Malvern & Camden.—See Chicago, Rock Island & Pacific.

Mexico Northwestern.—A branch has been opened for business on the Chihuahua division from San Antonio, Mex., to Cusihuiriachic, 13 miles. B. B. Bryant, chief engineer, Ciudad Juarez, Chih., Mex. (July 21, p. 158.)

Mexican Railway.—This company has adopted plans, it is said, for the standardizing of its road between the City of Mexico, Mex., and Vera Cruz. All the tunnels, of which there are a number of considerable length, will be enlarged. All the grades between City of Mexico and Esperanza will be reduced and the curves lengthened, and other improvements will be made. W. T. Ingram, resident engineer, City of Mexico.

Milwaukee, Peoria & St. Louis.—An officer writes that the prospects of building are good, but contracts are not yet let for a line from a point opposite the city of Peoria, Ill., on the east bank of the Illinois river north, crossing the Atchison, Topeka & Santa Fe, thence via Lacon and Hennepin to Rockford, about 120 miles. Connection is to be made with the Chicago, Milwaukee & St. Paul at the Chicago, Indiana & Southern bridge at Depue. Maximum grades will be .5 of 1 per cent.; maximum curvature 3 degrees. The right-of-way has been secured from Peoria to Depue, and about one-half of the line has been located. The company expects to develop a traffic in coal from the fields located at the southern end of the line. F. W. Cherry, Princeton, is back of the project. B. Schreiner, chief engineer.

Minneapolis & St. Louis.—See Iowa Central.

New York Subways.—The New York Public Service Commission, First district, has announced that bids will be received on December 5, for the construction of section nine of the Lexington avenue subway in the borough of Manhattan. The plans call for the construction of a four-track double-deck subway from a point just north of 67th street to a point about seventy feet south of 79th street, with stations at 68th and 77th streets. (Nov. 3, p. 931.)

Northern Pacific.—A contract has been given to the Weymouth Construction Company, Seattle, Wash., it is said, for building the first section of the Lake Union belt line at Seattle, between Ross station and Boren avenue. The contract is said to be worth $225,000, and includes putting up freight stations. W. L. Darling, chief engineer, St. Paul, Minn. (October 6, p. 691.)

Oregon Electric.—An officer writes that work is now under way by Guthrie McDougall & Co., building an extension from Salem, Ore., south to Eugene, about 75 miles. L. B. Wickersham, chief engineer, Portland, Ore. (October 27, p. 860.)

Oregon Roads.—The Fall City Lumber Company is having surveys made for a line from Fall City, Ore., to Siletz Basin. J. J. Sammonds is engineer in charge.

Pittsburg, Binghamton & Eastern.—The New York Public Service Commission, Second district, has rescinded, cancelled and annulled its order made in February, 1908, whereby permission was granted this company for a change of route in the counties of Broome and Tioga. Since the order was issued the company went into the hands of a receiver. The present owners of the property do not intend to construct the railway.

Santa Fe, Prescott & Phoenix.—An officer writes that under the name of the Verde Valley, a branch is to be built from Cedar Glade, Ariz. to New Jerome, 38.5 miles. The contract has been let to the L. J. Smith Construction Co., Kansas City, Mo. The line is being built to provide an outlet for traffic from the Verde valley and the United Verde Copper Company's new smelter, at New Jerome. W. A. Drake, vice-president and J. A. Jaeger, chief engineer, Prescott. (November 3, p. 932.)

St. Louis & San Francisco.—The Brownwood, North & South, which has been acquired by the Frisco, has finished construction work on the line from Brownwood, Tex., north to May, 32 miles, and is now open for traffic. Surveys for an extension have been made. It is understood that the line will be extended through coal fields to a connection with the Texas & Pacific. F. G. Jonah, chief engineer, St. Louis, Mo. (July 14, p. 104.)

St. Louis Southwestern.—The Central Arkansas & Eastern, building from England, Ark., to Stuttgart, 26.5 miles, and from Rice Junction to Hazen, 20 miles, has been completed and connections have been established with the St. Louis Southwestern at England and at Stuttgart. C. D. Purdon, chief engineer, Tyler, Tex. (October 13, p. 735.)

Swanton & Alburg.—Incorporated in Vermont with a capital of $100,000, and office at Barre, the company plans to build from Swanton to Alburg, 10 miles. It will connect with the St. Johnsbury & Lake Champlain at Swanton, and the Rutland Railroad at Alburg. The directors include F. S. Darling, F. G. Howland, T. H. Cave, Barre; S. Keemie, Toronto, Ont., and A. C. Percival, Montreal, Que. C. S. Mellon, president of the New York, New Haven & Hartford, is also interested in the project.

Verde Valley.—See Santa Fe, Prescott & Phoenix.

Texas & Pacific.—The railroad commission of Louisiana has ordered this company to extend its spur or side track at Yellow Bayou, La., a distance of 200 ft. from the present terminus—the work is to be carried out within 30 days; also that a platform to load and unload cars be constructed at that place. C. H. Chamberlin, chief engineer, Dallas, Tex.

Webber Falls, Shawnee & Western.—This road has been opened for business from Warner, Okla., to Webber Falls, 11 miles. C. C. Goodman, general manager, Webber Falls.

RAILWAY STRUCTURES.

Kansas City, Mo.—The Kansas City Terminal Company has let the contract to the Missouri Valley Bridge & Iron Works, Leavenworth, Kan., for building the foundations and piers for the new bridge over the Blue river at Sheffield, Mo. The work will cost approximately $30,000.

Montreal, Que.—According to press reports the Canadian Northern will put a 11-span bridge over the St. Lawrence river, near Montreal, between St. Genevieve and St. Dorothee.

New York, N. Y.—The New York Public Service Commission, First district, has asked for an appropriation of $1,000,000, to pay for grade crossing elimination work within the city limits of New York. Most of this work is to be carried out on the Long Island Railroad, in the borough of Queens. There are now about 400 grade crossings within the limits of New York City.

North McGregor, Ia.—The Chicago, Milwaukee & St. Paul has let the contract and started construction on a new brick passenger station to replace the structure which was destroyed by fire last spring. The building will be steam heated and electrically lighted, and will cost approximately $30,000.

Salem, Ore.—A contract has been given by the Oregon Electric, it is said, for building bridges over the Santiam river and

the Willamette river on the line between Salem, Ore., and Albany.

Seattle, Wash.—See Northern Pacific under Railway Construction.

Sidney, Neb.—The Union Pacific has let the contract to Geo. B. Swift & Co., Chicago, for building a 9-stall roundhouse to replace the structure recently destroyed by fire. (Nov. 3, p. 933.)

Sierra Madre, Cal.—The Pacific Electric is having plans made for a combined passenger and freight station at Sierra Madre.

Spokane, Wash.—The Chicago, Milwaukee & Puget Sound and the Oregon-Washington Railroad & Navigation Company have bought a strip of land a mile and a half long and 1,000 ft. wide, just east of the city limits. It is probable that the land will be used for freight terminals similar to those at Yardley, Wash.

Sumas, Wash.—The Northern Pacific is having plans made, it is said, for a new station to be built at Sumas.

Transcona, Man.—The Grand Trunk Pacific will build a car shop plant, to include the following buildings situated on either side of a 1,200 ft. midway, which will serve both the locomotive and car shops: A wooden lumber shed 165 ft. x 60 ft. on concrete foundations, a reinforced concrete and brick dry kiln 40 ft. x 70 ft., a concrete and brick wheel and machine shop 165 ft. x 75 ft., equipped with a 20-ton electric traveling crane, a brick freight car shop 200 ft. x 600 ft., equipped with two electric traveling cranes of 10 and 20-tons capacity, a brick planing mill 100 ft. x 300 ft., a paint store house 30 ft. x 40 ft., a coach paint shop 100 ft. x 340 ft., two coach shops each 120 x 200 ft., and equipped with 70-electric transfer tables, and two office buildings each 60 ft. x 68 ft., one for the car shops and one for the locomotive shops which this company will also build at this place.

Wolfville, N. S.—The Dominion Atlantic Railway, it is said, is planning to build a brick and stone station.

Woodland, Cal.—The Vallejo & Northern will soon ask for bids, it is said, for putting up a station at Woodland, to cost $15,000. Plans are now being made.

Vancouver, B. C.—A contract is said to have been given by the Canadian Pacific to Skene & Christie, Vancouver, for building a large hotel at Vancouver.

The Canadian Pacific, it is said, is having plans made for a new station at Vancouver.

FOREIGN RAILWAY NOTES.

The 40 miles, now under construction by the Guatemala Railway Company, Guatemala, from the port of La Union, Salvador, to San Miguel, will be completed in January, 1912. The line will then be extended to San Salvador, about 200 miles distant, passing through Usulatan, San Vincente and Cojutepeque.

There is much interest in the completion of the line from Huancayo to Ayacucho, in central Peru, and its extension to Cuzco, since this stretch would form an integral part of the main line of the theoretical Pan-American Railway, of which the only completed sections in Peru at present are the lines There is also a short section under construction between Chimbote and Recuay.

The latest accident report of the Russian ministry of ways and communication shows that the total number of accidents of all the Russian railways in 1908 was 20,047. This total is divided as follows: 50.7 per cent. with rolling stock in motion; 38.4 per cent., accidents on the line not attributable to rolling stock in motion, but including loading, discharging, etc.; 10.9 per cent., accidents not directly attributed to the railway service. Nearly all the accidents resulting from rolling stock in motion affected employees. The percentage of accidents on the treasury lines under this head was higher than that on the private lines. Accidents have constantly increased since 1903, when there were only half as many as in 1908. The number of accidents to passengers showed a large increase in 1907–1908, but in the following two years there was a great decrease. On the other hand there was a large increase in accidents to employees during that period.

Railway Financial News.

Boston Railroad Holding Company.—This company has asked the Massachusetts railway commission for authority to issue $239,500 preferred stock, the proceeds to be used to take up a demand note for $239,517 which was given to pay for $227,300 stock of the Boston & Maine.

Carthage, Watertown & Sackett's Harbor.—See New York Central & Hudson River.

Chicago & Alton.—Samuel Insull has been elected a director and a member of the executive committee, succeeding George H. Ross.

Illinois Southern.—Stockholders at a special meeting have voted to approve the issue of $3,000,000 first mortgage bonds and $1,380,000 income bonds to refund the present first mortgage bonds taken by the clearing house committee when the Walsh banks failed.

International & Great Northern Holding Co.—This company has been incorporated under the laws of Virginia with $5,500,000 capital to act as a holding company for railway stocks and for allied purposes. Frank J. Gould has been made president. It is understood that the Holding company will be used in the reorganization of the International & Great Northern in such a way as to preserve the equity of the third mortgage bondholders of the railway company in case the Texas railway commission does not allow a greater valuation than $30,365,000 for the I. & G. N. in Texas. The reorganization plan, as previously mentioned in these columns, calls for a valuation of $35,457,000, and under the present ruling of the Texas commission, the reorganized company would be prevented from issuing $4,000,000 common stock preserved for exchange of third mortgage bonds of the old company and for defaulted interest coupons up to March 1, 1911. It is proposed that the Holding company buy the entire amount of common stock issuable under the commission's present property valuation, or any later valuation, and that the Holding company will issue participation certificates of beneficial interest to the full value of the common stock called for in the reorganization plan.

Jamestown, Chautauqua & Lake Erie Railway.—George Bullock, of New York, has been appointed receiver of this company and of the Jamestown & Chautauqua, and of the Chautauqua Steamship Company. The railway companies operate a line from Jamestown, N. Y., to Westfield.

Marshall & East Texas.—Stockholders are to vote on December 5 on the question of authorizing the issue of $5,000,000 5 per cent. first mortgage bonds.

Minneapolis, St. Paul & Sault Ste. Marie.—This company has filed a mortgage to secure $20,000,000 Chicago Terminal 4 per cent. bonds of 1911-1941. This mortgage is given in connection with the Mortgage Terminal Company, which has been formed to buy land for and build the Soo's Chicago terminal.

New York Central & Hudson River.—The New York Public Service Commission, Second district (state), has authorized the New York Central & Hudson River to buy the outstanding 11 shares of preferred stock and 27 shares of common stock not already owned by the N. Y. C. & H. R., there being a total of 215 shares of preferred stock and 4,650 shares of common stock outstanding of the Carthage, Watertown & Sackett's Harbor, at a price not more than $125 a share. The Carthage, Watertown & Sackett's Harbor was leased in 1872 to the Utica & Black River Railroad, which perpetual lease has been assigned to the Rome, Watertown & Ogdensburg and assumed by the New York Central & Hudson River.

St. Louis, Iron Mountain & Southern.—See an item in regard to traffic agreements with the St. Louis & San Francisco in Traffic News.

St. Louis & San Francisco.—See an item in regard to traffic agreements with the Texas & Pacific in Traffic News.

Texas & Pacific.—See an item in regard to traffic agreements with the St. Louis & San Francisco in Traffic News.

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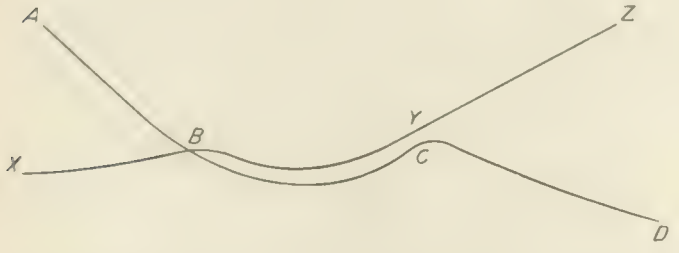
THE developments of recent years have lead the majority of railway managers to believe that most or all of the increases in net earnings which railways can hope to enjoy in future must be produced by reductions in the expenses of operation. In looking about they are finding many places where, by increases in the amount and in the efficiency of the supervision exercised over the various branches of operation, numerous and substantial economies can be effected without detriment to service. We begin this week the publication of a series of articles entitled "Opportunities for Economies on American Railways," by L. C. Fritch, which, it is believed, will be of very general interest. The articles will not be published each week, but at the rate of about one per month, and each of them will deal with a different "opportunity" of the kind mentioned in the general title. While most of Mr. Fritch's railway career has been in the engineering department, he has had a wide experience, having been division superintendent, assistant to the general manager and assistant to the president, and having done a variety of work along efficiency lines. It is to be hoped that his articles will draw out others from railway men, whether they agree or disagree with his views. There cannot be too much frank and intelligent discussion of the means for increasing economy and efficiency in the operation of American railways.

THE first ruling of the new public utilities commission of Connecticut is on the question of the reduction of fare from 15 to 10 cents on the trolley line from Hartford to Manchester, about 10 miles. The ruling calls for official information relating to the business of the line and original and secondary financing—these as a basis for the determination of a just fare. The Hartford and Manchester line is one of some twenty or more constituent properties now merged in the Connecticut Company—controlled by the New Haven—and which holds about nine-tenths of all the street railway properties in Connecticut. Since the consolidation the larger corporation has gone under general management and has been refinanced with total issues of debentures alone amounting to some $14,000,000. In determining the fare, after it gets the figures, the commission will have before it some puzzling problems and of a character reaching far beyond the special case. Is the Manchester line to be segregated, original cost determined and the fare adjusted on a basis of that cost or replacement values? Or, on the other hand, is the property to be treated as part of the Connecticut corporation's system, and carry its share of the cost of general management and of the fixed charge on the general debt? Again, is the fixing of fare to be based on the high charge of cross-country lines, or the low charge of the intensive business of the cities, or the general average per mile of both on some 700 miles operated by the Connecticut Company? If the Manchester line is to be treated as a separate unit by the commission it means the application of the same rule to other component parts of the system, the purview of original stock-watering long before the independent street railway companies were consolidated, and a local application of the "unscrambling of the egg" to Connecticut street railway fares. The final decision of the commission will be suggestive and of considerable scope as affecting the interests of a steam railway corporation controlling 1,300 miles of street railways in three states.

ON the face of it, there seems to be something wrong with an accounting rule which would permit a railway company to reduce the grades on a certain part of its line to 0.5 per cent. at a cost of $1,230,000, and charge this amount to capital account, but which would not permit the company to relocate its line to obtain a 0.5 per cent. grade at a cost of $630,000, and charge this much smaller sum to capital. The Kansas City Southern has brought suit against the Interstate Commerce Commission in the Commerce Court to obtain a ruling on such a case. The company has a mortgage which provides that bonds can be delivered by the trustee only to pay for capital expenditures. The practical effect, therefore, of refusing to permit the company to charge certain expenditures to capital account amounts apparently to a prohibition of the sale of securities by the company. The company had Horace Burt make a report on the best method of obtaining a line with 0.5 per cent. grades between certain points. He reported that if the present right of way were used and the grade reduction work done on this, it would cost $1,230,000, but that if the company abandoned its old line and built a new line, it could obtain the same results at a cost of about $630,000. The Interstate Commerce Commission's accounting rules pro-

vide that work done to reduce grades on an existing line may be charged to capital account as additions and betterments. On the other hand, the rules provide that if a property is abandoned, the cost of replacing it, less salvage, must be charged to operating expenses. Even as a piece of accounting theory it seems as if replacement value of abandoned property might better be charged to profit and loss than to income account, and the proof that the theory of charging it to expenses is wrong is in the fact that in practice, as illustrated by the Kansas City Southern case, it becomes a *reductio ad absurdum.*

THE block system is so immeasurably superior to the time-interval system for protecting trains against rear collisions, that it pays to use it even when, because of lack of money, it is necessary to suspend the space interval very frequently. For this reason it is used on many lines where stations are long distances apart and permissive signals have to be given to freight trains every day, the absolute block system being maintained invariably only where a passenger train is involved. But by demanding too much of permissive signaling many superintendents have got into trouble. Permissive signaling, carried out according to the rule—which is that the following train shall be wholly responsible for not running into the leading train, never expecting a flag or torpedo—is safer than the time interval; but mixing the permissive system and the time interval system is liable to confuse the trainmen to such an extent that it would be better to use one system alone, even if it were the poorer one of the two. To forget this is pretty sure to cause trouble. Again, there are situations where neither permissive signaling nor the time interval can be made satisfactory without reducing speed or lengthening time intervals to an absurd degree. One of these is illustrated in the drawing below. This shows the arrange-



ment of tracks where a rear collision happened recently not a thousand miles from Chicago. A freight train running from A to B, C and D was unexpectedly stopped near C. A following freight, which received a permissive signal at A, ran into the standing train, and two men were killed. The main trouble was that the [illegible] was placed on the flagman of the leading train, though there would have been difficulty under simple permissive [illegible]. It was night and the flagman and the following engineman both attributed their errors to the presence of a long freight train on the line X, B, Y, Z. They got its lights mixed with those of their own road. The flagman kept watch of the X Z train's [illegible] and thought he was protecting his own rear, but thought he was extending the rear as he properly should on his own track. The engineman, seeing a similar combination followed the X Z tail lights, the curvature of both lines being such that [illegible]

THE LEAKAGE OF GRAIN FROM BOX CARS.

THE general freight agent of a prominent western railway said recently, "Nothing will do so much to improve the morals and integrity of the grain trade in respect to weighing as a grain tight box car." The element of uncertainty as to weight is a strong incentive for the unscrupulous grain seller to overstate the weight of his shipment and of the buyer to understate it. Large expense is now incurred by railways on account of grain shortage claims. If box cars could be made tight enough to prevent grain leakage, this expense could be avoided. The money loss to the carriers due to grain leakage can be gaged by the fact that five of the granger lines, owning about 150,000 box cars, paid out in one year more than $500,000 on account of claims for loss of bulk grain in transit.

At the June meeting of the Car Foremen's Association of Chicago, A. Schuyler, assistant weighmaster of the Chicago Board of Trade, presented data relating to grain car leakage, covering a period of six years, with some suggestions as to the cause and remedy. This information, together with that brought out in the discussion by the car foremen, has considerable value in its bearing on the construction and repair of the superstructure of box cars. It was found from the examination of 164 cars at one Chicago elevator that 9 per cent. lost grain on account of loose and defective sheathing, and 7.3 per cent. on account of defective doors and end posts. Two cars leaked at the end door and three at the grain doors. The percentage of leaky cars in the lot was over 20. This is larger than the average shown by the Chicago Board of Trade records which disclose that for the past six years 10 to 17 per cent. of all loaded grain cars weighed in the Chicago district had leakage defects; that 66 to 73 per cent. of all leaks were due to loose and defective sheathing; and that 14 to 28 per cent. were due to weak, defective and improperly installed grain doors, while 8 to 14 per cent. of the leakage was due to spills over the temporary grain doors. The leakage due to grain doors has been growing less in this period of six years, while that due to defective sheathing and lining has increased, and it is this latter part of box car construction which should receive proper investigation and improvements.

The flooring of wooden box cars is generally 1¼-in. tongued and grooved pine, and is nailed to the wooden sills and sawed off flush with the side sill. The posts and braces, 2½ in. to 3 in. wide, are also placed flush with the outer face of the side sill. The soft pine sheathing, with boards placed vertically, is nailed to the side sill and plate and to furring strips between the posts and braces. The inside lining boards, tongued and grooved, are laid horizontally and nailed to the same furring strips. This makes a cellular structure with posts and braces between the two walls. On the cars of some railways the lining is continuous from top to floor, making a closed cell; on many other cars there is a longitudinal opening 2 in. high at the middle belt rail and at the floor; these are intended to allow grain which gets between the lining and the sheathing to flow out when the car is emptied. There is disagreement among car builders as to the importance or value of these openings and as to the two methods of constructing the walls of box cars. The open lining is of some use for the purpose stated, and it prevents to some extent the accumulation of materials which would make the car foul and objectionable. It also permits of inspection at the floor line to detect leakage from loose sheathing. The advocates of the closed lining say that it can be easily inspected and if kept tight and in proper repair it matters little whether the sheathing is bulged, loose or defective, as leakage cannot extend to it. Defects in the sheathing cannot be so easily detected, and it is only after leaking begins that they are discovered, and then repairs are difficult.

The principle of closed lining is correct, not only for the reason stated, but on account of the effect of pressure due to the weight of grain. This pressure on the lining is resisted by the posts and braces, but with the sheathing it is only held by nails

in soft and often rotten wood. This is principally true of the old wooden cars whose side sills are soft from decay, or whose sheathing is split from frequent nailing. New wooden cars will suffer from decay in a much shorter time than the older cars which were built of sills comparatively free from sap and with sheathing of almost all clear white pine. In the design of new box cars with steel underframes this leakage of grain from the defects noted does not seem to have had proper consideration. The sheathing is usually held in place by a nailing strip spiked to the floor, making a very insecure fastening. Such construction is fit only for rough freight, and after a short service it is necessary to nail boards on the outside to keep the grain in.

New cars leak on account of short flooring boards or defective ends. They are often built of unseasoned hard pine and with irregularly sized flooring and siding, and after a hot summer the shrinkage of this lumber develops cracks which permit bulk grain to leak.

There should be a more rigid classification of box cars, and only those which are tight and in good condition should be marked good for the elevators. Others which may leak can be marked good for merchandise; and others, not so good, for rough freight. Cars with weak doors and end posts should not be selected for grain. The use of the temporary grain door is now general, and the door posts soon become filled with nails and spikes so that they are injured and weakened, and it is difficult properly to fit temporary grain doors to them. These defects in sheathing and lining have led to the use of burlap or paper coverings, and of oakum calking. The practice is so general that "cooperage" is now a common term as applied to this class of car repairs.

It has been suggested that a closed lining sheet metal angle be nailed to the car floor with the upper edge driven into a groove in the bottom lining board; also that a metal angle be fastened over the top belt rail from a groove in the top lining board to prevent grain from entering the cell between the sheathing and lining. The paper and burlap coverings are not effective if the upper belt rail is not tight, and there are records of cars so "coopered," which have traveled only a few miles between loading and unloading elevators and have shown a loss of over 300 lbs. of grain. When linings leak the grain is often allowed to remain in the pockets; when these are cleaned out the grain often weighs as much as 250 lbs. per car, and averages 80 to 120 lbs. When this grain is allowed to remain behind the lining after the car leaves the elevator, it is an incentive to car sweeping vandals to damage and mutilate box cars so that the conditions necessary for their harvest will be maintained.

The Rock Island Lines have recently issued special instructions covering the inspection and repair of box cars for bulk grain loading, and these require the use of wide strips of burlap over the grain doors, at the car ends, and for patching defective floors and lining. All these expensive methods of making box cars secure against the leakage of grain should be more seriously considered in the design and specifications for new box cars, for the present remedies and those usually suggested must be regarded as temporary makeshifts which should not be necessary in a proper permanent construction. The ideal grain car secure against leakage would be a steel tank car 9 ft. in diameter, somewhat similar to those now built for the oil traffic. The obvious objection to such a car is that even in the grain districts box cars are only loaded with wheat six or eight times a year at most, so that a special grain car cannot be considered. The all-steel box car has been used by the Union Pacific, and it must be free from leakage if the grain doors are made tight. The same road has some box cars with corrugated steel ends, which are tight to that extent. The Canadian Pacific has 3,000 box cars with steel underframes and steel posts and braces. The sheathing is 1½ in. x 5 in. pine laid horizontally, and is bolted to the steel frame with provision for any adjustment required by shrinkage. This car was illustrated in the *Railway Age Gazette*, March 10, 1911, page 455. The Erie also has in service box cars of this type. In this design the objectionable cellular construction is avoided, and there is good opportunity to inspect for leakage on the inside or outside, and the sheathing boards are bolted and not nailed. There should be little difficulty in keeping this type of car secure against grain leakage.

Most railways will prefer for the present to use the usual vertical board sheathing and wooden posts, but they will order steel underframes in increasing numbers. This type of box car should receive some improvement over present designs to prevent grain leakage. It is suggested that a steel sheet at least 1/16 in. thick and 1 ft. high, flanged with a short angle at the bottom, be placed around the bottom of the car and be riveted to the steel side sill. The siding could be bolted to this by the use of a steel band on the outside of the sheathing, and nailing at the bottom could be dispensed with. This should prevent bulged and loose sheathing and leakage at the corners. While this exact construction may not be the best for the purpose, it will serve to illustrate the principle which should be observed in the design of box cars with steel underframes and wooden superstructure.

SOME REMARKS ON CO-OPERATION BETWEEN INDUSTRIAL CONCERNS AND RAILWAYS.

THERE was much talk about co-operation between the railways and the shippers in the year following the passage of the Hepburn act. The National Industrial Traffic League, composed of traffic representatives of large industrial concerns and commercial associations, was formed largely to bring this about. One of its principles was that differences about rates should be settled oftener by conference and agreement and less frequently by appeals to commissions and courts. Since the League's organization there have been more appeals to commissions and courts and more long and bitter struggles between railways and shippers than before. But it is undiscouraged. It gave a dinner in Chicago on November 16 to which prominent railway officers were invited; and the keynote of all the speeches was "co-operation."

More real co-operation between the railways and industrial and commercial concerns is most desirable. Many problems could thereby be amicably and speedily solved, whose solution is now relegated to the slow, expensive and unsatisfactory processes of litigation. That there is not more of this sort of co-operation is largely the fault of railway men. They are too much inclined to herd by themselves. If more of them, and especially more of the higher traffic and operating officers, made it a practice to belong to and attend regularly the meetings of their local commercial organizations, to serve diligently on their committees when invited, and constantly to participate there and elsewhere in discussions of large transportation, industrial and commercial problems, the relations between the roads and the commercial and industrial interests would be better improved, to their mutual advantage.

But many persons connected with large industrials, including not a few members of the National Industrial League, have fallen woefully short of living up to the principle of co-operation, which is the object of so much laudation at public dinners, but which elsewhere has thus far been more honored in the breach than in the observance. There can be no real, beneficial co-operation between industrial concerns and railways which does not consist in active efforts by both to promote the interests and protect the rights of each. The tendency of the anti-pooling provision of the Interstate Commerce act and of the Sherman anti-trust act is to compel the railways to compete recklessly, and, in consequence, to discriminate unfairly. Every intelligent industrial traffic manager in the United States always has known this. Have they shown the spirit of co-operation by helping the railways in their efforts to get these unreasonable provisions modified? The National Industrial Traffic League has favored an

amendment to the Sherman law as it applies to railways, but it did not advocate it with the same energy or effect that it did legislation to give the Interstate Commerce Commission more power over rates. Certain shippers incited action under the Sherman law against the railways when the roads took concerted action to advance their rates; and some of the members of the Industrial Traffic League participated in this move.

It is notable that the attitude of shippers toward the Sherman anti-trust law has perceptibly changed recently. It has become anathema to many of them because while it seemed to them a good law to set in operation against the railways, they consider it a bad law when put in operation against industrial trusts. The western roads that combined to raise rates did not control anywhere near as large a part of the railway business of the United States as certain of the large combinations control of the business in their lines; and the Interstate Commerce Commission had power if unreasonable rates were made to reduce them. But, while the federal government received the applause of shippers for starting the prosecution at Hannibal, Mo., it evokes loud complaints from them by enforcing the Sherman law against the Standard Oil Company and the American Tobacco Company and setting it in motion against the United States Steel Corporation and the International Harvester Company. Perhaps it is only human to admire the big stick more when used for one's apparent advantage, to break a more or less offending neighbor's head, than when laid on one's own pate.

The agitation against railways in which large shippers have so cheerfully and noisily participated is one of the main causes of the present attitude of public sentiment toward both railways and large industrial corporations. They succeeded in convincing the public that the management of railways was bad; but the public, contrary to their intentions and expectations, has included in its condemnation all large corporations. The industrials being now in the same, or a much worse plight, as the railways, the reasons and the opportunities for some real co-operation between them for large purposes seem improved. One of the worst features of the railway business today is the continuance of unfair discriminations in rates for the express benefit of some of these large concerns whose traffic managers belong to the National Industrial Traffic League. Real, far-sighted co-operation would see that their continuance is against public policy, is morally wrong, and will, in the long run, get both parties to it in very serious trouble, and would bring about their elimination. Are the shippers of packinghouse products and copper, for example, prepared to show their spirit of co-operation to the extent of agreeing with the railways to advance the rates on these commodities to a reasonable basis? Are the large industrials owning small railways which are in the enjoyment of per diem reclaim arrangements which result in their receiving what are morally, if not legally, rebates, ready to show their spirit of co-operation by agreeing to the abolition of these arrangements? Or, are shippers in favor only of the sort of co-operation which benefits them, and costs them nothing?

Again, is the spirit of co-operation between the railways and shippers such that they can take concerted action for measures amending the Sherman act so as to make it reasonable as [illegible] former President Roosevelt in *The Outlook*. The destruction [illegible] destroy the worst existing abuses in modern industry; it will not [illegible] through large combinations. The dissolution of the splendid organization built up by the Standard Oil Company will not reduce [illegible]

The great need, as Mr. Roosevelt points out, is not the demolition [illegible] of these combinations [illegible]

says, it is the height of folly to continue to leave in effect and enforce the Sherman act as to industrial combinations, how much more unwise and unjust is it to leave it in effect and enforce it as to railways, which already have been subjected to more administrative control than he advocates for industrial corporations.

The situation of the railways was illustrated by a remark made by a very prominent industrial traffic manager at the meeting of the National Industrial Traffic League. Some question being raised as to certain changes in classification in Southern territory, H. C. Barlow of Chicago described the Sherman anti-trust act "as a lasso with which to curb the railway freight classification committees when they get too frisky." "Under the Sherman anti-trust law," he said, "the Southern Classification Committee cannot meet again if you don't want it to. I mean if you want to go that far." It is known to every man who knows anything at all about railway traffic that the existence of the various railway traffic committees is absolutely indispensable to the satisfactory handling of classification and rate matters. Under modern conditions the business dealings of the railways with each other and of shippers with the railways would be reduced to anarchy if these bodies did not exist. The railways under existing law cannot either individually, or by concert, put into effect a single change in interstate rates or classifications that will increase the cost of transportation to the shipper which is not subject first to review by the Interstate Commerce Commission. And yet Mr. Barlow implies that the classification and rate committees are in violation of the Sherman law, and exist only because it is not strictly enforced. It is doubtful if the view expressed by him is entirely accurate, but the fact that there can be any doubt at all as to the legality of even the most reasonable concerted action by railways is an overwhelming argument in favor of the amendment of the vicious law which causes that doubt.

No one can blame the administration for enforcing the Sherman law. It is its duty to institute proceedings against every combination, railway or industrial, which it believed exists in violation of it. And it is to be hoped that it will unreservedly and impartially perform that duty; for experience indicates that nothing short of its enforcement against all the classes of combinations to which it applies will ever bring about its appeal or reasonable modification. That it is the administration's determination to do this President Taft has most emphatically declared. Fronted by this menace to the economic welfare of every business, and, indeed, of every person in the United States, it would seem that the shippers, the railways, the labor unions, and all other interests should by co-operative action endeavor to secure reasonable legislation for the modification of the Sherman law. That would be a form of co-operation which would be worth while.

However, before any such movement is started, the leaders of industry had best recognize and face the fact that it is a necessary condition precedent to the reasonable modification of the Sherman law that industrial concerns shall submit to some such administrative regulation as has been extended over railways. Their spokesmen have often said that the railway is a public service corporation, while such concerns as the International Harvester Company and the United States Steel Corporation are engaged in private business. The more intelligent public opinion of the country now recognizes the fact that, while the law may say this, economically the distinction has, by the growth of many industrial concerns to enormous proportions, been largely obliterated, and that the public interest as surely requires strict [illegible] of them as of railways. If the leaders of [illegible] are aware of this, and are not prepared to submit to effective public regulation, they had just as well yield themselves up to the rigors of the Sherman law; for in the present state of public opinion—a public opinion their own anti-railway agitation has helped produce—they have got to submit to either such judicial regulation as they are now receiving or to administrative regulation similar to that to which the railways are subjected.

Letters to the Editor.

HANDLING CONSTRUCTION WORK WITH DIVISION FORCES.

Pocatello, Idaho, Nov. 6, 1911.

To the Editor of the Railway Age Gazette:

As a division superintendent who spent a number of years as a locating and construction engineer, and has twice had the opportunity of moving from the position of superintendent of construction to that of division superintendent of divisions, portions of which each time consisted of the line which I had built, I find letter No. XIX From an Old Railroad Official to His Son, a General Manager, in the issue of October 6, most interesting.

The division organization which will take care of the construction of second track, terminals, and work which must of its very nature be in a measure handled by the forces, trains and equipment of an operated line, is to be desired. The division engineer with the co-ordination of other division officials can most successfully conduct this work. He is acquainted with the resources of the division. As to terminals, although plans have been very carefully made and approved by operating officials, many details constantly arise in which slight changes are necessary to make a yard or shop plant desirable from the viewpoint of economical or convenient operation. These features may be brought to the attention of the division officials as the work progresses, and if desirable, a cabinet meeting can be called and the matter quickly decided upon. It has been said that the details of the building of the most extensive terminals in the world were largely a matter of development as the work progressed, and it is rare that an engineer reporting to a chief engineer at some distant point, perhaps, feels at liberty or has the self-assurance to make these minor changes without first consulting with his superior officer.

In the construction of a new line one of the problems before the engineer at the "front," who must be resourceful and self-reliant in meeting constantly changing conditions, is presented by the fact that at his isolated location he reports to a distant chief engineer, who cannot provide for him as quickly as sometimes is necessary; or, if he reports to an operating officer, it may be to one who has not had the particular experience to enable him to realize fully the needs of the construction engineer and his work. For instance, the division superintendent or his assistants may have a locomotive which has already made, or nearly made, the mileage required before it is entitled to an overhauling in the back shop, and it is frequently supposed that such a locomotive is plenty good enough for the work train requirements of the construction engineer, although it must be kept at a point distant from shop and roundhouse where light repairs may be kept up. This is a mistake, of course. The requests of this isolated construction engineer for equipment, material or supplies may frequently be given secondary consideration by division officials, because they must first look after their own work.

All of this naturally makes the aggressive young engineer fight for his own, and it is a struggle for self-preservation rather than a desire "to put one over on the so-called operating men" as expressed in the letter. By all means, the man who has had experience in conducting transportation and in the maintenance department should be the best man to handle the construction job if he has had the opportunity to also gain construction experience, for he should know then for what he is building.

There are three points, however, which I would like to bring out in connection with the subject. They are these:

First, when it is decided to build the new line, and the cabinet meeting of all the assistants is called, and the work turned over to the division engineer, it must be understood right then and there that in order successfully and economically to handle the construction of the new line, unless it be very short and the work light, the engineer who is to have direct supervision, must, by all means, move bag and baggage to the "front." A few years ago, the chief engineer of the Northern Pacific in a little book of instruction to its locating engineers, emphasized the fact that a locating engineer could not direct his work from behind the transit. No more can a construction engineer direct his work from an office.

Second, it is absolutely essential that successfully to prosecute construction work there must be a separate and complete organization at the "front." The trainmaster of a division has not the time to so direct the movement of work trains on construction as to handle successfully the movement of gangs of laborers, of material for contractors, for track layers, and for bridgemen. It by no means follows that a good conductor on a freight train will be a successful work train conductor, who can and will look after the handling of his train in such a manner as to cause the least possible delay to gangs of workmen. The despatcher of an ordinary division has not the time to handle the work trains on a construction job. The engineer should have in his office at the front, a wire, the telegraph line having beep kept up, and one of his office force should be a capable operator or train despatcher who is able to do such despatching as may be necessary when two or more trains are employed. Such a job requires a well arranged material yard, and a certain amount of supplies, tools, etc., to carry on the work day by day without calling upon the general store for emergency supplies or tools. Provision must be made for taking care of the locomotives to a certain extent. The engineer who depends on sending his work train locomotive to a terminal shop one hundred miles or more distant for wash-out, light repairs, etc., will find that he has sacrificed the opportunity for doing small jobs in the odd moments, on Sundays or rainy days, which at the end of the month make for satisfactory progress. On construction work perhaps more than anywhere else, it is looking after the little things, the details which save fifteen minutes here and fifteen minutes there to a hundred men or more, which tells. The big things take care of themselves. There is no routine work, and the success of the construction engineer is spelled by looking after these details, insofar as to see that they are done. He must provide a small, well equipped blacksmith shop, perhaps on a car. He must provide necessary tools, pumps, fittings, etc., for improvising temporary water stations. He must also see that his boarding outfits are properly handled. Numerous other details need not be mentioned.

Third, the construction engineer's office should be equipped with sufficient force to enable him to keep proper record of the forces employed, and the amount of material expended in such a way as to enable him at stated periods thoroughly to analyze the cost of his work as it progresses. This does not mean any interference with the duties of the division accountant, if he is to look after the final accounting for the work, but simply that time keepers, material clerks, estimate clerks, etc., shall be aides to the division accountant, although not directly reporting to him.

W. P. Armstrong,
Superintendent, Montana Division, Oregon Short Line.

The Canton-Hongkong Railway is now in full operation for passenger and freight service. It was formally opened on October 4. The first, or British section was constructed from Hongkong to Sam Chun, about 22 miles, and opened about a year ago. The second section was constructed by the Chinese government, with the money loaned by the colonial government of Hongkong, and extends 89 miles from the British border at Sam Chun to Canton. The British section tunneled through many mountains, and cost $5,164,710, while the Chinese section traversing level ground and having two main bridges, cost $6,510,000. Two through express trains are run in each direction daily between Canton and Hongkong. Nearly all the freight cars and passenger cars were made in China.

IMPROVING RAILWAY TERMINALS AT SEATTLE.

BY H. COLE ESTEP.

After an investigation extending over eighteen months and at a cost of nearly $50,000, the Municipal Plans Commission of the city of Seattle has submitted its report. The commission was empowered by law "to procure plans for the arrangement of the city with a view to such expansion as may meet future demands." The idea was to draw up a scheme for the physical development of the city which should be at once comprehensive and harmonious. In addition to many other problems, the commission devoted a large portion of its energies to a study of the steam railway terminals at Seattle and has recommended radical changes in the existing facilities.

The changes suggested include a rearrangement of the tracks along the waterfront on Railroad avenue for a distance of five miles, the construction of a sea wall and the filling of three miles of the present pile trestle on the Great Northern right of way, extensive track elevation on the tide flats at the southern end of the city to cost about $9,000,000, and finally the erection of a large new union passenger station at the south end of Lake Union, together with a tunnel under the main portion of the city to connect with the existing stations on King street.

As will be seen by references to Figs. 2 and 3, Railroad avenue, with its southerly extension, Whatcom avenue, follows the line of Seattle's waterfront on Elliott Bay from Smith's Cove to Spokane street, a distance of five miles. It is really a strip of railway right of way rather than a street, for it affords an important connection between the railways entering Seattle on the north and those entering on the south. The avenue is encumbered with tracks practically its entire length and between Yesler Way and Pike street it traverses the busiest section of the waterfront. To the west are the piers for passenger and freight steamers, docks, warehouses and some commercial houses; on the east lies the principal commercial and business district of the town. Both sides of the avenue must, therefore, have adequate facilities for handling freight. Between Yesler Way and Holgate street, the south end of the avenue, the territory through which it runs is occupied by wholesale houses and manufacturing plants, while south of Holgate street, Whatcom avenue runs over tide flat lands at present almost entirely given over to switch yards and manufacturing establishments. The present problem is to separate the heavy railroad and street traffic on this thoroughfare.

The width of Railroad avenue proper varies from 120 ft. to 180 ft. The railways have franchises which if used to their limit would occupy practically the whole street except a narrow margin along its west side, which is frequently crossed by the curved tracks leading to the piers. Between King and Pike streets there are now eight tracks, laid on 15-ft. centers, the center line of the most easterly one being also the boundary line of Northern Pacific property on the east side of the avenue [illegible]

[illegible] the waterfront must cross Railroad avenue, and as it is a water- [illegible] street traffic also seeks this avenue to avoid the adverse grades that so complicate any transportation problem in Seattle. A [illegible] one concerned. Between King street and Bell street the rail- [illegible] between the hours of 7 a. m. and 9 p. m. [illegible] Between Main and Union streets, where most of the passenger steamer docks are located, they are prohibited [illegible] between the hours of 7:30 and 10:30 a. m. and 4:30 and 9 p. m.

[illegible] the railways and the public of the delays and danger incident to the present congested condition, the Commission recommends that Railroad avenue be brought to a width of not less than 180 ft. at all points; that a sea wall be built along the west side of the avenue from Madison street to Smith's Cove and the avenue filled and paved its entire length from Smith's Cove to Holgate street; also that Whatcom avenue be fully improved from Holgate street to Spokane street.

It is estimated that 2,500,000 cu. yds. will be required to fill the avenue north of Madison street, along the line now occupied by the Great Northern trestle. Unlike the territory south of Washington street, which is filled or partly filled from Railroad avenue out to the inner harbor line, the tide land to the north is so narrow that the proposed sea wall is located on the outer margin of Railroad avenue, widened where it is necessary. Fig. 2 shows the suggested location of the slips and piers which will

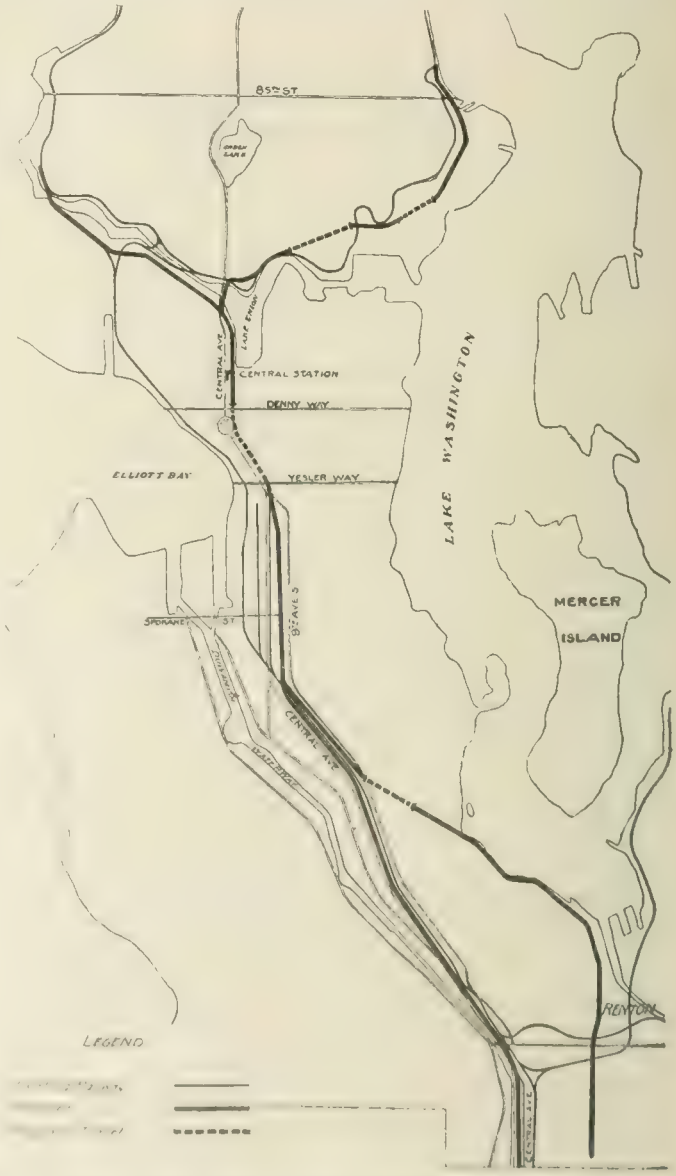


Fig. 1—Principal Railway Entrances Into Seattle.

[illegible] in the area in the future. It is recommended that the latter shall lie north and south, running parallel to each other and occupying all the space outward from Railroad [illegible]

Only tentative designs are submitted at present for the sea wall; Fig. 5 shows one which the commission considers should prove satisfactory for a great part of the waterfront. It provides that broken rock of large size, free from dirt and small particles, shall be dumped in windrows, one above the other, forming the slope of the structure facing the bay. On the completion of the first windrow to a level 8 ft. or more in height, the area behind, that is, on the shore side, is to be filled

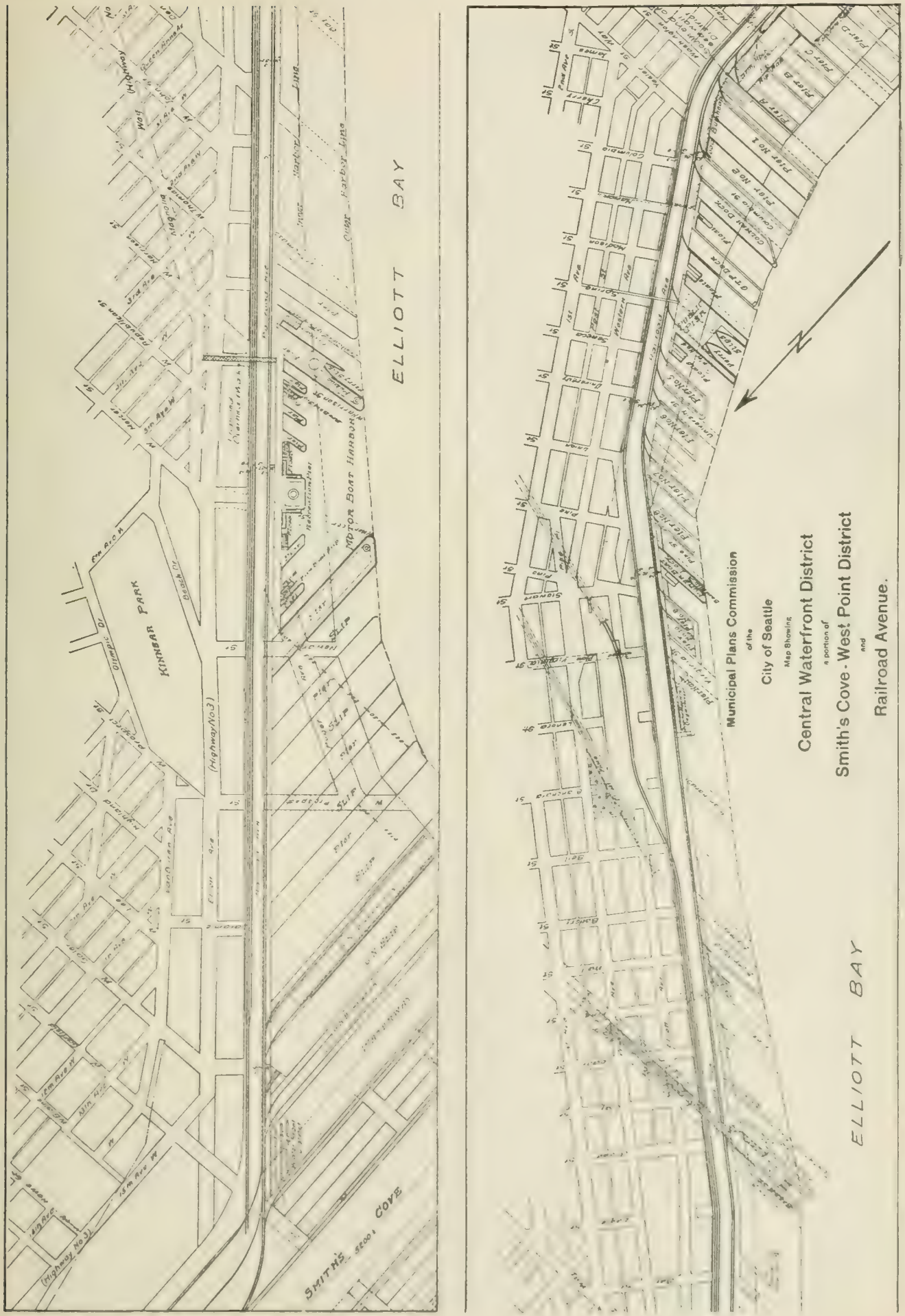
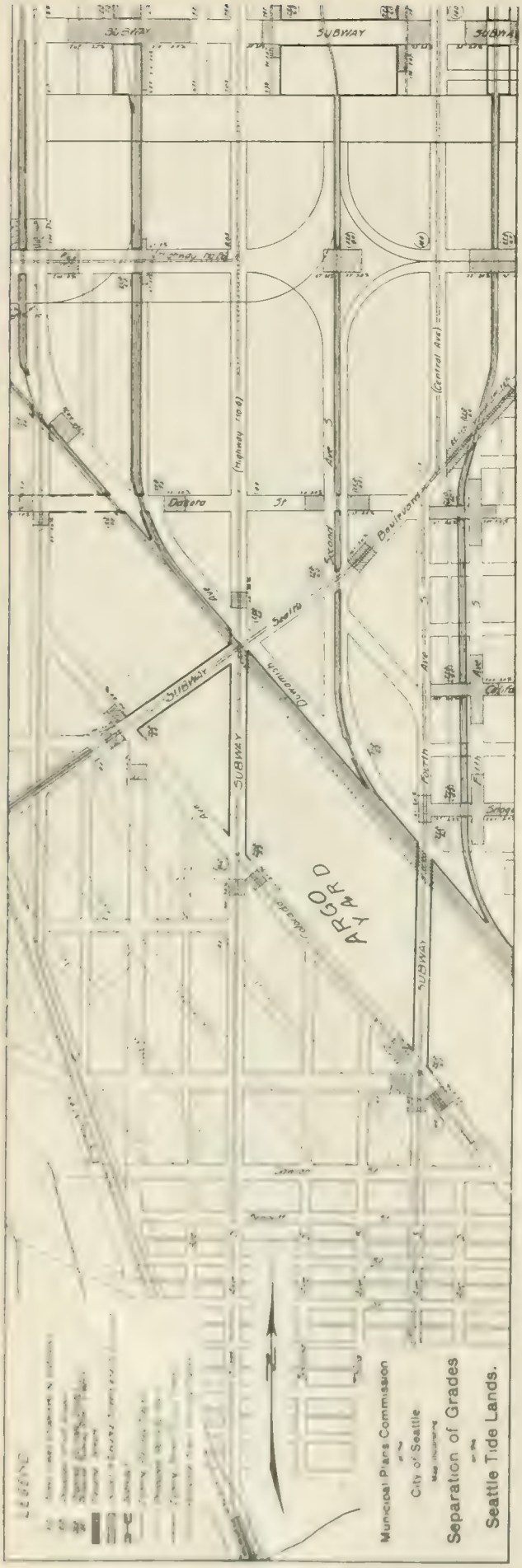


Fig. 2—Waterfront North from Present Stations.



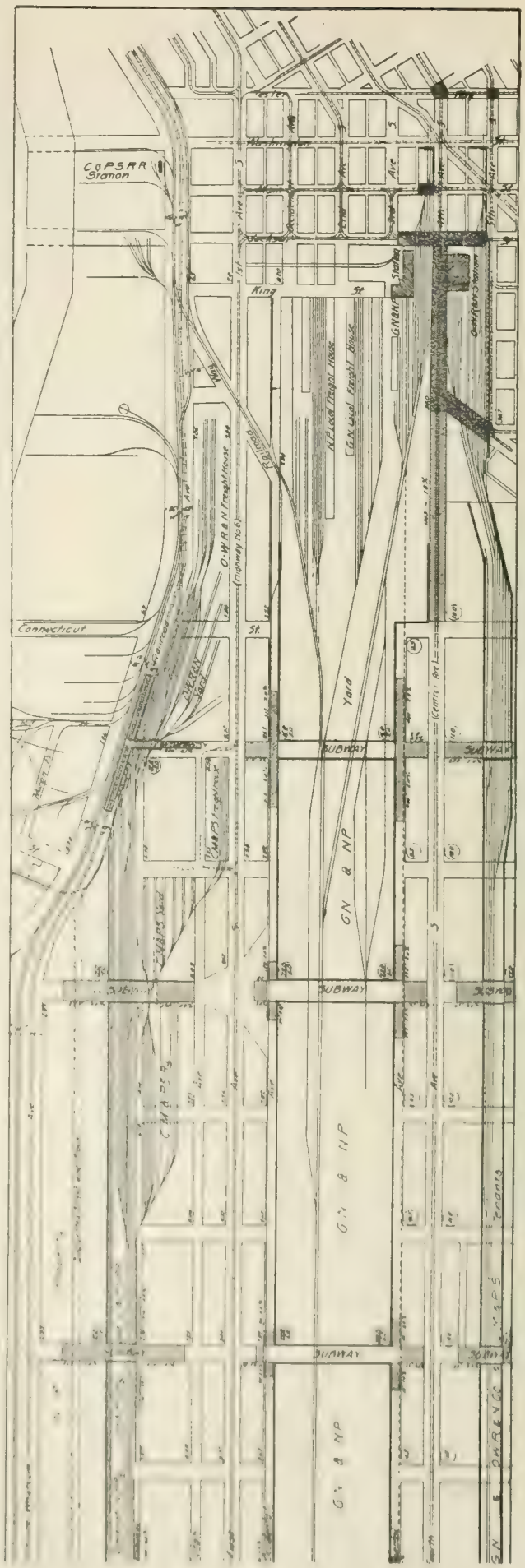


Fig. 3—Railway Yards South of Present Stations.

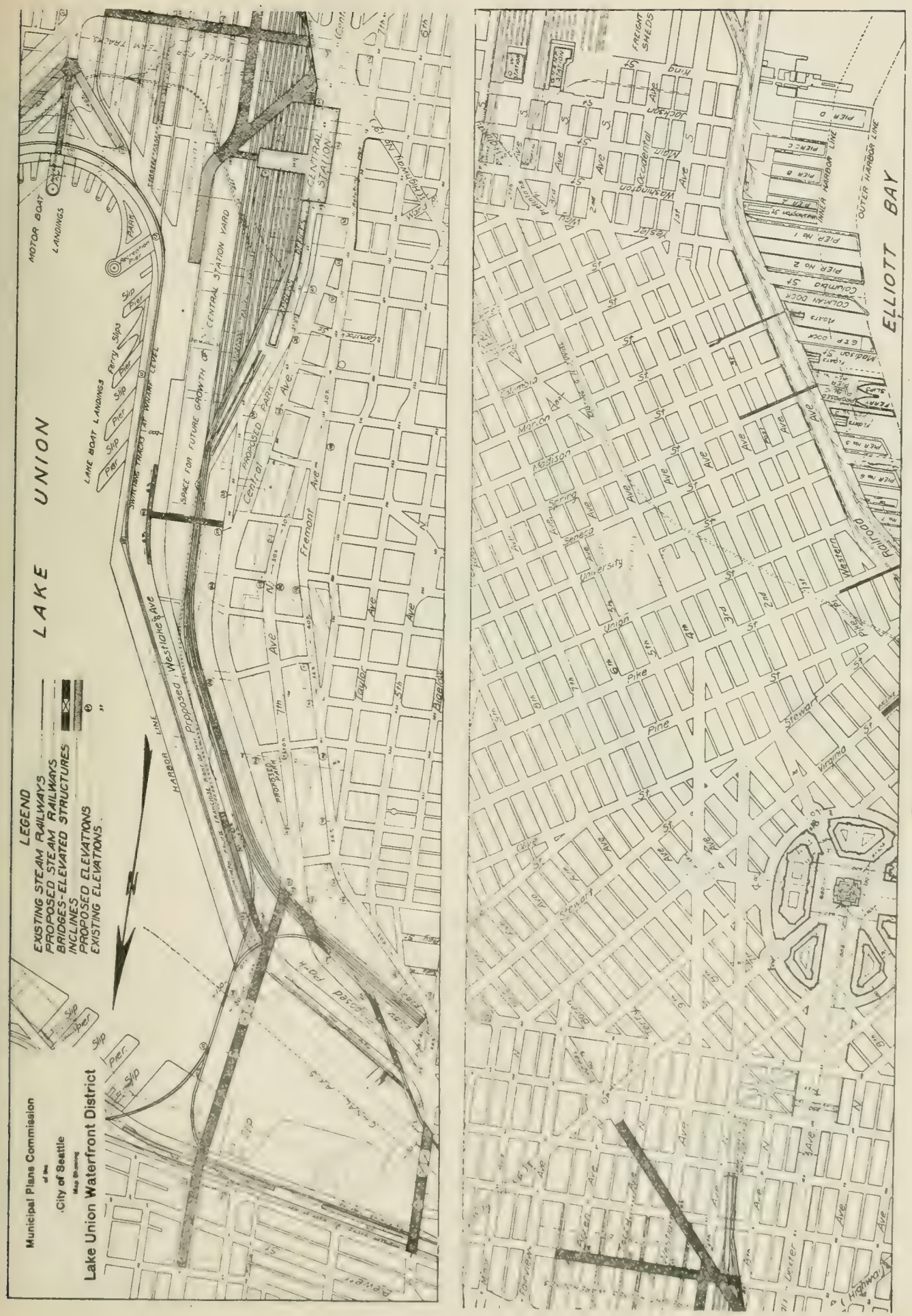


Fig. 4—Site of Proposed Central Station.

with sand or other suitable material. The next windrow is then to be built on top of the first, on a line with the slope, and filling made behind it until by a repetition of this process the work is carried to mean low water.

The face of the broken rock is expected to take a natural slope of 1¼ to 1, and after the filling is completed a slope wall about 3 ft. in thickness will be laid in cement mortar from mean low water to grade. This method insures stability, and the cement wall will afford a barricade against the destructive wharf rat. The cost of this design is estimated at from $75 to $100 per lineal foot, such cost to include riprap, masonry, slope wall, all filling, sidewalk and curb.

Various other plans for improving conditions in the congested district between King street and Smith's Cove were considered. The most apparently feasible of these, a project for the construction of an elevated street over the railway tracks the entire length of the avenue from Spokane street to Smith's Cove, was finally dismissed as prohibitively costly and the present crossings, and it is expected that the plan thus outlined will meet the needs of the situation for many years to come. In the event that future development requires more clear space along these streets it is planned to elevate the tracks on the east side of Railroad avenue on a permanent structure that will permit of the movement of vehicles and pedestrians below it. The tracks on the west side, serving the piers, may have to be shifted further west, following the projected moving of the waterfront westward, but neither of these changes should be necessary for a number of years.

When surrendering portions of their rights of way on Railroad avenue and Railroad Way for the accommodation of street traffic, the commission recognizes that the railways will justly insist that new franchises for competing lines shall not be granted along the areas released, and the city, for its part, would expect to require that the tracks remaining on the avenue should be for the common use of all steam railways.

The second problem the commission takes up in connection

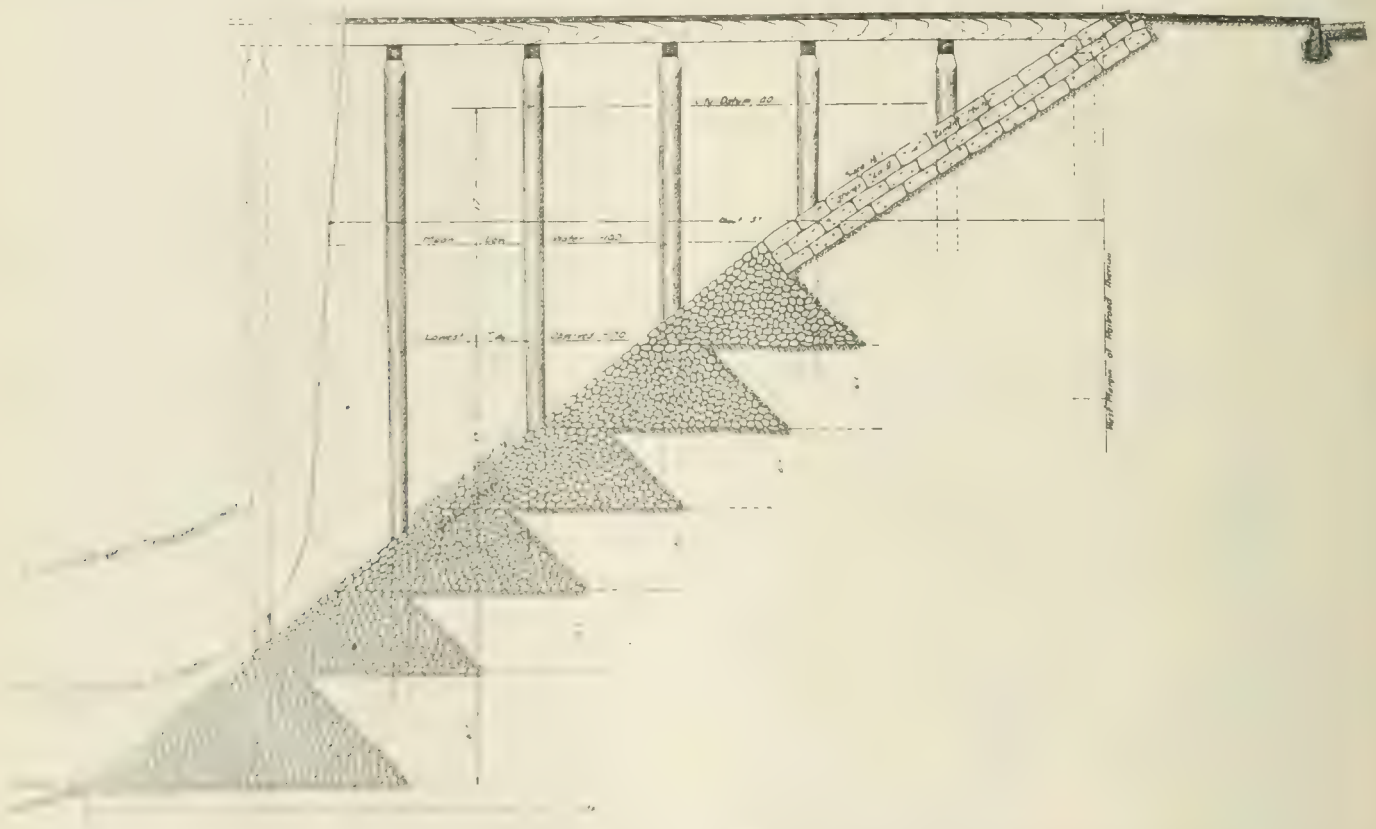


Fig. 5—Design of Proposed Sea Walls.

University street, it was understood that the railways were relay their remaining tracks 13-ft. centers instead of the present in Figs. 2 and 3.

tide flats at the south end of the city. The tract east of the East Waterway and north of Duwamish avenue, shown in Fig. 3, comprises about 1,450 acres, streets included, of which there are extensive areas outside of the railway properties that are available for future manufacturing developments and which will therefore require rail facilities for handling freight. The tracks, properties and franchises of the railway companies extend north and south through this tract, lying approximately parallel to each other.

A proposition to elevate certain streets and avenues in this district once was adopted and a condemnation ordinance passed by the city council. This was afterward repealed and it is now [illegible] would be unwise. The commission is unanimous in regarding track elevation with subways for such cross streets as are to [illegible] the only [illegible] solution of the problem, and it is stated that the engineering departments of the railways concerned concur in this opinion, although prior to the studies

made by the commission they had favored the elevation of the streets rather than of the tracks. Fig. 3 shows the improvements suggested, together with those few subways which the commission has felt could be definitely located now.

It is not intended that industrial tracks shall be elevated unless special circumstances render it desirable in individual instances, such as at the Colorado street yard of the Northern Pacific, where it is thought desirable to retain two such tracks along one side of the property. Generally speaking, industrial tracks are to be confined to alleys running north and south, although a single industrial track on the east side of Utah avenue is allowed, another on the west side of Occidental avenue and still another on the east side of Oriental avenue. Right of way for any additional tracks that might be needed along these avenues must be provided for by the property they serve or by future widening of the avenues. No franchises for industrial tracks crossing avenues between King street and Duwamish avenue are to be granted, unless the tracks are elevated at least at the crossings.

The plan provides for the elevation of the extensive Argo yard of the Oregon-Washington Railway and Navigation Company. South of this yard the running tracks are all close under the slope of the hill on the east side of the valley; they are not to be elevated, but are to be crossed, where it is necessary for street connections, by short overhead bridges.

Tentative estimates of the cost of elevating the tracks on the tide flats indicate that the ultimate expenditures by the railways will amount to eight or nine million dollars. In view of the financial depression and the preliminary work necessary before actual construction could be begun, the commission provides that the track elevation need not begin before September 15, 1913. The date of the completion of the work is left to the future.

In choosing the location for a future union passenger station at Seattle, the Municipal Plans Commission considered first the available approaches to the city. Just as topographical conditions led the existing railways to enter Seattle from either the north or the south, any new roads seeking entrance would have to follow practically the same routes. The desirable avenues of railway ingress and egress are three in number and are so located that they form a huge "Y," the branches of which, referring to Fig. 1, may be described as follows:

(1) Any line entering over the south tide flats, produced northward to Lake Union.

(2) The Northern Pacific route from the north, along the west side of Lake Union.

(3) The Great Northern route via Salmon Bay and the east side of Puget Sound.

At the intersection of these three lines on the southwest side of the Lake Union Basin the commission puts the site of the proposed central station, as shown in Fig. 4. The location chosen is at Roy street and Central avenue, the proposed axial highway of the city, thus making the station virtually a part of the civic center.

The station would be adjacent to the ferry and steamer landings planned for the southwest end of Lake Union and there would be space available for terminal facilities for all the railways, allowing for future growth. The three routes leading to the station have been planned so as to eliminate all grade crossings along the main lines through the city. Space would be available for coach storage and cleaning yards between the proposed new main line along the north side of Queen Anne hill and Lake Washington canal, from Fremont avenue to Fourteenth avenue west. The same location would afford space for a general yard to be used as a center of switching operations and for making up and breaking up freight trains.

Those roads which now have their freight depots, passenger coach and storage yard facilities on the south tide flats would not be expected to abandon them, nor their present passenger stations. These would be needed to accommodate the south end of the city and the yards near the proposed central station would be utilized by the railways entering from the north. The south tide flats would be connected by tunnel to the central station district, eliminating substantially all schedule trains from Railroad avenue.

The commission advocates a single terminal management, either private or municipal, on the basis that it would eliminate duplication of track and terminal facilities, release land valuable for industrial purposes, simplify and reduce the cost of operation, facilitate the prompt delivery of cars and make the port and city a terminal unit.

The foregoing is a brief outline of the suggested changes in the steam railway terminals at Seattle as recommended by the Municipal Plans Commission. The railways affected include the Northern Pacific, Great Northern, Oregon-Washington Railway & Navigation Co., and Chicago, Milwaukee & Puget Sound. The commission consisted of 24 members appointed by the various civic and commercial interests of the city, the appointments being confirmed by the mayor. Among other interests, the railways were represented on the commission. The work was under the supervision of Virgil G. Bogue, consulting engineer, New York. Mr. Bogue was chief engineer of the Western Pacific during its construction.

Regarding the execution of the plans suggested by the commission, an amendment to the city charter provides that the report of the commission shall be submitted to a vote of the people and that if it receives a favorable majority, "It shall be adopted and shall be the plan to be followed by all city officials in the growth, evolution and development of said city of Seattle." These legal formalities are now in process of execution and there is practically no doubt that the plan as outlined by the commission, including the suggestions regarding railway terminlas, will become a part of the organic law of the city.

PROPOSED SPECIFICATION FOR POSTAL CARS.

The sub-committee of mechanical officers of the Special Committee on Relations of Railway Operation to Legislation after conferences with a committee from the post office department and with the chief engineers of the American Car & Foundry Company, Barney & Smith Car Company, Standard Steel Car Company, Pressed Steel Car Company and the Pullman Company, has drawn up a proposed specification for the construction of all-steel and steel underframe full postal cars. This specification is being sent to the railways for examination and approval. Any suggestions as to modifications should be sent to C. A. Seley, mechanical engineer, Rock Island Lines, Chicago, Ill., before December 1, or representatives of the railways may appear before the committee at a meeting at the New Willard, Washington, D. C., December 4. On the following day, December 5, the committee will meet with the post office department committee. The proposed specification is as follows:

GENERAL.

Type.—Postal cars may be built according to any of the following types of construction: (a), Heavy center sill construction, the center sills acting as the main carrying member. (b), Side carrying construction, the sides of the car acting as the main carrying members having their support at the bolsters. (c), Underframe construction in which the load is carried by all the longitudinal members of the lower frame. The super-structure framing may be of steel or of wood re-enforced as per R. M. S. Specification Plan No. 1. (d), Combination construction in which the side frames carry a part of the load, transferring same to the center sills at points remote from the center plate for the purpose of utilizing uniform center sill area. Steel castings may be used as parts of the underframe in any of the above types.

Materials.—All rolled steel plates and shapes used in the car framing shall be made by the open-hearth process. The physical and chemical properties of all material used in the car framing shall be in accordance with the latest standard specifications of the American Society for Testing Materials, as follows: The

standard specification for structural steel for bridges, for steel plates, shapes and bars; the standard specification for wrought iron, for iron bars and plates; the standard specifications for steel, malleable iron and gray iron castings.

Workmanship.—All workmanship throughout the car shall be first-class. The jointing of the car framing shall be made so that the structure as a whole shall be built to dimensions specified, and all joints exposed to the weather shall be made tight against leakage.

Live Loads.—The car body shall be designed to carry the specified live load in addition to its own dead weight under service conditions. Where no live load is specified the maximum capacity of the car, as determined by wheel loads, shall be used as a basis for calculations.

Buffing.—The maximum end shock due to buffing shall be assumed as a static load of 400,000 lbs. applied horizontally at the resultant line of the forces acting at the center line of the buffing mechanism, and at the center line of draft gear respectively, and shall be assumed to be resisted by all continuous longitudinal underframe members below the floor level, provided such members are sufficiently tied together to act in unison.

Details.—All connections, except those specified in the second paragraph under end construction shall be designed for the maximum strain to which the member connected shall be subject, and secondary stresses in any members caused by eccentric loads shall be properly combined with the direct stresses in such members. The maximum fiber stress in any member subject to both direct and secondary stresses may be taken at 20 per cent. greater than those given in the paragraph on stresses, but the direct stresses considered alone must not exceed the allowable stresses given in said paragraph.

The minimum distance between centers of rivet holes shall be three diameters of the rivet, and the minimum distance between the center of the rivet hole and a sheared edge shall be not less than one and one-half times the diameter of the rivet. Below the floor line, framing connections of floor beams, posts, etc., may be of rolled steel, pressed plate, or cast steel, and above the floor line such connections may also be of malleable iron. Connections for I-beams, channels or tees may also be made by coping the flanges and bending the web to form a knee, and for angles by coping one leg and bending the other. The use of fillers in the underframe and superstructure shall be avoided wherever possible. All holes for rivets or bolts in the underframe, superstructure and outside finish shall be drilled or punched and reamed to size and fairness. No drifting of holes will be allowed. In deducting rivet or bolt holes to obtain the net area of any section, they shall be taken at 1/16 in. larger than the diameter of the rivet or bolt. The effective area of a rivet shall be taken as its area before driving. All rivets when driven must completely fill the holes and have full concentric heads or be countersunk when required.

Center Sills.—The center sills may be built up or composed of rolled or pressed shapes, either with or without cover plates, and cast steel draft sills or end construction may be used in connection with any of the above types, with suitable riveted [illegible] center sills may be either of uniform depth or of the fish-belly shape, and may be composed of rolled shapes, web plates, flange angles and cover plates. If [illegible] and angles omitted [illegible] shall be connected to the webs with a sufficient number of rivets to transfer the total shear at any point in a distance equal to the depth of the sill [illegible] must extend at least two rows of rivets at each end beyond their theoretical [illegible]

[illegible] and cast steel draft [illegible] be built up [illegible] end construction, [illegible] sills to transmit the calculated vertical shear.

[illegible] may be of rolled or [illegible] and suitable connections at center and side sills.

Floor Supports.—Longitudinal floor supports shall be supported at each transverse floor member.

End Sills.—The end sills may be either of rolled or pressed shapes, built-up construction or cast steel, with ample connections at center and side sills. They must be designed for the maximum vertical loads to which they may be subject and also for the assumed horizontal loads transferred from the vertical end members as specified in the third paragraph under "end construction."

SIDE FRAME.

General.—In calculating the stresses in the side frame its effective depth when designed as a truss or girder may be taken either as the distance between centers of gravity of the side plate and side sill or as the distance between centers of gravity of belt rail and side sill. At the side door openings the bending moment caused by the vertical shear at the door post shall be considered as being resisted by the section above and below the door openings, and the sum of the direct stresses and those due to bending at such section shall not exceed the stresses specified. A sufficient proportion of any reinforcing members added to these sections shall be extended far enough beyond the door posts at each side so that their reaction can be taken care of by the side frame without exceeding the limit specified for stresses

Posts.—The sum of the section moduli taken at any horizontal section between the floor and the top line of windows, of all posts and braces on each side of car, located between end posts, shall be not less than .30 multiplied by the distance in feet between the centers of end panels, a panel length being considered as the distance between lines of rivets in adjacent vertical posts.

Sheathing.—Outside sheathing plates shall be not less than ⅛ in. in thickness.

ROOF.

General.—The roof may be of either the clear-story or turtle-back type, depending on the standard contour of the railway for whose service the cars are built. In the clear-story type the deck plates shall be in the form of a continuous plate girder, extending from upper-deck eaves to deck sill, and either built up of pressed or rolled shapes or pressed in one piece from steel plates. The carlines may be of either rolled or pressed steel shapes, extending in one length across the car from side plate to side plate, or may extend only across the upper deck. In the latter case the lower deck carlines may be formed by cantilever extensions of the side posts or by independent members of pressed or rolled shapes. In the turtle-back type, the carlines may be of either pressed or rolled shapes, extending in one length across the car between side plate and side plate, or may consist of cantilever extensions of the posts.

Carlines.—The projected area of the portion of roof in square feet supported by carlines, divided by the sum of the section moduli of the carlines must not be more than 100.

Roof Sheets.—Roof sheets, if of steel or iron, shall be of a minimum thickness of 0.05 in., and either riveted or welded at their edges.

END CONSTRUCTION.

Vertical End Members.—The sum of the section moduli of all vertical end members shall be not less than 35, and the section moduli of the main members, either forming or adjacent to the door posts, shall be not less than 75 per cent. of this amount.

The horizontal reactions of all vertical end members at top and bottom shall be calculated from an assumed external horizontal force applied 18 in. above the floor line, to all vertical members in the proportions given above, such force being of sufficient amount to cause bending of all vertical members acting together, and top and bottom connections of vertical members shall be designed for these reactions.

Except where vertical end members shall bear directly against or be attached directly to longitudinal members at either top or bottom, the assumed reactions shall be considered as loads

applied to whatever construction is used at end sill or end plate, and both these last named members shall have section moduli, respectively, sufficient to prevent their failure horizontally before that of the vertical end members.

End Plate.—The end plate may be a rolled or pressed section, or of built-up construction, and shall extend across the end of the car from side plate to side plate, with ample connections at the ends, or shall be of other satisfactory construction to withstand the assumed loads given above.

Stresses.—All parts of the car framing shall be so proportioned that the sum of the maximum unit stresses to which any member is subject shall not exceed the following amounts in pounds per square inch, except as modified in the first paragraph under "details," the second and third paragraphs under "end construction." These stresses, unless otherwise stated below, are for steel having an ultimate tensile strength of from 55,000 to 65,000 lbs. per square inch. Where other materials are used, they shall bear the same proportion to the ultimate strength of the material used.

The stress in built-up bolsters shall not exceed 12,500 lbs. per square inch.

The stress in cast steel for bolsters and other details shall not exceed 8,000 lbs. per square inch.

The stress in sills and framing shall not exceed 16,000 lbs. per square inch.

For members in compression the above stresses shall be reduced in accordance with usual engineering practice.

Rivets (Rivet Steel).

Shear, other than buffing	10,000 lbs. per sq. in.
Bearing, other than buffing	20,000 " "
Shear, buffing	12,000 " "
Bearing, buffing	24,000 " "

Floor.—Sub-floor of postal cars to be of iron or steel plate, upper or wearing floor of composition or of matched wooden flooring, maple or yellow pine preferred, with proper insulation. Composition flooring may be secured by corrugated, keystone or equivalent style of plate or by wire fastening which is anchored to the sub-floor.

Interior Finish.—Inside, side and end linings and head lining of postal cars to be of flat or corrugated steel plate, composition board or wood, preference in the order named, properly secured to the car framing.

Insulation.—Suitable fabric or material shall be used as an insulation against cold or heat in the side and end walls and roof of steel postal cars, securely fastened as the nature of the material may require for efficiency and durability.

Doors and Windows.—Postal cars to be equipped with such side doors, end doors and side windows as are shown on the standard plans of the R. M. S. department. Doors and windows may be made of wood or metal and when glazed the glass shall be double strength. Trimmings and locks to be the railway company's standards. Doors and windows, including swinging deck sash, to have suitable weather stripping.

Lighting.—Lighting of postal cars primarily to be with electricity or gas with candles provided for auxiliary light. Distribution of light shall be in accordance with the requirements of the working space and doorways. Electric light installations on postal cars shall include distribution, preferably by conduit system with separate circuits, cut-outs, and switchboard regulation; lamps to have shades of railway company's standard. The generator, distribution, battery boxes and their equipment, train connectors, charging plugs, other accessories, and all wiring to be as per the railway company's standard practice. Gas lighting installations on postal cars to be in accordance with the railway company's standard practice.

Heating.—Heating of postal cars primarily to be with steam, applied either as a vapor system, with separate regulation for each coil, hot water steam heated, or direct pressure steam, with preference in the order named. Pipes are to have suitable protection guards of wire or perforated steel. For postal cars running into territory requiring them, an auxiliary coal burning stove shall be furnished, complete with coal box and firing tools, smoke jack and protection guards. The stove and coal box to be securely fastened. The stove may be used to heat direct or to heat the coils of an auxiliary hot water system. The train pipe steam line to be applied and equipped with end valves, steam hose and couplings, as per M. C. B. requirements and the railway company's standards.

Ventilation.—Ventilation of postal cars of clear-story design to be accomplished by means of swinging deck sash protected by screens. Trimmings of swinging deck sash to be railway company's standards. Postal cars not having clear-story roofs are to have a sufficient equipment of self-acting ventilators in the roof.

Vestibules.—Postal cars are to be equipped with railway company's standard short vestibule.

Couplers and Draft Gears.—The details of the coupler and draft gear to be in accordance with M. C. B. and U. S. safety appliance requirements, and the practice of the railway for which the cars are built.

Buffing Mechanism.—The details of the buffing mechanism to be in accordance with the practice of the railway for which the cars are built.

Brake and Signal Equipment.—Postal cars to be equipped with automatic air brakes and signal equipment of the latest design railway company's standard. Hand brakes in accordance with U. S. safety appliance standards. Brakes to be applied to all wheels, and to be preferably arranged inside on four-wheeled trucks. The braking power should not be less than 80 per cent. of the light weight of the car, based on 60 lbs. air pressure in the air brake cylinder. Suitable cord or attachments shall be furnished for convenient operation of the conductor's valve and train signal system.

Steps, Handholds, Signal Brackets.—The details of the steps, handholds and signal brackets to be in accordance with U. S. safety appliances and M. C. B. requirements and the practice of the railway for which the cars are built.

Stanchions and Screens.—Permanent stanchions in storage ends and at ends of pouch racks, screen frames, and screens to be located as per standard R. M. S. plans.

Safety Bars.—Safety bars to be applied in an equivalent manner to that called for in R. M. S. specifications, plan No. 1.

Interior Equipment.—The following list of equipment shall be arranged as shown on standard R. M. S. drawings, the details as per railway company's standards: letter cases, pouch racks, paper boxes, distributing table, hinged table, shelf and letter drop, general order case and tag case, drawers, pouch catcher, cinder guards and brackets, hopper, wash stand, water cooler, water tank, mirror, wardrobe, fire buckets, fire extinguishers, and wrecking tools.

Truck.

General.—Trucks may have either the built-up metal or cast steel frames, and may be either of the four-wheel or six-wheel type, within the limit of wheel loads given below. For cars equipped with one cast iron brake shoe per wheel the effective maximum emergency brake shoe pressure must not exceed 18,000 lbs. per shoe. When two brake shoes per wheel, or one shoe per wheel having a higher coefficient of friction than cast iron are used, the wheel loads may be increased to the allowable carrying capacity of the M. C. B. standard rules.

Wheel Loads.—Maximum weight of loaded cars must not exceed 15,000 lbs. per wheel for M. C. B. standard axle having 5 in. x 9 in. journals, or 18,000 lbs. per wheel for M. C. B. standard axle having 5½ in. x 10 in. journals.

Details.—Wheels shall be either all-steel or steel-tired. All other truck details, including body and truck center plates and side bearings, shall be in accordance with M. C. B. requirements and the practice of the railway for whose service the cars are built.

Painting.—The painting of car body and trucks shall be in accordance with the railway company's specifications for steel cars.

Lettering and Numbers.—The lettering and numbers of postal cars to conform to R. M. S. requirements and the railway company's standards.

IS BIG BUSINESS AN INDUSTRIAL EVIL?*

BY FAIRFAX HARRISON,
President, Chicago, Indianapolis & Louisville.

On one of the few occasions when I came into personal contact with Mr. Harriman, I went to his office, by appointment shortly before his death, to ask him to do something, and was told that he was ill in bed, but would see me if I came uptown. He was then living in a rented house on upper Fifth Avenue, one of those typical New York houses of melancholy exterior and Persian splendor within. I was shown up to a room on the second floor, a gorgeous high ceilinged chamber fretted with gilding and heavy with hangings, and there on a little iron camp bed between the windows lay that redoubtable Captain of Industry. It seemed to me as I entered that he was all eyes and spectacles. I thought of a spider, of an owl at night, but I soon felt most of all the intense luminousness of his gaze, the undaunted spirit shining through and suffusing the frail body. I asked him what I came to ask and received a curt refusal, and rose to go, but he bade me wait and presently plied me with questions about the railways in the southeast. I was astonished at the detail of his knowledge of the map, he seemed to be as ready in his reference to junction points as a rate clerk, but seemed also to know minutely the financial structure of the various systems, their physical condition and the ruling grades of their principal arteries of traffic. He spoke briefly but eloquently of the inevitable growth and prosperity of the South and its requirement of transportation facilities, and then proceeded to outline a plan, which he said he would some day accomplish, for a common control of all the main lines of railway in the territory, and so make possible the pouring of their accumulated traffic upon that line which should be found to be physically best suited for development and efficient operation. He swept aside the difficulties of hostile public opinion and hobbling statutes in a serene confidence that the end was economically desirable. "They will come to understand it," he said. I confess that I gasped. At intervals during the conversation he would turn to the telephone standing on the table beside the bed, seize it and

"in his hand
The thing became a trumpet."

Sudden winged words, abrupt but unmistakable in their command, were transmitted to his office to be distributed over the far-flung battle lines of his power and responsibility, and then in an instant he would courteously turn to renew what he was saying to me.

On that narrow bed lay the slender and physically feeble embodiment of the "Big Business" which is now being everywhere haled before the bar of Public Opinion.

Because of the manner in which the subject is handled by some government officials and their magazine allies, it sometimes seems that it is mere bigness of business which is now regarded as an offense, and one is struck by the anomaly of this attitude with the traditional worship of mere bigness by the American people. Foreign observers have made a by-word of the frequency of our proud and indiscriminate boasts of the size of things, of [illegible] the Congressional Record, of the number of animals slaughtered [illegible]

At the dinner of the American Iron and Steel Institute in Chicago last winter Baron von Bodenhausen, one of the visiting [illegible] the "biggest in the world," and how he had won his bet before [illegible]

be proud of things because they are big, and we are naturally astonished by an attack for that very reason on some of the institutions which the man in the street has most loudly acclaimed as typical American achievements. But fortunately we have realized that, while only the biggest trusts have been pilloried as yet, they are on trial, not for their size, however that fact may be used to promote opinion hostile to them, but for deeds and industrial tendencies which are those also in kind of the lower middle class trusts and even of some individuals. We are not always convinced of this by the words of the politicians, because, alas, we are not always persuaded of their sincerity, but our understanding of the public opinion which supports the attack comes out of the mouths of those publicists whose impartial habit of mind, aloofness of view and intellectual sanity command our respect. Among these stands at the top President Eliot of Harvard, who has recently illumined our existing industrial problems in an oration, delivered in historic Faneuil Hall on the Fourth of July last, a sober analytical discussion which contains much to give pause to the serene complacency of those who say that the attacks on big business are mere effusions of politicians. His argument is that the American people who declared their independence in 1776 were, by reason of their individualism, industrially sounder than are we today: "they were by inheritance and occupation and through such public instruction as they received, an independent people. Every man owned his own means of production"; that while we still enjoy the political independence they achieved, we are sunk, by the tyranny of the "industrial government" to which we are now subjected, into a dependence far more evil than that which the man of 1776 threw off. He says:

"The huge monopolistic industrial combinations, the combinations among financial institutions which put great masses of capital within the control of a few persons and the large-scale retail establishments, in which captains are few and subordinates many, all tend to diminish the personal independence of the average man or woman. The trades unions take a strong hand in reducing the personal independence and practical liberty of the journeymen in their respective trades. In short, it is impossible that the clerks, operatives, salesmen, and trades unionists of today should be as independent, self-reliant and enterprising as the pioneers, farmers, fishermen and uncontrolled mechanics of 1776 were."

It is not to be suggested that in thus preferring the economic and industrial condition of our revolutionary forebears, Dr. Eliot is a mere *laudator temporis acti;* that he has indulged the predilection of the elder statesmen for reminiscence of the "good old times," for he best of all knows that it is impossible again to reproduce that condition, to turn back the clock to that simple and virile individualism, which he exalts. The interval since the American Revolution has been the time in which, as the poet foresaw, "the individual withers, and the world is more and more." It is no longer individuals who compete in manufacture and trade, nor even groups of individuals, but nations themselves are now arrayed in militant industrialism: and the conditions affecting the average man which such competition creates are common to all the commercial nations of the present day. The [illegible] which we are now suffering is not peculiar to us, but is a *weltschmerz* which we share with all our national competitors. If it were not true that the development of our big business had in the main been along the lines of increased production and reduced cost, in a word, of efficiency, it is not likely that we would long survive in the crowded markets of the world, for the man of 1776 with his individualistic methods could no more compete in modern world industrialism than could Achilles, [illegible] war cry and personal prowess swept to destruction the champions of Ilium, prevail against the discipline and organization and preparedness of Gen. Oyama.

[illegible] that the growth of our activities from [illegible] has been attended by lamentable mistakes [illegible] but if we agree that today large units are

necessary for efficiency, it would seem that our efforts should be directed to amelioration of the conditions which make for evil rather than by victorious indulgence in that modern sport of kings, "trust busting," whereby the good is destroyed with the evil. It is in this respect that the present attitude of the government towards business disturbs those serious students who observe contemporary economic history. There was a time when an attorney general of the United States was able to say, after a notable forensic victory, that "the government of the United States will not run amuck," but today we find not only that the responsible officers of government are performing their sworn duty in enforcing the Sherman law, as every sane man must respect them for doing to the last extremity, but also, in public utterances, are they advocating and defending the outworn policy of the lethal statute. We are told with solemn authority that competition between individual producers must be restored to its old place in industrial life, not merely because the law of 1890 so ordained, but because, forsooth, that is sound economic policy today. It is a summons of the sturdy pre-Revolutionary fishermen and the farmers from the mists of time.

Competition between individuals in their economic situation was indeed necessary because some competition is always a necessary element of a sound industrial life, and they could have no other, but inasmuch as we must now compete as a nation with other nations to preserve our existence, it seems better to concentrate our energies on the effort for individual efficiency than to waste our aggregate strength in domestic quarrels. An audience of railway traffic officers is perhaps best of all qualified to testify to the folly of unrestricted competition between individuals or groups of individuals even on the largest scale. Who here can "point with pride," as the political platforms say, to the competition in rates which has made past railway history to scarlet; the recurring incidents of solemn compact and flagrant disregard of the pledged word; the hectic fluctuation of prices of necessities; the disturbance of security values and of business generally, which were consequent upon rate wars? No one but the gambler benefited by such evil days, yet these are the things which were the direct and notorious consequence of the kind of competition which is now proposed to reinstate. It was indeed in the effort to secure stability of business against this cut-throat competition that many of the mergers of railways were accomplished and some of the existing great systems were built up; yet the men who brought this about never dreamed that they were committing crime. In their hearts they were proud of what they had done, as men are apt to be of the deeds they accomplish with high purpose, but as the conscious criminal seldom is.

Whatever may be the case of the manufacturer, the railway officer is today fortunately under no necessity to observe the presidential admonition and search his heart for the motives of his business life, for there has been supplied for the railway officer an effective remedy for the evil consequences of unrestricted competition, namely: Regulation, and that, I maintain, is the true medicine for the industrial situation generally.

We have seen in a few years the development of the policy of regulation of the railways to a remarkable standard of success measured by the results obtained. In making this statement I am not likely to forget the preliminary failure of methods of regulation, the incompetence, the inefficiency, nay, even the insincerity of its administration at times, and, worst of all, the evil inconsistency of dual regulation by state and federal government in respect of the same subject matter at the same time; but accepting these hardships in a large sense because of the end to be ultimately attained, we must recognize that the incidence of regulation has already enabled railway officers to do many things, which in their hearts they always wanted to do, and to end some abuses—notably rebates and free transportation—which were always offensive. Regulation has also done much to secure railway investments as a whole on a safer and firmer foundation than ever they were: it is true that fewer "melons" are now cut; there are fewer sensational rises in security values on the stock exchange; there is less buying and selling of whole railways, and, for the moment, there is even less construction, but the railway securities which have real merit are today tending more nearly to reach an equilibrium of investment value with an assured return at a reasonable rate.

Those who have been wont to buy railway stocks for the sake not of the income, but of the possible profit from an expected increment in market value, are discontent, and it is from Wall street that we hear the most violent criticism of regulation. Of course, there are, and for a long time will continue to be, some railway officers who oppose regulation from habit and conviction. We all know the fine old-fashioned railway officer who achieved his promotion and present dignity in the rough and tumble days and who continues to rely upon brute force in resisting regulation, because he only sees the hardships which it entails upon the railways and the inefficiency of those who administer the régime. He is as unable to adjust himself to modern conditions in which regulation is an accomplished and accepted fact, as would be an antediluvian beast, but it will not be long before he can be found only in the museums beside the ichthyosaurus and the diplodocus.

In the paper from which I have already quoted, but with which I regret I cannot altogether agree, Dr. Eliot recognizes what I here maintain, that the remedy for the industrial evil in big business lies in regulation; and, in his judgment, the only alternative is government ownership. "Hence," he says "in a democracy, if a monopoly be natural and inevitable, or, in other words, indispensable to efficiency, it must be either regulated or assumed by government."

With a conservative government policy towards business, big and little, no man can venture to foretell the industrial future of the United States. We hear our political liberty lauded from every platform, our natural resources rehearsed on every hustings, but we do not so often take stock of what is today perhaps our chief economic advantage, namely: that we have led the world in adjusting ourselves to increased costs. What has caused those increased costs in another question. Be it the increased volume of gold available for the arts and as the basis of circulating currency, or be it something else, the tendency is apparent in every commercial community throughout the world. In the United States every manufacturer, like every responsible railway officer, knows that in the last ten years his costs have actually increased and that he has had to adjust his business to new conditions. Sometimes it has seemed that during the process disaster must result, but with few exceptions the adjustment has been made and wherever accomplished it is a victory "no less renowned than war." Our two principal industrial rivals, England and Germany, have still to make this adjustment. We have recently witnessed a bloodless revolution in England, which preludes the early realization of a just expectation of British labor for higher wages, and keen observers report that something of the same kind is pending in Germany. Think for a minute what this might mean to the commerce of the United States. We are already paying the highest wages in the world, and yet today, through efficiency and low transportation charges, we are able to compete with those nations in which the question of a living wage for labor is just beginning to find effective voice and a response from government. That their production costs will go up is inevitable, and when they do we should come into an era of national prosperity which would be unexampled. The risk is that government shall meanwhile have wiped out the margin of our prospective advantage by limiting efficiency through fear of the bogy monopoly. Let us pray that statesmanship may see in Big Business the instrument destined to reap this rich harvest of opportunity and, through Regulation, find means to purge it of its evils, but at the same time foster its strength and efficiency.

ECONOMIES EFFECTED BY MALLET LOCOMOTIVES ON THE NEW YORK CENTRAL & HUDSON RIVER.

The introduction of 26 Mallet locomotives has increased the operating capacity of a single track division on the New York Central & Hudson River 40 per cent. without the construction of a single mile of new track. They replaced the heavy consolidation locomotives in slow freight road service on the Pennsylvania division, and made it possible to handle 1,400 cars in twenty-four hours, as compared to 1,000 cars under former conditions. A Mallet locomotive now hauls a 4,000-ton train over the division, a profile of which accompanies this article, without assistance. In addition to the heavy grades there are many curves, some as sharp as 8 degs. Pusher service has been eliminated and the 26 Mallets are now able to handle the entire traffic, replacing 60 consolidation locomotives. As the maximum train load has been increased, the number of trains per day has been decreased by ten each way. The congestion of traffic, therefore, has been relieved and the amount of overtime has been reduced 80 per cent. The Mallets save on an average 35 per cent. of the fuel burned per ton-mile, as compared to the consolidations, or, in other words, they make 54 per cent. more ton-miles per ton of coal.

The consolidation locomotives which were replaced weighed 236,000 lbs. each, and had a tractive effort of 45,700 lbs. By using two of these engines on ruling grades it was possible to take a maximum train of 3,500 tons over the road at an average speed of 15 to 18 miles per hour. Under these conditions 60 consolidation locomotives were required, of which 31 were used in road service and 29 in pusher service. Four pushers were stationed at Beaver Dams, N. Y., one at Corning Junction, 20 at Stokesdale Junction, Pa., 2 at Newberry Junction and two for helping around the wye at Avis. Under these conditions the maximum operating capacity of the single track was so nearly reached that overtime was excessive. A careful study of the situation showed that the operating capacity could be increased only by double tracking the line, or by increasing the weight of the trains by the use of heavier motive power. The latter course was adopted as being the most economical, and it was decided to attempt to secure a locomotive capable of hauling a train of 70 loads up the heaviest grade on the division at a speed of not less than 10 miles per hour, and to make the distance at an average speed of from 10 to 14 miles per hour. The Mallet locomotive seemed to offer the best solution of the problem. One of these locomotives of the 2-6-6-2 type had been ordered from the Schenectady plant of the American Locomotive Company for use on another division, and it was decided to thoroughly test it out on the Pennsylvania division.

TESTS.

Two separate series of tests were made, in the first case the Mallet was found to give a considerable economy in fuel consumption per ton-mile as compared with the consolidation locomotives originally, i. e., low speed, heavy freight service in which the economies due to the Mallet principle were most conspicuous. The Mallet was then returned to the Schenectady plant of the American Locomotive Company and equipped with a superheater, a Security brick arch and was otherwise prepared for the operating conditions under which it was to be used.

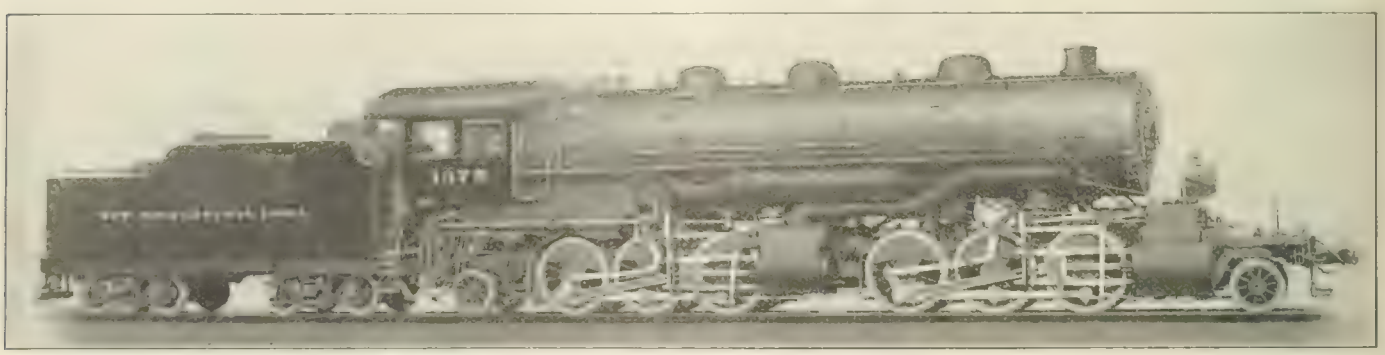
A second series of tests were then made which proved conclusively that highly superheated steam used in conjunction with compound cylinders gave greater economy in operation. As a result of the tests 25 additional Mallets were ordered and have been placed in service. These were slightly modified from the tested locomotive, as may be seen by reference to the comparative table of dimensions of the locomotives.

TABLE 1.—GENERAL DIMENSIONS OF LOCOMOTIVES TESTED.

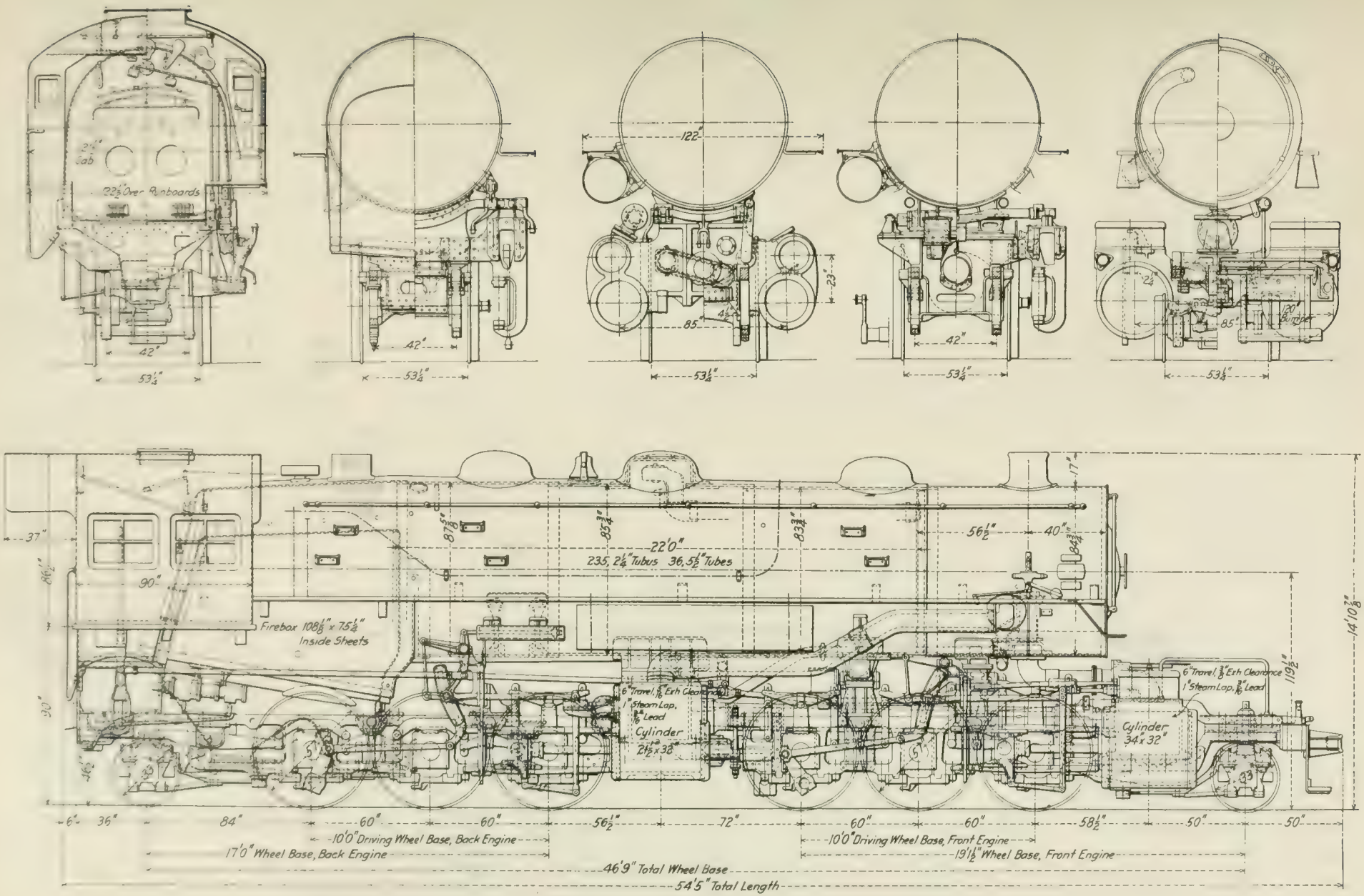
	N. Y. C. Consolidation Class G.6.G.	P. R. R. Consolidation Class H.8.B.	Mallet as Modified in Second Test.	Mallet as Finally Ordered.
Maximum tractive effort, lbs....	45,700*	45,300*	66,600	67,500
Maximum tractive effort (working simple) lbs.	.....	.....	79,900	81,000
Wt. on driving wheels, lbs.....	211,000	211,700	304,500	301,500
Wt. on leading truck, lbs.....	25,000	26,900	25,000	26,000
Wt. on trailing truck, lbs.....	.....	.....	22,500	26,500
Wt., total of engine, lbs.....	236,000	238,600	352,000	354,000
Wt. of tender, lbs.....	147,400	158,000	152,700	153,700
Wt., total of engine and tender, lbs.	383,400	396,600	504,700	507,700
Wheel base, rigid, ft. and in....	17- 6	17- ½	10-0	10-0
Wheel base, driving, ft. and in.	17- 6	17-	30-8½	30-8½
Wheel base, total of engine and in.	26- 5	27-	46-4	46-9
Wheel base, total of engine and tender, ft. and in.....	60-11½	62-	74-8	75-8
Cylinders, diameter, in.....	23	24	30½ & 33	31½ & 34
Cylinders, stroke, in.....	32	28	32	32
Wheels, diameter of driving, in..	63	62	57	57
Wheels, diameter of truck, in....	33	33	33	33
Wheels, diameter of trailing, in..			33	33
Wheels, diameter of tender, in..	33	36	33	33
Boiler pressure, lbs. per sq. in...	200	200	200	200
Boiler, type	St. top	Belpaire	St. top	St. top
Boiler, outside diameter, in.....	82	80	83¼	83¾
Boiler, length, in.....	108¼	110	108¼	108¼
Firebox, width, in.....	75¼	77	75¼	75¼
Tubes, number	446	465	385 & 36	385 & 36
Tubes, diameter, in	2	2	2¼ & 5½	2¼ & 5½
Tubes, length, in	15	15.0	20	20
Heating surface, tubes, sq. ft....	3,512	3,665.91	4,168	4,168
Heating surface, firebox, sq. ft.	184	181.0	185	197.9
Heating surface, arch tubes, sq. ft			13	27.1
Heating surface, total, sq. ft.	3,696	3,846.9	4,366	4,393
Grate surface, sq. ft.			966.3	966.3
Fuel, kind of	Coal	Coal	56.5	56.5
Tender, water capacity, gals....	7,500	7,000	8,000	8,000
Tender, coal capacity, tons	12	12	12	12

*Calculated at 85 per cent. mean effective pressure. †Calculated at 85 per cent. of boiler pressure.

All of the tests were made under the personal direction of three experts, one each from the New York Central & Hudson River, the Pennsylvania Railroad and the American Locomotive Company. The consolidation locomotives, with which the Mallet was compared, were the best designs of that type of locomotive on the New York Central & Hudson River and the Pennsylvania. No attempt was made to compare the best consolidation locomotive which might be built with the best Mallet, but rather to com-



Mallet Compound Superheater Locomotive; New York Central & Hudson River.



Mallet Locomotive Used on the Pennsylvania Division of the New York Central & Hudson River.

pare the modern powerful freight locomotive with the most approved design of about five years ago for the same class of service. The tests are, therefore, valuable in that they indicate the great improvement that has been made in locomotive design within the past few years. The two consolidation locomotives did not differ greatly in general design, and were not equipped with either superheaters or brick arches. The Mallet locomotive had approximately 40 per cent. more total weight and 44 per cent. more weight on driving wheels than either of the consolidations. The tests covered a period of two and a half months.

Conclusions:—The final conclusions of the committee as to the advantages of the Mallet were:

"Economy in train operation due to the larger output in ton-miles per locomotive.

"Greater economy in coal per unit of power due to the larger boiler available, and especially to the use of compound cylinders and superheated steam.

"Judging from the construction of the parts of this locomotive and its riding qualities, with the ability to take curvatures as represented on the division over which the tests were made, there would seem to be no reason to expect any undue injury to the locomotive itself when running at a speed of 30 miles per hour.

"On return trips from Stokesdale, a number of the runs were made at speeds which would indicate that 30 miles per hour would not be at all detrimental to the locomotive itself."

"As to injury to the track at speeds of 30 miles per hour, the weight per axle for the Mallet locomotive is very much below that which is common practice with passenger locomotives, where as high as 60,000 pounds per axle is often employed, and from this standpoint, it is considered that no undue injury would be occasioned to the track suitable for consolidation locomotives similar to the G. 6 G., with a locomotive of this type."

Table 2.—Comparison of General Performance of Mallet and Consolidation Locomotives Under Different Speed Conditions.

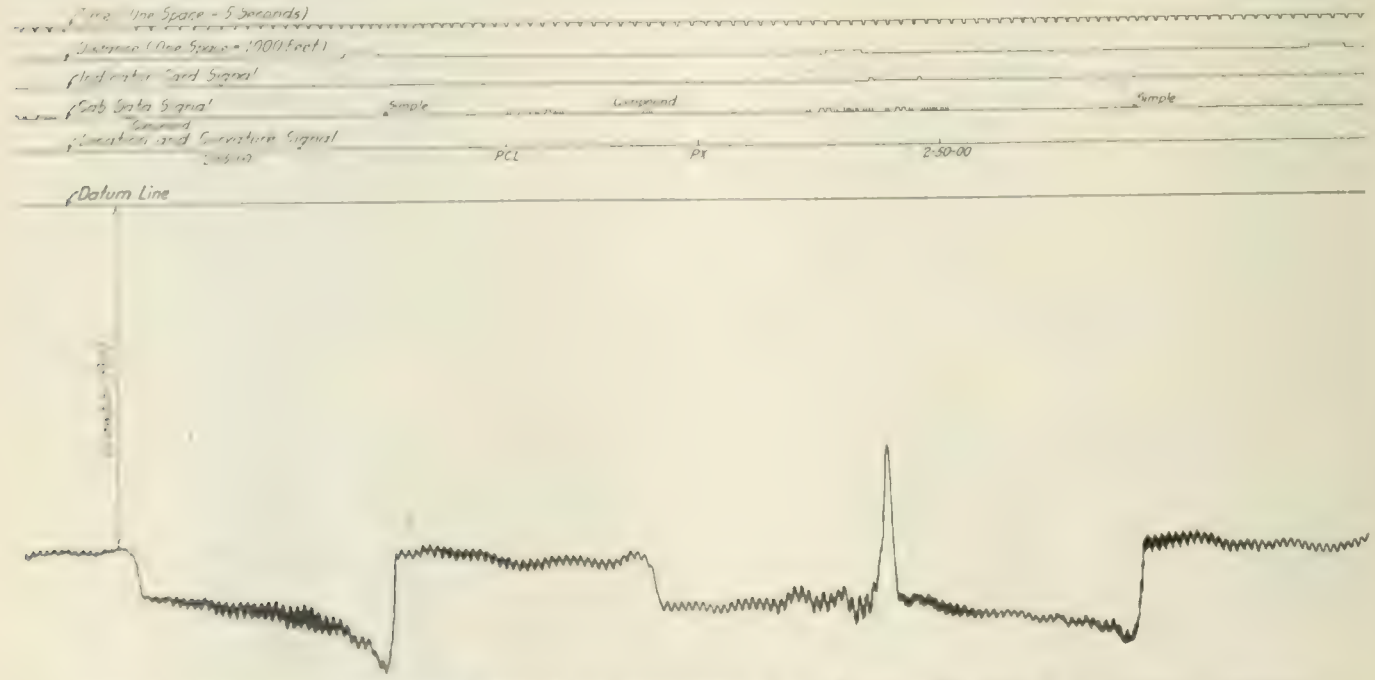
	Approximate average speeds.	Type of Locomotive. 2-8-0	2-6-6-2	Per cent. in favor of Mallet as compared with consolidations,
Number of cars	12.5	41.5	65.3	57.3
	15.0	36.7	58.2	58.6
	17.5	....	40.	....
	21.0	25.5	....	....
Average weight per car, tons	12.5	60.15	57.2	....
	15.0	55.12	59.5	....
	17.5	.....	64.7	....
	21.0	60.47	....	....
Total tonnage behind tender	12.5	2,495.5	3,734	49.6
	15.0	2,017.5	3,461	71.5*
	17.5	.....	2,588	....
	21.0	1,542	.....	....
Total elapsed time, hours	12.5	5.89	6.86	....
	15.0	4.65	5.00	....
	17.5	3.51	4.51	....
	21.0	....	....	....
Running time, hours	12.5	4.605	4.58	....
	15.0	3.765	3.87	....
	17.5	.....	3.37	....
	21.0	2.82	....	....
Average speed, running time, m.p.h.	12.5	12.75	12.9	....
	15.0	15.7	15.2	....
	17.5	....	17.5	....
	21.0	21.4	....	....
Coal per ton-mile, lbs.	12.5	0.1275	0.077	39.6
	15.0	0.1392	0.084	39.6
	17.5	.....	.....	....
	21.0	0.1418	0.086	....

*This relatively higher percentage in favor of the Mallet is probably due to the fact that the consolidations were not loaded to their full capacity at 15 miles per hour.

TEST DATA.

All tests were made over the portion of the road from Avis yard, Jersey Shore, to Stokesdale Junction, Pa., a distance of 63.07 miles. The runs were confined exclusively to the northbound movement, the engines being turned at Stokesdale Junction and returned light to Avis. The descending grade from Stokesdale to Corning, the end of the division, made a continuance of the run through to the latter point necessary. All observations were begun at Torbert, 4.24 miles north of Avis. This made it possible to get the locomotive in good running condition, and the fire built up ready for taking observations. From the profile it will be seen that the remaining distance of 58.83 miles from Torbert to Stokesdale Junction is entirely ascending grade, with the exception of about 4.5 miles of level track distributed over six places, and 1.19 miles of descending grade occurring at two points. As nearly as possible all the runs of the Mallet in the second test were made under the same conditions as those in the first. The same crew operated the locomotive, and the weather and rail conditions were approximately the same.

The following data shows a comparison between the performance of the modified Mallet used in the second test and the average



Portion of the Dynamometer Chart Showing the Advantages of the Simpling Feature on the Mallet Locomotive.

for the two classes of consolidation locomotives previously tested. The coal used in both tests was good and of uniform quality. By far the greater proportion came from the same mines. The average of the samples analyzed showed:

Volatile matter	25.26	per cent.
Fixed carbon	64.28	per cent.
Ash	10.44	per cent.
Moisture	3.444	per cent.
Sulphur	1.922	per cent.
B. T. U. (dry coal)	13,802	

The General Performance:—The most important comparison shown in Table 2 is the saving of 39.6 per cent. in coal burned per ton-mile in favor of the Mallet. This is very little higher than the average of 35 per cent. which is secured in actual daily service. The significance of the economy in fuel per unit of work done is strikingly brought out by the comparison in Table 3. From these figures it will be seen that because of the saving of 39.6 per cent. in the fuel consumed per ton-mile, the Mallet makes 61.2 per cent. more ton-miles than the consolidations on the same amount of coal.

Table 3.—Comparative Performance in Ton-Miles Per Ton of Coal of Mallet and Consolidation Locomotives.

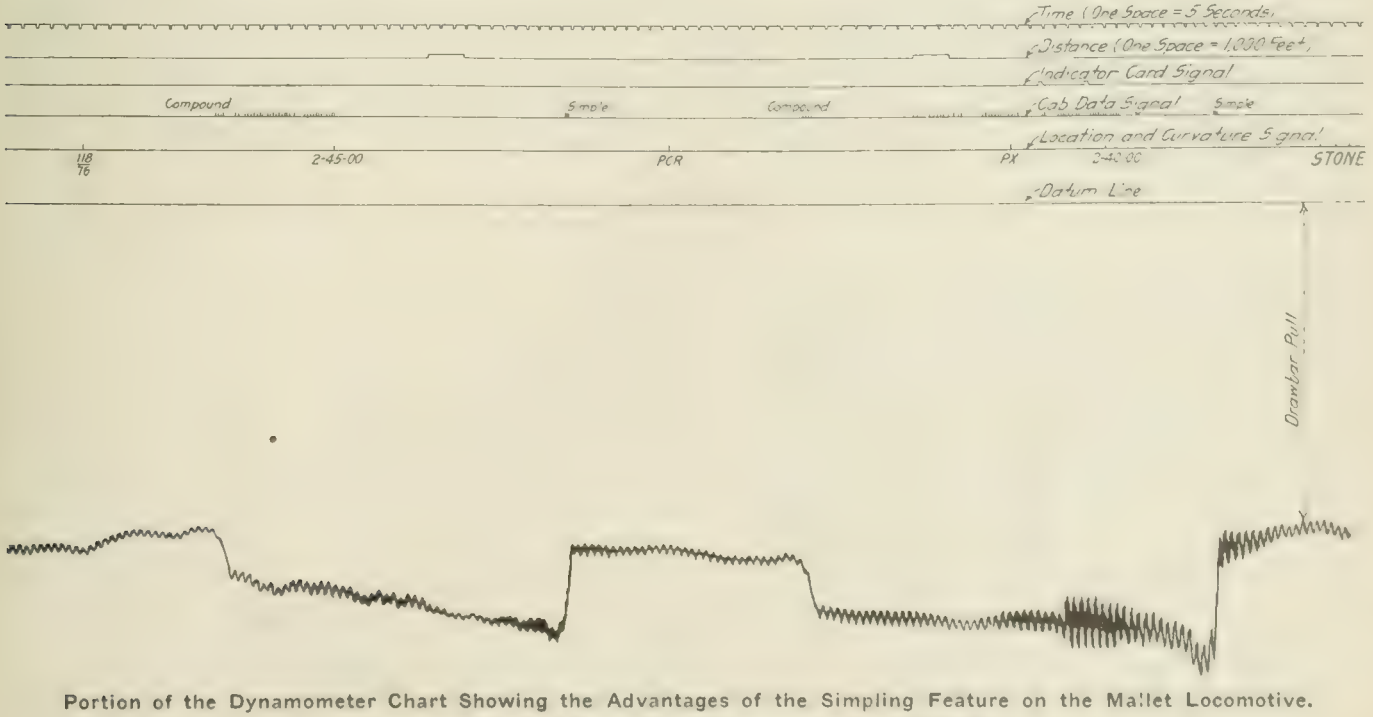
Approximate average speeds.	Ton-Miles Per Ton of Coal. 2-8-0 Type.	2-6-6-2 Type.	Per cent. in favor of Mallet as compared with consolidations.
12.5	16,219.5	26,610	63.9
15.0	14,807.5	23,872	61.2
17.5	.....	23,148	....
21.0	14,898	.....	....

Table 2 also shows that, within the range of speeds in which it is operated in actual service, the increase in the normal theoretical maximum tractive effort of the Mallet, as compared with the simple locomotives, is fully realized at the draw bar. With a theoretical tractive effort, 45 and 47 per cent. gerater, respectively, than the New York Central and the Pennsylvania consolidation locomotives, the Mallet hauled approximately 49 per cent. more tonnage than the average of the two at approximate speeds of 12½ miles per hour. On these runs both consolidation locomotives were loaded to their full capacity. At approximate speeds of 15 miles per hour, the Mallet shows a still greater relative hauling capacity. In this case, however, it is possible that the consolidation locomotives did not have the maximum tonnage they could handle at that speed. The records for the lower speed may consequently be most conservatively taken as an accurate measure of the relative hauling capacities of the three classes of locomotives in the slow-speed drag service.

One run of the series was made to determine the maximum train load that the Mallet locomotive would haul over the division without stalling. The locomotive was given 63 steel cars and a caboose, making a total load of 4,465 tons behind the tender. This run demonstrated clearly the advantage of the reserve capacity available with the system of compounding used, which makes it possible to secure an increase of 20 per cent. in power by the use of steam direct from the boiler in both the high and low pressure cylinders by the separate exhaust from the high pressure cylinders and the intercepting valve. By means of these special devices, the back pressure on the high pressure cylinders is reduced when working simple, and the increased power is secured without sacrificing the equal distribution of the work between the two engines. With this reserve power to use in a pinch and get the train over the critical points an otherwise prohibitive train load was taken over the divison wthout stalling. The hardest portion of the line was from mile posts 123 to 118, and simpling was resorted to at a number of critical points. This is clearly shown on a portion of the dynamometer diagram, which is reproduced. By the same means the hard pull north of Cedar Run was successfully accomplished. The total amount of the time during which the locomotive was simpled was approximately 8 per cent. of the time the throttle was open; an average speed of 10.6 miles per hour was made.

On many roads short grades on a division, though not of sufficient importance to warrant pusher service, necessitate the reduction of 500 tons or more in the maximum train load which could otherwise be taken over the division. With the increase of 20 per cent. in power actually available in the type of Mallet tested for such emergencies, these critical points can be surmounted and so much through tonnage gained.

The Boiler Performance:—The comparison in Table 4 emphasizes the advantage in fuel economy of having a large boiler with an ample margin of capacity above the average demands on it. At approximately the same rate of combustion, the Mallet gave an increase in equivalent evaporation per pound of coal varying from a maximum of 18.8 per cent. to a minimum of 13.58 per cent. In the thermal efficiency of the boiler the Mallet showed a distinct superiority over the consolidation locomotives, ranging from a maximum of 17.7 per cent. to a minimum of 13.62 per cent.



Portion of the Dynamometer Chart Showing the Advantages of the Simpling Feature on the Mallet Locomotive.

One quarter Inch of Drawbar Pull is equivalent to about 7,850 lbs.

Table 4.—Comparison of Boiler Performance of Mallet and Consolidation Locomotives.

	Approximate average speeds.	Type of Locomotive. 2-8-0	2-6-6-2	Per cent. in favor of Mallet as compared with consolidations.
Dry coal fired per hour	12.5	4,033.5	3,680	....
	15.0	4,420.5	4,423	....
	17.5	.....	3,985	....
	21.0	4,957	.....	....
Equivalent evaporation per hour, lbs.	12.5	33,957.5	36,849	8.5
	15.0	36,807.	41,819	13.6
	17.5	.....	36,203	....
	21.0	39,859.5	.....	....
Equivalent evaporation per pound dry coal	12.5	8.42	10.01	18.8
	15.0	8.32	9.45	13.58
	17.5	....	9.08	....
	21.0	8.04	....	....
Equivalent evaporation per hour per sq. ft. of heating surface, lbs.	12.5	10.15	9.32	....
	15.0	11.008	10.58	....
	17.5	.....	9.16	....
	21.0	11.914	....	....
Coal fired per sq. ft. grate per hour for time throttle was open	12.5	72.34	65.13	....
	15.0	79.26	78.28	....
	17.5	.....	70.54	....
	21.0	88.91	.....	....
Boiler horsepower	12.5	984.25	1,069.1	8.6
	15.0	1,066.9	1,212.1	13.6
	17.5	.....	1,049.4	....
	21.0	1,155.35	.....	....
Temperature in smokebox	12.5	616.	519.	....
	15.0	633.	522.9	....
	17.5	....	495.2	....
	21.0	633.5	.....	....
Temperature in firebox	12.5	1,805.5	1,742	....
	15.0	1,783.5	1,936	....
	17.5	.....	1,785	....
	21.0	1,868	.....	....
Thermal efficiency of boiler, per cent.	12.5	58.68	69.07	17.7
	15.0	58.63	66.62	13.62
	17.5	.....	68.60	....
	21.0	57.51	.....	....

Performance of Locomotives as a Whole:—The true measure of the relative economy in coal consumption of two locomotives is the comparative amount of dry coal burned per dynamometer horsepower per hour. In such a comparison, local conditions, such as profile and variation in train loading, are eliminated. On this basis, Table 5 shows an economy in fuel in favor of the Mallet, ranging from a maximum of 39.8 per cent., at speeds of 12½ miles per hour, to 34.4 per cent. at 15 miles per hour. The comparatively low figures for the machine friction of the Mallet, which were verified by a subsequent test made by hauling the locomotive with an electric locomotive, are of interest. They reflect the advantage in the Mallet type of construction of the reduction in the unit weight on the moving parts and the shorter rigid wheel base. In spite of the greater number of journals and moving parts, the Mallet showed a higher machine efficiency than the consolidation type.

Table 5.—Comparison of Performance as a Whole of Mallet and Consolidation Locomotives.

	Approximate average speeds.	Type of Locomotive. 2-8-0	2-6-6-2	Per cent. in favor of Mallet as compared with consolidations.
Average speed running time, miles per hour	12.5	12.75	12.9	....
	15.0	15.7	15.2	....
	17.5	....	17.5	....
	21.0	21.4	....	....
Average drawbar pull, lbs.	12.5	22,726	34,071	49.9
	15.0	19,883	31,360	56.9
	17.5	.....	23,424	....
	21.0	15,930	.....	....
Maximum starting drawbar pull, lbs.	....	46,280	66,000 working compound	42.6
			80,000 working simple	72.8
Machine efficiency, per cent.	12.5	88.85	89.21	....
	15.0	86.17	89.16	....
	17.5	.....	86.60	....
	21.0	85.35	.....	....
Machine friction in lbs. of drawbar pull	12.5	3,066.5	4,468	....
	15.0	3,517.	4,083	....
	17.5	.....	4,044	....
	21.0	3,288.5	.....	....
Dry coal per dynamometer horsepower per hour, lbs.	12.5	5.235	3.15	39.8
	15.0	5.295	3.47	34.4
	17.5	.....	3.65	....
	21.0	5.465	....	....
Water per dynamometer horsepower, lbs.	12.5	33.465	26.80	22.9
	15.0	33.56	26.83	20.05
	17.5	.....	27.08	....
	21.0	33.685	.....	....
Thermal efficiency of locomotive, per cent.	12.5	3.50	5.59	59.7
	15.0	3.50	5.32	52.0
	17.5	....	5.43	....
	21.0	3.445	....	....

The tests clearly demonstrated the advantage of the Mallet for the division on which they were made, and proved that the Mallet when properly designed is not limited to slow speed drag service.

Work is being actively pushed on the construction of the 47-mile line between Jinja, on Lake Victoria Nyanza, Africa, and Kakindu, in the direction of Lake Kioga. This is the first railway to be constructed in the Uganda protectorate, as the Uganda Railway, from Mombasa, on the Indian ocean, to Port Florence, on Lake Victoria Nyanza, lies entirely in the East Africa protectorate. The Jinja-Kakindu line is not destined to become the main line of the Uganda railway system, its primary object being to link up the two lakes. When completed, however, its influence on the traffic of northeastern Africa will be considerable, as it will form the last link but two of a route 3,850 miles long between Cairo and Mombasa, made up of a series of railways and navigable waterways. The two missing links in this route will be from Gondokora to Dufile, and from Wadelai to Foweira, a total of 170 miles.

Profile of That Part of the Pennsylvania Division of the New York Central & Hudson River on Which the Mallet Locomotives Were Tested.

OPPORTUNITIES FOR ECONOMY ON RAILWAYS.

BY L. C. FRITCH, C. E.*

I.

The very nature of the transportation industry, by virtue of its operations being scattered over extensive areas, affords formidable opportunities of waste and extravagance, which in other branches of industrial activity may be more fully controlled and regulated, because of the possibility of supervising more closely their various operations, and thereby reducing waste and extravagance to a minimum.

Waste in our national life has become a byword among other nations. It is claimed that the American people waste enough in their food items to feed the French nation. If this is true of this item of living, it is in a measure true of other expenditures. We are looked upon as a nation that is extravagant in time, efforts, and even in the loss of human lives in our disastrous accidents.

Waste is often the result of a superabundance of the thing wasted. We have our years of plenty and prosperity and become prodigal in our expenditures of time, money and effort until the hand of want is laid upon us, and necessity demands that we observe the laws of prudence which we have so wantonly transgressed. One cannot discount the future and cheat the laws of economy any more than one can overdraw his account in a bank or transgress the laws of health without paying the penalty and facing the day of reckoning.

During a period of prosperity we go from one extravagance to another until a point is reached where in the entire fabric of business is strained to the breaking point. Then a depression sets in. The load is lightened and we hasten to the other extreme and cut below a safe minimum. Such is the history of a cycle of prosperity and depression; and in fact the history of the action of men the world over.

True economy does not mean niggardliness, but it does mean the best for the purpose designed; the best brains in the employee, the best tools in the shop, the best equipment and roadway on railways, and above all an organization which possesses all these in proper proportion and commensurate with its needs.

It has been stated that if commercial business were conducted on the same lines as the railway business, the commercial concerns would go into bankruptcy in a short time. The truth of this statement cannot be admitted. If commercial business were conducted along the lines of our railway business by men without the training of railway men the result would doubtless be disastrous. In the railway business, men are largely thrown upon their own resources and responsibility, and this begets in them self-reliance, and decision, and the ability to act quickly and upon their own judgment. If railway men were situated as men in other industries so that advice and guidance could be secured in their every act, as is possible in commercial concerns, the results secured might be more fruitful. There is no better disciplined army of men in any line of activity than in the railway business and the splendid results achieved by them is a monument to their ability.

There is, however, opportunity for waste, and great waste, in the railway business, in almost all of its various departments and in a greater or less degree on all roads. Much of this waste is unavoidable by virtue of the peculiar nature of the business. But, on the other hand, much of it is unnecessary waste, and a large part of the unnecessary waste is ruthless and inexcusable waste. "Ruthless waste makes woeful want," is as true when applied to the railway business as to our private affairs. No employee would tolerate in his own private affairs the extravagance and waste often witnessed and sometimes practiced in his own employment for the railway company.

It lies within the power of every employee of a railway corporation to practice prudent economy, no matter what his position, or how humble his sphere may be. This may take the form of economy in time, in the use of material, in avoiding possible loss or damage to property and in countless other ways that come to the attention of almost every employee in his daily experience. Every employee owes a duty to the company he serves to safeguard the interests entrusted to him and to regard those interests as faithfully and loyally as though they were his own.

There has never been a time in the history of the railway industry when the need of prudent economy was as urgent as at the present time. The revenues and the operations of railways have been so circumscribed by governmental regulations and laws that the only means of saving the roads from what in many instances must result in ultimate receivership is the enforcement of strict economy in order to enable it to meet its obligations and yield a fair return to the owners of railway property.

In the practice of this economy every employee has a part and should assist in every possible manner for his own pecuniary interest if for no other purpose.

Some splendid results have been secured recently on roads which have made a special effort along particular lines, as by the introduction of efficiency methods and the application of checks on certain operations, resulting in great savings over the old methods.

There are many opportunities for economizing in railway operations, and an effort will be made to point out some particular items where appreciable savings may be effected.

LOCOMOTIVE FUEL.

One of the largest single items of operating expenses is that of fuel for locomotives. The cost of this item for the past ten years on the railways of the United States has been as follows:

SUMMARY OF COST OF LOCOMOTIVE FUEL.

Year.	Miles.	Cost of Locomotive Fuel.
1910	227,525	$213,838,384
1909	235,402	188,735,868
1908	230,494	201,905,054
1907	227,454	200,261,975
1906	222,340	170,499,133
1905	216,973	156,429,245
1904	212,234	158,948,886
1903	205,313	146,509,031
1902	200,154	120,074,192
1901	195,561	104,926,568
Ten year average, per year		$166,212,834
Last five year average, per year		195,048,081

Locomotive boilers are so restricted within rigidly defined limits of space by reason of clearance limitations, and are forced to work under such high demands, that a degree of economy possible in stationary boiler plants cannot be attained in the locomotive boiler. Notwithstanding this, there is an astonishing waste in the use of fuel for locomotives which, if properly conserved, will yield a saving of large proportions on American railways.

The actual distribution of fuel consumed on the average American locomotive has been carefully determined as set forth in Bulletin 402 of the U. S. Geological Survey, and may be stated as follows:

(1)	Stand by losses, consisting of fuel used in keeping up steam while engine is standing idle, in starting fires preparatory to taking out on run and fuel left in fire box at ends of runs, amounting to	20 per cent.
(2)	Losses due to vaporizing the moisture contained in the coal, amounting to	5 per cent.
(3)	Wasted on the ground and stolen, amounting to	1 per cent.
(4)	Losses due to unconsumed gases escaping through stack, amounting to	10 per cent.
(5)	Losses due to unconsumed fuel in cinders and sparks, amounting to	10 per cent.
(6)	Losses due to unconsumed fuel in ashes, amounting to	3 per cent.
(7)	Losses due to radiation, leakage of steam and miscellaneous causes, amounting to	6 per cent.
(8)	Utilized in effective work, amounting to	45 per cent.
	Total	100 per cent.

The losses incurred in the use of fuel on railways may be classified into two parts:

First, those due to the limitations imposed upon the locomotive boiler plant, causing thereby certain defects resulting in incomplete combustion and lack of full utilization of the total heat units in the fuel. Many of the defects or deficiencies may

*Chief Engineer, Chicago Great Western; ex-President American Railway Engineering Association.

be overcome, and some of them are in gradual process of elimination or improvement.

Second, the losses due to carelessness or inefficiency of the human element in firing fuel on locomotives. Much of this loss, if not all, may be eliminated by a process of education of fireman in proper methods of firing and co-operation on the part of the engineer in so working the locomotive that fuel will be fired at the proper time and the fuel utilization of heat units effected in the evaporation of water and the generation of steam.

The annual expense for fuel for locomotives on the railways of the United States at the present time is $200,000,000 in round figures. Therefore each 1 per cent. of loss is equivalent to a loss of $2,000,000, and efforts put forth to remove existing defects or the introduction of improvements which will eliminate waste will result in greater saving in the operating expenses of railways than in any other item of expenditure. It is amazing to contemplate the fact that only 45 per cent. of the fuel consumed is utilized in the boiler for effective work, or, in other words, that $200,000,000 is annually expended to produce $90,000,000 worth of effective work, or an efficiency of only 45 per cent.

The possibility of increasing this efficiency by a reduction in the elements of waste is interesting, and presents a promising field for investigation and experimentation.

Item 1. Stand by losses are not due to the locomotive itself, and can be controlled entirely by proper regulation in the roundhouse and by train despatchers in handling trains on the road. Good roundhouse practice and systematic ordering of engines at proper times for taking out trains and the prompt movement of traffic over the road by intelligent train despatching will effect a large saving in this item of loss. It is not unreasonable to believe that this item can be reduced 25 per cent., so that the loss will stand at 15 per cent. instead of 20 per cent., as under present average practice.

Item 2.—Losses due to evaporating moisture in coal are only controllable to the extent of securing coal with a low degree of moisture, but as this is not always practicable and fuel having other important elements must be used, it is unlikely that this item of loss will be reduced.

Item 3.—Losses due to coal wasted on ground and stolen may be reduced by not permitting the overloading of coal on engine tenders with resultant waste by falling off the engines while running. The loss due to theft may be regulated to a small extent by proper supervision. This item as a whole should be reduced at least 25 per cent., making the loss stand at 75 per cent. of what it is now.

Item 4.—Loss due to unconsumed gases escaping through the stack is one that can be largely reduced and offers one of the greatest possibilities for increasing the fuel efficiency in locomotive boilers. By the introduction of brick arches, baffles and the application of smoke box super-heaters, reheaters or feedwater heaters much of this loss can be stopped. Progress along these lines is being made, but much remains to be done. It should be possible to reduce this loss about 50 per cent., so that it will stand at 5 per cent. instead of 10 per cent.

Item 5.—Losses due to unconsumed fuel in cinders and sparks are an item of considerable importance and can be largely, if not almost entirely, eliminated. Increased grate area, improvement in [illegible] the application of brick arches and other devices, and proper selection and preparation of fuel will reduce these losses by at least one-half, or to 5 per cent.

Item 6.—Losses due to unconsumed fuel in ashes resulting from fuel dropping through the grates into ash pan can be prevented by a proper design of grate. Proper methods of firing will also tend to reduce this loss at least one-third, or to 2 per cent.

Item 7.—Losses due to radiation and leakage of steam may be reduced by proper methods of insulation and attention to keeping all valves and steam connections tight. A reduction of at least one-third, or to 4 per cent. is possible.

[illegible] It is astonishing that less than one-half the heat value of fuel is utilized in effective work in the boiler, the rest being dissipated in losses due to various causes as outlined above. Not all of the value of fuel that is utilized effectively in boilers is used in producing tractive power. A further loss is incurred by escaping steam from safety valves, cylinder cocks, injectors, bell ringers, blowers, oilers, etc. These uses demand a varying percentage of the 45 per cent. of the total fuel consumed, and while utilized in work incidental to the production of tractive power; nevertheless, some of it is dissipated in losses, such as the escaping of steam through safety valves and cylinder cocks, and needless application of blower, which altogether may represent a further loss of at least 5 per cent. There is not, therefore, more than 40 per cent. of the actual heat value of fuel in locomotives utilized to produce tractive power or the effective work of the steam locomotive. This means that while the total cost of fuel for locomotives is about $200,000,000, only $80,000,000 worth of effective work is secured from this expenditure, and $120,000,000 per annum produces no effective results. While, of course, 100 per cent. efficiency in this expenditure is not and never will be a possiblity, there is reason to assume from the foregoing analysis that from 20 per cent. to 25 per cent. of the losses now incurred may be eliminated, effecting a saving of from $40,000,000 to $50,000,000 per annum.

The second element involved in the waste of fuel on locomotives is the loss incurred through the negligence, ignorance and carelessness of enginemen.

So enormous is this waste that in some instances as much as 50 per cent. of the fuel fired on locomotives is absolutely lost. This fact was clearly demonstrated by a test run on the Lehigh Valley Railroad on June 21, 1911, a detailed report of which may be found in the issue of the *Railway Age Gazette* of July 28, 1911, on account of its practical bearing on this important subject it may be of interest to repeat the main facts here.

Passenger Train No. 4 Buffalo—New York Express leaving Buffalo at 9:58 a. m. with Atlantic type passenger engine 2475 was selected for the test. The train consisted of ten cars. Two cars were dropped at Bethlehem, 359 miles from Buffalo, one car was dropped at Boston, 370 miles from Buffalo, the remaining seven cars being handled through to Jersey City, 446.6 miles from Buffalo. The same locomotive with the same crew ran through the entire distance, an engine crew being taken on at Sayre to act as pilot over the division east of Sayre. The engine took water eight times, and sufficient coal was supplied at Buffalo to make the entire run. The total amount used was 30,070 lbs., or practically 15 tons. The fire was not cleaned or even raked during the whole run, and the grates were slightly shaken six times.

The performance of the locomotive, and the coal consumed per unit of service were as follows:

Train miles	446.6	
Car miles	4,[illegible]14.8	
Ton miles	234,395.6	
Coal used per ton mile	0.128	lbs.
" " " train mile	67.33	lbs.
" " " pass car mile	7.134	lbs.
Shovels of coal at 14 lbs. each per train mile	4.8	
Coal used on trip total	30,070	lbs. or 15 tons
Miles run to one ton of coal	29.70	miles
Coal per sq. ft. grate area per hour	48.94	lbs
Time of run	12 hrs.	3 minutes
Actual running time	10 "	40 "
Average speed	41.8	M. P. H.

The comparison between the coal consumption on the test run and the average for year 1910 is as follows:

	Coal per train mile Lbs.	Coal per car mile. Lbs.	Shovels per mile. No.	Total coal used. Tons.
Test run	67.33	7.134	4.8	15
Average 1910	142.*	24.4	9.4	25 to 30

This test clearly demonstrates what may be accomplished with extraordinary care in the firing of locomotive fuel, and shows a saving of nearly 50 per cent., as compared with the previous [illegible] average record. It is not unreasonable in the light of this experience to expect a saving of at least 25 per cent. with ordinary care and the proper discipline and method to check the consumption of fuel and locomotive performance. If this is true, then it is possible to reduce the cost of locomotive fuel on

the railways of this country at least one-fourth, or $50,000,000 per annum.

It is remarkable that in view of the great possibility of economizing in railway operation in the single item of locomotive fuel, such crude methods are in vogue on most railways of keeping a check on fuel consumed and of working comparisons between the actual performance per unit of service and what should be a reasonable work per unit of service. Many railways have equipped coaling stations with scales to determine accurately by weight the fuel delivered to locomotives. Careful inquiry shows that in most cases little or no actual results have been secured from the weighing of coal, and many railway officials claim that scale weighing coaling stations are not a success and do not contribute to coal economy.

Direct issue is taken with these claims, and it is confidently asserted that if all coaling stations were equipped with scales and these scales kept in proper order, and a system of records were established whereby coal would be charged to each locomotive and the work performed recorded so as to determine absolutely the consumption per unit of service for each locomotive, a check would be established by which men could be held to accountability in this important item of expenditure. A particular railway which has determined on the policy of weighing accurately all coal delivered to locomotives and keeping a record of the individual performance of locomotives, anticipates a saving of at least 10 per cent. of the cost of fuel per annum as a result of this system alone.

The difficulty has been not that scale weighing coaling stations are unsuccessful, but that they have not been systematically and properly operated in the past. On most roads this is now left to ignorant and incompetent men, and is not systematically and faithfully followed up. Like so many things on a railway, the plan is only one-half perfected and, of course, fails of its proper accomplishment. To be successful in this matter, as in all others, there must be careful planning, fully covered by instructions, and the instructions must be obeyed, otherwise failure results.

There is great promise of economy in fuel for locomotives in the use of mechanical stokers. Several types of stokers have been in use for some time, but experience with them has been limited and many practical details remain to be developed before their use can be made completely satisfactory. Definite results have, however, been secured by their use, their advantage being the greater uniformity in distribution of fuel over the firebox area and the admission of proper quantities of air, resulting in more complete combustion of fuel.

The matter of expense of locomotive fuel is so important that it will warrant the adoption of a complete and scientific system governing fuel selection and purchase on the basis of the heat value of fuel, the accurate and systematic disbursement and accounting of all fuel used and a careful check on its consumption by individual locomotive performance and rigid insistence on the accomplishment of a predetermined reasonable result based upon known and definite results which are within the realm of reasonable accomplishment, making due allowance for varying conditions and contingencies.

This result can only be attained by a well organized fuel bureau or department, which shall be charged with producing actual and definite results. Any railway which will undertake this task will be astonished at the results secured.

To meet the deficit in the operation of the Chilean state railways during the past year, the freight, passenger and baggage rates were raised by a decree of February 9, 1911. It was found, however, that this increase would produce a revenue considerably in excess of the actual deficit sustained, or any probable deficit that might occur. The department of industry has, therefore, modified the increased tariffs by reducing the freight rates on merchandise 30 per cent.; other rates remaining the same.

RAILWAY BUSINESS ASSOCIATION DINNER.

The third annual dinner of the Railway Business Association was given at the Waldorf-Astoria, New York, last Wednesday night. The attendance, which was over 800, included, besides a large number of railway presidents and vice-presidents and heads of railway supply companies, a representative gathering of presidents of chambers of commerce and similar organizations, and officers of industrial companies other than supply companies.

The speakers were Governor Emmett O'Neal of Alabama; Walker D. Hines, chairman of the executive committee of the Atchison, Topeka & Santa Fe; A. C. Rulofson, president of the California Home Industrial League, and H. J. Pettengill, member of the executive committee of the Texas Commercial Secretaries' Association. President George A. Post of the association was toastmaster.

Among those present at the dinner were: A. A. Allen, of the Missouri, Kansas & Texas; William Barbour, of the Linen Thread Company; F. A. Bedford, of the Philadelphia Traffic Club; W. G. Besler, of the Central of New Jersey; O. P. Briggs, of the National Foundries Association; W. C. Brown, of the New York Central; George F. Brownell, of the Erie; B. F. Bush, of the Missouri Pacific; D. D. Caldwell, of Wells Fargo & Co.; John Claflin, of H. B. Claflin Co.; H. B. Clow, of Rand, McNally & Co.; H. P. Davidson, of J. P. Morgan & Co.; Frank H. Dixon, of Dartmouth College; Newman Erb; S. M. Felton, of the Chicago Great Western; W. W. Finley, of the Southern Railway; W. A. Gardner, of the Chicago & North Western; John M. Glenn, of the Illinois Manufacturers' Association; Frank Hedley, of the Interborough Rapid Transit; Francis L. Hinne; J. H. Hustis, of the Boston & Albany; E. T. Jeffery, of the Denver & Rio Grande; L. E. Johnson, of the Norfolk & Western; George Kittredge, of the New York Central; Julius Kruttschnitt, of the Harriman Lines; E. T. Lamb, of the Norfolk Southern; L. F. Loree, of the Delaware & Hudson; Wiliam G. McAdoo, of the Hudson & Manhattan; C. C. McCain, of the Trunk Line Association; S. S. McClure; Logan McPherson, of the Bureau of Railway Economics; Norman E. Mack; W. F. Mahl, of the Harriman Lines; F. O. Melcher, of the Chicago, Rock Island & Pacific; H. U. Mudge, of the Chicago, Rock Island & Pacific; W. T. Noonan, of the Buffalo, Rochester & Pittsburgh; George T. Oliver; W. L. Park, of the Illinois Central; E. Pennington, of the Minneapolis, St. Paul & Sault Ste. Marie; Ralph Peters, of the Long Island; Ira Place, of the New York Central; Sereno S. Pratt, of the New York Chamber of Commerce; W. L. Ross, of the Chicago & Alton; C. E. Schaff, of the Lake Shore & Michigan Southern; Jacob H. Schiff, of Kuhn, Loeb & Co.; J. M. Schoonmaker; C. M. Schwab, of the Bethlehem Steel Company; Isaac N. Seligman; Senator John C. Spooner; A. E. Stillwell, of the Kansas City, Mexico & Orient; E. T. Stotesbury, of Drexel & Co.; Isidor Straus; J. C. Stuart, of the Erie; J. B. Thayer, of the Pennsylvania Railroad; A. P. Thom, of the Southern Railway; William H. Truesdale, of the Delaware, Lackawanna & Western; Frank Trumbull, of the Chesapeake & Ohio; Roberts Walker, of the Chicago, Rock Island & Pacific; George Westinghouse; Daniel Willard, of the Baltimore & Ohio; W. R. Willcox, of the New York Public Service Commission; W. H. Williams, of the Delaware & Hudson, and Edwin W. Winter.

Abstracts of the addresses of Governor O'Neal and of Mr. Hines follow:

GOVERNOR O'NEAL'S ADDRESS.

The law-making power should approach railway questions in no spirit of passion or prejudice, but with a mind free from bias or bitterness, seeking only to reach just and conservative conclusions in the important problems involved, and while fixing rates and other incidentals of public service to avoid carefully any crippling of these enterprises or any impairment of their ability to maintain a proper equipment for the public service and earn a fair return on the capital invested.

Like the powerful barons of the feudal ages some of the great

railway systems in former years fancied themselves grown equal to the sovereign power. These great interests became aggressive in their exactions, generating that public hostility which later flowered into laws that were perhaps in some instances unduly burdensome. The enforcement of these laws was responsible for an opposition to all the laws and the development of that new doctrine which denies the right of a state government to impose upon an interstate road any regulation of even its intrastate traffic. To deny to a state the right to regulate rates on intrastate shipments would be to enthrone the railway above the state or any other power, expose its citizens to an unrestrained and unlimited taxation for private gain and involve the destruction of sovereignty. Looking broadly to the general interests of society it would be better even for the railways to have unjust laws if there were no other alternative than to have the right of the state to regulate its internal affairs in this regard impaired or utterly destroyed. If the right to regulate intrastate rates reasonably does not reside in the state it resides nowhere.

Confiscatory rates made by a state are as bad as predatory rates made by railways. Under neither can there be that equality of opportunity which all our institutions try to preserve. I feel gratified that my own state, lately the theater of a desperate political struggle between the people and the railways, has through its dominant political party made a declaration of policy on which both the people and the railways can with justice to themselves and to each other stand:

"We favor legislation which will safeguard the rights of the public as against such corporations, but condemn any legislative attempts to cripple such corporations by enactments which are harsh, retaliatory or inspired by a spirit of hostility."

That same spirit of hostility was manifested in Alabama when a law was enacted which denied railway corporations under the threat of forfeiture of their charters the right to appeal from the state to the federal courts. I denounced such a law then as unconstitutional because it denied to foreign railway corporations engaged in business in Alabama the equal protection of the laws —a position which was subsequently confirmed by the United States court of last resort and which law during my administration was stricken from our statute books.

I am gratified to know that rebates have almost entirely ceased to exist, and that the discrimination which has heretofore largely been responsible for the hostile feeling that may once have existed has been to a great extent eliminated. There is no hostility on the part of the people of my section to railway corporations.

We recognize that in an undertaking so hazardous as the construction and operation of railways investments in these enterprises will cease if these corporations are restricted in their earnings to the limit of legal interest, and that a policy which would discourage railway building would not only be unwise but detrimental to the best interests of our section.

We fully recognize the marvelous work which the railways have done towards the development of the industrial interests of the country. We recognize that the presidents of the great transportation corporations and the railway map makers of the country have shown marvelous skill and genius. If mistakes have been made they have been due to the belief of the state and nation in sitting with folded hands and not sooner exercising the power vested in them to protect the public. In insisting upon the sovereign power of the state to regulate intrastate rates we are not seeking to restrict the operation of railways, impede or check their growth or prevent fair and even liberal returns on their property.

The railways are in the hands of the government more than ever before and are steadily getting more completely into that position.

The rates which railway companies can charge are almost wholly controlled by the governments, federal and state. As a practical matter interstate rates cannot be increased without the consent of the Interstate Commerce Commission, and, generally speaking, must be reduced whenever the commission says so. There are commissions in about forty of the states, some with complete power and some with partial power to control intrastate rates. Almost always, when any commission, federal or state, proposed to reform any rate adjustment the reform is accomplished by reducing rates, and not by increasing them. A commission almost never sanctions any increase in a rate, and it is an almost everyday event for commissions to make orders necessitating rate reductions.

The operating expenses of the railways are being steadily increased through governmental action, for example, by reducing the hours of service of railway employees, increasing the size of the crews required to operate trains, increasing the liabilities of injuries to employees, and prescribing the compensation to be paid to injured employees. There is a marked tendency toward increase of legislation of this character. All such legislation tends to compel the payment of more money for the same service at the very time that the rates received for such service tend to be reduced by government action.

Moreover, the laws are requiring increased capital expenditures for more expensive cars, for more expensive stations, and for greatly increased expense with a view to promoting the public safety. Likewise, there is constant pressure of municipalities and of local public sentiment compelling railways to make enormous additions to their investments in the way of elevating tracks, abolishing grade crossings, providing more handsome stations and more comfortable service, all of which increases the investment without increasing the ability to pay a return upon it.

I am not criticizing these conditions. I am merely stating the facts. I want to emphasize that these governmental activities have converged to a place where very grave responsibility rests upon the governments, both federal and state. The upper and nether millstones are getting very close together. It is a grave duty of the government to prevent their coming any closer, and it is your duty and your interest to impress that fact upon those who make and enforce the laws.

I should say that pre-eminently it is your opportunity and your duty to urge upon the public officers of the country a sense of responsibility for the general situation. Too often one officer advocates a single policy which may reduce rates, or increase operating expenses and rates, and close their eyes absolutely to every other aspect, overlooking the fact that the situation has now reached a point where nothing can be done on any aspect of the question which does not affect the general situation as a whole. And further, on that point, one of the most effective ways to inculcate this sense of responsibility is to encourage the placing in a single tribunal of the various powers on this subject. So long as a commission may reduce rates, and has to give no thought to the question of operating expense, or capital investment, it is not likely to have a very lively sense of responsibility for providing the means for paying the operating expenses and for creating the additional capital. So long as legislators, on the other hand, can direct their attention exclusively to requiring increased operating expenses and increased capital investments, paying no attention to rates, saying that the commission will take care of that, there again we have a condition where a comprehensive and direct sense of responsibility is lacking. Since it has become the general practice in this country to place in the hands of the commissions, who are supposed to be thoroughly advised in the premises, the questions of railway revenue, and the rates the railway companies may charge, certainly it is wise for you gentlemen to encourage all public officers to adopt the policy that legislation restricting railway net earnings, through increased operating expenses, or through increasing the capital invested, ought not to be had except upon the recommendation of the commission, which presumably knows more about it than the legislature.

I believe that governmental agencies are coming more and

more to appreciate this grave responsibility, and I believe that there is gradually developing an appreciation of the central proposition that railway companies cannot properly perform their public service and raise the hundreds of millions of new money required to improve that service unless the margin between receipts and expenses is sufficient to pay an attractive return upon the existing investment and in addition to provide a substantial surplus to sustain the credit of the companies.

I do not believe you can render any greater assistance in the promotion of the public welfare than to stimulate in every public officer a clear appreciation that railway legislation has reached the point where the government has become in a very large measure responsible for the adequacy of railway service, and must live up to that responsibility in order to protect and promote the transportation service.

BUSINESS MEETING OF THE ASSOCIATION.

The annual business of the association was held earlier in the day, meeting at the Waldorf-Astoria, New York, November 22. The report of the executive committee said, in part:

The Railway Business Association has no part in party politics. The ideal condition as we view it would be for all parties everywhere and always to declare so boldly for adequate railway earnings that the question would never be an issue between them. To that end we should exert our energy and influence and by directing our argument to all the parties alike we can, while retaining our independence, press our propaganda with the makers of platforms.

The part taken by the railway supply manufacturers [in promoting better relations between the railways and the public] has been accomplished by reasoning with their neighbors and securing their organized co-operation. That way lies future achievement. To business bodies let us appeal. We may now count on a quick and sure response from business men. They now have problems of regulation.

Through the first two years of our existence as an organization, we frequently found it desirable to make public appearances in the discussion of particular situations. During 1911, in the absence of occasions for that type of activity, we have been able to develop a kind of effort more fundamental and of greater permanent value. That work is the thorough study from time to time of some specific phase of public relations, resulting in the publication of a piece of vital, fresh information, illustrating our policy of conciliation, and disseminated in the form of a bulletin. . . .

The committee on Plan and Scope made recommendations, which were unanimously adopted, to enlarge the scope of the activities of the association by taking part in discussions on subjects other than regulation. The constitution was amended to make this possible and also to facilitate further amendments. The report of the Committee on Finance showed an increase in revenue of $5,000 over last year and a decrease in expenditures of $8,000 from last year, largely due to diminished activities in matters of legislation. The cash balance of the association increased $9,000 during the year. An index of the growth of the association is that at the dinner three years ago there were 250 places and at the dinner on November 22, 1911, there were 829 places. Officers were elected as follows for the ensuing year: President, George A. Post, Standard Coupler Company, New York; vice-presidents, H. H. Westinghouse, Westinghouse Air Brake Company, Pittsburgh, Pa.; W. H. Marshall, American Locomotive Company, New York; A. H. Mulliken, Pettibone, Mulliken & Company, Chicago; A. M. Kittredge, Barney & Smith Car Company, Dayton, Ohio; O. H. Cutler, American Brake Shoe & Foundry Company, Mahwah, N. J.; W. E. Clow, James B. Clow & Sons, Chicago, and George W. Simmons, Simmons Hardware Company, St. Louis, Mo.; secretary, F. W. Noxon; treasurer, C. A. Moore, Manning, Maxwell & Moore, New York; and assistant treasurer, M. S. Clayton, Manning, Maxwell & Moore.

SOUTH MANCHURIA RAILWAY.*

In August, 1905, the Japanese government acquired, by the treaty of peace between Russia and Japan, the main railway line from Changchun, Manchuria, to Port Arthur, together with the branch lines and other properties. The South Manchuria Railway Company was formed to take over these lines and properties from the government. The authorized capital of this company is $100,000,000. The Japanese government owns half of the total authorized capital, which is its share for handing over to the company the complete railway lines in Manchuria with the properties belonging to them and the coal mines of Fushun and Yentai, with a total assessed valuation of $50,000,000. The other $50,000,000 capitalization was made available by subscription to Japanese and Chinese subjects only. The shareholders are guaranteed a dividend of 6 per cent. a year by the Japanese government. The first issue of shares was limited to $10,000,000, of which only $1,000,000 was fully paid for. There remains, therefore, $40,000,000 stock not yet issued and $9,000,000 subscribed to but not yet fully paid for. Both the president and the vice-president of the company are appointed by the government, as are the directors, who, however, must own at least 50 shares of the company's stock.

On April 1, 1907, the company took possession of and commenced operations on the following lines, which constitute the investment of the government: The main line between Dairen and Changchun, 437½ miles; the line from Nankuanling to Port Arthur, 39 miles; Tashihchiao to Yinghou, 13 miles; the Yentai branch line, 9¾ miles; the line from Suchiatun to Fushun, 39 miles; and the Antung-Mukden line, 189 miles. With the object of raising the funds required for the reconstruction of these lines, as well as for subsidiary undertakings, the company has up to the present issued in London three separate issues of 5-per cent. debentures amounting in all to $40,000,000, both capital and interest being guaranteed by the Japanese government.

The gage of the railways, when acquired from the government, was 3 ft. 6 in., with the exception of that of the Antung-Mukden line, which was only 2 ft. 6 in. The company immediately commenced to change the gage to the standard of 4 ft. 8½ in. on all lines, except the Antung-Mukden line, and completed the work without interruption to traffic. The track between Dairen and Suchiatun, a distance of 238½ miles, was doubled. Traffic on the standard gage was opened on the Port Arthur line in November, 1907, and on the entire main line in June, 1908. In spite of many adverse circumstances and difficulties due to the war, the engineers had succeeded in widening the gage on more than 500 miles of railway in one year.

In order to improve the through traffic between Europe and the Far East, the company inaugurated in October, 1908, an express service between Dairen and Changchun, consisting of Pullman sleeping and dining cars of the latest type. The express trains run three times a week and connect Changchun with the Siberian trains of the International Sleeping Car & Express Train Company and the Russian State Express. At Dairen the expresses connect with the steamship service operated by the company between that city and Shanghai twice a week. An agreement has been made with the Japanese government railways, the Osaka Mercantile Steamship Company and the Japan Mail Steamship Company regarding through transportation of cargo. This was put into effect January 1, 1911, simultaneously with the through freight traffic between Shanghai and the principal stations on the South Manchuria Railway. By virtue of these arrangements exceptional facilities are now obtained in through cargo transportation, at this company's principal stations, to many ports in the East, as well as in Europe, Australia and America.

The reconstruction of the Antung-Mukden line to standard

* Abstracted from the *Far Eastern Review*.

gage was begun in August, 1909, and 35 miles were opened to traffic on November 3 of the same year. On November 3, 1910, the line was opened from Antung to Chikuanshan. In regard to the remaining section from Penhsihu to Chikuanshan, 73 miles, in spite of the great engineering difficulties that are constantly being met with, it is expected that the work will be completed by March, 1912. The Yingkon branch, which formerly had its terminus at Niuchiatun, has been extended as far as the new Japanese town of Yingkon, where a new station was built and opened to passenger traffic in November, 1909, and where the old station is being used as a freight office. The reconstruction of the Yenti branch line, which became necessary in consequence of the increased output of the Yenti coal mines, was also completed, and on March 1, 1910, freight trains began to run between Liaoyang and the mines.

The reconstruction of all the railways compelled the company to dispense with the narrow gage rolling stock, which was therefore sent to Japan in 1908. This equipment included 217 locomotives, 3,727 freight cars and 157 passenger cars. The rolling stock in use in June, 1910, included 298 locomotives, 2,965 freight cars and 179 passenger cars.

Originally a central railway work shop had been erected in Dairen for constructing, repairing and rebuilding rolling stock, not only to meet the requirements of the company, but also those from outside. Besides this central work shop other smaller ones were built which, however, were found incapable of meeting the demand. It was therefore decided to build a fully equipped shop at Shahokou, near Dairen, which is now nearly completed. This shop will have a capacity of repairing 20 locomotives and 46 freight cars at the same time. The company also intends to improve the other shops.

The passenger traffic has increased from 1,512,231 passengers in 1907 to 2,179,062 passengers in 1909. The freight traffic has increased from 1,486,434 tons in 1907 to 3,568,527 tons in 1909. In 1907 the gross earnings were $4,884,444, and the expenditures were $3,050,807, and in 1909 the gross earnings were $7,508,099 and the expenditures were $2,909,167.

The company instituted a regular steamship service between Dairen and Shanghai by chartering a steamer. This service was opened August 10, 1908, and connects with the shortest and quickest route from Europe to Shanghai. It is important for passenger and freight traffic, as well as for mails. In May, 1909, a second steamer was chartered so that now there is a semi-weekly service between Dairen and Shanghai.

The Fushun coal mines are about 22 miles east of Mukden. It is estimated that they contain 800,000,000 tons of coal, and the daily output has recently been increased to 3,000 tons. In order to meet the demand for gas the company has established works at Dairen with a productive power of 280,000 cu. ft. The company has also been very active in building new towns and improving old ones. Parks have been created in Dairen and three other important places; agricultural experimental stations have been established, as well as markets, cemeteries [illegible] The total area of land belonging to the railway amounts to 46,000 acres, all of which is offered for lease with the houses erected upon it, with the exception of those parts occupied by the military and civil departments of the government. Hospitals have been established at all the most important points, where treatment is extended not only to officers and employees, but also to all residents. Schools have been established by the company along its lines, and in [illegible], 1910, the total [illegible] attendance was 1,300.

[illegible] about 60 per cent of the earth work is done. Nine per cent of the dwellings have been erected and all the bridges have been completed. On the Central Amur Railway the preparatory work is finished. There are no [illegible] and all the work is being done by the government. [illegible] Dwellings with baths, restaurants etc. [illegible] The engineers are paid $[illegible] to $[illegible] a month, and foremen $[illegible] a day.

RAILWAY SHARE CAPITAL.

BY WILLIAM Z. RIPLEY,

Professor of Economics, Harvard University.

The capital stock of a railway, in contradistinction to its bond issues which stand for indebtedness, represents ownership and responsibility for management. This capital is divided into shares, usually of a par value of $100 each. Theoretically this par value is presumed to represent an actual investment of funds in the enterprise; and the total capital stock, together with the bonds, is supposed to equal the aggregate assets of the company. But in practice there is no such relation at all; as the wide range of market quotations for stocks above and below par readily proves. The stock may, in fact, have had no value at all at the outset save for purposes of management and control. Nevertheless, the existence of this par value, stated upon the face of each certificate, serves two very important purposes. It defines the basis upon which earnings are distributed in the form of dividends; thus enabling the public to measure the relative profitableness of operation. And in the second place, it roughly defines the liability of each shareholder in case of failure or fraud. It is of the essence of the corporate form of organization that this liability shall be limited to the amount of the investment. Each holder of a share stands to lose its cost to himself; but he cannot be called upon further to satisfy the claims of creditors, as might the partner in a business concern. This is the principle of "limited liability," which on a large scale has made possible the co-operation of many scattered investors in complicated enterprises.

The stated par value of each unit of share capital, then, supposedly represents an amount actually invested in the enterprise. This supposition may assume concrete form in the case of shares, which at issue were only in part paid up; which were, in other words, emitted without a corresponding enhancement of the company's assets. These assets are the sole security of creditors, primarily bond holders. And unless these assets at least equal the face of the indebtedness, the bond holders are bound to suffer. From this circumstance flows the long standing rule in Massachusetts and other states, prohibiting any issuance of evidences of indebtedness greater than the amount of capital stock. But the principle that the capital stock is a trust fund for the benefit of creditors may go even farther than this. If the full face value of shares was not paid up, as it was asserted to be,—that is to say, if the assets do not equal the capital stock,—the shareholder may be called upon to make up the unpaid balance. The necessity of this important rule in exceptional cases may be shown by a concrete example.

About 1888 one Harper owned a narrow gage railway in Ohio, about 20 miles long. This had never even earned operating expenses, and was acquired practically for the value of scrap iron. It was subsequently described as badly built, with heavy grades, narrow cuts and fills, only temporary bridges and very light rails. Harper proceeded to organize the Cincinnati, Columbus & Hocking Valley Railroad Company, capitalized for $600,000 in stock and $1,200,000 in bonds. He personally subscribed for 2,500 of the 6,000 shares, no cash, however, being paid in. To this company he delivered his narrow gage road in exchange for the bulk of its securities, and then turned over part of the bonds thus received to various contractors for extending the line [illegible] at each end, and for making it a standard gage road. How thoroughly this was done appears in evidence, among other things, to the effect that the new rails were merely spread out on the old narrow gage ties. There were no sta[illegible], no water tanks, and there was no business. It was "probably worth for scrap $2,000 per mile, or, as a railway, $4,000, or for 28 miles, say $112,000, for which Harper received $1,670,000 in securities." The bonds not exchanged for work done were publicly sold. The company failed, of course. The unsatisfied creditors sued Harper for the par value of his 2,500 shares, taken on subscription, but not paid for. And the Federal court

held the claim good; viz., that Harper as a stockholder was liable for full payment in money at par or its equivalent, in view of the fraudulent nature of the transaction.

The foregoing extreme case of fraudulent over-valuation of a company's assets in connection with the issue of its stock shows the danger lurking in the recently advanced proposition to abolish the par value of share capital altogether. This proposed elimination of the "dollar mark" is advocated by most eminent counsel. It has been endorsed by the New York Bar Association, and incorporated in a bill passed by the New York legislative Assembly in 1909. Much testimony in its favor has been recently presented to the Federal Securities Commission created under the Mann-Elkins Act of 1910. Each share instead of theoretically at least standing for $100 paid in, would become a "certificate of participation" in earnings. Dividends would be declared, not in a percentage of capital stock, but as a fixed sum of money per share. The proposal while legislatively pushed, both in New York and New Jersey as a remedy for the overcapitalization of business corporations, has already been adopted by public service companies elsewhere. Street railway lines in Massachusetts, organized as voluntary associations, have employed it. The United States and Adams express companies have no par of stock, but issue "interests" or "shares of interest," as they are termed. The Great Northern Railway iron ore properties in 1907 were thus financed and set apart. It has been proposed to reorganize the surface trolley lines in Chicago in a similar way. The proposition, while from the standpoint of private finance seeming to safeguard investors against fraud, is vicious in the extreme as applied to common carriers or other public service companies. It releases the promoter from any positive liability for overcapitalization. There being no par value, there is no obligation to pay in any stated sum per share. The equivalence of assets and capitalization which ought to obtain in the case of any company holding valuable rights from the public, becomes non-existent. And what is of equal importance, all standards by which to readily measure the reasonableness of the general scale of charges disappears.

PREFERRED STOCK.

Originally all railway shareholders were equal in respect of their rights and obligations. At a later time, possibly in imitation of the early English practice of splitting stocks into "preferred" and "deferred" shares, the American roads began also to divide their capital stocks into classes. The simplest device was to create a preference as to dividends upon a relatively small part of the stock, leaving to the so-called common shareholders whatever balance might be left. By reason of this preference one would suppose that the preferred stock would command a much higher price than the common shares. But this need not be so. For usually there is coupled with the preference as to dividends, the further provision of limitation of the rate of return to a fixed percentage. Thus the Union Pacific Railroad has outstanding $100,000,000 of preferred stock, limited in return, however, to 4 per cent. Nor is this 4 per cent. return cumulative in this instance. If not earned in any given year, the deficiency does not become a charge upon earnings of subsequent years. As a result, the market value of the preferred shares is most stable; but at a far lower price than the common stock commands. All surplus earnings over and above the preferred 4 per cent, going to the ordinary shares, gives the latter a peculiar, albeit a speculative, value. This arises, of course, from the fact that it is the residuary legatee of all future increments of revenue. As between two railways having equal share capitals, and being otherwise similarly circumstanced, except that one had split up its capital into common and preferred sorts, while the other had not, one would expect wider price fluctuations for the common stock of the former than of the latter. Fluctuations in earning power in other words would be focussed upon a smaller base.

The nature of the preference accorded to one class of shares may be of many sorts. Sometimes, as on the Chicago, Milwaukee & St. Paul, both classes of stock share alike after the first preference is met. In other cases, as on the Chicago & North Western, the 7 per cent. preferred shares are entitled to an additional 3 per cent. preference, after the common shares have received 7 per cent. Not until 10 per cent. is thus paid upon the preferred may any additional dividends be declared upon the common stock. The Seaboard Co. limited the non-cumulative feature to a period of five years, ending in 1910. The Reading Company, by reason of repeated reorganizations, has a still more complicated arrangement. There are two classes of preferred shares ahead of the common stock, both 4 per cent. non-cumulative. After 4 per cent. has been paid for two consecutive years on the first class, the second may be converted into common and first preferred stock in equal parts. A provision of great importance is the division of voting power between different classes of shares. The Wisconsin Central charter entitles the preferred shareholders to elect a majority of the directors in case of failure to pay the full prescribed dividend for two years in succession. This right is at all times vested in the relatively small amount of preferred shares of the Rock Island Company. The common shareholders have practically no voice in the management at all. The same thing is true of the New York, Ontario & Western. Probably the most complicated scheme of all was the mode of financing of the old Chicago Great Western. This followed the English practice, with no less than four distinct grades of preference in its capital issues.

Yet another feature of importance respecting preference in share capital has to do with the relative lien on assets. This issue usually arises in cases of bankruptcy or reorganization; but as in the attempted segregation of Union Pacific investments in other roads in a separate holding company after 1908, the preferred shares were a source of trouble. The matter should, of course, be made clear in the charter. Yet many controversies have arisen in this regard, notably on the Baltimore & Ohio and Northern Pacific roads. Does a preference as to earnings imply or confer a preferred claim upon the assets in case of foreclosure? Especially is this difficult to determine, where, as on the Northern Pacific road, the preferred shares were exchanged in reorganization for old bonds which were direct liens on landed property. In other words, the nice issue is raised, as to the distinction between preferred share capital and income or other bonds. Where both are accorded preference both as to earnings and assets, the two kinds of securities are practically identical. A peculiar instance of preferred stock may be mentioned in this connection. Many railways have only one class of share capital, all being common stock. The Great Northern has only one class, but it is all preferred. No common stock has ever been issued. This peculiarity is due to a charter right dating from 1865, which authorized the issue without limitation of such classes of preferred shares as it deemed proper. Under this charter the company claims exemption from state supervision of all capital issues of a preferred sort, and carefully refrains from any emission of common stock at all. The Rutland Railroad, also, since its reorganization in 1900 has 98 per cent. of its capital stock in the form of preferred shares. These shares are cumulative with reference to dividends; and now in 1911 are said to carry nearly 200 per cent. of dividends due, as a heritage from its checkered past.

Complicated provisions as to retirement or conversion of special classes of shares are not infrequent. The Southern Pacific preferred shareholder might convert his holdings into common stock after 1905; and the company might redeem them at $115 for five years after 1910. This issue was in many respects analogous to a convertible bond with a sinking fund provision. Ho wembarrassing some of these details may become, was well illustrated in the Northern Securities imbroglio in 1901. The outcome of the spectacular buying campaign for control of the Northern Pacific road between the Harriman and Hill interests finally resulted in the ownership by Harriman of a majority of about $1,000,000 in the total capital stock of the company.

But this majority was principally in the preferred shares. The Morgan-Hill party controlled a clear majority of the common stock; and at the time dominated the board of directors. Harriman control, however, despite ownership of a majority of the total capital, was thwarted by a retirement clause applicable to the preferred stock. Thus the control of the entire property depended upon the exercise of this retirement privilege on any January 1st prior to 1917. Normally the Harriman party would have assumed charge at the annual meeting in October; but this could be prevented by postponement of the election of new directors until after the first of the new year, when the preferred stock became subject to retirement. It was a complete deadlock, resulting in truce and subsequent compromise between the contending parties.

On the whole, it would appear that differentiation of share capital is more common than it used to be. Preferred shares amounted to about one-seventh of the total capital stock of American roads in 1890. This proportion reached a culmination in 1898, when about 27 per cent. of total capitalization was preferred. This, as will be seen, was a direct outcome of the widespread reorganizations incident to the panic and depression of 1893-'7. It was also in part probably connected with the financing of new railway consolidations. Since 1900 the proportion of preferred shares has tended to decline; amounting in 1908 to only about one-fifth of the aggregate share capital of the railways of the country. Normally it may be expected not to deviate widely from this proportion.

Among the reasons for creating a preference in the share capital of a company, the original one was probably in part sentimental. A new enterprise could be made a dividend payer from the outset by concentrating the first revenue upon a small proportion of preferred stock. The English practice is surely in part due to this reason. Regular dividends even upon only a portion of the total capital, considerably enhance a company's credit and its reputation among investors. A second reason for issuance of preferred stock was to raise new capital for extensions or improvements. Possibly the condition of the money market may be such at times as to preclude borrowing; that is to say, issuing bonds or notes. Or, as under the laws of many states, the bonded debt may already fully equal the capital stock, so that further borrowing is precluded. Moreover, the issue of new shares may be preferable, as they do not create fixed charges, to become an embarrassment in periods of depression. But the preference clause must be added in order to appeal effectively to conservative investors. Such was undoubtedly the motive in the financing of the Southern Pacific Company in 1904. Called upon to repay large advances for improvements by the Union Pacific, it could not issue bonds. Nor could it issue new common stock at the market price of $45 per share then prevailing. No other course than the issue of preferred stock was open. Five years later, surplus revenues having increased, the entire issue was retired at $115 per share. This provided a substantial bonus to those original shareholders who had come forward to aid the company when the issue was put forth. And temporary financing was effected without increasing fixed charges. This was the issue, by the way, concerned with the notorious Keene stock market pool, elsewhere described.*

A third and most important cause of preference in share capital has to do with financial reorganization. Bankruptcy is [illegible] by inability to meet fixed charges, that is to say, interest upon funded or current obligations. It may be brought about by temporary causes, such as the industrial depression of 1893 or 1907. The natural growth of [illegible] may eventually bring increased revenues sufficient to cover such imperative [illegible], but time is necessary. On the other hand, the bondholders with prior liens upon the assets, are in a position to [illegible] to the stockholders, who stand to lose all in foreclosure proceedings. A fair compromise would seem to be to accord preference as to future earnings to those whose claims as bondholders must first be satisfied. The new company, by the exchange of part of its funded obligations for preferred stock, is relieved for the time of an undue burden of fixed charges; and surplus earnings as they emerge go to those to whom they rightfully belong. This practise, now widely approved, was not so general before 1893. But six of the seven most important reorganizations within the succeeding four years of depression, made use of the plan. An important feature, intended for the protection of the preferred shares, thus created, was a prohibition of the issuance of other bonds ahead of the new stock. But by such a combination of issues, the old bondholders are given rights to such earnings as may accrue up to the limits of the return to which they were entitled by their former holdings; and yet the common shareholders very properly reserve to themselves all increments of revenue over and above this amount.

Preferred shares not only may arise out of disintegration of railway properties through reorganization. They may also be an outcome of consolidations. The two properties to be joined, may be of very unequal earning power. They may also possess assets of widely different value. One may be a great present earner; the other may have valuable franchises or potential earnings in future. It is to the interest of both to combine. The shareholders must come in, if at all, on different terms. The simplest device is to accord a preference as to dividends to the one class, and indefinite possibilities of future profit to the other. The issuance of preferred shares completely solves such problems. The fifth and final reason for preferred stock issues, has already been mentioned. It may be an expedient for concentration or retention of control, with a minimum amount of investment. Such concentration may of course be as effectively applied to the common stock. In the Hudson Companies, which control the North river tunnels, all voting power is vested in $5,000,000 of common stock, while $16,000,000 of preferred shares are a nonentity in management. Legitimate enough, as used to safeguard the interests of former bond holders after a reorganization, as employed by the Wisconsin Central or Ontario & Western; such a device, as used in the Rock Island Company is most prejudicial to common stockholders. Fortunately the experience of this latter company shows it to be a plan which largely defeats its own end. Any large class of stock, deprived of its voting rights, may be expected to make little appeal to the investing class.

COST OF TRANSPORTATION ON THE ERIE CANAL AND BY RAIL.*

In the wide discussion regarding canals and inland waterways in this country during the past few years, little attention has been directed to the total cost of canal transportation. The term "total cost" is here used to cover not only the immediate cost of conveying goods, but also the cost of maintenance of the canal, cost of ordinary repairs, and fixed charges, dividends, and depreciation charges, if any.

Freight rates via the Erie canal are frequently contrasted with freight rates via railway, but as they comprise only the immediate transportation cost, that is, the direct charge for conveyance alone, they are hardly comparable with railway rates, which provide the revenue from which must be met not only the cost of conveyance, but also fixed charges upon the capital invested in the plant and the expense of maintenance of plant and equipment. All tolls on New York state canals were abolished in 1882, and the canals since that date have been maintained and operated at the expense of the state for the free passage of boats. Thus the only charges made against a shipper of goods by canal are those of the boatman who handles the goods, and

*Trade Bulletin No. 1, Bureau of Railway Economics, Washington, D. C.

these charges do not help to pay for the maintenance of the canal or for repairs. From the shipper's point of view a canal rate of two mills a ton mile is unquestionably preferable to a railway rate of six mills, if speed and convenience of handling are not as important to him as a low rate. It will be shown, however, that from the broader point of view of the community the railway rate, although apparently higher, may not actually be so. The maintenance and fixed charges on the canal, which are borne by the community, may amount to more than the difference of four mills per ton mile, which is the immediate saving to the shipper. This raises the question whether the burdening of the entire community for the benefit of the shippers, who constitute only a portion of it, is justified. But leaving this question aside, a fair comparison of the cost of transportation by canal and by rail should certainly be of aggregates that include every element in those respective costs.

This study is an effort to estimate the total cost of transporting a ton of freight one mile on the Erie canal at the present time, and to compare that cost with typical or average railway ton-mile freight receipts. To reach an estimate of transportation cost on the Erie canal, it has been necessary to ascertain three items in that cost: first, fixed charges on the canal, or cost of capital; second, cost of maintenance; third, immediate cost of transportation. The sum of these three items will give, fourth, the total cost of transportation.

The Erie canal is a product of state enterprise, paid for from funds obtained for the most part through loans made by the state of New York. These loans have to a large extent been repaid, partly out of the revenue from the canal and partly from sinking funds established and built up through taxation. Because of this liquidation of the canal debt, interest charges paid by the state on behalf of the canal have till recently been comparatively small. The canal represents, however, the investment of the people of the state of New York in a transportation plant, just as a railway represents an investment on the part of its stockholders and bondholders. In ascertaining canal transportation costs that shall be strictly comparable with railway transportation costs, it will therefore be necessary to arrive by some method at the physical value of the Erie canal today and on that value compute fixed charges, representing interest on the investment and depreciation.

But how estimate the value of the canal? There are two ways: first, to take the total cost of construction and permanent improvements to date or, second, to make a physical valuation of the whole canal property. Clearly, it is impossible to value the property without a careful appraisal. The statement so frequently made during the New York state canal campaign of 1903 that the Erie canal, as it stood, was worth more than the total amount expended on it since its inception, cannot be accepted without proof, especially as value depends so definitely on performance. The canal is not of value except as a canal, and as a canal is valuable only in proportion to the service rendered by it. It is feasible, however, to ascertain the total cost of construction and improvement of the Erie canal as a measure of its present value.

Complete official data showing the cost of the Erie canal to 1905, the year when work on the new barge canal was commenced, are not available. The canal autditor of the state of New York, in his annual report for 1882, stated the total cost to that year as $49,592,000. From 1882 to 1905 a number of special appropriations were made by the New York legislature for the purpose of improving the state canals, chiefly by deepening the channels and lengthening the locks. Among these appropriations was one of $9,000,000, made in 1895 for the purpose of increasing the lock capacity and depth of the Erie, Champlain and Oswego canals. Of the amounts spent under the latter appropriation up to July 15, 1898, more than five-sixths, or $6,787,000, was expended on the Erie canal.* What proportion of the other appropriations was applied to the Erie canal it is not possible to ascertain, but the share of that canal in the total was considerably over one-half. The Greene committee estimated that the cost of constructing and improving the Erie canal down to 1896 had amounted to $56,165,000.† It is probable, therefore, that Hepburn's estimate of $57,600,000‡ as the total cost to 1905 is well under the truth. On the basis of $57,600,000, the cost of the Erie canal up to 1905 was $163,600 a mile, which may be compared with the cost of road per mile of the four main trunk lines between Buffalo and New York: the New York Central, the Erie, the Lackawanna, and the Lehigh Valley. The cost of road per mile of these railways, according to the reports made to the Interstate Commerce Commission for 1905, was as follows:

New York Central	$181,250
Erie	292,970
Lackawanna	90,240
Lehigh Valley	60,490
Average	$212,716

Canal construction is far more expensive than is ordinarily appreciated, as is seen from the foregoing comparison:

It will now be possible to estimate the total cost of transportation on the Erie canal, made up of three items already enumerated: cost of capital, cost of maintenance, and immediate cost of transportation.

First. *Cost of Capital:* Taking 4 per cent. as the rate of upkeep on the Erie canal—an item intended to provide for interest charges and for extraordinary repairs and depreciation—and using a conservative estimated value of but $55,000,000 for the canal at the present time, instead of the $57,600,000 cited above, we have a total annual fixed charge of $2,200,000. This amount will be apportioned per ton mile of canal traffic in 1909 in a later paragraph.

Second. *Cost of Maintenance:* The cost to the state of New York of maintaining the Erie canal in 1909, according to data contained in the annual report of the superintendent of public works of that state,** amounted to $672,105. This amount is ascertained by adding to the $500,551 of operating expenditures and ordinary repairs a proportion, obtained by pro-rating on the basis of comparative expense, of the total general and division expenses of the canals of the state. This added charge covers administrative and supervisory expenses. The reduction of this item of maintenance to a ton-mile basis will be made shortly.

Third. *Immediate Cost of Transportation:* This is composed of boatmen's charges for conveyance. Canal boat rates vary considerably with the season, the condition of traffic, and the attitude of the boatmen. There are so few owners of boats on the Erie canal at present that they can regulate boat rates practically at will. The actual cost incurred by the boatmen in conveying wheat on the Erie canal was estimated by the Greene committee of 1889†† at 1.75 mills per ton mile. This estimate covers interest at 5 per cent. on investment in boats, all expenses for wages of boathands, and repairs, deterioration, and insurance on boats, without allowance, however, for profit to the boatmen. The average rate on wheat from Buffalo to New York during the season of 1909 varied from 2.07 mills per ton mile¶ in July to 3.33 mills in October and November; and on corn from 1.87 mills to 3.07 mills. The average for the season was 2.60 mills per ton-mile on wheat and 2.35 mills on corn. These rates differ by less than one-half of 1 per cent. from the average of the rates reported by the superintendent of public works for the years 1900 to 1909, and may therefore be considered as representative. The foregoing rates and estimates apply to grain only. For all commodities moved on the canals of New York state, the average ton-mile rate between 1903 and 1907 was 2.00 mills.§ An estimate of 2.00 mills for the average ton-mile rate on the Erie canal today would therefore seem to be a reasonable one. This represents the immediate charge for conveyance.

*Report of Committee on Canals of New York State, 1899, p. 162. This committee is commonly known as the Greene committee.

†Report, p. 153.

‡A. Barton Hepburn: Artificial Waterways and Commercial Development, p. 100.

**Report for 1909, pp. 31-39.

††Report of Committee on Canals of New York State, 1899, p. 57.

¶Ascertained by reducing the through rate per bushel to a ton-mile basis.

§Hepburn, p. 104.

Fourth. *Total Cost of Transportation:* Of the three components of transportation cost so far discussed, two have been gross amounts for the Erie canal as a whole, while only the last is expressed in terms of ton-mile traffic. To reach a figure of total cost per ton per mile it will be necessary to ascertain the total ton mileage of the traffic on the Erie canal in 1909, and reduce the first two amounts to a ton-mile basis.

Unfortunately, no ton-mileage figures are reported for the canal traffic in New York state at the present time. It will be necessary to make an estimate for the Erie canal based upon the reports of tonnage carried. The total number of tons of freight carried on the Erie canal in 1909 was 2,031,307. What proportion of this was through freight was not reported, but if the proportion was the same as in 1908, then 436,731 tons consisted of through freight, and 1,594,576 tons of way freight. If we assume that way freight was carried an average of half the length of the canal, or 176 miles—which is a liberal assumption—and that all the through freight was carried the whole length of the canal, or 352 miles, we have a total ton mileage of 435,000,000 for 1909.

On the basis of 435,000,000 ton miles of traffic in 1909, the fixed charges or cost of capital, $2,200,000, were equivalent to 5.06 mills per ton mile; and the cost of maintenance, $672,105, to 1.55 mills per ton mile. The total cost of transporting one ton of freight one mile on the Erie canal in 1909 was made up, then, of the following items:

Cost of capital	5.06 mills
[illegible]	1.55 "
[illegible]	.00 "
Total	8.61 mills

Thus there is obtained a total charge for canal transportation of 8.61 mills per ton mile, directly comparable with a railway freight rate. What railway freight rate or receipt shall be quoted in comparison with this 8.61 mills of canal cost? By the four principal railways running between Buffalo and New York freight receipts per ton mile in 1909 were reported to the New York State Public Service Commission as follows:

New York Central	6.2 mills
[illegible]	6.1 "
[illegible]	7.3 "
[illegible]	6.4 "

Whichever one of these various railway average receipts per ton mile be taken, the cost of transportation on the Erie canal will be found to exceed it by from 16 to more than 40 per cent. Even when compared with average railway receipts for the whole United States, the Erie canal cost of transportation is considerably the higher. Thus average freight receipts per ton mile in 1909, for all the railways of the United States, amounted to 7.63 mills, as compared with 8.61 mills of cost on the Erie canal. For specific commodities the result is similar. The Interstate Commerce Commission reports that average railway freight receipts in 1909, for four of the commodities which make up a large part of the Erie canal traffic, were as follows:

[illegible]	[illegible] mill
[illegible]	[illegible] "
[illegible]	[illegible] "
[illegible]	[illegible] "

None of these averages, it will be observed, is as high as the average cost of transportation via the Erie canal.

All this is true despite the very conservative estimates in making up the figures for the Erie canal—and this conservatism is worthy of special emphasis. Thus the ton mileage estimate used is probably too large, and the ton-mile canal rates based on that estimate are correspondingly low. In the opinion of the statistician to the New York superintendent of public works, the average length of haul of way freight over the Erie canal is not over 100 miles, yet the estimate here adopted is 176 miles. Again, 4 per cent. is a conservative rate for depreciation and interest. The net [illegible] of all the railways in the United States in 1909 [illegible] an average dividend and interest rate above that amounted 4 per cent., and an allowance of 4 per cent. for both interest and depreciation charges in connection with the Erie canal, is, in comparison, clearly a minimum. Finally, the estimate of value of the Erie canal property used in the computation is considerably lower than the estimates of the Greene committee and of other careful students of canal history.

Another fact that must be recognized in a comparison of railway and canal transportation costs is that the grade of goods shipped via canal is far inferior to that shipped via railway. The goods sent by canal are bulkier, coarser, of less value, and naturally are carried at a lower average rate. Of the tonnage carried over the New York canals in 1909, for example, nearly a third (31.8 per cent.) consisted of stone, rock, lime and clay; another third (36.6 per cent.) consisted of coal, iron ore, pig iron, boards, timber, pulp wood and wood pulp; while a fifth (21.2 per cent.) was made up of grain, ice and salt. It is clear that an average railway freight rate based only on such articles as were carried by the Erie canal in 1909 would be lower than the average freight rate on all articles carried by railways. The computations made above, therefore, result in an average canal rate lower than if the grade of articles carried by the canal averaged as high as on the railways. Notwithstanding this, the average canal rate, as has been shown, is actually higher than the highest average railway freight receipt quoted.

One cause of the high cost of transportation on the Erie canal is the fact that the canal remains idle so large a part of each year. The average length of the canal season is 223 days, or about 7½ months. During the remainder of the year the plant and the boats lie practically idle, although all of the general and many of the maintenance expenses continue without change. In the estimate of the Greene committee regarding the actual cost of transportation, allowance was made for this period of idleness by computing all expenses on the basis of only seven round trips a year—a full load on the down trip and a third of a full load on the return. But in estimating depreciation and interest charges no such allowance can be made—the plant is in existence and must be maintained, whether in operation or not. Whether or not this long period of idleness each year on the part of the canal is responsible for a large or a small part of the greater cost of canal as compared with railway transportation, it is an inherent feature of canal business in the state of New York and must be taken into account when comparing the canals and railways of that state.

This study has been limited to the Erie canal of today, all the statistics being based on past performances of record. The people of the state of New York are now engaged in spending more than $100,000,000 in the enlargement and improvement of the canal system of their state. What the total cost of transportation on the new barge canal now emerging from the old Erie will be, no one is in a position to know definitely. The Greene committee of 1899 estimated the cost of the barge canal at about $60,000,000. Already more than $100,000,000 has been voted for this purpose, with the possibility that another $19,000,000 will be required for terminals. The Greene committee also made an estimate of the cost to the boatmen of conveying goods through the barge canal, corresponding to their estimate of 1.75 mills on the old Erie referred to in an earlier paragraph. The estimate on the barge canal was 0.52 mill. Whether this estimate will prove to be approximately accurate, or whether time will show it to have been too low, no one at the present time can tell, as no facts exist on which even an approximation may rest. It is clear, however, that having added so greatly to the cost of the canal, rates must be much lower, or volume of traffic far greater, or cost of maintenance and repair lower in proportion to volume of traffic—one or all of these must result before the total cost of transportation on the new Erie will fall to or below the level of the average railway freight rate.

It seems clear, then, from the data presented in the foregoing pages, that the transportation of goods on the Erie canal at the present time is a more expensive process, considered from the broadest point of view, than on the typical or average American railway, whether or not that railway be one that competes directly with the canal.

General News Section.

The Southern Railway has advanced the pay of all clerical employees who have been receiving $70 a month or less.

The New York Central is now running electrically propelled trains between New York and Tarrytown, on the Hudson division, 24½ miles.

The New York, New Haven & Hartford has been fined $250 at New York City for maintaining a nuisance in the use of soft coal in a locomotive.

Damages to railways in southwestern Colorado by the floods of last month have, in many cases, only just been repaired. Some of the towns on the Denver & Rio Grande were without railway service for forty days.

The Grand Trunk, as mentioned recently in these columns, has indicated to the Indiana railway commission that it will install automatic block signals on its line from Valparaiso, Ind., to Chicago before July 1, 1912, and from Valparaiso east to the Indiana state line before January 1, 1913.

According to the *Washington Post* enough senators are displeased with the Commerce Court for suspending the reductions in trans-continental freight rates which were ordered by the Interstate Commerce Commission, to justify the hopes, which are entertained in many quarters, that a bill can be passed in the senate abolishing the Commerce Court.

The Maine Central has bought from the Boston & Maine two Mallet compound locomotives, which were used in the Hoosac tunnel prior to its electrification. The Maine Central will operate the engines on the division from Portland, Me., northwesterly through the White mountains of New Hampshire. They are the first Mallet compound engines ever owned by the Maine Central.

The Buffalo, Rochester & Pittsburg is to introduce telephones for train despatching on 160 miles of its line. The Chicago & North Western has ordered telephone apparatus for the line from Boone to Council Bluffs, 150 miles. The Pittsburgh, Shawmut & Northern has ordered telephone apparatus for despatching on its line between St. Marys, Pa., and Brookville, about 50 miles. All of these companies bought their apparatus from the Western Electric Company.

Irving G. Barger, a messenger of the United States Express Company on the Delaware, Lackawanna & Western, was murdered in his car by a robber on the night of November 17 within the space of four minutes, Barger having been seen alive at Taylor, a station south of Scranton at 8:26, and having been found dead at Scranton, when the train arrived there at 8:30. The messenger had been shot, and his safe had been emptied of most of its valuables.

Shippers Considering the Proposed Clearance Law.

Members of the National Industrial Traffic League have been asked to make a special study of the proposed Federal law relating to clearances between structures located on railways and cars passing over the lines of the latter. The various firms connected with the organization are asked to prepare statements showing what the approximate cost to them will be in the event the provisions of the proposed law are enforced. According to President J. C. Lincoln, a large industrial concern reported that compliance with such a law would cost it more than $1,600,000

Unfilled Tonnage of the Steel Corporation.

The report of the United States Steel Corporation shows that the unfilled tonnage on October 31 was 3,694,328 tons, an increase of 83,011 tons over the previous month. This is the highest that it has been since July 31, 1910, when it was 3,970,931 tons, with the exception of August 31, 1911, when it was 3,695,985 tons. The October unfilled tonnage was not a surprise, for during that month new business was received at the rate of about 35,000 tons a day, and shipments were at the rate of about 32,000 tons a day, or close to 10,000,000 tons a year. In October, 1910, the unfilled tonnage showed a shrinkage of 276,000 tons from the preceding month.

Cost of Snowsheds.

In a report to the California State Railroad Commission the Southern Pacific states that it has 35 miles of snowsheds in the Sierra Nevada Mountains, valued at $2,250,000. During the past four years fires in the sheds have cost $186,262, an annual average of $46,565. Renewals on account of wear are placed at $67,000, and repairs at $40,000 per annum. The total annual expense, including patrolling, and fire trains, is stated to be $203,615.

Hudson-Manhattan Trains Through to Newark.

The Pennsylvania Railroad and the Hudson & Manhattan announce that their joint passenger line from Cortlandt and Church streets, New York, to Park place, Newark, N. J., 8.9 miles long, will be put into full operation next Sunday. The Hudson tunnel trains have been running as far as Manhattan Transfer, a mile east of Newark, for some weeks, but the completion of the concrete viaduct into Newark was delayed by legal difficulties. Running towards New York in the morning and out of New York in the afternoon these trains will be from six to twelve minutes apart, and in all there will be 86 trains a day eastward and 74 westward. These trains run over the old line of the Pennsylvania from Summit avenue, Jersey City, to Manhattan Transfer; westerly from Manhattan Transfer to Newark the line is elevated, crossing the Passaic river by a new double-deck bridge; and east of Summit avenue the line is underground and under-river. The lower deck of the drawbridge at Newark is used by freight trains of the Pennsylvania as an entrance to the Newark city freight house, formerly reached over the Center street line.

Bristol Improvement Finished.

The Pennsylvania Railroad announces that, beginning next Sunday, its trains will run through Bristol, Pa., on the New York division, over the new line through that town which has been under construction for the last two years. This line is about 80 rods shorter than the one which it supplants. The new road, like the old, is a four-track line and has track tanks on all four tracks for supplying water to the locomotives. The improvement has cost $1,012,000, and ten grade crossings are abolished. The new line is carried over the streets of the city by four reinforced concrete bridges and three bridges of reinforced concrete slabs. The new passenger station is at Beaver Dam Road and stands at the street level, passengers ascending to the track platforms by covered stairways. This building is of stone from local quarries, ornamented with Indiana limestone.

Threatened Strike of Rock Island Shop Employees.

A full statement of the points involved in the pending controversy between the Rock Island Lines and their shop employees, failure to settle which has resulted in a breach in the negotiations and threat of a strike by the employees, has been issued by the management of the road. It is signed by W. A. Nettleton, general superintendent, and by W. S. Tinsman, A. E. Sweet, and W. M. Whittenton, general managers of the three districts of the road, is addressed to the public and the shop employees, and is as follows:

In view of the rumors of an impending strike of the shop employees of the Rock Island Lines, and recognizing the right of the public to have full information on a question that involves its welfare, as well as one which involves the surrender to a committee of employees of the right to say in what manner the corporation shall perform its service to the public, the following statement is submitted:

The policy of the company has always been one of fairness toward its employees. It has withheld retrenchment of forces as long as possible. It has always paid wages equal to those of contiguous lines. Its men have always served under working rules and conditions as favorable as those of contiguous lines.

In view of these facts and the present business conditions of the country, this company could not consider anything that contemplated an increase in its expenses, and the general

committee of shop employees, at the beginning of the conferences, over four months ago, were fairly advised of this. But, notwithstanding that notice, the above committee insisted upon pressing negotiations that finally terminated November 10, 1911.

Briefly, the issues upon which the employees' committee justify a strike are as follows:

(1.) They demand that the payment of five hours minimum overtime shall commence one hour earlier than at present. The company declines this, because of increased expense, with no compensating return.

(2.) They demand that any employee called to work overtime shall "be released upon completion of the job called or held for, unless other emergency work arises which requires immediate attention and he is the only man of his craft on duty." The company declines this, because of increased expense, and for the reason that a man is given a minimum of five hours' pay if he works after six a. m. or p. m. The company has a right to the use of the man for the time paid, even though the job for which he is called may not consume all of that time.

(3.) They demand that laying off and employing men shall be governed exclusively by seniority. The company declines this, for the reason that its schedules with all other employees provide that ability of the individual shall be taken into consideration in employing and promoting men and in reducing forces. It is the duty of the company to treat all employees alike and to give all fair and equal consideration, to the end that the most efficient, honest and diligent workmen shall be given steady employment, and for the further reason that if forces were to be reduced in the manner demanded by the employees it would permit them to indicate those to be laid off, thereby prohibiting the company from ridding the service of the less desirable employees, and thus embarrassing it in its efforts for economical operation.

(4.) They demand that only "running repair" work be done when shops are closed; that time and one-half be paid to men employed in regular hours, when shops are closed, upon miscellaneous repairs to locomotives or cars, or upon what is commonly known as "dead" work. The company declines this, because of increased expense which would result from an idle force of such men, a greater part of the time, as are necessary to be employed in keeping up running repairs when shops are closed, and declined for the further reason that it prevents the company from exercising its right to conduct its own business in the most economical manner.

(5.) They demand that no foreman, either regular or temporary, be permitted to work at any time when mechanics are available. The company declines this, for the reason that such a rule would prevent the company from retaining its foremen and thus maintaining its organization in times when shops are closed.

(6.) They demand that applicants for employment "shall only be required to give the name, position wanted, address and address of nearest relative." This question also involves the right of the company to secure the personal records of applicants for employment, and, indirectly, although not appearing in the demand, the ability of the company to apply its pension system alike to all employees. The pension system, created to care for aged employees, is frankly opposed by the committee representing the employees in the mechanical crafts. The company declines for the reason that it has one application blank for all candidates for employment. It cannot and will not make any different rule for applicants for employment in the mechanical department from that made for applicants for employment in other departments. All must be treated alike. The pension system that has been established must govern all employees from the highest to the lowest. This company has the undoubted obligation to its employees, as a class, to insist upon these things, and, [illegible] as far as it is able to so determine.

[illegible] the committee demands [illegible] per hour, which, with the articles [illegible] would result in a tremendous increase in the expenses of the company, without contemplating any return in the shape of additional service or of economy in any form. Articles not dealing directly with [illegible] to take from the company its right to conduct its business in its own way and to protect the interest of its employees at large.

The mechanical committee seeks to create a different set of rules for one class of employees from that which exists for all other employees. They seek to deny to the company the right which belongs to every citizen and employer to require persons entering his service to give evidence of good character and sound health. A departure from this practice, as outlined by the rule proposed by the employees' committee, would permit the employment of diseased, incompetent, inefficient and immoral men. No honest man need in any way be embarrassed by complying with the rules of the company in the matter of employment.

To the final proposition of the Railway Company, the men have answered advising that they will strike if the company does not come to satisfactory settlement with the committee. The negotiations are thus ended by the shop employees' committee. In order to have the employees thoroughly understand the conditions under which they are working, the company hereby announces its intention of continuing in effect until further notice the rates of pay and working conditions as outlined by the schedules in existence at the time of their cancellation by the committee.

Extension of a Chinese Railway.

The short section of the Sunning railway between Kung-yik and Tow-shan, China, which was opened to traffic last year, has proved profitable and its extension to Sunwui, whence it would have water connection with Hongkong, is expected in the near future. The earnings of the railway have averaged about $10,000 a month. The road was built with funds three-fourths of which were raised by Chinese from the Sunning district living in California and the remainder locally. All of its cars and most of its locomotives were made in the United States. The promoter of the railway was a Chinese who had spent many years in America.

Western Railway Club.

At the regular monthly meeting of the Western Railway Club, held at the Auditorium hotel, Chicago, on November 21, the paper for discussion was on the Use of Denatured Alcohol in Railway Service, by Michael Schwarz, manager of the Alcohol Utilities Company.

Transportation and Car Accounting Officers.

The Association of Transportation and Car Accounting Officers' Association will hold its next regular meeting at the Seelbach Hotel, Louisville, Ky., December 12 and 13.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

Air Brake Association.—F. M. Nellis, 53 State St., Boston, Mass.

American Association of Demurrage Officers.—A. G. Thomason, Boston, Mass.

American Association of General Passenger and Ticket Agents.—W. C. Hope, New York; next convention, Seattle, Wash.

American Association of Freight Agents.—R. O. Wells, East St. Louis, Ill.; annual, June 18-21, Chicago.

[illegible] Association of Railroad Superintendents.—O. G. Fetter, [illegible], Cincinnati, Ohio. 3d Friday of March and September; annual, March 17, Chicago.

[illegible] Electric Railway Association.—H. C. Donecker, 29 W. 39th St., New York.

American Railway Association.—W. F. Allen, 75 Church St., New York.

American Railway Bridge and Building Association.—C. A. Lichty, C. & N. W., Chicago. Next annual convention, third week in October, 1912, Baltimore, Md.

[illegible] Railway Engineering Association.—F. H. Fritch, Monadnock Block, Chicago; annual convention, March 19-21, 1912, Chicago.

[illegible] Master Mechanics' Association.—J. W. Taylor, Old Colony building, Chicago. Annual convention, June 17-19, Atlantic City, N. J.

[illegible] Railway Fuel Engineers' Association.—M. H. Bray, N. Y., N. H. & H., New Haven, Conn.

American Society for Testing Materials.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.

American Society of Civil Engineers.—C. W. Hunt, 220 W. 57th St., New York, 1st and 3d Wed., except June and August, New York.

American Society of Engineering Contractors.—J. R. Wemlinger, 13 Park Row, New York; 2d Tuesday of each month, New York.

American Society of Mechanical Engineers.—Calvin W. Rice, 29 W. 39th St., New York. Annual meeting, December 5-8, New York.

Association of American Railway Accounting Officers.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.

Association of Railway Claim Agents.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 22, 1912, Los Angeles, Cal.

Association of Railway Electrical Engineers.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago.

Association of Railway Telegraph Superintendents.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.

Association of Transportation and Car Accounting Officers.—G. P. Conard, 75 Church St., New York; December 12-13, Louisville, Ky.

Canadian Railway Club.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.

Canadian Society of Civil Engineers.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

Car Foremen's Association of Chicago.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

Civil Engineers' Society of St. Paul.—D. F. Jurgensen, 116 Winter St., St. Paul, Minn.; 2d Monday, except June, July and Aug., St. Paul.

Engineers' Society of Pennsylvania.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

Engineers' Society of Western Pennsylvania.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

Freight Claim Association.—Warren P. Taylor, Richmond, Va.; annual, May 15, Buffalo, N. Y.

General Superintendents' Association of Chicago.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

International Railway Congress.—Executive Committee, rue de Louvain, 11 Brussels; 1915, Berlin.

International Railway Fuel Association.—D. B. Sebastian, La Salle St. Station, Chicago.

International Railway General Foremen's Association.—L. H. Bryan, Brown Marx building, Birmingham, Ala.

International Railroad Master Blacksmiths' Association.—A. L. Woodworth, Lima, Ohio.

Iowa Railway Club.—W. B. Harrison, Union Station, Des Moines, Ia.; 2d Friday in month, except July and August, Des Moines.

Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York; annual convention, May 14-17, Pittsburgh, Pa.

Master Car Builders' Association.—J. W. Taylor, Old Colony building, Chicago. Annual convention, June 12-14, Atlantic City, N. J.

Master Car and Locomotive Painters' Association, of United States and Canada.—A. P. Dane, B. & M., Reading, Mass.; next annual convention, second week in September, 1912.

New England Railroad Club.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

New York Railroad Club.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

Northern Railway Club.—C. L. Kennedy, C., M. & St. P., Duluth, Minn; 4th Saturday, Duluth.

Omaha Railway Club.—H. H. Maulick, Barker Block, Omaha, Neb.; second Wednesday.

Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

Railway Club of Pittsburgh.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh

Railway Industrial Association.—G. L. Stewart, St. L. S. W. Ry., St. Louis, Mo.; annual, May 12, 1912, Kansas City, Mo.

Railway Signal Association.—C. C. Rosenberg, Bethlehem, Pa.

Railway Storekeepers' Association.—J. P. Murphy, Box C, Collinwood, Ohio.

Richmond Railroad Club.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

Roadmasters' and Maintenance of Way Association.—L. C. Ryan, C. & N. W., Sterling; September, 1912, Buffalo, N. Y.

St. Louis Railway Club.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

Society of Railway Financial Officers.—C. Nyquist, La Salle St. Station, Chicago.

Southern Association of Car Service Officers.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.

Southern & Southwestern Railway Club.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

Toledo Transportation Club.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

Traffic Club of Chicago.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.

Traffic Club of New York.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

Traffic Club of Pittsburgh.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

Train Despatchers' Association of America.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.

Transportation Club of Buffalo.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

Transportation Club of Detroit.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.

Traveling Engineers' Association.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.; August, 1912.

Western Canada Railway Club.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

Western Railway Club.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Wednesday in month except July and August, Chicago.

Wood Preservers' Association.—F. J. Angier, B. & O., Baltimore, Md.; annual, January 16-18, Chicago.

Traffic News.

From Winnipeg, Man., it is reported that all of the railways are suffering from severe congestion of freight because of unusual efforts to ship wheat eastward before the close of navigation.

Reports from Cherryfield, Me., state that the extensive tracts of land recently bargained for in that region by the Maine Central have finally been bought, and that they will be used for agricultural purposes. These lands aggregate 36,000 acres. It is proposed to establish numerous experimental farms, and it is said that after the experiments shall have been conducted a sufficient time, the land will be offered for sale to farmers.

The New York, Ontario & Western has withdrawn its notice of a proposed reduction in rates on freight westbound from New York to Chicago and other western territory, so that the present rates, 75 cents per 100 lbs. (first class) New York to Chicago will continue in force. The notice which had been issued, reduced all rates to the basis formerly in effect, 6 cents (first class) less than the standard rate. The Erie and the Lackawanna had signified their intention of meeting the 69-cent rate.

The "Governors' Special" is again announced—this time in a despatch from St. Paul, which says that the train is to start east November 27. It will consist of eleven cars, and there will be on it the governors of ten or more western states. Four of the cars will be filled with agricultural and mineral products of those states, forming an exhibit which is to be shown in 22 cities. The enterprise is managed by the Northwest Development League. In Baltimore, December 8, the governors expect to meet seven governors of southern states.

Advertising representatives of the Western railways, including the Rock Island lines, the Burlington, the Missouri Pacific, the Union Pacific, the Chicago & North Western and the Chicago, Milwaukee & St. Paul, were guests of the Colorado Springs Chamber of Commerce during the week beginning October 30. A trip was made each day to some place of interest in the vicinity of Colorado Springs; Pike's Peak, the Cripple Creek district, the Cheyenne canyons, Manitou, Canyon City and the Royal Gorge having been visited, and luncheon was served while on the trip.

The Wabash, Chester & Western, a road in Southwestern Illinois, has filed in the United States district court at Springfield, Ill., a petition to restrain the enforcement of the 2-cent fare law against it. The petition alleges that the Illinois maximum 2-cent fare law is unreasonable, unjust, oppressive, discriminatory, confiscatory and void. The gross receipts of the road from passenger service are said to be inadequate to secure a reasonable profit. Arguments on the state's objections to the report of the master in chancery in the Chicago, Peoria & St. Louis 2-cent rate case will be heard at Springfield, November 27.

Bernard W. Baker of Baltimore, president of a proposed independent American company to run steamships between the ports of the Atlantic and the Pacific by way of the Panama canal, has complained to President Taft that bankers in New York City, who had promised him money, had suddenly, of one accord, all withdrawn their promises; and he says that this strange action is due to the influence of the trans-continental railways, the owners of which desire, if possible, to stave off the establishment of any means of transportation between the Atlantic and the Pacific, which may take a part of their traffic. A number of bankers, interviewed by the newspapers, declare Mr. Baker's charges to be unfounded, and say that his present real or apparent lack of success is due to inherent defects in his plan.

The New England shippers who have been discussing the value of the demurrage bureau at Boston have presented to the railways and to the Interstate Commerce Commission a number of proposed changes which they desire to have made in the demurrage rules, particularly one to modify the average rule. In the same connection they call for the continuance of the Boston bureau under the present plan, by which the commissioner is responsible jointly to the railways, the government and the shippers, declaring that no commissioner who is responsible only to

the railways can properly perform the functions of such an office; and the present commissioner, Mr. Thomason, is commended as able and impartial. At Chicago a committee of the National Industrial Traffic League is also formulating proposals concerning changes desired in the uniform demurrage rules.

The Hudson & Manhattan announces that beginning December 24 the fare for the longer trips in its trains will be increased from 5 to 7 cents. To all stations on Sixth avenue, Manhattan, from all points in New Jersey, the 7-cent rate will apply. The fares will still remain considerably cheaper than those by rival lines, which consist of a combination of street car and ferry service. The universal 5-cent rate was adopted by the company voluntarily, at the opening of the line three years ago, in the hope that the traffic would be heavy enough to justify it. In the statement now issued the company is quoted in part in our column of Financial News. The extension of the tunnel lines westward from the shore of the river at Jersey City is now in use for trains running through to Newark, but the station at Summit avenue, Jersey City, something more than a mile from the shore, has not yet been opened. With this station opened, the fare to or from Cortlandt street, New York, will be 5 cents, and the 5-cent rate will also be retained for all trips which do not cross the river. The trains of the Hudson & Manhattan will next week begin running through between Church street, New York, and Park place, Newark; and the fare will be 17 cents single; 30 cents round trip; $6 for 50-ride family tickets, and $5.65 for individual monthly tickets.

Car Surpluses and Shortages.

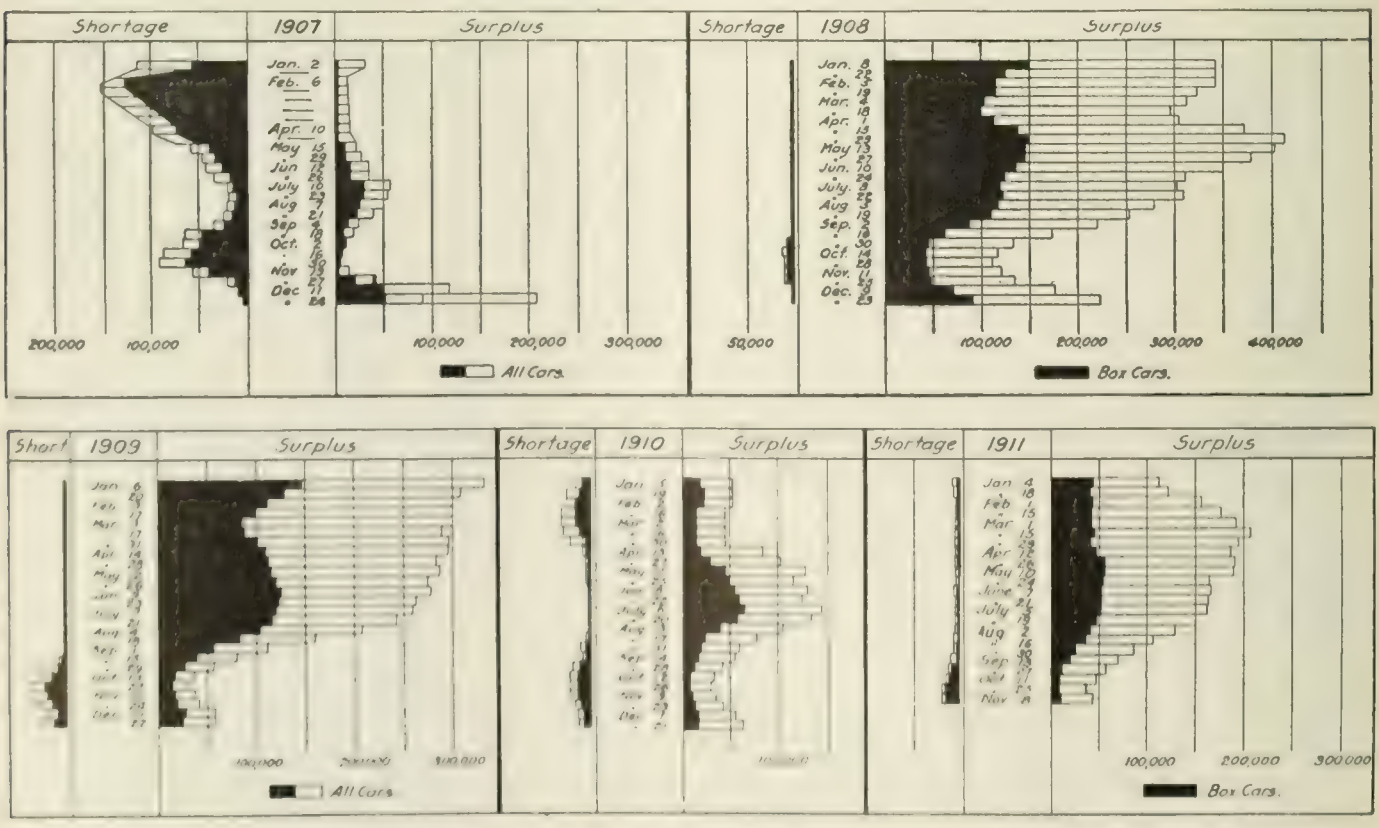
Arthur Hale, chairman of the committee on relations between railways of the American Railway Association, in presenting statistical bulletin No. 107, giving a summary of car shortages and surpluses by groups from July 6, 1910, to November 8, 1911, says:

"There is an increase of 5,984 cars in the surplus, making a total surplus of 45,290 cars. The largest increase is shown to be in coal cars, which increased from 12,148 cars on October 25, 1911, to 16,398 cars on November 8, 1911, an increase of 4,250 cars. The increase in surplus coal cars is chiefly in group 2

Car Surpluses and Shortages.

Date.	No. of roads.	Surpluses—Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.	Shortages—Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.
[illegible] November 8, 1911	7	213	674	203	219	1,309	518	125	250	274	1,167
" 2.— " 8, 1911	25	554	90	5,214	1,409	7,267	187	0	153	160	500
" 3 " 8, 1911	26	67	344	5,563	1,868	7,842	3,716	0	65	1,061	4,842
" 4— " 8, 1911	10	19	32	[illegible]	585	1,220	614	143	1,404	0	2,161
" 5— " 8, 1911	18	123	51	596	932	1,702	560	120	517	33	1,230
" 6.— " 8, 1911	24	5,933	806	1,337	3,709	11,785	108	6	100	7	221
" 7 " 8, 1911	3	107	15	0	684	806	50	0	41	0	91
" 8— " 8, 1911	19	379	79	1,068	1,374	2,900	1,784	128	431	74	2,417
" 9 " 8, 1911	9	1,391	84	416	535	2,426	460	0	0	0	460
" 10.— " 8, 1911	19	721	756	1,417	4,515	7,409	2,296	124	25	0	2,445
" 11 " 8, 1911	5	[illegible]	110	0	514	624	2,997	84	0	161	3,242
Total	165	9,507	3,041	16,398	16,344	45,290	13,290	730	2,986	1,770	18,776

*Group 1 is composed of New England lines; Group 2—New York, New Jersey, Delaware, Maryland, and Eastern Pennsylvania lines; Group 3—Ohio, Indiana, Michigan and Western Pennsylvania lines; Group 4—West Virginia, Virginia, North and South Carolina lines; Group 5—Kentucky, Tennessee, Mississippi, Alabama, Georgia and Florida lines; Group 6—Iowa, Illinois, Wisconsin, Minnesota and the Dakotas lines; Group 7—Montana, Wyoming and Nebraska lines; Group 8—Kansas, Colorado, Missouri, Arkansas and Oklahoma lines; Group 9—Texas, Louisiana and New Mexico lines; Group 10—Oregon, Idaho, California and Arizona lines; Group 11—Canadian lines.



Car Surpluses and Shortages in 1907 to 1911.

(New York, New Jersey, Delaware, Maryland, eastern Pennsylvania) and group 3 (Ohio, Indiana, Michigan, western Pennsylvania). There are also increases of 2,341 cars and 213 cars in box car surplus and miscellaneous car surplus, respectively, while flat cars show a decrease of 820 cars. The increase in box car surplus is principally in group 6 (Iowa, Illinois, Wisconsin, Minnesota, Dakotas).

"The total car shortage is practically the same as reported in the previous period, although the totals for the various classes of cars show changes. The increase in surplus cars is setting in at exactly the same period as last year, and the amount of increases for this report is almost identical with that for the corresponding period in 1910. The total surplus this year, however, is slightly higher than last year, having been 34,581 on November 9, 1910, as against 45,290 for this report."

The accompanying table gives car surplus and shortage figures by groups for the last period covered in the report, and the diagrams show total bi-weekly surpluses and shortages in 1907 to 1911.

A Frisco Line to New Orleans.

The St. Louis & San Francisco, following the failure of its plans to stablish a connection with New Orleans on the west side of the Mississippi river by means of an alliance with the Texas & Pacific, announces that a connection from Memphis to New Orleans (and also to Mobile) is to be established on the east side of the river. Jointly with the Louisville & Nashville the "Frisco" has acquired an interest in the New Orleans, Mobile & Chicago, which extends from New Albany, in the northern part of Mississippi, on the Frisco's line to Birmingham, southward to Laurel, 214 miles, and thence southeastward to Mobile, 111 miles further. From some point north of Mobile, an extension of this line is proposed to be built southwestward to the Louisville & Nashville, thus giving a short-line connection with New Orleans. The arrangement between the three roads also provides for extension of the New Orleans, Mobile & Chicago northward to Jackson, Tenn., where a connection can be made with the Nashville, Chattanooga & St. Louis. By this proposed combination of lines the distance from Memphis to New Orleans will be 49 miles less than by the route which has been proposed west of the river.

National Industrial Traffic League.

The National Industrial Traffic League held its annual meeting in Chicago last week, and J. M. Belleville, of the Pittsburgh Plate Glass Company, was elected president.

A committee was appointed to confer with the committee on relations of railways of the American Railway Association, with a view to discussing numerous desired revisions of the uniform demurrage and car service rules. It is intended to gather and digest the views of all interests in all parts of the country, so as to present a comprehensive report on this subject.

A report on refund of overcharges developed in revising billing, presented the committee on freight claims and referring to negotiations of that committee with the Association of American Railway Accounting Officers and the American Association of Freight Agents, was adopted.

It was recommended that when the report of the Uniform Classification Committee is sent to the carriers for adoption, it should be placed in the hands of shippers at least 30 days before the meeting of the classification committee, and that all classification committees shall provide for public hearings on all subjects to be considered by them at their meetings, and that 30 days' notice be given. A letter from D. O. Ives, chairman of the league committee on classification, which was read at the meeting, expressed doubt as to the legal right of the shippers to compel such publicity. Another member stated that Chairman Clements, of the Interstate Commerce Commission, in reply to a letter regarding the matter, said the commission had no jurisdiction over the subject.

Several changes were outlined for the uniform bill of lading and the standard bill of lading, and reference was made to the Stephens bills and the Adamson bill, both introduced in Congress, dealing with bills of lading. Both were said to contain excellent features, but they also contain features not altogether satisfactory, and it was recommended that the legislative committee and the bill of lading committee of the league jointly consider them, with a view to adopting the best features of both and then making recommendations to the proper committee of Congress.

The bill before Congress prescribing car clearances was strongly opposed. J. M. Belleville, of the Pittsburgh Plate Glass Company, said his firm could not market 15 per cent. of its product if the bill became a law. Another member said that for the city of Duluth to comply with a similar bill which had been introduced in Minnesota would cost $15,000,000. Doubt was expressed as to whether it would reduce accidents or have any effect other than to bar the plea of contributory negligence where accident did result from obstructions not in accordance with the bill. It was decided to appoint a committee of 15 to oppose the bill in Congress.

Attention was called to a plan tried at Jacksonville, Fla., of having shippers employ a force of inspectors at various freight stations in large centers to work in the interest of shippers and receivers of freight. The proposition was simply laid before the league, with the suggestion that it be adopted wherever it would be found necessary and practicable. There was a feeling that it would be too costly at the very large cities.

The carriers who have been making special efforts to reduce friction over the settlement of claims were commended. Particular attention was called to the new method of handling and settling claims adopted by the St. Louis & San Francisco.

A standing baggage committee is to be appointed by the league to confer with the national baggage committee, which was recently named at Chicago by representatives of commercial concerns interested in excess baggage rates and regulations.

At the annual dinner, which was held Thursday evening, well known speakers advocated closer co-operation between shippers and railways. Among the speakers were O. P. Gothlin, chairman of the State Public Service Commission of Ohio, and W. A. Garrett, chairman of the Chicago General Managers' Association.

Mr. Garrett reminded the manufacturers that it would cost railways $630,500,000 to comply with the provisions of a bill now pending in Congress, requiring the use of steel cars. Traffic Director Bartow of the Chicago Association of Commerce claimed that the freight classification committees came within the scope of the Sherman anti-trust law and might be convicted of illegal conspiracy whenever shippers wished to go that far.

Railway Earnings in Russia.

The financial reports of the Russian railways show that the total receipts for all the railways were $577,190,500, or $80,232,000 more than the estimates, and $39,162,000 more than the receipts for 1909. The operation expenses were $377,764,900, or $7,340,200 more than the estimates and $6,103.500 less than in 1909. Thus the excess of total receipts over the total expenditures for 1910 amounted to $199,425,000, or $73,891,800 more than the estimates, and $42,265,522 more than in 1909. The net profit was $197,525,000, or $76,202,700 more than the estimate, and $44,602,210 more than in 1909. The net profit on the treasury railways amounted to $124,558,040, or $48,686,160 more than the estimates, and $29,660,350 more than in 1909. The net profits for the private railways made $72,966,900, or $27,516,347 more than estimated, and $14,939,808 more than 1909. Analyzing the various results from the treasury railways we find that the Southern line yielded the largest profit. Then the South Western, the Ekaterinsk, the Nikolaieffsk North Western, Northern, Riga-Orel, the Moscow Kursk-Nizhegorod, and the Privislinsk. Amongst the treasury railways, in Asiatic Russia a deficit of $3,621,260 was anticipated. There was a surplus in the receipts over the expenditure on the Tashkent line of $4,255,130; on the Siberian line of $3,323,450; and on the Central Asiatic line of $1,421,930; and on the Trans-Baikal line there was a surplus of receipts over expenditures of $6,079,330. Among the private lines the most profitable are the Caucasian railway with $14,911,380 net profit and the South Eastern railway, with $14,765,830 net profit.

Freight Car Balance and Performance.

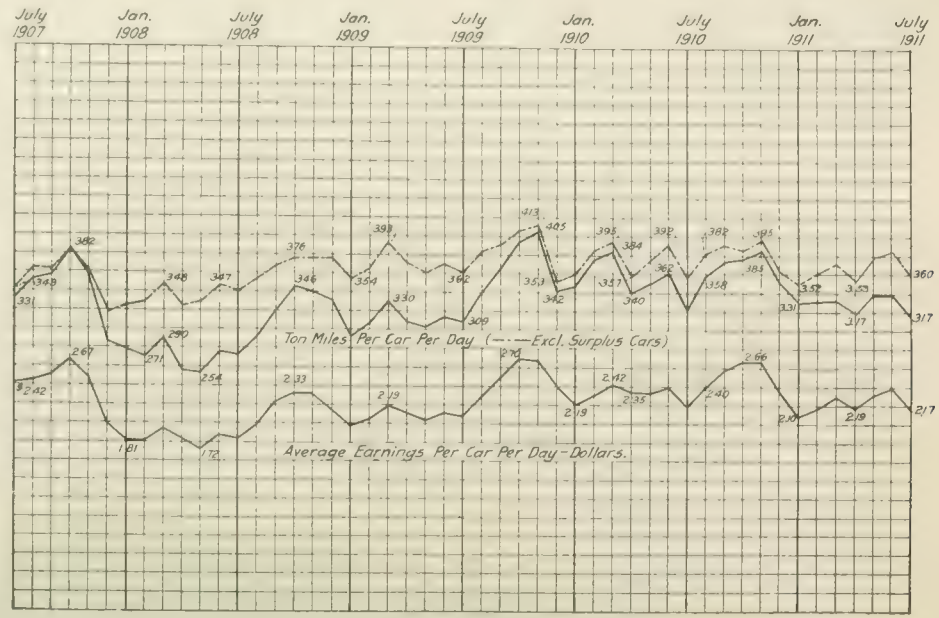
Arthur Hale, chairman of the committee on relations between railways of the American Railway Association, in presenting the statistical bulletin No. 108, covering car balance and performance for July, 1911, says:

Most items of performance for July, 1911, show a decrease in

CAR BALANCE AND PERFORMANCE IN JULY, 1911.

	N. Y., N. J., Conn., Mass., Eastern Pa.	N. Y., N. J., Conn., Mass., Eastern Pa.	Ohio, Ind., Mich., Western Pa.	Va., W. Va., N. and So. Carolina	Ky., Tenn., Miss., Ala., Ga., Fla.	Iowa, Ill., Wis., Minn.	Mont., Wyo., Neb., Dakotas	Kan., Colo., Okla., Mo., Ark.	Texas, La., New Mex.	Ore., Idaho, Nev., Cal., Ariz.	Canadian Lines.	Grand Total.
				186,236	167,554	392,113	18,694	136,350	25,744	144,749	106,063	1,969,411
				144,715	114,590	298,060	7,866	99,877	24,006	69,687	76,150	1,362,009
				45,641	38,929	95,692	12,761	34,707	8,872	50,920	29,836	563,212
			734,761	171,356	153,519	393,752	20,130	134,584	32,878	120,607	105,986	1,925,221
			18,939	.....	.....	1,639	1,436	.....	7,134	.....	.....	.....
	69	69	74	66	68	76	42	73	93	48	72	69
	43	37	38	26	23	24	66	25	34	35	28	29
	96	96	109	92	91	100	108	98	127	83	100	98
		70,430	11,680	2,896	6,079	15,470	1,452	7,312	2,405	11,340	2,536	94,767
			245,841	174,252	159,598	409,222	21,582	141,896	35,283	131,947	108,522	2,019,988
	8.44	8.41	10.63	7.83	11.11	7.97	7.47	10.80	6.15	6.44	7.47	9.05
		7,491	3,064	3,109	2,542	6,317	535	2,649	671	2,687	2,130	32,505
	74	66	80	56	63	65	41	54	53	49	51	62	
			152,676,736	122,621,785	119,686,526	270,773,987	23,948,104	84,515,366	24,289,734	110,168,451	91,943,646	1,543,635,221
	20.1	20.8	20.0	22.7	24.2	21.3	35.8	20.1	22.2	26.9	27.3	21.9
	70.3	65.3	66.7	64.2	68.2	69.5	71.0	69.2	68.0	70.4	73.5	67.7
		7,415,609,000	2,242,616,919	1,895,391,239	1,570,876,485	2,499,302,126	332,487,762	1,131,710,364	281,668,682	1,582,640,052	1,182,371,411	20,605,003,925
	20.3	15.3	15.7	15.5	13.2	12.6	14.5	13.4	11.6	14.6	12.9	14.2
	24.7	23.4	23.3	24.1	19.4	18.5	20.5	19.6	17.1	20.7	17.5	21.1
	366	389	320	351	321	271	541	269	258	392	351	317
	$8,346,681	$44,444,939	$12,894,601	$10,597,488	$10,272,325	$26,563,162	$3,665,311	$7,353,100	$2,336,817	$14,498,193	$8,470,662	$145,447,229
	$1.07	$1.09	$1.93	$1.84	$1.98	$2.19	$4.60	$2.44	$2.93	$3.23	$2.58	$2.22
	1.96	2.18	1.78	1.99	2.16	2.18	4.27	2.51	2.29	3.88	2.58	2.27
	1.40	2.05	1.69	1.96	2.08	2.09	3.98	2.37	2.14	3.54	2.51	2.17

Car Performance.



Car Earnings.

business as is usual for that time of the year. The average miles per car per day show a decrease of 1 mile per car per day as compared with June, 1911, while the average ton miles remain nearly normal. The average ton miles per car per day for all cars show a decrease of only 21 ton miles as compared with June, 1911. The same items excluding surplus and shop cars show a decrease of 26 ton miles. Average earnings per car per day decreased from $2.38 to $2.17, while the average earnings per car per day excluding idle cars decreased from $2.67 to $2.44.

The accompanying table gives the figures for July and the charts show car earnings and performance by months in 1907 to 1911.

The Traffic Club of New York.

The annual meeting of the Traffic Club of New York and the election of officers will he beld on November 28 at the Waldorf-Astoria Hotel. In addition to the inauguration of the officers elect, a vaudeville entertainment has been arranged for by the entertainment committee.

INTERSTATE COMMERCE COMMISSION.

The commission began at Washington last week a re-hearing on the case involving rates on lemons in carloads from California to eastern cities, the Commerce Court having annulled the former decision of the Interstate Commerce Commission reducing these rates from $1.15 to $1.

Commissioner Prouty took testimony in New York City on Monday of this week in a complaint that rates on watermelons in carloads from the southern states to New York and other eastern cities are excessive. Previous to 1902 the Pennsylvania Railroad delivered watermelons in New York City, but since that date has refused to carry them across the river in cars (on floats), requiring consignees to accept delivery at Jersey City; the rate to Jersey City being 1 cent per 100 lbs., less than the former rate to New York. The melon men claim that some dealers in New York have had to go out of business because of the change of the delivery point from New York to Jersey City. The consignees also complain of congestion of watermelon shipments in Jersey City, though it appears that the railway has delivery tracks there which will permit the unloading of 70 cars a day.

The commission on November 17 ordered a reduction in freight rates from the Mississippi river crossings to Missouri river cities from 60 cents (first class) per 100 lbs., to 55 cents, all of the classes, including the lettered classes, being reduced proportionately. This action was taken in the Burnham-Hanna-Munger case, which arose several years ago and which has been before the commission and courts repeatedly. The rates here dealt with are proportions of through rates from the Atlantic seaboard and other eastern points. The commission originally ordered a reduction from 60 to 51 cents. The United States Circuit Court at Chicago annulled this order, and the suit was then taken to the United States Supreme Court, which reversed the Circuit Court and established the rates fixed by the commission. But by this time the two-year term of the commission's order had nearly expired, and so the railways restored the higher rates. The shippers then entered a new complaint and the commission suspended the tariffs while it should make a complete new inquiry. It was asserted by the defendants that the commission's rate would cause a reduction in revenues on freight moving from east of the Mississippi river to the Missouri river and St. Paul, and including territory intermediate and basing on the Missouri river and on St. Paul, amounting to $1,200,000, or $870,000 on the first five classes. The commission does not take the ground that the rates are extortionate, but holds they are not proportionate, and therefore not reasonable. Uniform rates applicable as parts of the through rates on shipments from all points east of the Indiana-Illinois state line from the Mississippi river crossings to the Missouri river cities are prescribed. Reparation on past shipments is denied. The order goes into effect December 30, and continues in force for two years.

Pay for Repairing Cars Forbidden.

Balfour, Guthrie & Company et al. v. Oregon-Washington Railroad & Navigation Co. Opinion by Commissioner Lane:

Complainants ask that defendant be required to provide in its tariffs for reimbursement of shippers for repairs made on cars to fit them to hold grain in bulk. Such an arrangement would be susceptible of use as a subterfuge for granting rebates, and shippers should refuse to accept cars that are in such a state of disrepair as to render them unfit for use. Complaint dismissed. (21 I. C. C., 539.)

The Right to Know Probable Future Rates.

Leon E. Lum v. Great Northern Railway Company. Opinion by Commissioner Meyer:

The defendant moved to dismiss the complaint without further hearing, for a number of reasons, among which was one based on the two-year provision of the law. The commission does not regard as material the allegation that complainant could not possibly ship ore within two years of the effective period of an order of this commission. If the commission prescribes a reasonable rate today for the movement of traffic which possibly may not move within two years, and the railway company refuses to continue that rate voluntarily for a period longer than two years, it becomes the plain duty of the commission to institute a new investigation at the proper time and prescribe a rate which shall be just and reasonable under the circumstances and conditions prevailing at such time. Any man who is situated as is this complainant has a right to know what the lawful published rate on his proposed product is and will be for a reasonable period of time in the future. The commission can not deny the right of the complainant to secure the publication of a rate in advance of far-reaching and consequential business arrangements which can be profitably made when predicated upon one rate, and which can not possibly be made on a commercial basis when predicated upon a higher rate. The motion is overruled and the case will proceed to a determination in accordance with the act. (21 I. C. C., 558.)

STATE COMMISSIONS.

W. A. Spalding, assistant engineer of the Galveston, Harrisburg and San Antonio at Houston, Tex., has been appointed assistant engineer of the California Railway Commission.

As a result of the investigation of Commissioner H. H. Sanborn, the California State Railroad Commission has ordered a reduction in the freight tariff on dried fruit from San Joaquin Valley points to San Francisco. The present rates, placed in effect in September, 1910, are reduced approximately one-half. The new tariff is to become effective immediately, and varies from 85 cents per ton from Fresno, to $3.97 per ton from Bakersfield and points in the vicinity.

COURT NEWS.

An appeal to the Supreme Court of the United States has been filed by the government from the ruling of the Commerce Court granting a temporary injunction in the intermountain rate cases.

In the federal court at New York City, November 16, the grand jury returned indictments against two officers of the Lehigh Valley and one of the Baltimore & Ohio, and against seven freight shippers or brokers, on the charge of giving or accepting illegal rebates. It is charged that shipping brokers in New York City have been allowed a 10 per cent. commission on import shipments controlled by them and that these commissions, in whole or in part, go to the owner of the goods, thus constituting an illegal discount from the tariff rate. The railways claim that the broker or forwarding agent is the agent of the railway company, while the government aims to show that he is the agent of the shipper.

New York Public Service Commissions Law Interpreted.

The Court of Appeals of the state of New York has annulled the decision of the Public Service Commission, First district, that the reorganization of the Third Avenue (surface street)

Railroad Company of New York City, now in the hands of a receiver, can be carried out only according to a plan approved by the commission. The commission has twice rejected plans proposed by the bondholders and other interests connected with the company, but the court now allows the last of these plans to be carried out regardless of the action of the commission.

Under the plan new securities amounting to $54,916,000 were to be issued to take the place of $70,028,800 old securities. The Public Service Commission denied permission to issue the new securities on the ground that the capitalization proposed was not justified by the value of the property. The court declares that the reorganization was no concern of the Public Service Commission as long as the securities proposed to be issued did not exceed the face value of the securities already in existence. The statutory provisions for the reorganization of corporations, embodied in sections 9 to 12 of the stock corporation law, have not been repealed as to railway corporations by the provisions of the Public Service Commission's law, nor do the provisions of the stock corporation law relieve corporations formed by reorganization from compliance with section 55 of the Public Service Commission's law.

It is not necessary for the reorganized corporations first to obtain the permission and approval of the commission under section 53 of the Commission's law, before it may exercise the rights, privileges and franchises of the predecessor railway, nor is it necessary for such company first to obtain the approval of the Public Service Commission under section 54 of such law, to enable a lawful transfer to it of the franchises, etc.

"The requirement of the statute," says Judge Cullen, "is that the issue of the securities shall be necessary for the acquisition of the property, and although as a general rule under this requirement, the securities should not be authorized except where the value of the property is equal to the amount of securities issued, there may be exceptions to the rule. One is found in the statute itself.

"Thus, in the case of a merger the limit of the amount of stock of a corporation is dependent, not on the value of its property, but on the stock outstanding of the constituent corporations prior to the merger. We think the same rule is applicable to the case of a corporation formed on the reorganization of a foreclosed railway.

"We do not say that in the reorganization of a railway the new corporation is authorized to issue securities in excess of those of the company to whose property and franchises it has succeeded and the new money or property that may be put in the enterprise. Such a plan would be plainly inconsistent with the spirit of the Public Service Commissions law against the issue of 'watered' stock or bonds; but up to the limit we have named, the new corporation has the right to issue securities. The determination of the commission to the contrary was therefore erroneous."

FOREIGN RAILWAY NOTES.

The government of Colombia has recently paid to the Antioquia Railroad $40,000 as subsidy for 2½ miles of line recently opened to public traffic.

Another section of the Amaga Railroad, Colombia, was opened to public traffic on July 20. This new section lies between Envigado and Sabaneta.

The Paulista Railway, Brazil, proposes to construct a double line from Jundiahy to Campinas, near Sao Paulo, to be later extended as far as Rio Claro.

[illegible] railways in Germany are equipping their locomotive cabs with [illegible] to absorb the vibration, which is said to affect the hearing of the engineers.

The Cordoba Central Railway, Argentina, has extended its [illegible] to Buenos Aires, thereby placing the capital of the republic in direct rail communication with Tucuman, via Rosario.

It is planned to extend the railway now running from Buenos Aires, Argentina, to Resistancia on the Parana river, about 180 miles north of Puerto Piloxeyo. The extension will necessitate the inauguration of a railway ferry service between Puerto [illegible] and Asuncion, Paraguay.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

Charles H. Dietrich has been appointed assistant freight claim agent of the Chicago, Milwaukee & St. Paul, with office at Chicago.

S. G. McMeen, of Chicago, has been elected president of the Mount Hood Railway & Power Company, a road in Oregon extending from Portland to the base of Mount Hood.

J. P. O'Brien, vice-president and general manager of the First district of the Oregon-Washington Railroad & Navigation Company, and general manager of the Southern Pacific lines in Oregon, has been appointed vice-president and general manager of all lines of the Oregon-Washington Railroad & Navigation Company, with office at Portland, Ore.

J. L. Parris, assistant attorney for Iowa and South Dakota of the Chicago, Rock Island & Pacific, has been appointed attorney for Iowa, with office at Des Moines, Iowa, succeeding Carroll Wright, deceased. Stringer & Seymour, attorneys for Minnesota, with office at St. Paul, have been appointed also attorneys for South Dakota, that state having been under the jurisdiction of Mr. Wright until the time of his death.

Reuben Wells Leonard, who was recently elected chairman of the Commissioners of the Transcontinental Railway, with headquarters at Ottawa, Ont., as has already been announced in these columns, was born in 1860, at Branford, and graduated from the Royal Military College, Kingston, in 1883. He was then for two years employed on survey and construction work for the Canadian Pacific in the Lake Superior district, and the latter part of 1885 was resident engineer of that road in Manitoba. He was later engineer on surveys and construction on the Ontario and Quebec divisions of the same road, and from 1887 to 1890 was chief engineer of the Cumberland Railway & Coal Co. of Springhill, N. S. From 1890, to 1906, he was engineer on the Canadian Pacific in Quebec, Ontario and British Columbia and of the following works: Engineer, in charge of construction hydro-electric plant of the Niagara Falls Park & River Railway Company; contracting engineer of the Ottawa & Parry Sound Railway; chief engineer in charge of construction of the Canadian Pacific short line, Montreal, Que., to Ottawa, Ont.; chief engineer of the St. Lawrence & Adirondack, of the New York Central Lines, in charge of surveys and construction in Quebec; consulting engineer of the Rutland-Canadian Railway, in charge of surveys and construction; engineer in charge of iron and nickel mining for the Lake Superior Corporation; chief engineer of the Cape Breton Railways, surveys and construction; engineer in charge of construction for the Hamilton Cataract Power Company's hydro-electric plant at St. Catharines, Ont.; also of the Kamanistiquia Power Company at Kakabeka Falls. Since 1906 he has been president of the Coniagas Mines, Ltd., and of the Coniagas Reduction Company, Ltd. Mr. Leonard is a member of the board of governors of the Toronto University; Kingston School of Mining; Wycliffe College, Toronto; Bishop Ridley's College, St. Catharines; vice-president of the Canadian Mining Institute, and was formerly vice-president of the Canadian Society of Civil Engineers. He is a member of council of the Institute of Mining and Metallurgy, London, England; also a member of the American Institute of Mining Engineers.

Operating Officers.

T. J. Brown has been appointed chief train despatcher of the Grand Trunk, with office at Durand, Mich.

J. H. Curtis has been appointed acting car distributor of the Bangor & Aroostook, with office at Bangor, Me., succeeding G. V. Thompson, resigned.

[illegible] has been appointed chief despatcher of the Coast division of the Chicago, Milwaukee & Puget Sound and the Tacoma Eastern, succeeding E. G. Fowler.

C. L. Stone has been appointed superintendent of telegraph of the San Pedro, Los Angeles & Salt Lake, with office at Los Angeles, Cal., succeeding I. T. Dyer, deceased.

W. F. Braggins, general agent of the Texas & Pacific at New Orleans, La., has been appointed superintendent of terminals, with office at Dallas, Tex. P. L. Wing, freight agent at New Orleans, has been appointed superintendent of terminals at that place.

E. B. Cook, division superintendent of the Lake Shore & Michigan Southern at Chicago, has been appointed division superintendent, with office at Cleveland, Ohio, succeeding J. K. Russell, retired on a pension, effective December 1. F. M. Smith, assistant division superintendent at Chicago, succeeds Mr. Cook.

Guy Adams, who has been appointed manager of mail traffic of all the Frisco Lines, effective January 1, as was announced in these columns last week, was a postal clerk, and held other positions in the government railway mail service for 15 years. He was for a time general baggage agent of the Union Pacific, Denver & Gulf, now the Colorado & Southern, was later employed in the operating department of the Chesapeake Beach at Washington, D. C., and subsequently was made traveling passenger agent of the Lehigh Valley. He went to the Delaware, Lackawanna & Western in 1899 as division passenger agent at New York. In 1904 he was appointed supervisor of mails of the Chicago, Rock Island & Pacific, and in 1906 had his jurisdiction extended over the Chicago & Eastern Illinois, the Evansville & Terre Haute, and the St. Louis, Kansas City & Colorado, now part of the Frisco system. In 1909 his jurisdiction was extended over the St. Louis & San Francisco proper, and in 1910 his title was changed to manager of mail traffic, since which time he has had jurisdiction over the Chicago, Rock Island & Pacific, the St. Louis & San Francisco and the Chicago & Eastern Illinois. For five years he has been chairman of the committee on railway business mail of the American Railway Association, which has formulated the rules now in effect on the leading railways of the country for the handling of railway business mail.

Guy Adams.

Joseph Lindsay, who has been appointed superintendent of the Great Northern, with office at Sioux City, Iowa, as has been announced in these columns, was born May 20, 1859, at Durham, Ont. He was educated in the country schools of Ontario and began railway work in March, 1883, with the Canadian Pacific on construction work through the Rocky mountains. He remained with that company five years, having been in the building department and in train service as well as on construction work. He then went with the Great Northern, where he was for seventeen years in the bridge and building department, with headquarters at Superior, Wis., having been consecutively carpenter, foreman carpenter and master carpenter. He was transferred to the operating department on April 20, 1911, when he was appointed trainmaster on the Butte division, and he was promoted to superintendent as above on November 1.

D. W. Campbell, whose appointment as general superintendent of the Shasta and Portland divisions of the Southern Pacific, with office at Portland, Ore., has been announced in these columns, was born November 11, 1867, at Hanover, Can. He spent ten years in school and began railway work in June, 1882, with the Grand Trunk. In November of that year he went with the Canadian Pacific as train despatcher, and in April, 1887, was appointed to a similar position on the Northern Pacific, where he remained almost four years. He then went with the Oregon Railroad & Navigation Company and remained with that company and its successor, the Oregon-Washington Railroad & Navigation Company, until the time of his recent appointment, having been consecutively train despatcher, chief despatcher, assistant superintendent, superintendent and general superintendent; his last title with that company was assistant general manager.

James A. McCrea, whose appointment as general manager of the Long Island Railroad, with office at New York City, has been announced in these columns, was born on May 26, 1875, at Philadelphia, Pa., and was educated at St. Paul's school at Concord, N. H., 1888-1892, and graduated from Sheffield Scientific School of Yale University in 1895, with the degree of Ph.B. Mr. McCrea began railway work on November 5, 1895, as a rodman in the engineering department of the Pennsylvania Lines West of Pittsburgh. He was later in the maintenance of way department on the Cincinnati & Pittsburg division, and from May, 1897, to May, 1898, was on the Philadelphia division. He was appointed assistant engineer of the Eastern division in May, 1898, and in August of the following year, became engineer of that division. From June, 1901, to January, 1906, he was superintendent of the Cincinnati division, and was then appointed general superintendent of the Long Island Railroad, which position he held at the time of his recent appointment as general manager of the same road.

Traffic Officers.

A. G. Bantly has been appointed commercial agent of the Chicago, Milwaukee & Puget Sound, with office at Everett, Wash.

M. A. Johnson has been appointed soliciting freight agent of the Cleveland, Cincinnati, Chicago & St. Louis, with office at Evansville, Ind.

H. P. Salter, general agent of the Louisville & Nashville at Anniston, Ala., has been appointed freight agent, with headquarters at Nashville, Tenn.

C. A. Silkern has been appointed freight soliciting agent of the Southern Railway, with office at Nashville, Tenn., succeeding H. E. Woodworth, promoted.

J. T. Crawford, traveling passenger agent of the Chicago, Rock Island & Pacific at Peoria, Ill., has been appointed traveling passenger agent, with office at Chicago.

Harvey E. Lounsbury, whose appointment as general freight agent of the Southern Pacific Company's lines in Oregon, with office at Portland, Ore., has been announced in these columns, was born February 2, 1873, at Deer Lodge, Mont. He attended the public schools, and began railway work in 1887 with the Oregon Railroad & Navigation Company, as an office boy for the general passenger agent. During the time he was with that road he studied shorthand at night school, and in 1891 was made stenographer and clerk in the office of the manager of the Southern Pacific lines in Oregon. He was then consecutively passenger clerk, traveling freight agent, and district freight agent of the Southern Pacific; general agent in the freight department of the O. R. & N. and the Southern Pacific and district freight agent of the latter company, with office at Portland. He was appointed assistant general freight agent of both companies in November, 1910, from which position he is now promoted.

H. E. Lounsbury.

P. M. Ripley has been appointed assistant general traffic manager of the El Paso & Southwestern System and the Morenci Southern Railway, with office in New York City.

J. G. Lowe, until recently general agent of the Union Pacific at St. Louis, Mo., has been appointed traveling passenger agent of the Western Pacific, with office at Kansas City, Mo.

W. H. Winnfield has been appointed soliciting freight agent of the Frisco Lines, with office at Dallas, Tex., succeeding W. M. Bottorff, resigned to accept service with another company.

A. J. O'Reilly, commercial agent of the Chicago, Indianapolis & Louisville at Indianapolis, Ind., has been appointed general agent of the freight department, with headquarters at Indianapolis.

H. J. Schwietert has been appointed traveling industrial and immigration agent of the Illinois Central, with office at Memphis, Tenn., succeeding Frank Henius, resigned, to engage in other business.

R. L. McKee, traveling freight agent of the Louisiana Railway & Navigation Company, at Little Rock, Ark., has been appointed commercial agent, with office at Little Rock, and his former position has been abolished.

F. M. Martin has been appointed traveling freight agent of the Lake Erie & Western, the Fort Wayne, Cincinnati & Louisville and the Northern Ohio, with office at Indianapolis, Ind., succeeding F. S. Wills, resigned.

A. M. Hall, traveling passenger agent of the Missouri, Kansas & Texas of Texas at Dallas, Tex., has been transferred to Victoria, Tex., and R. G. Buford, traveling passenger agent at San Antonio, Tex., succeeds Mr. Hall. V. B. O'Neal, depot passenger agent at San Antonio, succeeds Mr. Buford.

Engineering and Rolling Stock Officers.

W. S. Crites has been appointed division engineer of the Southern Pacific Company, with office at Los Angeles, Cal., succeeding F. L. Burckhalter, promoted.

H. M. Church has been appointed engineer maintenance of way of the Wheeling System of the Baltimore & Ohio, with office at Wheeling, W. Va., succeeding J. A. Spielmann, promoted.

G. Mihleison, assistant general boiler inspector of the Atchison, Topeka & Santa Fe at Topeka, Kan., has been transferred to the Coast lines of the Santa Fe. J. K. Nimmo has been appointed assistant general boiler inspector of the eastern lines, at Topeka, and George C. Nichol, foreman of the boiler shop at Albuquerque, N. Mex., has been appointed assistant general boiler inspector of the western lines, in charge of the Northern and Southern districts, with office at Albuquerque.

OBITUARY.

A. A. Hayes, freight auditor of the Atchison, Topeka & Santa Fe, at Topeka, Kan., died at that place on November 20, from blood poisoning that resulted from a gunshot wound.

John W. Dana, formerly treasurer and auditor of the Portland & Ogdensburg, now the mountain division of the Maine Central, died at Portland, Me., at the age of 68 years.

W. H. Hill, until the middle of October assistant general freight agent of the Chicago, Burlington & Quincy at Kansas City, Mo., and recently in the office of the president of that road, died at Burlington, Iowa, on November 20 at the age of 42 years.

John J. Ryan, superintendent of motive power of the Galveston, Harrisburg & San Antonio and other Harriman Lines in Texas, with office at Houston, died on November 20. Mr. Ryan was born on July 1, 1849, at East Boston, Mass., and was educated in the public schools. He was an apprentice at the McKay & Aldus Locomotive & Marine Works, and began railway work in 1870 with the New York & Lake Erie. He was then previous to 1877 consecutively with the Rhode Island Locomotive Works, the Ames Tool Co., the New York & Erie, the Eastern Railroad, the United States Navy Yard, the Pennsylvania Railroad, the Delaware, Lackawanna & Western and the Atlantic Coast Line. From March, 1877, to January, 1883, he was with the Galveston, Harrisburg & San Antonio, successively as machinist, general engineer and foreman, and was appointed master mechanic of the same road in February, 1883. He became master mechanic in March, 1885, of the Atlantic system of the Southern Pacific Co., and from January, 1890, to October, 1892, was general master mechanic of the same system. On October 1, 1892, he had been appointed superintendent of motive power of the Galveston, Harrisburg & San Antonio.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Chicago & North Western is in the market for 75 locomotives.

The Illinois Terminal Company has ordered 1 mogul locomotive from the Baldwin Locomotive Works.

The Wabash, Chester & Western has ordered one eight-wheel locomotive and one mogul locomotive from the Baldwin Locomotive Works.

CAR BUILDING.

The Chesapeake & Ohio is in the market for 250 steel underframes.

The Harriman Lines are figuring on from 12,000 to 40,000 freight cars.

The Chicago & North Western is in the market for 3,300 box cars.

The Erie has ordered 25 milk cars from the American Car & Foundry Company.

The Atchison, Topeka & Santa Fe is said to be figuring on 8,000 cars. This is not yet confirmed.

The San Antonio & Aransas Pass is in the market for 100 steel underframes for reinforcing box cars.

The Castle Valley Coal Company, Salt Lake City, Utah, is making inquiries for 200 all steel coal cars.

The Lehigh Valley has ordered 30 coaches, 20 smoking cars and 2 dining cars from the Pullman Company.

The Live Poultry Transportation Company, Chicago, is in the market for 250 steel underframe poultry cars.

The Buffalo, Rochester & Pittsburg has ordered 1,000 steel underframes from the Pressed Steel Car Company.

The Norfolk & Southern is said to have increased its inquiry for 500 box cars to 1,000 box cars. This item is not confirmed.

The Maxton, Alma & South Bound, Alma, N. C., is in the market for 2 box cars, 2 flat cars, 1 combination passenger and baggage car, 1 combination mail and baggage car and 1 caboose.

The Canadian Pacific has ordered 4,500 box cars, to be divided as follows: 2,500, Canadian Car & Foundry Company; 1,000, Pressed Steel Car Company; 1,000, American Car & Foundry Company.

The New York Central Lines have ordered 4,000 box cars and 1,000 hopper cars in addition to the equipment mentioned in the *Railway Age Gazette* of November 17.

IRON AND STEEL.

The Chesapeake & Ohio is in the market for 1,000 tons of bridge steel.

The San Antonio & Aransas Pass is in the market for 20,000 tons of rails.

The Atlantic Coast Line has ordered 12,000 tons of rails from the Carnegie Steel Company and 7,000 tons from the Maryland Steel Company.

The Philadelphia & Reading has divided an order for 15,000 tons of rails between the Pennsylvania Steel Company and the Bethlehem Steel Company. Part of these rails will be used on the Central of New Jersey.

General Conditions in Steel.—The steel industry has shown little change during the past two weeks, but a drastic change is expected before the end of the year. Steel men feel that the recent large equipment orders are only the beginning of a long succession of large orders which railways will now be compelled to place. Many manufacturers are bullish and feel that there will be a sharp rise in prices in the near future.

Supply Trade News.

E. L. Pollock, formerly vice-president and general purchasing agent of the Rock Island Lines, has gone to the Safety Car Heating & Lighting Company, New York, with office in Chicago.

The Jeffrey Manufacturing Company, Columbus, Ohio, has opened a branch office in the American Bank building, Seattle, Wash. Percy E. Wright, who has been for a number of years in the sales department, has been made manager of the Seattle office. The Jeffrey company now has 13 branch offices in the United States, as well as nearly 100 agencies in the leading commercial centers of the world.

The Youngstown Sheet & Tube Company, Youngstown, Ohio, has placed an order with the Mesta Machine Company, Pittsburgh, Pa., for one twin, tandem-compound, reversing-type engine with 44-in. and 76-in. x 60-in. stroke, and an order with the William Tod Company, Youngstown, for one manipulator. This equipment will be used in the new open-hearth steel works and finishing mills which this company is building at Youngstown.

The Remy Electric Company, Anderson, Ind., builders of magnetic ignition and lighting devices for all types of gas engines and gasoline motor-driven vehicles, which recently absorbed the American Electric Headlight Company, Indianapolis, and now makes the American electric headlight for steam locomotives, has bought all patents, designs, good will and manufacturing rights of the Peters electric headlight for steam locomotives. The locomotive headlight departments of the R. G. Peters Company, Grand Rapids, Mich., have been moved to Anderson, and the Peters headlight will be made and sold by the Remy company. New buildings will be erected at the Anderson plant for this purpose. The Remy company will employ the principal men heretofore employed by the Peters company in its headlight department. The designs and patents of both the Peters and the American companies will be used in making the headlights of the Remy company.

George W. Hebard, acting vice-president of the Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., died at his home in New York on November 17. Mr. Hebard was born in Barre Centre, N. Y., in 1845 and was educated at the Albion Academy, Albion. He came to New York in 1869 and became identified with the early history of the manufacture of electrical apparatus, becoming president of the United States Electric Lighting Company, Newark, N. J., in 1882. Later, as president of the United Electric Light & Power Company, he was closely affiliated with the introduction of the Westinghouse alternating current system in New York by means of the overhead system. At the time the United States company was taken over by the Westinghouse company, Mr. Hebard was president of the United States company, and in the re-organization was made vice-president of the Westinghouse company; and, in 1888, when this company took over the Sawyer-Man Electric Company, Mr. Hebard was given charge of the newly acquired organization. Mr. Hebard was a director in several corporations, including the Bridgeport Gun Implement Company, Bridgeport, Conn., and the Union Metallic Cartridge Company, Bridgeport. He was a member of the Chamber of Commerce, the Lawyers' Club of Manhattan and the Brooklyn Union League Club.

TRADE PUBLICATIONS.

Okonite Joints.—The Okonite Company, New York, has published a useful little folder, under the title, Economy in Joint Making, with Instructions, which gives information on insulating and protecting joints to avoid short circuits.

Railway Supplies.—The Railway Equipment Company, Portland, Ore., has issued a booklet entitled From Spike to Locomotive, which contains an index of all the railway supplies handled by this company.

San Pedro, Los Angeles & Salt Lake.—The passenger department of this company has issued a 32-page booklet called California Today, which contains views and descriptions of the beauty spots in California along the line of this road. An index of the hotels in the principal cities is also given.

Railway Construction.

New Incorporations, Surveys, Etc.

Akron, Canton & Youngstown.—An officer writes that work is now under way from Britain, Ohio, to Akron, four miles, and from Erie Junction to East Akron, one mile. The P. T. McCourt Company, Akron, has the contract. The line is to be extended east via Mogadore to Youngstown, 42 miles. F. E. Bissell, chief engineer, Canton, Ohio. (June 9, p. 1333.)

Altus, Lubbock & Roswell.—An officer writes that surveys have been made from Lubbock, Tex., to Roswell, N. M., and work is now under way on 80 miles by M. J. Hurley, Silverton, Tex., between Memphis, Tex., and Lubbock. A. B. Thurston, chief engineer, Houston, Tex. (November 10, p. 975B.)

American Traction & Power Co.—Incorporated with $500,000 capital and office at Wilmington, Del., to build electric railways in Indiana. H. C. Brubaker, president; George E. Bruce, secretary, 1233 Oakland avenue, Indianapolis, Ind.

Argentine Central.—An officer writes that an extension is to be built from Waldorf, Colo., to Keystone, 17 miles. E. J. Tuttle, general manager, Denver, Colo.

Arkansas Valley Railway, Light & Power Company.—Incorporated in Colorado with $10,000,000 capital, and office at Pueblo. The plans call for building an interurban line from Canon City, Colo., east to Pueblo, about 40 miles, and eventually through the Arkansas valley to the Colorado-Kansas state line, in all about 200 miles. The incorporators include T. W. Devine and W. F. Raber of the Pueblo & Suburban Traction & Light Company, Pueblo, and F. W. Insull.

Atchison, Topeka & Santa Fe.—A contract for the construction of a branch line from Corona, Cal., to a point in the Temescal canyon, has been let to Oscar Ford, Corona.

Batesville Southwestern.—An officer writes that a contract has been let to J. B. Lewis, Batesville, Miss., to build a logging road from Batesville, southwest, about 17 miles. Track laying is half finished. There will be one steel bridge and several short trestles. R. J. Darnell, lessee, Memphis, Tenn. (August 11, p. 303.)

Bellingham, Mt. Baker & Spokane.—This company will soon commence the construction of a line, it is said, along the middle fork of the Nooksack river, in Whatcom county, Wash. The company has filed a deed at Bellingham, Wash., showing its right of way. The company was organized to build from Bellingham, southeast via Deming to Glacier, thence to the headwaters of the north fork of the Nooksack river. Joseph Morrison, president, and C. E. Wright, chief engineer, Bellingham. (August 11, p. 303.)

Buckhannon & Northern.—An officer of the Monongahela Railroad writes that work is now under way by McMenamin & Sims, Philadelphia, Pa., from Martin, to the Pennsylvania-West Virgina state line, 8.4 miles.

Canadian Northern.—A contract has been given to John Twohy Brothers, Portland, Ore., it is said, for the construction of 100 miles of line from a point about 50 miles north of Kamloops, B. C.

Canadian Pacific.—The Colonsay sub-division is now in operation from Regina to Colonsay, 133.1 miles. J. G. Sullivan, chief engineer, Winnipeg, Man.

Cherryvale, Oklahoma & Texas.—An officer writes that work is now under way by the Continental Construction Company, Caney, Kan., from Caney, Kan., southeast to Vinita, Okla., 62 miles. An extension is projected from Vinita to Siloam Springs, Ark., 60 miles. B. J. Dalton, chief engineer, Lawrence, Kans. (May 12, p. 1133.)

Chicago & Eastern Illinois.—See St. Louis & San Francisco.

Eastern Maine.—An officer writes that this company is starting out two surveying crews between Bangor, Me., and Houlton, which are 108 miles apart, and expect to have the surveys finished by January next. The proposed route from Bangor is via Holden and East Eddington, thence via Amherst Township and Great Pond, then to the head of Nickatous lake, thence via

Lakeville plantation, Dobsis lake, through Carroll and Prentiss to Bancroft, thence via Haynesville, Orient, Amity, Cary plantation and Hodgdon to Houlton. The new line will open up a large undeveloped section of timberlands in Maine. George W. Maxfield, president; F. O. Beal, treasurer; Frederic Danforth, chief engineer, Bangor. H. P. Sargent, Brewer, and W. H. Taylor, New York, are directors. (August 11, p. 304.)

Grafton, Fairmont & Clarksburg (Electric).—An officer writes that it has not yet been decided when contracts will be let to build from Grafton, W. Va., via Pruntytown, Meadland and Boothsville to Fairmont, 32 miles, with a branch from Boothsville to Bridgeport, 7 miles. The work will be light and calls for the excavation of 15,000 cu. yds. a mile. Maximum grades will be 4 per cent. and maximum curvature 20 degrees. There will be three long, high bridges of deck truss design. One is to be 400 ft. long, another 600 ft. and the third 1,250 ft. In addition there will be four bridges, each 60 ft. long; also three trestles, each 300 ft. long. Charles F. Sutherland, president, Morgantown, W. Va., and H. M. Fry, chief engineer, Fairmont.

Great Southern.—An officer writes that the plans call for building an extension from Dufur, Ore., to Juniper Flats, 40 miles, and that grading has been finished from Dufur southwest to Friend, 11 miles. The work is being carried out by the company's men. John Heimrich, president, Portland. (May 5, p. 1084.)

Greenville, Spartanburg & Anderson.—An officer writes that work is now under way by W. J. Oliver, Knoxville, Tenn., on the section from Greenwood, S. C., north to Greenville, 61 miles. E. Thomason, general manager, Charlotte, N. C. (June 23, p. 674.)

Hudson & Manhattan.—See an item under General News regarding the opening of the New York-Newark, N. J., line.

Idaho Northern Railway.—An officer writes that contracts have been let to the Utah Construction Company, Ogden, Utah, and grading work is now under way on 56 miles of the extension from Emmett, Idaho, north along the Payette river. Track has been laid on five miles. Twenty miles of the work is through a rocky canyon. Maximum grades will be 2½ per cent.; maximum curvature, 1 degree. There will be four tunnels, each about 400 ft. long. The line is to be continued along the Payette river to a point about 103 miles from Emmett. The company expects to develop a traffic in timber, grain and livestock. J. H. Smith, engineer, Nampa, Idaho. (August 11, p. 304.)

Jefferson & Northwestern.—An officer writes that this company has projected an extension of 12 miles from the present end of track at Mile 31 to Naples, Tex. Address H. B. Montgomery, Jefferson, Tex.

Louisville & Nashville.—See St. Louis & San Francisco.

Madison County.—An officer writes that this company is planning to build an extension from Allanstand, N. C., to the North Carolina-Tennessee state line, about five miles. W. N. Garrett, vice-president, Stackhouse, N. C. (March 3, p. 433.)

Missouri, Oklahoma & Gulf.—An officer writes that work is now under way by J. W. Hoffman & Co., Dewar, Okla., from Coalton to Deep Fork, four miles, and surveys have been made for an extension from Henryetta, west to Oklahoma City, about 102 miles. J. J. Harrison, chief engineer, Muskogee, Okla. (October 27, p. 860.)

[illegible] Road.—Announcement has been made by the federal government that a railway is to be built, it is said from Edison, Conway, Miss., to Zilwaukee, about 25 miles. It is understood that the project will be financed with private capital. The names of the promoters are not given.

Mississippi Roads.—An officer of W. P. Dickinson & Co., Chicago, writes that the company is interested in financing a railway, or some construction work for Angus Jetson, Memphis, Tenn., and Pensacola, Fla., via Meridian, Miss., about 300 miles. It appears as yet to be built from that line at a point near Chester, Miss., northwest to Helena, Ark., about 125 miles. The line has been surveyed, the route located and most of the right-of-way secured, and much of the financing has been arranged for. The company has already located its terminals. Maximum grades will be 1.5 per cent.; 85-lb. rail will be used.

Monongahela Railroad.—See Buckhannon & Northern.

Nebraska, Kansas & Southern.—An officer writes that this company has located an extension from the present end of track to Stockton, Kans., about 150 miles. The company was organized to build from Garden City, northeast to Stockton, about 165 miles, and track has been laid from Garden City east, about 15 miles. Baxter L. Brown, chief engineer, 610 Laclede building, St. Louis, Mo.

New York Central & Hudson River.—Permission has been granted this company to abolish two freight yards and stations at Spuyten Duyvil, N. Y., upon the opening of a new yard with a greater capacity at Kingsbridge. An officer writes that plans for a new yard at Kingsbridge have not yet been fully developed. Most of this work is to be carried out by the company's forces. G. W. Kittredge, chief engineer, New York.

New York Subways.—The New York Public Service Commission, First district, has rejected all bids on the sections of the Lexington avenue subway, from the Battery north to a point between Houston and Bleecker streets, and the section which runs under the Harlem river.

North Carolina Interurban.—An officer writes that this company expects to let contracts before January 1 to build from Gastonia, N. C., northwest to Cherryville, continuing in a westerly direction via Shelby, Cliffside, Rutherfordton, Chimneyrock, Bat Cave and Baltimore to Asheville, about 90 miles. East of Rutherfordton the work will be easy, and between that place and Chimneyrock there will be some rock work. West of Chimneyrock there will be heavy rock work on 15 miles. There will be three steel bridges, each 100 ft. long, and four trestles. The plans include the construction of three hydro-electric power houses, dams and plant. The company expects to develop a traffic in cotton, cottonseed, cotton mill products, timber, farm products, coal and general merchandise. W. A. Harrill, president, Rutherfordton.

Northumberland County Traction.—An officer writes that this company has given a mortgage to secure funds for building an electric line in Northumberland county, Pa. The company has been granted franchises to build from Sunbury, northeast to Wilkesbarre, about 60 miles; also from Sunbury north to Williamsport, 35 miles. Track has been laid from Sunbury north to Northumberland, about three miles. D. A. Howe, president; G. Parkman, secretary; W. H. Bloom, treasurer, and R. V. West, superintendent. The offices are at Sunbury.

Orangeburg Railway.—An officer writes that work is now under way from Orangeburg, S. C., northwest to North 17 miles. William C. Wolfe, president, Orangeburg.

Oregon Roads.—The Randolph Lumber Company is building a line from Parkersburg, Ore., along Bear creek, for about 7 miles. It is understood that the line will eventually be extended to other points in that district.

Pennsylvania Railroad.—See an item under General News regarding the opening of the New York-Newark, N. J., line; also another item regarding the change of location and elimination of grade crossings at Bristol, Pa.

Pittsburgh & Lake Erie.—See Western Maryland.

Raleigh & Charlotte.—Surveys have been made for a line to be built in North Carolina. J. M. Barr, former president of the Seaboard Air Line, and E. C. Duncan, of Raleigh, N. C., are back of the project.

Randolph & Cumberland.—An officer writes that this company has projected an extension from McConnell, N. C., to Elkin, 100 miles. T. L. Riddle, secretary, Carthage, N. C.

Rawhide Western Railway.—An officer writes that all of the grading work has been finished from Walker lake, Nev., northeast to Rawhide, 31 miles. Track has been laid on 350 ft. for a connection at the junction with the Southern Pacific. Charles Wesley Reed, Clause Spreckles building, San Francisco, Cal., is back of the project. R. L. Tilden, chief engineer, Winnemucca, Nev.

Salisaw, McAlester & Southern.—An officer writes that work is now under way between Coalgate, Okla., and McAlester, 30 miles. The plans call for a line from Salisaw southwest to

McAlester, thence to Honey Grove, Tex., about 190 miles with a number of branch lines. M. J. Smith, chief engineer, McAlester, Okla.

Sand Springs Interurban.—An officer writes that this company has track laid on the line from Tulsa, Okla., west to Sand Springs, 8 miles, and has projected an extension from Tulsa, northeast to Collinsville, about 20 miles. W. H. Hendron, chief engineer, Tulsa. (June 30, p. 1714.)

San Francisco, Napa & Calistoga.—Incorporated in California, with $2,000,000 capital and headquarters at San Francisco. The incorporators include: T. V. Maxwell, G. C. Earl, N. H. Spaulding and C. C. Sullivan.

St. Joseph & Savannah.—An officer writes that this company has projected a line from Savannah, Mo. to Fillmore, 11 miles. C. W. Campbell, chief engineer, St. Joseph, Mo.

St. Louis, Brownsville & Mexico.—See St. Louis & San Francisco.

St. Louis & San Francisco.—An extension of the branch of the St. Louis, Brownsville & Mexico, which now runs from Port O'Connor, Tex., west to Bloomington, 39 miles, is projected north to Victoria, about 15 miles. Connection is to be made at Victoria with the Southern Pacific.

This company and the Louisville & Nashville, will jointly build 120 miles of new line at an average cost of $35,000 a mile to complete connections over new joint routes, including a cut-off from Beaumont, Miss., to the Louisville & Nashville, just east of New Orleans, La. The Chicago & Eastern Illinois is to build an extension to Paducah, Ky., when the new double-track bridge over the Ohio river at that place is completed. This arrangement will add about 500 miles to the Frisco system. See an item under Traffic News regarding these new lines. F. G. Jonah, chief engineer construction, St. Louis, Mo.

Southern Railway & Navigation Co.—An officer writes that this company is now at work on on extension from Jeffris, La., to Vidalia, 8 miles. D. K. Jeffris, president and general manager, Pullman Bldg., Chicago, Ill.

Spokane & British Columbia.—An officer writes that surveys have been made for an extension from Republic, Wash., southeast to Spokane, 140 miles. W. T. Beck, president, Republic.

Tampa Northern.—An officer writes that surveys are now being made for an extension from Brooksville, Fla., north to Dunnellon, 40 miles. M. F. Amorous, president and general manager, Tampa, Fla.

Tidewater & Southern.—An officer writes that nearly all of the grading work has been done and track has been laid on two miles between Stockton, Cal., and Turlock. There will be two steel bridges of 120 ft. each and two bridges of 150 ft. each; also a 4,000-ft. trestle. The company expects to find a traffic in general merchandise, dairy products and fruit. Carl Brueck, president, and J. H. Wallace, chief engineer, Stockton. (November 3, p. 932.)

Western Maryland.—It is expected that work will be finished in December on the new line from Cumberland, Md., north to Connellsville, Pa., 87 miles, where connection is to be made with the Pittsburgh & Lake Erie. H. R. Pratt, chief engineer, Baltimore, Md.

Woodville Railroad.—An officer writes that an extension is projected from Wakulla, Fla., south to Crawfordsville, 10 miles. Thomas M. Hall, president and general manager, Woodville, Fla.

RAILWAY STRUCTURES.

Craigdell, Pa.—The Pennsylvania Railroad has given a contract to T. N. Sims & Co., Philadelphia, Pa., for constructing a small concrete arch, to replace a girder bridge over the hollow near Craigdell on the Conemaugh division. The cost of the work will be between $10,000 and $15,000.

East St. Louis, Ill.—The Southern is preparing plans for an 18-stall roundhouse, a machine shop and a blacksmith shop to cost approximately $75,000.

El Paso, Tex.—According to press reports the Texas & Pacific will put up a concrete and steel freight house in El Paso, to cost $75,000.

Hazelton, B. C.—The Grand Trunk Pacific, it is said, will build a station at Hazelton.

Kamloops, B. C.—Waddell & Harrington, engineers, Kansas City, Mo., will design and superintend the construction of ten new steel bridges for the Canadian Northern. The total cost of the structures will be about $1,000,000. Seven bridges will span the Thompson river, one the North Thompson river, and two will be over the Fraser river, between Cisco to Kamloops, B. C.

Kirkland, Wash.—The Northern Pacific will build a new station at Kirkland.

McAlester, Okla.—The Missouri, Kansas & Texas is remodeling and enlarging its passenger station and is building offices for the American and United States express companies.

New Haven, Conn.—The New York, New Haven & Hartford will soon start work on a $50,000 machine shop near the roundhouse on the Quinpiac meadows, above Cedar Hill station, which is nearing completion. For the Connecticut Company the New Haven has started the construction of an addition to its Grand avenue power house, 32 ft. x 70 ft. It is to be of brick and reinforced concrete. This is to be used as a boiler and engine room and will cost about $25,000. (July 7, p. 65.)

Portland, Ore.—The Southern Pacific has taken out a permit to build a new car repair shop at the foot of East 22d street, at a cost of $3,900, and plans are being made for a new passenger station on Water street to cost $5,000.

Sacramento, Cal.—The Southern Pacific is building a double-deck bridge to carry double tracks, with a highway on the upper deck, over the Sacramento river, near Sacramento. The swing span is to be 400 ft. long and will weigh 3,150 tons. The American Bridge Co. has the contract for the steel work. The entire bridge will weigh 5,000 tons.

Seattle, Wash.—The Northern Pacific has given a contract to the Weymouth Construction Co., Seattle, for improvements and additions to its Pier No. 1, Seattle, to cost $125,000. (June 23, p. 1675.)

Tacoma, Wash.—The Oregon-Washington Railroad & Navigation Company has been granted permission to build an overhead crossing over Indian Stuck valley, near Tacoma.

B. D. Voskresensky, the engineer who accompanied the Russian minister of ways of communication in his journey of inspection along the Amur Railway, has made a report on his experiences in connection with this railway. It is divided into the Western Amur, the Central Amur and the Eastern Amur. The route lies along a plateau, from 2,800 ft. to 3,500 ft. above sea level. At a height of 2,500 ft. permanently rozen ground has to be dealt with. Ignorance of the properties of permanently frozen ground was the cause of many difficulties in the construction. A striking example is shown in connection with the Tchitin workshops which showed fissures and gave the impression of having suffered from earthquake, notwithstanding the fact that the foundation of the walls had been laid very deep, in some places 14 ft. Experience has shown that on the contrary such foundations should be laid near the surface, in which case the building holds together well. The country through which the line is being laid is exceedingly picturesque, suggesting Switzerland. The work was accompanied by great difficulties. The workmen lived both summer and winter in tents, and it was only their enthusiasm that enabled them to overcome their privations. The necessaries of life, including tea and sugar, were frequently wanting, and the cost of living was exceedingly high for everybody. The ground along the line is very rocky and was very expensive to remove. Water was difficult to obtain, for the rivers became completely frozen on the Trans-Baikal line. In such circumstances wells were dug and water was conveyed in heated channels, but on the Amur Railway arrangements are much more simple and freezing is obviated by means of circulating water in pipes. At present the most difficult part of the road has been cut through and the Western Amur Railway should be finished in 1912. Along the whole region the population is increasing and villages are forming up notwithstanding a number of unfavorable circumstances.

Railway Financial News.

Ashboro & Aberdeen.—A press despatch from Greensboro, N. C., says that the control of the Ashboro & Aberdeen has been sold to the Seaboard Air Line. The A. & A. runs from Aberdeen, N. C., to Mount Gilead.

Atlantic Coast Line.—The directors have declared a semi-annual dividend of 3½ per cent. on the common stock, thus placing the stock on a 7 per cent. annual basis as compared with a 6 per cent. annual rate paid heretofore. The Atlantic Coast Line is controlled by the Louisville & Nashville.

Atlantic Northern & Southern.—It is understood that the court has approved the purchase of this property by Colonel George Adams. The Atlantic Northern & Southern runs from Atlantic, Iowa, to Kimballton, and from Atlantic to Villiscalla, a total of 54 miles. (October 6, p. 692.)

Boston & Maine.—Negotiations for a new lease by the B. & M. of the Suncook Valley Railroad have failed to arrive at any satisfactory understanding. President Mellen, writing to a representative of the stockholders of the Suncook Valley, is quoted as saying in part: "One of the charges that I have found most hard to meet is that many of the present difficulties in which the Boston & Maine finds itself at the present time are the results of improvised leases. The responsibility for all existing leases lies with the former administrations, and it is the determination of those at present in charge that nothing of this nature may be laid at their door. The major portion of the mileage of the leased lines in New Hampshire is at the present time far from self-supporting. . . . It may become a necessity to reduce the rentals paid if not by the negotiations with the owners in last resort through the medium of the courts and a receivership. Nothing but the support given to the Boston & Maine in the present crisis in its affairs by the New York, New Haven & Hartford has thus far saved it from such a recourse. The Boston & Maine offered to exchange Concord & Montreal class 4 stock for Suncook Valley stock on the basis for one share of C. & M. for three shares of Suncook Valley. The Concord & Montreal pays 7 per cent. Under the lease that has now expired, the Suncook Valley stockholders were receiving 6 per cent. on their stock, which compares with 2⅓ cents which they would receive if they accepted the offer of the Boston & Maine.

Chesapeake & Ohio.—See Kanawha & Michigan; also Hocking Valley.

Cincinnati, New Orleans & Texas Pacific.—The directors have declared an extra dividend of 2½ per cent. on the common stock, and in addition a semi-annual dividend of 3 per cent. The annual rate was previously 5 per cent.

Concord & Montreal.—See Boston & Maine.

Delaware, Lackawanna & Western.—The stockholders of the Oswego & Syracuse, a subsidiary of the Delaware, Lackawanna & Western, are to vote December 6 on the question of making a mortgage to secure an issue of bonds which are to reimburse the D. L. & W. for advances to pay for matur-

Hocking Valley.—The directors have declared a semi-annual dividend of 1 per cent. This places the stock on a 6 per cent. basis as compared with an annual rate of 4 per cent. paid since 1907. The Hocking Valley is controlled and the majority of its stock held by the Chesapeake & Ohio.

Hudson & Manhattan.—The company, which operates the tubes under the Hudson river, has raised the fare from Jer-

company has not earned interest on its bonds, taxes and

standing the particularly fair attitude of the New Jersey au-

1911, taxes aggregated $114,589. For the present fiscal year, on the basis of assessments already made they will be increased to approximately $478,282. If the company was exempt from taxation (like the New York subway) it could continue to carry passengers for a uniform five-cent fare."

Kanawha & Michigan.—The directors have declared a 2½ per cent. dividend, payable December 30. The only previous dividend was the 4 per cent. declared last June. The Kanawha & Michigan is controlled by the Chesapeake & Ohio and the Lake Shore & Michigan Southern jointly.

Louisville & Nashville.—See Atlantic Coast Line.

New York Central & Hudson River.—The directors have authorized an issue of $15,000,000 joint N. Y. C. lines equipment trust 4½ per cent. certificates.

Norfolk Southern.—The supreme court of Virginia has affirmed the dismissal by the circuit court of the suit brought by the Vandyke-Zell syndicate to invalidate the sale of the old Norfolk & Southern to the present Norfolk Southern Company. This apparently is a final settlement of the point that has been in litigation ever since the foreclosure sale.

Oregon-Washington Railroad & Navigation Co.—The *Wall Street Journal* says that it is understood that Kuhn, Loeb & Co., New York, have bought from the Union Pacific and resold $6,500,000 50-year 4 per cent. refunding bonds of the Oregon-Washington Railroad & Navigation Co.

Oswego & Syracuse.—See Delaware, Lackawanna & Western.

Pascagoula Northern.—A press despatch from Mobile, Ala., says that the St. Louis & San Francisco has bought the Pascagoula Northern. This road runs from Evanston, Miss., to Pascagoula, 42 miles.

St. Louis & San Francisco.—J. W. Dixon, counsel, and T. D. Heed, assistant secretary, were elected temporary directors, succeeding Frank Trumbull and C. R. Gray, resigned.

Savannah, Augusta & Northern.—See Savannah & Statesboro.

Savannah & Statesboro.—This company is to lease and take over the operation of the Savannah, Augusta & Northern. The Savannah & Statesboro runs from Savannah, Ga., to Statesboro, 33 miles, and the Savannah, Augusta & Northern runs from Statesboro, Ga., to Steven's crossing, 39 miles. (Feb. 17, p. 335.)

Seaboard Air Line.—Arrangements have been made to sell the $6,785,000 Seaboard Air Line Railway adjustment bonds held by the Seaboard Company. With the proceeds of the sale of adjustment bonds and other cash assets which the Seaboard Company holds, it could, if it desired, retire the $6,360,600 first preferred stock at par. The Seaboard Company is the holding company for the Seaboard Air Line Railway. It was organized in 1905 and owns 83 per cent. of the stock of the railway company, the adjustment bonds heretofore referred to, and $900,000 5 per cent. notes of the railway. The Seaboard Company has no debt and has outstanding, beside the preferred stock referred to, $28,543,300 common stock and $15,993,600 second preferred stock.

This company and the Seaboard & Roanoke Railroad have filed in Virginia a mortage to secure $2,500,000 first mortgage 5 per cent. bonds.

Suncook Valley Railroad.—See Boston & Maine.

Vandalia.—This company has passed the quarterly dividend of 1 per cent. usually paid in November, and President Wood has issued a circular in which he explains that last year the dividend had not been earned in that year and was paid in part from surplus, and that notwithstanding the reduction of the rate from 5 per cent. to 4 per cent., which reduction was made in May, the dividend could not be continued except by making further payments from surplus. Pay rolls have increased over $400,000 and operating expenses have increased $135,000 as

Western Maryland.—The company has applied to the New York Stock Exchange to list $4,115,000 additional first mortgage bonds.

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F. A. SIMMONS, *President*

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GENERAL NEWS SECTION 1139

THIS is the day of specifics. We have several dozen varieties of specifics in our national pharmacy, and we are firmly convinced that if we can only pick out the correct number and apply it to our malady a cure is certain. President Taft has suddenly discovered that the trouble with our cost of living is to be found in the series of distributing agencies that lie concealed along the pathway of the product on its way from producer to consumer, each of which levies its tribute before permitting further progress. The president has not only discovered the disease, but has promptly picked out the specific and proposes at once to apply it. His specific is the parcels post. Create a new agency for the transportation of parcels directly between producer and consumer, and the thing is done. But has the president considered that we have agencies now in the express companies whose service, except for long distances and the very lightest packages, is cheaper than that of the parcels post would be under any rate proposed in any bill thus far submitted? Has he considered that the mail order houses at present encourage the assembling of orders for shipment by freight? Has he taken into account the extent to which people prefer to "shop," to inspect and handle the goods before purchasing, and that this preference applies to everything they buy except those standardized articles which are ordinarily shipped in large quantities and in heavy packages that are beyond the reach of the parcels post? Are we going into the political patent medicine business? And if so, are we not liable to have about the same degree of effecting cure as the real patent medicine venders have, and no more?

BULLETIN No. 21 of the Bureau of Railway Economics, which was printed in the *Railway Age Gazette* last week, demonstrates what will be surprising only to those not familiar with the situation; namely, that the total cost of transportation on the Erie canal is greater than on the railways, and that the expenditure in constructing and improving the Erie canal up to the year 1905 amounted to far more per mile than the cost per mile of providing the roadbed, buildings, locomotives and cars of most of the railways of this country. The bulletin is a temperate and careful exposition of the comparative costs of transportation on the Erie canal and by rail. Discussion of collateral phases of such a comparison would have brought out some points discreditable to the state of New York. Notwithstanding that the canal was constructed and is maintained at the expense of the state, tolls for its use not having been collected for its use since 1882, the state does not require uniformity in or publicity of the rates charged by the boatmen for the traffic which they carry. On the contrary, they are allowed to charge what they will and to vary their charges between one shipper and another. The state of New York, therefore, is guilty of the immorality of permitting on a means of transportation which it owns the very practices which have been widely condemned on the part of the railways, and for the prevention of which laws have been passed and commissions established. Although exact and detailed reports of tonnage are required from the railways, no reports of traffic on the canal are required, the estimates of tonnage given in the bulletin having been arrived at through laborious research. The boatmen on the canal derive an uncertain living during the period when it is open, which does not average as much as two-thirds of the year. Railway employees, on the other hand, are a very well paid class of men who for the most part have regular employment throughout the year. This study is of the Erie canal as it stands today. It remains to be seen whether the new barge canal will justify the expenditure being made on it. The $100,000,000 already voted for its construction and the additional $19,000,000 needed for terminals recall the remark of a former president of the New York Central Lines to the effect that if the state of New York would place in his hands the appropriation necessary to reconstruct the Erie canal he would agree to build a new four track railway for its entire length with part of the funds, and that the remainder placed at interest would yield enough to pay for its operation.

A NEW ORLEANS despatch tells of the indictment on 10 counts by the federal grand jury of a shipper charged with false valuations by which he obtained a lower freight rate. The incident directs attention to that under-billing of consignments from which railways are the more likely to suffer because detection is not only difficult but unpleasant. Detection involves, in the first place, the clues upon which suspicion is based and, next, the obtaining of evidence in such ways, for example, as the opening of the boxes of the consignor—not a pleasant task, especially if he happens to be an important shipper. Then there is that other fraud, underweighing by the consignor. But their detection is easier and the responsibility really rests upon the railway company itself if its agents—as in some cases—do not insist upon re-weighing but accept the consignor's figures. In both these cases—under-classification and under-weight—involving deliberate fraud, the provisions of the Interstate Commerce law are worth attention. The statute provides that any persons or officer or agent of a corporation who directly or indirectly "by false billing, false classification, false weighing, false representation of the contents of the package or the substance of the property, false report of weight, false statement or any other device or means," obtains or attempts to obtain transportation of such property at less than the regular rates, shall be guilty of fraud and incur a penalty not exceeding $5,000 fine or two years' imprisonment, or both, the crime being knowingly committed. The same penalty applies to under-valuation, and, it may be noted, is exactly the penalty incurred by a common carrier or its officers or agent for illegal rebates. The Interstate Commerce law treats carrier and consignor alike, and the former—whatever may be its timidity in calling upon the commission's detective agents—cannot plead that the statute does not give it a sufficient weapon. But with efficiency and insight at the freight house, and the shipper's realization of them, it does not seem as though the weapon need be often used.

BECAUSE the Commerce Court has set aside some important orders of the Interstate Commerce Commission a movement has been started, it is reported, by certain members of Congress, to abolish the court; in other words, in accordance with the most up-to-date political notions, it is proposed to "recall" the court. The court was established mainly to test the soundness of the reports and orders of the commission by applying to them the law as the court understood it. The criticism of it implies that those making it believe that they and the Interstate Commerce Commission know what the law means better than the court does, and that the commission is more apt than the court correctly to apply it. Undoubtedly, if this assumption is correct, the court ought to be abolished. But those familiar with the past history of the commission will recall that its experience with the Commerce Court is precisely similar to its previous experi- [illegible] reversed it before the Commerce Court was established. The [illegible] Commerce Commission and some experienced former circuit judges. Furthermore, the commission, as an administrative body, exercises executive authority, and, like practically all such bodies, has throughout its career shown a tendency to desire to ex- [illegible] that it has all the power it wishes to exercise. In view of these facts most observers are apt to think that the court's interpreta- [illegible] commission's. As to whether the existence of the court shall be [illegible] themselves little concern. There is an advantage to both shippers and railways in having all appeals from the commission in [illegible] restored, would overrule the commission just as often in proportion as the Commerce Court is doing. One argument made for the creation of the Commerce Court was that it would be more expert in dealing with matters of this sort; but most of the life was taken out of that argument by the limitation of the terms of the judges on the Commerce Court to five years. They are really circuit judges appointed for life, and temporarily assigned to the Commerce Court; and if the court were abolished they would be transferred to the circuit bench, where they would go on deciding rate cases much as they are doing now. There never was a more bizarre and probably illegal order than that issued by the commission in the transcontinental freight rate cases; and the fact that it was the action of the Commerce Court in restraining the enforcement of this order that started the agitation against the court shows that the agitation is an outgrowth of the new bureaucratic theory that administrative officials should be allowed to do their own interpreting of the laws under which they act and which they enforce, and that when the courts interfere with them they engage in more troublesome meddling. That theory can never prevail in the United States under our present form of government, no matter to what courts appeals lie from orders of administrative bodies.

DENVER'S RATE COMPLAINT.

THE Denver Chamber of Commerce, moved thereto by a furious agitation conducted by one of the local newspapers, has announced its intention to complain to the Interstate Commerce Commission because the wicked railways charge higher rates between Galveston and Denver than they do between New York and Chicago and between Newport News and St. Louis—the distances between these various points being substantially the same. The fact that business men, who in most things are level-headed, can be pushed by the yellow, pink and green school of journalism into making such a complaint shows how foolishly and unjustly people will act sometimes when not guided by the intelligence and common sense that enable them to succeed in their own businesses.

While the distances between New York and Chicago, and between Newport News and St. Louis, are about the same as that between Galveston and Denver, there is no similarity whatever between the conditions under which traffic is handled between these points. The railways operating between New York and Chicago have from two to six times as much traffic per mile, and the railways operating between Newport News and St. Louis likewise have several times as much traffic per mile, as have the roads from Galveston to Denver. Therefore, if the same rates were applied between Galveston and Denver as between the other points named, the lines from Galveston to Denver would be thrown into irretrievable insolvency. The average rate per ton per mile on the Colorado & Southern lines, for example, is 9.6 mills. If the class rates between Galveston and Denver ought to be the same as the class rates between Newport News and St. Louis, then, by the same token, all other rates should be. But if the Colorado & Southern lines received only an average rate of 5.77 mills per ton per mile, which is the average received by the Baltimore & Ohio, forming part of the short line from Newport News to St. Louis, the Colorado & Southern Lines' net operating income would be reduced to $608,830. This would be $2,056,178 less than enough to pay the annual interest on their funded debt.

The theory on which the Denver critics of the railways are proceeding is that rates per ton per mile between all points in the United States should be the same. From this assumption it [illegible] that the rates between New York and [illegible] Newport News and St. Louis should be [illegible] between Galveston and Denver as it does that the rates between Galveston and Denver should be [illegible] between New York and Chicago and between Newport News and St. Louis. Such a silly way of reasoning might, therefore, lead to the conclusion that [illegible] the New York Central, the Lake Shore, the Balti-

more & Ohio and the Chesapeake & Ohio are getting their transportation very much too cheaply. These shippers would say, however, that if the rates they pay were raised to the same basis as those between Galveston and Denver the roads between New York and Chicago, and between Newport News and St. Louis, would make too much money. But if the effect of an advance in rates on the earnings of railways is to be considered in determining whether it would be reasonable, why should not the effect on earnings of a reduction be given weight in considering whether it would be reasonable?

The complainants at Denver take the course so often followed by those who criticize railway rates either without fairness or without knowledge, and select for comparison with their own rates, not rates in other localities similarly situated, but the lowest rates that they can find anywhere. It is well known that between Chicago and New York the class rates are the lowest and the traffic the heaviest in the United States. Let us compare Denver's rates with some fixed by the Interstate Commerce Commission where conditions are more similar. The distance from Galveston to Denver is approximately 1,000 miles and the first class rate is $1.80. The distance from Chicago to Denver is approximately 1,000 miles, and the Interstate Commerce Commission, in the case of Kindel versus New York, New Haven & Hartford, fixed $1.80 as a reasonable first class rate from Chicago to Denver. The distance from Omaha to Ogden is 1,000 miles and the commission in the Salt Lake rate case held that a reasonable first class rate for this haul would be $1.90. The traffic affected by both of these decisions is denser than that between Galveston and Denver. Therefore, either the existing rates from Galveston to Denver are reasonable, or the Interstate Commerce Commission's decision in the Kindel and Salt Lake cases were wrong. Unless the commission shall deliberately choose to stultify itself in respect to its recent decisions in these cases, the complainants in this new Denver case cannot reasonably hope to be successful in prosecuting it. But it will be good advertising for the newspaper that started the agitation!

ABOLISH THE PRESENT GIVING.

IT is a widespread custom for the representatives of concerns that sell goods to give presents at this season to the representatives of concerns that buy them. Perhaps no class of persons spends more money this way than is spent by those connected with railway supply concerns for gifts for railway officers whose positions give them influence in determining what, and where, supplies and equipment shall be bought. The entire custom referred to is essentially bad. It is no better as it grows out of and affects the relations of those connected with railway supply houses and railways than as it obtains elsewhere. It ought, so far as it is associated with the supply and the railway business, to be destroyed; and there will never be a better time to begin than in the present holiday season.

The practice has prevailed so long and generally that many who have year after year been the donors or recipients may regard condemnation of it as hypercritical, or even hypocritical. If those who think thus will consider carefully its purposes and effects most of them will see wherein the vice of it lies. Is the giving, by an officer or salesman of a supply concern, of an expensive present to a railway officer, or one of his family, solely an act of personal courtesy and generosity which is intended to express merely the friendship of the giver for the recipient? The answer is, that the price of the gift almost invariably appears in the expense account that the giver turns in to his company. This would not be so if it were purely a personal matter. The reason why the supply concern ultimately pays for the present is that it expects thereby to gain something. Again, almost invariably when the railway officer leaves railway service he ceases also to be the recipient of gifts from supply men. These facts can mean only one thing, viz., that the supply house which foots the bill expects to be enabled thereby to sell more goods to the railway whose officer receives the gift, or to sell them at a higher price, or to sell poorer goods than it otherwise could.

Now, one of two results does ensue. Either the expenditure for the presents has its desired and intended effect, or it does not have. If it does not have it, the supply concern's money is wasted. If it does have it, the railway loses either because it does not get the kind of goods that ought to be bought for it, or because it does not get them at as low a price as it ought to. In other words, the money spent has finally to come out of somebody's pocket. That somebody is either the supply house or the railway. Generally, in the long run, it comes out of the pocket either of some individual railway or of the railways as a whole. If the most favorable view could be taken—viz., that purchases for railways were never influenced by this giving of presents—still, it would remain true that in the long run the cost of practically all of the expenditures for them would be added to railway operating expenses. As a matter of fact, no one who is familiar with the facts can entertain this most favorable and charitable view. The giving of presents by the supply houses does in many cases influence purchases, and in a bad way.

The worst feature of the matter is that such gift-giving is sometimes the precursor or cloak of theft or graft. There have been known cases where the prices of expensive presents to railway men have been itemized in expense accounts presented to supply concerns by their men, when the railway men never received or heard of them. Again, in some cases where grafting in railways has been uncovered, investigation has disclosed that it began by supply houses giving railway officers comparatively small presents in the form, perhaps, of stock in their concerns. The sensation of thus getting "easy money" was the beginning of the downfall of the railway men concerned. They did not intend at first to benefit themselves at the expense of their companies; but after they had taken the first step in that direction they were unable to retrace it or to resist the temptation to go farther. Of course, when persons in subordinate railway positions know their superiors are accepting gifts from supply houses the subordinates are apt to yield to, or even to invite, similar temptation. And the superior officer in this case cannot exercise the sort of supervision over his subordinates that his duty and the welfare of the road require.

Doubtless, most supply men and railway men would like to see abolished this and all other customs which tend, or may be suspected of tending, to interfere with their selling and buying goods absolutely on their merits. The situation is similar to that which existed in the days of railway rebating. Because some railways persisted in giving rebates and some shippers in accepting them, all felt that they must give and accept them, although all saw that rebating was a vicious abuse.

A beginning ought to be made right now to abolish the giving of gifts by supply concerns to railway officers. It would be a wise move if the president of each supply concern would issue an order forbidding those connected with it from giving presents, this holiday season or in future, to those directly or indirectly concerned with railway purchases; and if the president of every railway would forbid all directly or indirectly concerned with purchases from receiving presents from supply houses or those connected with them. If the supply concerns will not stop offering presents, railway men ought to reject them. The custom in question is not only intrinsically bad, but there is a danger connected with it of which most people do not think. It may invite malicious and exaggerated newspaper or magazine attacks at any time which would do everybody connected with supply houses and railways harm. One of the vital mistakes that the railways repeatedly have made has been to do nothing to correct abuses which everybody recognizes as such until attacks and movements for their abolition originated in hostile sources. Warned by the the experience of the past, such mistakes ought to be avoided in future.

PROPOSED POSTAL CAR SPECIFICATIONS.

THE *Railway Age Gazette* of November 24 published the proposed specification for the construction of all-steel and steel underframe full postal cars, which has been sent out to the railways for examination and suggestions, and will be discussed by a committee of railway men and a committee from the post office department at Washington, D. C., on December 5. The specification is intended as a ground work on which to build up the final standard plans. In its present form it may be regarded as recommended practice, representing as it does the best judgment of the railway, mechanical and mail traffic officers, and the individual builders of steel passenger equipment. It may be said, also, that it represents the various types of steel underframes which the car builders regard as their particular designs. These different types, as constructed heretofore, are not equally efficient as to strength and stiffness; nor are they equally economical in cost of construction and repairs; and a strict compliance with the proposed specification, especially with its requirement for stiffness, would call for considerable modification in many of the earlier designs for steel cars.

Something has been learned from the behavior of different types of underframes in wrecks, but even here true and impartial interpretation of results is difficult to obtain. One important lesson in steel car construction has been learned in this connection, and that concerns the relative importance of the section of the center sills to the complete system of longitudinal members in the underframe. A considerable change has taken place in the views of engineers and car builders as to this matter. The committee of the M. C. B. Association on steel passenger cars which reported in 1908 had been instructed to recommend, among other things, a standard sectional area for center sills and cover plates. It found that the center sill area for one type of car was 10.66 sq. in.; for another 18.52 sq. in., and for a third 50 sq. in.; and that on account of the differences in design no standard section for center sills could be recommended. It was evidently the general opinion at that time that the center sills should have a sufficient area to resist the entire buffing shock, but the improvements in end sill construction have been so pronounced that the postal car committee is able confidently to recommend a specification for buffing resistance which specifically includes all continuous longitudinal underframe members below the floor level. It is, however, distinctly provided that such members must be so tied together as to act in unison. This requirement insures a more substantial structure than is found in the ordinary steel underframe. The single paragraph of seven lines relating to buffing is probably the most important part of the whole specification, as it helps to explain why the different types of underframes are accepted, and makes clear that hereafter the center sills and cover plates are not to be regarded as the only members resisting end shock.

While the requirement that the maximum end shock due to buffing shall be assumed as a static load of 400,000 lbs. applied horizontally at the resultant line of the forces acting at the center lines of the buffing mechanism and draft gear, has been accepted by most railways and car companies, it has not become an established standard, and the adoption of this figure by the railway companies as a measure of the strength and stiffness of postal cars would have a good effect on passenger car design in general. While 400,000 lbs. compressive static load may be regarded as a minimum figure, it is based on the specified stresses, which are quite low. A figure as high as 500,000 lbs. has been recommended by good authority and used by some builders who assume the elastic limit of the steel as 30,000 lb.

The buffing figure recommended in the preliminary specification should insure ample strength and, if adopted, will help greatly to prevent the constant increase in weight of passenger equipment which is found in current practice. While the postal car specification adopts standards for the interior arrangement, the fundamental things, the proposed specification for the construction of the car body is based on general requirements, which are so intelligent and practical, and which mark such an advance over present practise, that it will doubtless be approved with little modification. In this way the reasonable demands of the government in its efforts to safeguard the postal clerks and make them comfortable will be fully satisfied, while no serious burdens will be laid on the railways, by involving them in excessive and useless expenditures, or by compelling them to abandon many of their individual standards or the essentials of established practice.

UNION PACIFIC.

AFTER two annual reports in which operations of the Union Pacific as a banking company were quite uninteresting as compared with its railway operations, it is especially necessary this year to keep clearly in mind the distinction between the two forms of activity of the company. This is so because at the end of the 1911 fiscal year the company shows an increase of $71,120,000 in its assets, which is very largely the result of banking operations and not of railway operations. It would possibly be more accurate to say that its being shown *this* year is the result of a change in banking methods rather than the result of banking operations.

From its railway operations the company—and by the company we mean the Union Pacific Railroad, the Oregon Short Line and the Oregon-Washington Railroad & Navigation Co.—earned net, after the payment of fixed charges and rentals, $21,580,000 in 1911, as compared with $25,990,000 in 1910. Four-per cent. dividends were paid on the Union Pacific preferred stock and 6 per cent. on the common, leaving a surplus from transportation operations of $4,600,000 in 1911 and $8,990,000 in 1910. The additional 4-per cent. dividends paid on the Union Pacific common stock comes from the company's revenue from investment banking operations. These banking operations and the increase in assets will be discussed later.

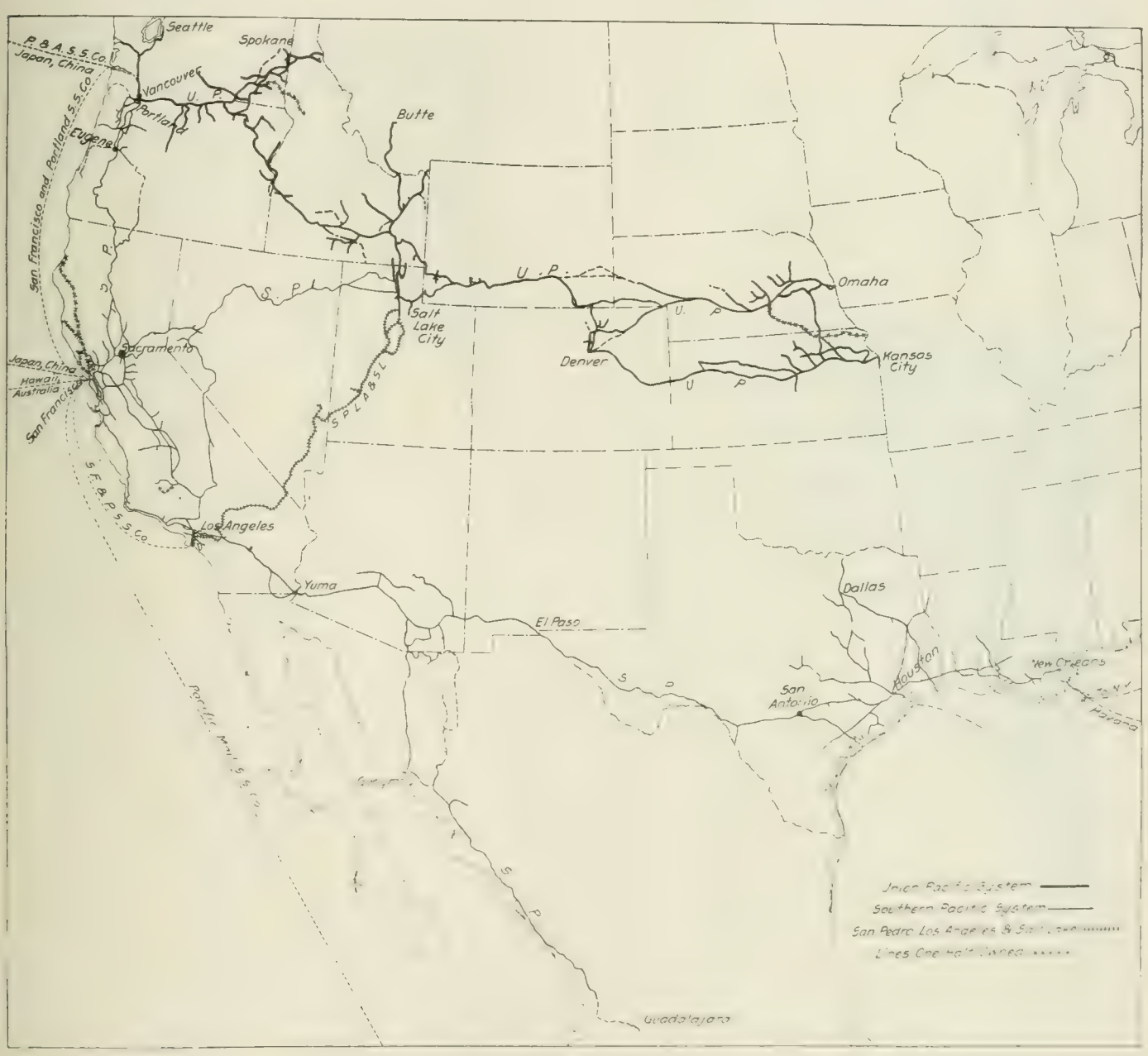
The Union Pacific's plant consists of 6,678 miles of railway. Its roadway and track are in some respects the best piece of railway property in the West. It is largely main line with a heavy density of traffic, ballasted from Omaha to Ogden with Sherman Hill disintegrated granite; and, of the 4,425 miles of main line, 1,621 miles are laid with 90-lb. rail and 1,479 with 80-lb. rail. Forty-two per cent. of the track, exclusive of sidings but including branch lines, is laid with 90 and 80-lb. rail. Nearly all of the line between Omaha and Cheyenne is double tracked, and there are long stretches of double track from Cheyenne west to Ogden. The road needs to be double tracked all the way from Omaha to Ogden, and the appropriation for doing the necessary additional double tracking has been made and work is in progress.

The Union Pacific's freight density (commercial and company freight carried one mile per mile of road) is 1,100,131. This is the figure for 1911, and is less by 4.80 per cent. than the density in 1910, due to a falling off in company freight traffic. In addition to this very heavy freight density, the Union Pacific carried last year 139,587 passengers one mile per mile of road, which was less by 8.34 per cent. than the passenger density in the year before. Moreover, a large part of the Union Pacific's passenger business is high class through business that demands a fast schedule and a minimum of delay.

The character of the freight traffic is diversified, but a large proportion of it is dependent on agriculture. In 1911, 11.98 per cent. of the total tonnage was furnished by grain, and the tonnage of all products of agriculture aggregated 24.31 per cent. of the total tonnage. This compares with 23.55 per cent. of total tonnage furnished by products of agriculture in 1910. Live stock and animal products furnished 6.55 per cent. of total tonnage in 1911 and 6.42 per cent. in 1910; products of mines furnished 33.81 per cent. last year and 33.89 per cent. the year before; products of forests furnished 14.51 per cent. last year and 14.31 per cent. the year before; manufactures furnished 13.33 per cent.

last year and 13.93 per cent. the year before; merchandise furnished 5.38 per cent. last year and 5.47 per cent. the year before. The total tonnage of revenue freight carried in 1911 was 15,550,000, and in 1910, 15,310,000. These figures include in both years company freight for which a charge is made. In 1911 this company freight for construction and new lines for which a charge is made amounted to 740,000 tons. The average haul last year was 392 miles, or just the same as the year before. The average receipts per ton per mile, however, were 1.003 cents, as compared with 1.024 cents, a reduction of 2.05 per cent.

The Union Pacific is a road that, partly from necessity and partly from a matter of policy, has especially endeavored to get its freight over the line on a fast schedule and has therefore not laid the same stress on heavy train loading that the Hill lines have; nevertheless, the Union Pacific's train load is a very creditable figure. Comparisons between 1910 and 1911 of revenue freight train load are not available because of the change of method in showing company freight on which there is a charge. In 1911 the revenue train load (excluding company freight on which a charge is made) was 441 tons, as compared with 452 tons (including company freight on which there was a charge). The train load last year was 499 tons for all freight, including company freight, both free and that for which a charge was made. This is an increase of 11.12 tons, or 2.28 per cent., over the year before. The difference in policy as between the Hill lines and the Harriman lines in regard to the importance attached to heavy train loads is quite well illustrated by the difference in construction of the Des Chutes line of the Oregon-Washington Railroad & Navigation Company and the Oregon Trunk, of the Hill lines, the Hill lines grade being much the lower. Traffic figures would probably show that the Hill lines have a considerably heavier average train load; but on the other hand, the Des Chutes cost a much smaller amount per mile to build than the corresponding mileage cost of the Hill lines.



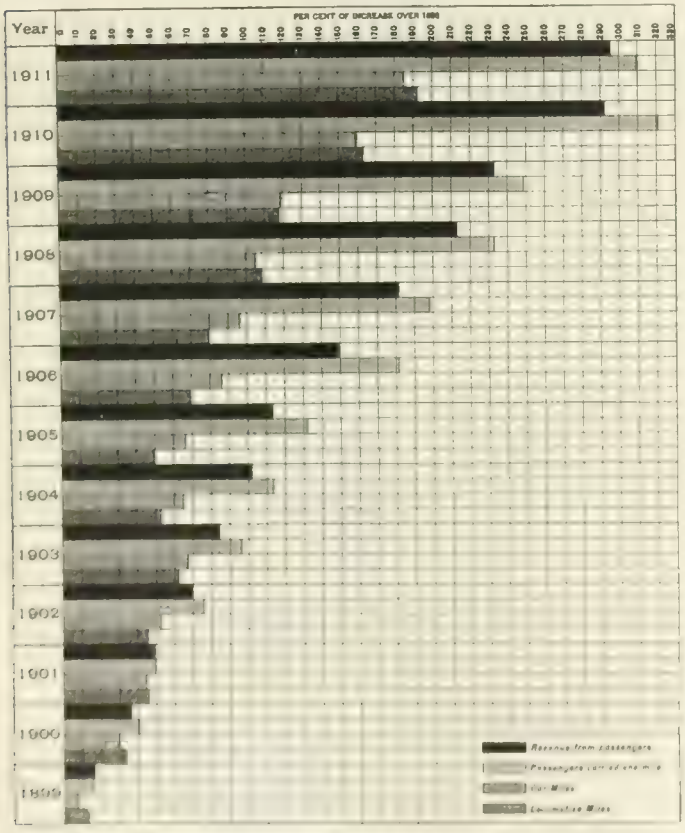
The Harriman Pacifics.

With total company and revenue ton mileage greater by 0.98 per cent. in 1911 than in 1910 and passenger mileage less by 2.78 per cent., and with average mileage of railway operated greater by 6.07 per cent., the Union Pacific and auxiliary companies had a locomotive mileage for freight and mixed trains less by 1.27 per cent. in 1911 than in 1910, and a locomotive mileage for passenger and mixed trains greater by 11.04 per cent. in 1911 than in 1910. It is interesting to note that the mileage of gasoline

motor cars aggregated 627,000 miles in 1911, or 3.95 per cent. of the total revenue passenger train mileage. The percentage of loaded freight car mileage to total freight car mileage was 74.93 in 1911, as against 76.30 in 1910. Transportation expenses as a whole amounted to $23,990,000, an increase of 8.03 per cent. over 1910. This increase is due in part to an increase of $691,000, or 9.76 per cent., in the cost of fuel for locomotives, bringing the total cost in 1911 up to $7,780,000. Last year transportation, traffic and general expenses consumed 32.40 per cent. of gross revenue of rail lines, as against 29.55 per cent. the year before; and maintenance of way and equipment cost 22.54 per cent. of gross in 1911 and 21.46 per cent. in 1910.

The average cost of maintenance of way and structures per mile of all main track, which includes first and additional main track is $1,431, or 1.84 per cent. less than was spent in 1910. Up to January, or later, on most of the lines the full track forces were at work, but since that time there has been a considerable cut in track forces, due to a necessity to cut down expenses. The Union Pacific is in such shape physically that it can cut its track forces to a mere skeleton of a force for a few months without any serious detriment to the property.

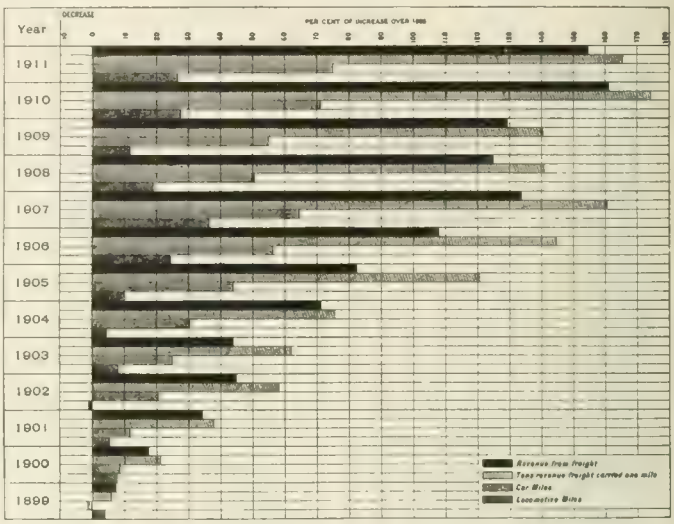
Maintenance of equipment cost $9,210,000 last year, an increase of 1.48 per cent. over the year before, due almost entirely to an increase in the cost of maintenance of locomotives. The average cost: including renewals and depreciation, per



Passenger Service and Traffic.

000 for buildings and structures, which includes $814,000 for buildings for general service; and $9,350,000 for additional equipment.

It is interesting to note the extent to which the Union Pacific has added to its equipment during the past year—a year in which there was a somewhat smaller traffic to be moved. At the end of 1910 the company had 1,134 locomotives, with an average weight of 87.82 tons; at the end of 1911 the company had 1,330 locomotives, with an average weight of 88.74 tons. Of the locomotives in service at the end of 1910, 28.93 per cent. were in



Freight Service and Traffic.

Showing by years the per cent. of increase over the year ended June 30, 1898, in the gross revenue from the transportaiton of commercial freight, the number of tons of commercial freight carried one mile, and the number of miles run by cars and locomotives in freight train service.

thorough order and 41.71 per cent. in good order; while in 1911 34.14 per cent. were in thorough order and 41.58 per cent. in good order. At the end of 1910, 18.34 per cent. of the locomotives required repairs and 11.02 per cent. additional were in shop, while in 1911, 15.49 per cent. required repairs and 8.79 per cent. were in shop. At the end of 1910 the company had 825 passenger train cars, and at the end of 1911, 959 passenger trains cars. At the end of 1910 the company had 26,043 freight cars, with an average capacity of 39.59 tons; at the end of 1911 the total number of freight cars was 28,955, and they had an average capacity of 41.60 tons. Certainly an average capacity of over 40 tons per freight car shows a policy of condemning and weeding out obsolete equipment, that is a good deal sounder policy of railroading than any theoretical charge of an arbitrary sum for depreciation, which charge the Union Pacific does not make.

When we come to the study of the balance sheet of the Union Pacific Railroad and auxiliary companies we are compelled to a study of the banking operations of the company as well as its railway operations. The balance sheet at the end of 1911 shows a total book value of $259,830,000 of bonds and stock owned (excluding the companies own securities). The Union Pacific and auxiliary companies owned at the end of 1911 $150,030,000 par value of their own stocks, which is more by $83,420,000 than was owned at the end of 1910. No part of these stocks is pledged. These companies at the end of 1911 owned $94,050,000 of their own bonds, an increase of $8,570,000 over the year before, and of these bonds no part is pledged. The total stocks and bonds carried on the balance sheet and mentioned above include $41,920,000 *par* stocks of other companies, of which only $99,000 are pledged. Stocks of these companies are held probably not so much as an investment of funds but for the advantages that may accrue to the Union Pacific as a railway company. To illustrate, the company owns half of the total outstanding stock of the Pacific Fruit Express, the other half being owned by the Southern Pacific.

In addition to these holdings for railway purposes, the Union Pacific and the Oregon Short Line own a total *par* value of $228,900,000 stocks of other railway companies, of which $133,460,000 stocks are deposited under the Oregon Short Line refunding mortgage. This is the par value. These stocks cost $223,796,000, and on June 30, 1911, their market value was about $267,000,000. These investment stocks, as they are called, include: Baltimore & Ohio; Chicago & Alton; Chicago & North Western; Chicago, Milwauke & St. Paul; Illinois Central; New York Central & Hudson River; Northern Securities' stubs; Railroad Securities Company; and, of course, control of the Southern Pacific, held not only for investment but for railway purposes. In addition to this, the Union Pacific and auxiliary companies own $36,280,000 face value bonds of other companies, of which $28,820,000 are pledged. The Union Pacific originally bought its investment stocks partly through its attempt to gain control of the Chicago, Burlington & Quincy with the consequent formation of the Northern Securities Company and its subsequent dissolution and distribution of assets. It was partly also through a desire of E. H. Harriman to gain a voice in the management of such companies as the Baltimore & Ohio and the New York Central.

Heretofore, when blocks of these investment stocks were sold the profit from the sale was credited to the total investment account. This year, however, the method has been changed and past profits have been credited to profit and loss. It is this taking into profit and loss account of past profits that has made this year's operation show an increase of $71,000,000 in the assets. If the Union Pacific were not a railway company but a company run only in the interests of stockholders and subject only to their regulation, it would be more conservative to continue the past policy of crediting profit on investment stocks toward writing down the valuation at which the remaining stocks were carried on the books. But the Union Pacific, it is a railway company facing the possibility of at any time having to justify its rates by bringing forward its own valuation of its property. The *Wall Street Journal,* in a very able study of the Union Pacific's handling of its investment stocks account, has suggested that the present "writing up"* of the profit and loss account is due to a farsighted belief on the part of the management that at some future time the railways may be taken over by the government. This may be perfectly true, but it is hardly necessary to go quite so far into the future to find at least a very plausible and convincingly sound reason why the account should be treated at it is.

If the Hadley commission should recommend the regulation by the government of the issues of securities and even, possibly, a physical valuation of railways, the railway companies would have to stand on their own bookkeeping. It is quite possible that unless their books showed all their profits the "written off" profits might not be admited as evidence of value.

The Interstate Commerce Commission has indicated clearly by its rules for charges for additions and betterments its theories as to crediting to surplus or cost of property everything that is not spent for upkeep. The Union Pacific's policy in transferring the profits on the sale of its stock from a "writing down" of the valuation at which they are carried to a "writing up" of the profit and loss account appears analogous to charging to capital account all additions and betterments whether or not necessitated by the general raising of the standards of railway property. It might be recommended that on the same theory the company should not carry these investment stocks on its balance sheet at cost, but should revalue them each year according to market prices so as to show any loss that might be incurred. This, however, would actually be more misleading than to carry them at cost until they are sold, because a valuation of these stocks taken at an arbitrarily fixed time would not indicate what the value of the stocks were if sold by a competent management under market conditions which they could themselves choose.

At the end of 1911 the Union Pacific had on hand $12,170,000 cash, or $3,090,000 more than at the end of 1910, and had demand loans due from the Southern Pacific of $20,000,000, or $9,100,000 more than at the end of 1910. It also has demand loans and time deposits amounting to $28,900,000. On the other hand, at the end of last year total current liabilities, including coupons due July 1 and dividends payable July 1 and October 2, amounted to $25,220,000, an increase of $1,440,000.

The table shows the principal figures for 1911 and 1910:

	1911.	1910.
Average mileage operated	6,678	6,296
Freight revenue	$59,964,364	$61,479,680
Passenger revenue	20,981,405	20,814,820
*Total operating revenue	88,983,108	90,228,092
Maint. of way and structures	10,445,203	9,915,482
Maint. of equipment	9,208,725	9,074,653
Traffic	2,021,492	1,985,018
Transportation	23,991,335	22,208,262
*Total operating expenses	49,807,834	46,938,909
Taxes	3,464,147	3,264,347
Operating income	35,711,127	40,024,835
Interest and rentals	14,131,937	14,031,196
Dividends payable from railway operation	16,977,487	17,004,320
Income from investment operations	18,296,571	19,512,051
Dividends (4 per cent. additional on the common stock, making a total of 10 per cent. paid)	8,663,829	8,681,546
Total surplus after the payment of dividends	14,334,446	19,819,825

*Including outside operations.

NEW BOOKS.

Problems in Railway Regulation. By Henry S. Haines. The MacMillan Company, New York. Cloth. 5¼x8¼. 582 pages. Price, $1.75.

Mr. Haines has developed in "Problems in Railway Regulation" the treatment of subjects dealt with in his "American Railway Management," "Restrictive Railway Regulation" and "Railways as Public Servants." It is largely an application of views previously expressed by him to new phases of regulation; and that there is a good deal of new matter in the book is as much a tribute to the resourcefulness of the regulating authorities as of the author.

After tracing historically the development of the American railway system and of the policy of regulation, he discusses specifically the questions of regulating, incorporation, finance, construction, operation and traffic. He gives one chapter to "Problems of Capital and Labor" and the concluding one to "Tendency of Government Regulation."

Having been a railway operating officer, he is most instructive and interesting in the discussion of regulation of operation. His chapter on this subject brings home rather forcibly the fact that few of us are apt to give enough credit to the federal government for the results it has gained in the regulation of operation. He shows that much good has been done by the Safety Appliances law; by the co-operation between the Interstate Commerce Commission and the American Railway Association in framing and carrying out regulations for the handling of explosives; by similar co-operation between the National Association of Railway Commissioners, the Interstate Commerce Commission and the roads in formulating and adopting the Uniform Code of Demurrage rules; and by like co-operation between the employees, the railways and committees of Congress in drafting the law for the inspection of locomotive boilers. His narrative and comment bring out forcibly that no wise and salutary regulation of operation ever has been adopted except when railway men and the regulating authorities did co-operate in working out a policy; and that the more regulatory laws or orders have tried to prescribe in detail what operating methods railways should use, the more complete failures they have been.

Mr. Haines is an advocate of the value-of-the-service principle in rate-making and shows how impracticable it is to ascertain the costs of different services accurately and how impracticable it would be to base rates on these costs even if ascertainable. He believes, like most students of the subject, that strict limitation of railway profits will prevent adequate railway construction and improvements, which will result in great public harm.

* "Writing up" is used in the bookkeeping sense.

Letters to the Editor.

OLIVER ROWE, INSPECTOR—A TRIBUTE.

Portland, Ore., November 17, 1911

To the Editor of the Railway Age Gazette:

Sad is the news from Cheyenne, Wyo. Dead as a result of injuries received in a collision at Rock River is Oliver Rowe, inspector of transportation of the Harriman Lines. Inscrutable are the ways of Providence. Ironical are the flings of fate. The faithful, tireless inspector, who by hundreds and hundreds of efficiency tests, who by intelligent checking night and day, had done more than his share to make travel safe, is himself the victim. A suddenly dazed brakeman throws the wrong switch in the face of a fast-approaching train and sets at naught years of official effort, millions of dollars of expenditure for safety appliances.

The life and death of this unassuming little man contain a lesson for all railway officials and employees. The fairies at his cradle denied him the graces, but they bestowed the stronger gifts of honesty, industry, coolness and patience. Devotion to duty was the dominant note in his character, so dominant that I am sure every one of us always worked a little harder after being with him. Brought up as an operator and train despatcher on the Houston & Texas Central, he became its division superintendent at Ennis. In later years, his closest home tie broken by death, he, as inspector of transportation, literally lived on the road. The position of an inspector is not an easy one. The burden of proof is on him to establish his sincerity as well as his capacity. So well did "Ollie" Rowe succeed in this that on most, if not all, divisions he became a welcome visitor. He had acquired unconsciously a great secret of success, the ability to subordinate himself to the work he represented. All day he would check train sheets in an office, so quietly that his presence might pass almost unnoticed. All night he would ride in a caboose or on an engine, so unobtrusively and so unostentiously that a stranger would give him little notice. Yet in all cases his reports became proverbial for their comprehensive recital of actual working conditions.

Men of his type are all too rare, and we who knew him are the better for the acquaintance. His work will live in the improved conditions that he helped to develop. D. A. D.

WANTED—MORE DISCUSSION OF THE UNIT SYSTEM.

November 11, 1911.

To the Editor of the Railway Age Gazette:

The series of letters by Major Hine, recently completed in the *Railway Age Gazette*, has been a great help and inspiration to the operating men in the trenches. Aside from the central theme of organization, the letters are filled with nuggets of homely truths [illegible] 100 per cent. The feudal system of operation, the fallacies of the road unit, the present comparison of results by the unstable operating ratio, the lack of proper support in critical periods from the real powers, are [illegible] time to time by the reiteration of known truths.

[illegible] perhaps by another name, in toto or in part. The writer was one [illegible] advanced are receiving practical application at the hands of the unbelievers and are working successfully.

The writer is a practical railway man with everyday duties that take him into the midst of things. As an experienced staff officer he has always striven to lead rather than to drive and has always given full consideration to the views of the men who think along different channels. As it is much easier to cling to the old than to develop the new, our gratitude is due to Major Hine for his conception of the unit system and to Mr. Kruttschnitt for his prompt recognition of its future possibilities.

Unless Major Hine can be induced to take up again the burden he has laid down, would it not be profitable to secure discussions of the merits and demerits of the system based on practical everyday operation? General Superintendent.

AFFABILITY—EXAMPLES OF THE OPPOSITE.

Mobile, Ala., October 23, 1911.

To the Editor of the Railway Age Gazette:

I have read with interest a letter signed "FX" in your last issue on Weaknesses in Train Operation, and also your editorial on Affability as an Asset. I believe that I have succeeded in gaining the confidence of nearly all of the men on my division by mixing with them freely and making them understand that they are to hew to the line, and to be square in every respect. They must do this in order to receive any assistance from me in helping them out of any tight place. They all appear to understand that each violation of the rules will be quickly and justly handled. In our attempt to inculcate lessons of politeness we try to give concrete illustrations. It is a good idea to do this frequently.

T. B. Turner,
Master of Trains, L. & N.

Mr. Turner quotes as follows from one of his circulars to employees:

The best possible way to win the good will and friendship of our patrons is by politeness. Be polite, no matter what happens; be polite to everybody; but reserve a special brand of charming deference for use toward older persons with whom you come in contact. Passenger trainmen have many questions asked that seem foolish, but the party asking them should be given as full and as pleasant an answer as possible. . . . I heard a patron of the road ask a conductor if his train was going to B—, and upon getting the answer "Not today," he was taken aback; and he felt hurt at such a short answer; and he remarked to me, "There is your Bureau of Information. I don't know which way B— is; have just come in from the country, and am turned around." Had the answer been "No, B— is in the other direction, and you can get a train at 9:20 p. m.," the man would have felt much better. It would not have taken five seconds to give the proper answer.

Recently a freight train moving backward came near striking a man, and one of the trainmen shouted to him, "Look out! what is the matter with you; can't you see?" The last part of the warning was superfluous and was taken as an insult; and it brought upon the trainman an arrest, followed by a fine; and he was otherwise humiliated. Would it not have been much better had he stopped after he said "Look out"? Or, if, in his haste, he spoke in a manner which was ungentlemanly, he should have added an apology. Had this been done, I believe the matter would have been dropped.

[illegible] I was riding on No. 5. The flagman called out twice "The next station is Pecan," but in doing so he enunciated the word Pecan in so low a voice that it was not understood by all. Two ladies were sitting just opposite me and one asked the other what the name of the station was, adding that "you can never understand what they say." The other woman answered, "I did not understand him," and looking out of the window she said, "I am unable to tell you." I then gave the desired information; and as I saw the flagman coming through the train I requested the first woman to ask him what station he had just called, but she replied to me, "I will do no such thing. I do not

want his impudence.' As the flagman got opposite me I said to him, "Flagman, this lady did not understand the name of the station just passed." The lady spoke up quickly and with a blush said, "Yes, I did; you said Pecan quite plainly." She was actually so intimidated, apparently by her general impression of trainmen's lack of courtesy, that she thus prevaricated in order to avoid discussion.

SOO LINE CUT-OFF FROM NEW RICHMOND TO WITHROW.

The main freight line of the Minneapolis, St. Paul & Sault Ste. Marie from Sault Ste. Marie, Mich., to Portal, N. D., does not enter St. Paul, but passes through the northern part of Minneapolis, although the company has its own tracks to its local passenger and freight terminals centrally located in both cities. A large amount of the company's freight traffic is for the far Northwest and does not need to be routed through the Twin Cities' terminals. The main line of the Wisconsin Central, which is now the Chicago division of the Soo, terminates at Trout Brook Junction, near the northern edge of St. Paul, where it connects with the Northern Pacific. A branch line of the Soo extends south from Cardigan Junction, on the main line, to the St. Paul terminals via Trout Brook Junction. As the company's principal freight terminal for the Twin Cities is at Shoreham, near the northern edge of Minneapolis on the main line, Chicago division freight bound for this yard had to be hauled southwest to Trout Brook Junction, then north on the branch to Cardigan Junction and then west to Shoreham. In addition to the indirectness of this route, the line of the Wisconsin Central for some distance out of St. Paul was very crooked, had heavy grades, and the class of equipment sent over it was seriously limited by the loading permissible on the steel bridge over the St. Croix river. In line with the policy of development on the Chicago division which had been adhered to since the acquisition of the Wisconsin Central, the Soo has built and recently placed in operation a cut-off running westerly from a point just west of New Richmond, Wis., about 40 miles out of St. Paul on the old Wisconsin Central line, to a connection with the main line of the Soo just north of Withrow, Minn. Besides affording a direct low-grade freight line to the Shoreham yard, the new line provides an alternate entrance to the Twin Cities for Chicago division passenger trains.

The locations of the old line and the new cut-off are shown on the accompanying map. The cut-off is 17½ miles long; it has a maximum grade of 0.5 per cent., and a maximum curvature of 1 deg. 30 min. The old line had grades as heavy as 1.3 per cent., and curves as sharp as 5 deg. The new alinement crosses the old five times between New Richmond and Carnelian Junction, the distance between these points being 14¼ miles by the new line and 18 miles by the old. The new line also eliminates about 1,300 deg. of curvature in that distance.

Location of New Soo Line Cut-Off.

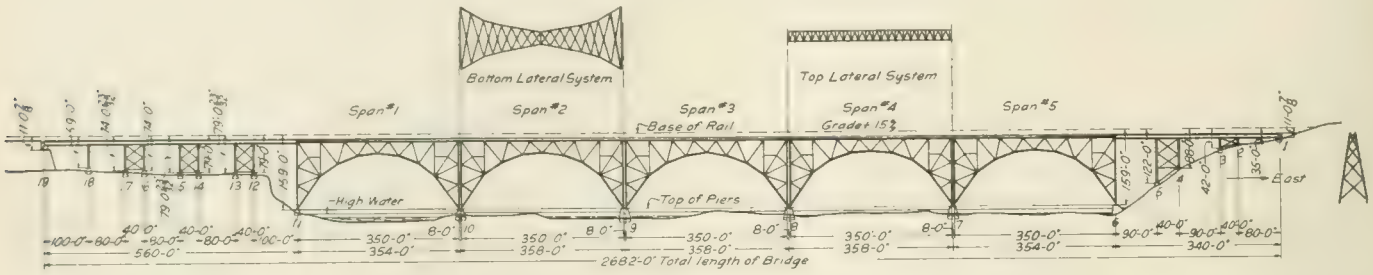
The St. Croix river is crossed on a new steel arch bridge at a much higher elevation than on the old line, allowing the road to keep to the high ground with a much improved line and gradient. On the 17½ miles, about 1,300,000 yds. of material was excavated. A small portion of this work was rock, but most of it was a good grade of gravelly clay, which was easily handled and stood up well in fills. About 13,000,000 yds of overhaul was involved in the work. Foley, Welch & Stuart, St. Paul, were the general contractors, and the grading was sublet in small contracts. No difficulty was experienced in any of the earth work, and the fact that the entire contract was finished during the season of 1910 shows that the planning and execution of the work were of the best. All track laying and

Soo Line Bridge Over St. Croix River.

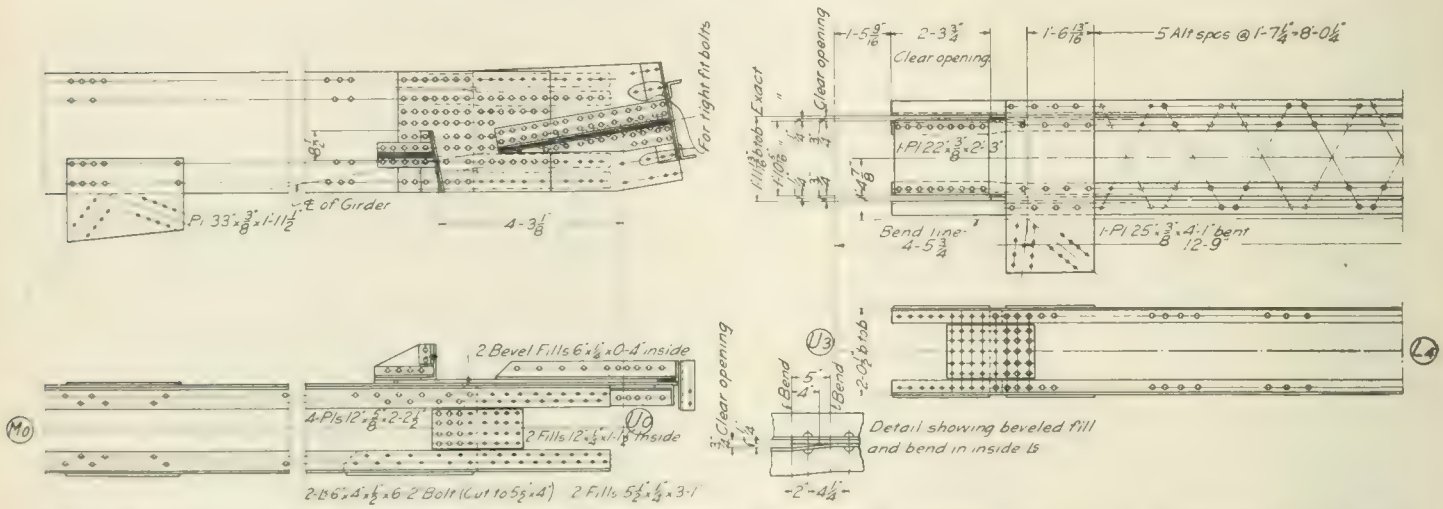
surfacing was handled by company forces. Gravel ballast, hard ties on curves and 85-lb. rail were standard.

The St. Croix river bridge has a total length of 2,682 ft., consisting of an east trestle approach 340 ft. long, five 350-ft. steel arches and a west trestle approach 560 ft. long. The elevation of base of rail on the bridge is 159 ft. above the tops of the piers, about 169 ft. above high water, and 181 ft. above ordinary stage of water. The design is made for Cooper's E55 loading and all steel work conforms to Soo Line specifications.

A trestle structure, using 100-ft. girders between bents and 40-ft. girders over towers, was considered for this location, and alternate estimates were made to compare arch and trestle types. The arch bridge was adopted because the comparison showed it to be cheaper and also a more rigid construction. It was found to require more steel than a trestle, and the shop work for the arch was more complicated, but these additional costs were more than offset by the saving in cost of foundations, since the pedestals for the towers would have had to be carried down to an extreme depth in order to rest on rock, and the cost of riprap for the larger number of piers would have greatly increased the total cost. An estimated saving of $35,000 to $40,000 was effected by using the design adopted. In addtion to its economy



Elevation of St. Croix River Bridge; Soo Line Extension.

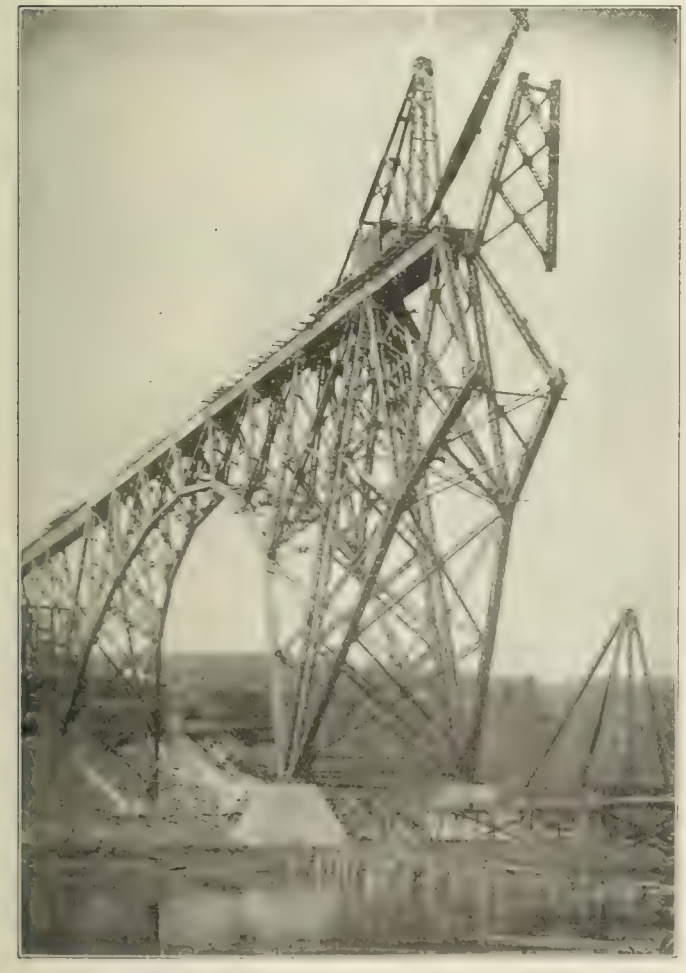

For right fit bolts
5 Alt spcs @ 1'-7¼"=8'-0¼"
Clear opening
Bend line
Detail showing beveled fill and bend in inside ls
2 Bevel Fills 6"x⅛"x0'-4" inside
2 Fills 12"x¼"x1'-1⅛" inside

Details of Connections of End Post to Box Girder Top Chord and Deck Girder Approach Span; and Connections of Typical Truss Member to Top Chord.

Finished Bridge, From East End.

the bridge as built is probably the most rigid structure for its dimensions in the country. This rigidity is secured by inclining truss members 2 in. in 12, and by adopting a special design which makes the three-hinged arch act as a two-hinged structure under live load. The structure, therefore, has the advantages both of the provision for temperature stresses and the adaptability to inequalities or settlement of the piers possessed by three-hinged arches and of the rigidity under heavy loads which is characteristic of two-hinged arches. The design includes other noteworthy features, of which the most striking are: the use of horizontal skew backs; the makeup of compression members to allow a minimum of 30 per cent. of the gross section in the flanges; and the connection of inclined truss members to the box girder top chord by bent plates, eliminating floor beams.

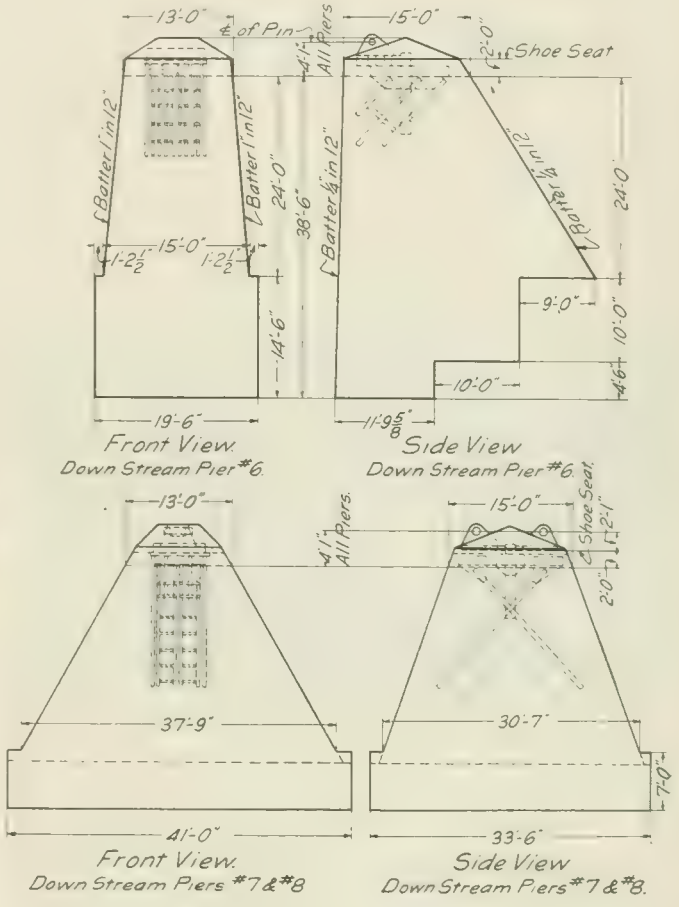
The use of a horizontal skew back was made possible by the adoption of heavy inclined anchorages in the concrete piers, as shown in the accompanying drawings. In piers 7, 8, 9 and 10, on which equal reactions from adjacent arches are carried, the anchorage is symmetrical about a transverse center line, the 18-ft. angles being inclined 45 deg. and crossed 5 ft. 7¾ in. below the center line of the horizontal channels. The cast steel bolsters supporting the shoes were shop-riveted to these channels and bolted at their inner ends to a vertical member projecting above



Erecting First Half of Second Arch as Cantilever.

the channels and carried down to the intersection of the anchorage angles. In piers 6 and 11, which carry a single arch reaction, the anchorage is similar to that described, except that the angles are arranged in three parallel tiers, inclined 45 deg. from the horizontal in the direction opposite that of the arch reaction. The designs of typical piers are shown in the drawing herewith, No. 6 being an end and No. 9 an intermediate pier. The two end piers and all pedestals under the approach girders are founded on rock, but the intermediate piers under the arch spans are carried on piles spaced 3 ft. center to center and driven from 50 to 80 ft. deep, the depth to rock under these piers being 100 to 125 ft.

The masonry in the piers was placed from a light trestle driven parallel to the center line and adjacent to the upstream piers. A mixing plant was located at each end of the bridge and con-



Typical Pier Designs, Showing Anchorage in Piers Carrying One and Two Reactions.

crete materials were hauled to these plants by teams from the nearest stations on the old line. On account of the precipitous bluff on the west bank it was necessary to provide a cableway to lower the concrete from the mixing plant down to the trestle. The buckets of concrete lowered along this cableway were carried out on the trestle on small push cars and dumped from transverse trestles built over the pier locations. The trestle and

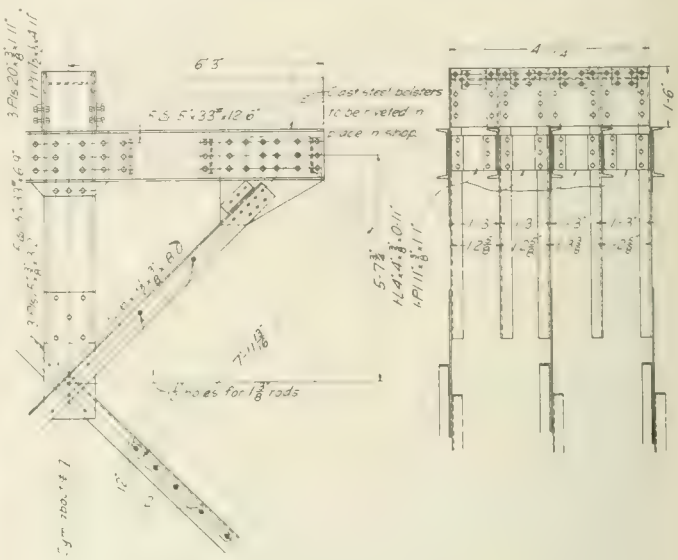
Adjusting the Footing of an Erected Arch.

the lower chord for the cableway at the west end are shown in one of the accompanying photographs.

The design of the lower chord is typical of all the heavy compression members in the structures. It is made up of four 6 in. x 3½ in. x ⅜ in. angles; one 34 in. x ½ in. cover plate; two 30 in. x ⅞ in. web plates, and four 6 in. x 6 in. x ⅞ in. angles. The gross area of this section is 114.18 sq. in., of which 61.68 sq. in., or 54 per cent., is in the flange. Although this ratio is not quite as high in some of the other members, it is never less than 30 per cent., which is considerably higher than the maximum ratio which is frequently used for similar designs.

The top chord is a box girder 5 ft. 1 in. high, back to back of angles, and 2 ft. ⅜ in. center to center of web plates. These girders are spaced 9 ft. center to center and connected by lateral bracing. The upper chord is carried directly by the truss members through bent plate connections; the flange angles of the members being crimped to leave a clear opening between each pair of angles, into which the gusset plates are inserted, being riveted through the angle leg. The section of the top chord over the upper hinge is not connected to the truss members at either end, and it is supported entirely on projecting sections of the adjacent girders. The girders are cut to overlap 1 ft. 5½ in., and two bronze and three steel plates are inserted to form a sliding bearing. The center girder is heavily reinforced at the ends, as shown in the accompanying drawing, to care for the stresses caused by this application of the load. Under dead load this short section slides back and forth on its bearings as the bridge

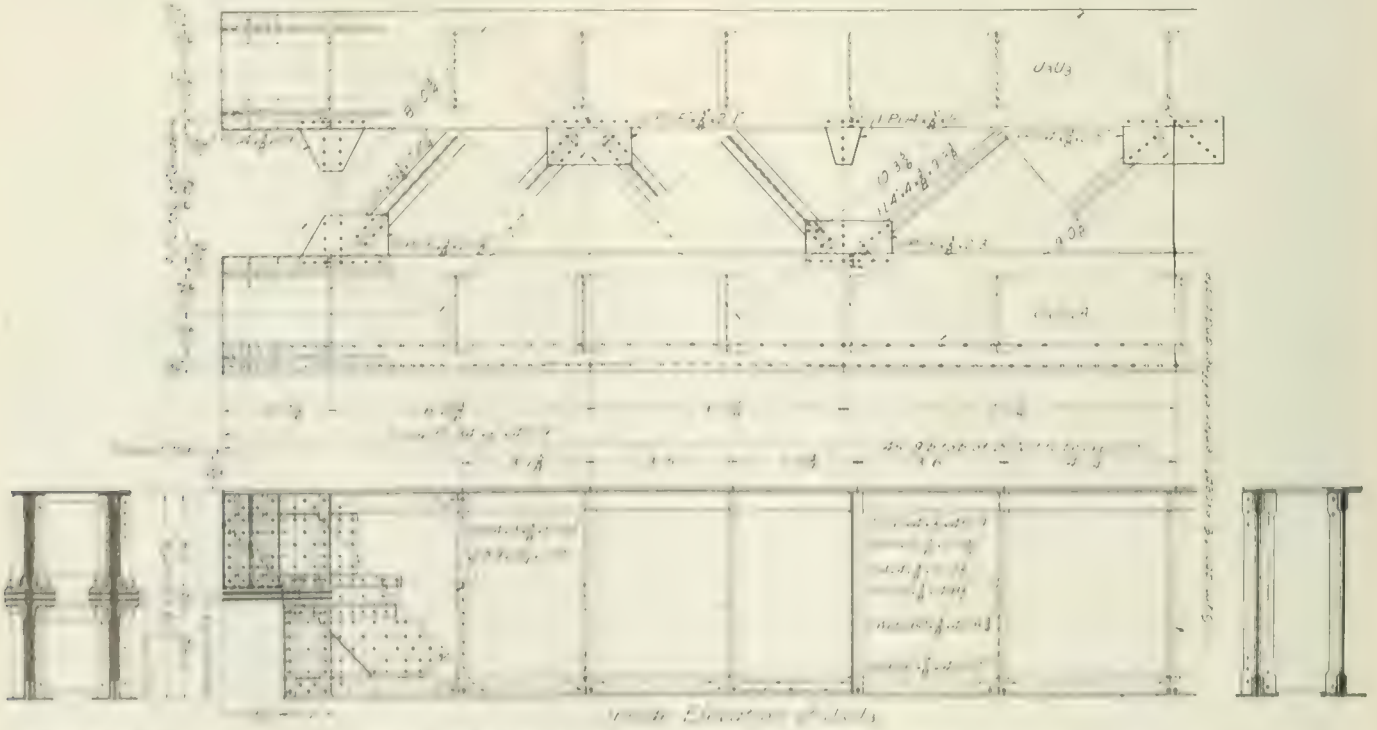
Trestle and Cable Way for Placing Concrete in Piers.



Details of Anchorage in Piers Carrying Two Reactions.

contracts and expands with temperature changes, the structure acting as a three-hinged arch. Under live load, however, these joints are locked by friction, fixing the length of the span over the upper hinge and forcing the structure to act as a two-hinged arch.

The erection of the bridge was accomplished very easily, considering its size. After the approach spans were completed the two end arches were erected on false work, which was very light and was practically all used more than once. The outer halves of



Details of Short Girder Over Center Hinge and Sliding Joint Which Effects Change in Action of Arch from Three-Hinged to Two-Hinged Structure; Soo Line Extension.

spans 2 and 4 were erected as cantilevers from the end spans, and false work was then placed from the ends on these cantilevers on which the remainder of the two arches was erected. Span No. 3 was erected entirely as a cantilever, the erection being carried on simultaneously from both ends. One of the photographs reproduced herewith illustrates the erection of the outer part of the second arch as a cantilever. The false work for the second half of the second arch was placed by a derrick car on the portion already erected. Four derrick cars were used; two on each end, one handling the members on the span and one unloading steel and handling material on the bank. In erecting the arches 9-in. wedges were provided behind the shoes to adjust the span and raise or lower the crown of the arch to bring it to grade. This eliminated the trouble incident to making the closing connection in the arch which would have been experienced if inclined skew backs had been used requiring the shoe to be permanently fixed before the erection of the arch. One of the photographs reproduced herewith shows the wedges for one span.

The foundation work on the bridge was begun in the fall of 1910, and the bridge was erected during the following winter and spring. The first train was sent over it in June, 1911. The entire work of building the new cut-off was under the direction of Thomas Green, chief engineer, and C. N. Kalk, principal assistant engineer. The design of the bridge was made by C. A. P. Turner, consulting engineer, and a number of the special features of the design are patented by him.

FOREIGN RAILWAY NOTES.

It is expected that the line connecting Taichon, Korea, and Kuasan, will be open to traffic by April, 1912.

In 1900 the operating ratio on the Prussian state railways was 61 per cent., and this rose to 74.62 per cent. in 1908. In 1909 it was 68.99 per cent., but was probably not less than 68.50 in 1910. It is estimated that in 1911 this ratio will be 68.63 per cent. The total annual receipts exceeded $500,000,000, therefore to reduce the operating ratio by only 1 per cent., means that $5,000,000 must be saved,

On December 31, 1909, the Belgian state railways had 4,093 locomotives in service, an average of over 150 locomotives for every 100 miles of line. This high average is justified by the great density of the population. The density of traffic is of course very great. Four-cylinder locomotives are favored for passenger train service, and although in France, Austria and Prussia this type of locomotive is seldom used without the compound engine, in Belgium the simple engine is still in favor. It is claimed that by the use of Schmidt superheaters, an economy can be obtained equivalent to that of the compound system. In freight locomotives the simple engine is used exclusively in Belgium. On the other hand of the 600 freight locomotives ordered by Prussia in 1908, 334 were compound, and of the 328 locomotives ordered in 1910, 135 locomotives were compound. The Belgian locomotives have six-coupled wheels. In 1909 the passenger equipment included 9,954 cars, or 370 for every 100 miles of line. Since 1904, corridor cars were ordered with three trucks equipped with Westinghouse brakes and steam heating apparatus. At the end of 1909, 1,571 cars were lighted with incandescent lamps with metal filaments. At the end of 1909 the freight equipment included 82,302 cars, an average of 460 cars for every 100 miles, furnishing a total capacity of 1,020,626 tons for all cars. Recent orders have been almost entirely for cars of large capacity (for Belgium), such as 15 ton box cars and 20 ton coal cars. In 1904 there were only 650 coal cars of heavy capacity, but this was increased to 6,037 at the end of 1909. The number of 10-ton box cars in 1904 was 9,998, and of 15-ton box cars, 3,958. In 1909 the number of 10-ton box cars was 10,503, and of 15-ton box cars, 7,197.

"QUESTIONS OF THE HOUR."*

BY F. A. DELANO,
President, Wabash Railroad.

While we have inherited from our Saxon forefathers a belief in the Town Meeting as a good place to discuss questions of the hour, yet when it comes to holding such discussions, business men today shy away from them. Indeed, it is an unfortunate but somewhat notorious fact that the questions which concern our business life are rarely discussed in the open by business men, and the man who does it is apt to be looked upon with suspicion by his fellows, as a theorist.

The effect of this failure on the part of the business men of the country to look after these important questions of law-makers and law-making, is that a few hundred men sitting in our federal and state legislatures have really played "football" with the business of the country. George W. Simmons of St. Louis recently stated the case well when he said:

"It seems to me quite natural, however, that this should be so when we reflect that in this, the greatest commercial nation of the world, upon whose prosperity depends the prosperity of the world, where we have over fifteen millions of people engaged in trade and manufacture—we have less than fifty members of Congress who are business men. There are said to be 135,000 lawyers in the United States, and yet they are represented by 212 lawyers in our National Congress. These lawyers, learned as they may be in the law or in the theoretical side of business, cannot, because of a lack of actual experience, know the commercial needs of the country as those men know them whose very bread and butter, the happiness and welfare of whose families and those nearest and dearest to them, are entirely dependent on their insight into, and their thorough mastery of, the commercial problems of the day."

The spectacle of 10 to 12 million men and women working by the sweat of their brow to produce wealth that supports us all, led around by the nose by this relatively small number of drones in the human hive, is, indeed, pathetic.

And yet it would not be fair to put all the blame on the politicians who represent, or even those who misrepresent us. We nominate and elect them and rarely tell them what we think they should do. Theoretically, they are servants of the people; practically, they are watching the headlines in the papers and trying to catch the popular key.

It is, therefore, with more than ordinary temerity that I venture before this audience to take up some of the problems which concern every one of us; but I do so, not so much to express new or advanced ideas, but to say out loud what I think many business men believe. I have taken for my subject, "Questions of the Hour," and propose to deal particularly with these three closely related questions:

The railway question, the tariff question and the trust question.

THE RAILWAY QUESTION.

As you all know, the Interstate Commerce law was passed in 1887, nominally in the interests of the general public, but more particularly of the shippers. The truth is, not one man in a thousand knows anything about freight rates, and public interest in the question has been a manufactured and inspired interest. Few people realize that on the commodities which are concerned in our daily lives, such as food and clothing, the rates of freight bear an insignificantly small percentage of the cost of the article; thus, on a piece of beef which retails at from 20 to 35 cents per lb. in Chicago, the rate from Kansas City or Omaha to Chicago would be less than 2 mills. On a ready made suit of clothes, which retails at from $20 to $40 in Chicago, the rate would amount to from 3 to 4 cents. On shoes retailing at from $2 to $6, the rate from Boston to Chicago would be about 2 cents.

A fifty-pound sack of flour retailing in New York at $1.50 pays a freight charge of 12½ cents from Minneapolis to New York. A suit of underwear retailing at from $1 to $5 pays a freight charge from New England mill points to Chicago of less than one-half cent per suit.

But it is easy and often convenient to blame the railways, as

* An address before the Toledo Transportation Club, November 24, 1911.

when I heard a retailer say to a customer who was complaining that he had to pay a higher price for an article which he had frequently bought: "Well, you know the railway rates have gone up." The customer knew nothing about the facts, and the explanation was accepted.

Not many months ago, an effort on the part of the railway companies to get an advance in rates met with a refusal from the Interstate Commerce Commission. Shortly after that time, I startled some of my good friends, especially in the railway fraternity, by stating that possibly that decision was a blessing in disguise, for the reason that the railways needed public sympathy, and favorable public opinion, even more than higher rates. This statement, by itself, was freely used in the headlines, without qualifying remarks, and was misunderstood. However, I believed then—and believe now—that while railways needed higher rates, there were other things they needed more. Furthermore, the Interstate Commerce Commission had good reason to hesitate in adopting the policy which proposed that, because the employees of the railways thought their wages should be increased, freight rates should, therefore, be advanced, and thus throw the burden on the ultimate consumer. True, this method had been successfully introduced by other employers, and in a most notable instance in this very state of Ohio, when the late Senator Hanna perfected a scheme for avoiding a strike of coal miners, by granting them the increase on conditions that they would help the operators to secure an advance in the price of coal from the consumer. However, that did not make it right or advisable.

As an economic policy, it is faulty; and the railway companies, being large consumers of many articles, have suffered along with the general public by its common acceptance. It is a policy of taking the easiest way and letting someone else take the consequences. Sooner or later this policy was certain to come to an end, perhaps, the refusal of the commission to permit railways to advance rates may be the thing we need to bring us all to our senses.

And yet, railways needed something, and everyone who knows realizes that they are having very hard times. Furthermore, until their purchasing ability is restored, we cannot have good times. In other words, there is no question that the margin between earnings and expenses, which has been steadily decreasing, is too small and that the railways need today, as when they made their plea, either an increase in rates, or some assistance in decreasing expenses.

My position, therefore, is that while I see good reason for the commission's decision, I have objected to their reasoning. I should have been better pleased if the commission in declining the request of the railways had done so on the ground that it was a faulty, economic theory; that the proposal to increase rates in order to increase wages was introducing a *deadly cycle* that would never terminate. If the commission, in declining the request of the railways, had permitted some of the rates to be advanced where they appeared to be too low, and had pointed out wherein railways might economize, they would have done valuable constructive work. Instead of this, the request was declined by citing the condition of the most notable carriers in the country and by arguing that because those carriers might survive without help, the railways, as a whole, did not need it; whereas the argument of railway men has always been that a moderate profit unless the country was ready to grant some sort of a minimum to the less successful; for, if railways, like other un-

However, the case was decided; and, being law-abiding citizens, the railway companies have accepted the decision and are doing the best they can to economize, learning some hard but useful lessons in the effort. True, we haven't yet discovered how

great possibilities of economy. To some of us it occurs that the same commission which denied the request for an advance in rates might very properly assist the carriers in securing the economies, for the reason that many of these economies are beyond the ability of the railways to accomplish unaided; as I shall venture to explain.

The most promising source of economy is in reduced train service; that means better loading of trains, both passenger and freight. This is the direction of economy which transportation service the world over has taken. Thus, the great Olympic, of 45,000 tons, with its capacity of 2,500 passengers and a crew of 1,000 men, takes the place of vessels of less than half the capacity and scarcely ten years old. Familiar examples even nearer at hand might be cited in the case of your 600-ft. ore carriers, with 12,000 to 14,000 tons capacity, discharging their cargo from thirty-two hatches in four hours' time. Not many years ago a vessel of half this tonnage was considered very large on the Great Lakes. The three-horse dray, the five-ton motor truck, are other examples.

Some of the most notable instances of economic waste in train service are found between our large cities. Thus, between Chicago and St. Louis, four trunk lines operate four trains each way on practically identical schedules. It is safe to say that ten or twelve trains, at the most, would accommodate the passengers as well; and if by reason of mutual understanding and approval by the Interstate Commerce Commission, these trains were run at different hours in the day, instead of being run on identical schedules by each road, the public would be really benefited.

Very similar conditions exist between Chicago and St. Paul, where seven roads operate from two to three trains a day on identical schedules; and other cases might be given in illustration almost indefinitely. To illustrate how it affects the public, I might cite the case of a friend who wished recently to go from Chicago to Seattle. Three routes were open to him. Each could furnish a good train leaving in the forenoon and one late at night. This man, who knew nothing of railway service, said to me: "Why doesn't one of these roads run its train earlier in the evening, so as to get me to Seattle a little earlier and give me a little more time there?" I then had to explain that each of the three roads must, in order to compete with its rival, match the service of the others, assuming a schedule which would be most popular. The result, of course, was that while six trains were operated between Chicago and Seattle, a traveler wishing to make the journey had practically only a choice of two hours of departure at his disposal.

Some of my hearers might say: "Why do not the railways get together and adjust these matters?" The answer is that "getting together" is made as difficult as possible, and an agreement is not only binding on the parties, but is—we are told—in contravention of the Sherman Anti-trust law.

In freight schedules, in the same way, some absurd conditions exist. Between New York and Chicago five routes maintain a 60-hour schedule, although it is generally conceded by shippers that a schedule twelve or even twenty-four hours slower would answer all requirements of most important freight, if made with regularity. For any one road to go single-handed to a slower schedule would mean business suicide. For the five roads to agree together would mean a "midnight" injunction. And yet it is safe to say that just in such ways as these millions of dollars

As a concrete suggestion for the consideration of the Interstate Commerce Commission and our lawmakers as well, why wouldn't it be proper for the commission to require time schedules to be filed in the same way that tariffs are filed, subject—like them—to thirty days' notice, and subject to suspension by the commission? If the oft-repeated statement is true—that

And there are other ways in which money could be saved on

the railways, which, in the aggregate, would go a long way towards the million dollars a day which our Boston friend, Mr. Brandeis, suggested; ways in which our lawmakers, instead of making it more difficult, might make it a little easier. Why, for example, should our lawmakers in one breath pass a statute requiring the railways to equip all their freight, as well as passenger cars with air brakes, so that—as the act recites—every train shall be controlled from the engine by the engineer's hand on the brake valve—and in the next breath pass a law—as has been done in many states and is threatened in the Federal Congress—requiring the railways to put a third brakeman on every train? There is a thinly veiled suggestion that this third brakeman is for the protection of the train; and yet not a railway man in this country but knows that, far from being there for safety or any useful service, he is simply one more man to be jeopardized in case of accident; for, with few exceptions, railway hand-brakes are never used in road service.

And why—I may be asked—should the public be interested in seeing the railway companies make a fair margin of profit, either by increasing some or all rates, or by diminishing wastes in operation? The simple answer is that the railway is the greatest purchaser in the country. Indeed, for every dollar taken over the counter, 42 cents—on the average—is spent directly in wages, and another 26 cents is spent for material, raw or manufactured. And this comes out before the creditors receive interest on their loans or the owners any dividends on their property. It is axiomatic that there cannot be any degree of prosperity in this country with the greatest single industry in a bad way; but it is a truth which cannot be too often stated.

Another way to reduce expenses is to reduce the cost of materials to the railways, and in this we find the tariff is involved, so we come to the tariff question.

THE TARIFF QUESTION.

When the railways were asking for higher rates my slogan was: "Give us higher rates or a reduced tariff." Certainly the tariff question is one in which the railways are vitally interested—quite as much as the general public. The railways are paid for transportation in coin whose purchasing power to buy coal, ties, lumber, rails, iron and steel, locomotives and cars has been steadily diminishing. In only one commodity, namely, cement, has there been any gain to the railways in the last fifteen years; and yet railway men realize that this tariff question must be dealt with cautiously, sanely—not savagely or brutally.

Even granting, as I believe to be the fact, that our high tariff was a good economic scheme as a temporary method of fostering manufacture in a new country, and that when it was continued beyond that point it became a tax on the many for the benefit of the few, still the manufacturing business cannot readjust itself to sudden changes. To my mind, the most serious difficulty today with the business of the country as a whole is, not that conditions are bad, but that there is a lack of certainty as to what is to happen next. Manufacturing and commerce can adjust itself to reasonable changes, and if any policy, gradual or progressive in its nature, were adopted by this country along a definite program, there would be no difficulty in an adjustment from a high tariff to a low tariff or tariff-for-revenue basis. But it is the uncertainties of tariff and the uncertainty of law that makes for business unrest and dissatisfaction. It is to be hoped that with the help of the bi-partisan tariff board now sitting on this question, we may arrive at an adjustment of these difficulties sanely and progressively, to sound conclusions. And if business men will work together, this can be brought about.

And now we come to the consideration of the trust question

THE TRUST QUESTION.

The Sherman Anti-Trust Law is also a law which concerns the railways as vitally as it does the general public. We first experienced the rigors of this law, for although after its passage, twenty-one years ago, it lay inactive and dormant, like so many of our laws, it was first actively invoked against the railways. I confess to a prejudice against the law; I have never regarded it as a *sincere* piece of legislation. It has always seemed to me a piece of political *buncombe*, which was passed in order to furnish campaign material. Be that as it may, it is notable that the first important case under it was that brought at the instance of the shippers against the railways in the Trans-Missouri Freight Association case, decided by the Supreme Court in 1897, in a very close decision. In this decision, and that against the Joint Traffic Association two years later, an action was brought against the railways for having formed an association, the real purpose and effect of which was to hold rates from being cut by reason of an agreement between the roads to observe the Interstate Commerce Law and not to pay rebates or to adopt any of the methods or devices which the law then, as well as now, said were illegal.

It is small wonder, therefore, that railway men, who were thoroughly discouraged by the result of the Anti-Trust decisions in '97 and '99, laugh in their sleeves when they see the manufacturers and merchants who were their accusers then, haled into court now under the very same law. It is only human of us to say: "I told you so. Our turn came first; your turn was bound to come next." But, now that we have all had our turn at it, instead of calling each other names, might we not better get together and consider the law itself? I am well aware that a large part of the community believe that the law should be enforced; and, unquestionably, while it stands on the statute books, it should be, even if it is—as I have suggested—an insincere piece of legislation, never meant by many of those who helped to put it on the statute books, to be literally and absolutely enforced. Viewing the law even from the most generous and reasonable viewpoint of our Supreme Court, is it a sane piece of legislation, and is it in line with the development of industry everywhere; e. g., England, Germany, Belgium, etc.?

It is maintained by many that competition must not be stifled, and yet there is probably not a man in the United States who does not know the terrible extremes to which free and unlimited competition may finally lead. Is it better that the lion and the lamb should lie down together with some sort of a "live and let live" understanding, or is it better that the lamb should lie within the belly of the lion? I do not set myself up as knowing what this law means, but I do say that if it really means, sincerely and honestly, to say what its words appear to an ordinary layman to say, I am inclined to think that 90 per cent. of the business of this country is in contravention to it. Then, I ask myself, must the business of the country all be disrupted and a readjustment made? To paraphrase the Good Book, I might ask: "Is man made for the law, or is the law made for man?" Must grocers "A" and "B," on the same street, cut each other's prices on butter, eggs, and other commodities, in spite of the fact that they have come by common experience to see that they can't afford to do it; and if this sort of ruinous competition is kept up, the ultimate end must be the survival of the fittest. Can Smith and Jones be compelled to compete, in spite of their conclusion, that it is better to live and let live? May not Brown and Williams belong to a labor union under which they pledge themselves that they will not work for less than a stipulated wage? Is the Sherman Anti-Trust Law to be enforced against the A. & B. labor federation? And what has become of the promises and protestations of our republican friends who some two or three years ago were satisfied that the Sherman Anti-Trust Law should be amended in some important particulars, but who are now saying that it is just exactly right, and should be enforced; that the decisions of the Supreme Court make the law as clear as day (*sic*), and that anyone ought to be able to see how he can live within it?

These and many other questions appeal to every man of business, and, indeed, to any thinking citizen. To me it has appeared perfectly apparent that the competitive system can only operate successfully if the state is ready to protect, in some measure at least, the weaker against the stronger. And in saying this, I assure you I believe earnestly and heartily in competition as the

best spur to any man's intelligence, ingenuity and self-development, but I can't see the sense of a law which says that A. B. & C. must compete and yet does not protect B. & C. from annihilation by reason of the greed or greater business capacity of A. I can't see the sense of law which says that A. B. & C. may not combine, and yet, by reason of the complete annihilation of B. & C., allows A. to survive alone in their stead.

While I contend that unlimited competition cannot be permitted without some provision for protection of the weaker, I believe, by the same token, that when as a result of competitive methods or otherwise the law of competition no longer applies, the state should have some right of supervision. That might properly be one of the penalties of greatness. So long as a dozen concerns in the iron business compete freely, and the price of iron products is regulated by the natural laws of competition, the public is amply protected; but just as soon as competition is obliterated, and, by reason of combination of the dozen concerns, or by reason of the annihilation of eleven of them by one survivor, the law of competition is nullified, then might not the state properly step in? I am aware that when I suggest this my friends will say: "Ah, but this is a dangerous authority to give to any man or set of men! It is a dangerous menace to free institutions." And my answer is that while it is a great extension in the powers of government and one I really do not like to urge, yet it is exactly the authority which the Interstate Commerce Commission has over the railways today. The commission does not make rates, but it has a right to say that they are too high or to fix a maximum, and the right to say that they are discriminatory, which obviously gives them the right to say that they are too low, for too low rates may involve quite as serious discrimination as too high rates.

After all, the greatest safeguard which the public has to rely upon in public supervision, far more potent than state or federal commissions, and at the same time inexpensive, is *publicity*. Many a small manufacturer or merchant makes 25, 50, or even 100 per cent. profit. I have known in my experience many such cases. The public knows nothing of these profits and is apparently indifferent to them, but let these manufacturers go into a joint combination, or trust, and let them show by published reports that they make 8 or 10 per cent., and they will at once become the target of hostile attack.

Many may say that it is a short step from the supervision of prices by the government to the control of all business by the government, or what might be termed "state socialism." To my mind, however, there is a very wide gulf between private ownership and operation with public supervision and public operation. And yet private ownership is successful only so long as the incentive of a fair margin of profit exists. This incentive is a valuable aid to efficient methods, and, when the possible excesses of human greed are held in check by publicity and supervision, represents to my mind the ideal conditions. No private corporation would desire to be run as our municipal, state or federal governments are run. I do not mean that our private corporations are necessarily more honestly conducted, for that is not the point; they are most clearly differentiated. Rather is it the fact that in corporate management there is a necessary and indispensable relation between income and outlay, the cost of manufacture and service must be accurately determined, conditions which do not exist in governmental [illegible]

[illegible] government officials are less honest, but because there is [illegible] efficiency and economy prevail, but these are the exceptions and not the rule.

IN CONCLUSION.

After all we *need less law, not more law*. We need an intelligent revision of our entire code of law with the assistance of practical men who know whether the laws can be enforced, and lastly, we need greater respect for, and enforcement of, the law. We should insist that the government which sets itself up as a critic of all business methods shall adopt an efficient system of accounting, cost keeping, annual reports promptly issued in a form intelligible to every citizen, and give the business man a chance to know what he gets for his taxes. There is not a railway so poorly run that it does not issue to even its smallest stockholders a report of each year's operation. This is equally true of every important industrial corporation. Why should we not have the same sort of information about all government departments—federal, state, county and municipal.

My conclusion as to our trust law is that it is far behind the practice and necessities of modern business, as demonstrated by experience abroad, as well as here. The remedy is not in finding how to evade this law, however, bad it is, but a united effort to get an honest, sincere law which decent men can and will live up to. If business men believe this, why should we not come out in the open and discuss it?

I believe an important remedy of the conditions surrounding us is plainer speaking and more frankness. We, as business men, do not believe that business methods are bad as a whole—indeed, I think that business ethics are better on the whole than professional ethics. Before we talk of greatly extending governmental authority and multiplying bureaus (the expansion in the last twenty years has been almost beyond belief), let us insist on getting governmental methods a little nearer to the efficiency of ordinary business methods.

RAILWAY CAPITAL: BONDS VS. STOCKS.

BY WILLIAM Z. RIPLEY,
Professor of Economics, Harvard University.

The first railways in the United States were built from the proceeds of sales of stock. Only after demonstration that they were legitimate investments, rather than speculative enterprises, was resort to bond issues possible. And then, also, it took time to discover that raising part of the necessary capital by borrowing at a fixed rate of return, gave opportunity for concentrating all the surplus earnings upon a relatively small capital stock. The Baltimore & Ohio was largely financed by stock issues, a goodly proportion subscribed by the state of Maryland. The annual report of the road for 1844 showed $7,000,000 capital stock as against only $985,000 of bonds; and even five years later, its outstanding stock was twice as large as the bonded indebtedness. The southern states, led by Virginia, gave most of their aid in early days by direct stock subscriptions. Virginia alone took about $21,000,000 par value before the Civil War. In 1855 the total issues of stock in the United States exceeded the amount of bonds by 42 per cent. To this day, a large number of the original small New England roads comprised in the Boston & Maine or the New Haven systems have no bonded debt at all. Nearly three-quarters of the entire capital of the Boston & Albany in 1907 was still stock. These conditions are all vestiges of the earliest practice in railway financing in this part of the country. In a measure the practice persisted in [illegible] enterprises directed from Boston. The old Atchison road in the palmy days of expansion was largely financed by stock issues. A radical change ensued in the subsequent years. In New England and the middle states, and in the South after [illegible] public aid was usually given in the form of bonds, the stock being held in private hands.

The issue of bonds in railway construction first attained prominence between 1850 and the close of the Civil War.

Speculation was rampant. The railway net was being rapidly extended, almost without regard to economy of construction. And, most important of all, state aid was being widely granted, either through subscriptions to bonds, official guarantee of interest, or exchange of state and municipal bonds for railway bonds. Prior to 1870, the state of Massachusetts alone had loaned $11,290,000 in these ways. New York had taken $8,200,000, likewise in bonds. Southern states like Tennessee, had substituted bonds for stock subscriptions, as a stimulus to new enterprises. During the Civil War period, however, in the East, the financial center of the country, the huge issues of United States bonds, seem to have absorbed much of the loanable capital of the country. The Pennsylvania, New York Central and Illinois Central for example, either ceased augmenting or actually decreased their bonded indebtedness. Bonds were still the main reliance. In the pioneer enterprises with stock issues rather as a bonus than a mainstay. As soon as the war was over, and particularly upon the establishment of closer financial relations with Europe, bond issues reassumed prominence even in the East. Little European capital came to this country in any other form than mortgage loans. The late sixties, with the exploits of Jay Gould and his associates in the Erie and other properties, greatly augmented the proportion of bond issues as compared with stock. The Erie had always led in this sort of financing. Even as early as 1851 it had $14,000,000 of bonds outstanding, with only $6,000,000 of stock. Commodore Vanderbilt, on the other hand, was much averse to the issue of bonds by the New York Central; and was finally persuaded to do so only on condition that he buy and hold them himself. As for the trans-continental lines, such as the Union and Northern Pacific, no other resource than bond issues was possible; and the same thing was true of most speculative construction in the West. Matters went on thus until the chapter was ingloriously closed by the panic of 1873, when nearly $500,000,000 of bonds defaulted in interest.

The period of twenty years from the reorganizations incident to the panic of 1873, continued to show heavy reliance of railway financiers upon borrowing as a means of finance. This was especially true of the Trunk Lines during the period of the rate wars after 1874. The Baltimore & Ohio, which until this time had been conservatively mortgaged, became hopelessly involved in debt within a few years. By the late eighties, the percentage of its income absorbed by fixed charges, ran up from about one-third to nearly nine-tenths. With the beginning of official data for the United States in 1889, it appears that for the country as a whole, stock and bond issues had reached a rough equivalence; although in part of the South, in New England and the Far West stock issues still appreciably exceeded the bonded indebtedness. Above this proportion of equality, it was not possible for bonded indebtedness to go under the corporation laws of many states. Several years after this time the general trend was still in the direction of increased bond issues so far as new financing was concerned. To borrow, in other words, was easier than to secure stock subscriptions from shareholders. Mortgage indebtedness continued to grow at the expense of stock, wherever it was possible. The proportion of reasonable safety was exceeded in many cases, until the rude shock of another financial panic again restored a proper balance.

The four years of industrial depression following 1893, were marked by the bankruptcy and reorganization of a great many railways. No less than one-sixth of the mileage and one-quarter of the aggregate capitalization of the railways of the United States fell into the hands of receivers, because of inability to meet fixed charges out of current earnings. The unwise and reckless amount of borrowing in the preceding years is well evidenced by this fact. It was inevitable, therefore, that the extensive readjustments of railway capital incident to the reorganizations of this time should have as a prime motive the reduction of fixed charges in proportion to income. This reduction was effected by the exchange in many cases of bonds, on which default of interest had occurred, for preferred stock with a dividend lien contingent upon earnings.

Fifty-seven companies, reorganized during this period, effected a reduction of fixed charges to the amount of $19,600,000. The seven principal ones cut the proportion of net income required to meet fixed charges by nearly one-third. Atchison in 1895 lessened its fixed charges by $4,185,000; Northern Pacific in 1896 by $4,755,000. Prior to 1895 the annual increase in railway capital had shown usually a large preponderance of bonds. During 1895 a change took place, stocks increasing during that year $127,000,000 and funded debt only $28,000,000. For the year 1896 stocks increased $265,000,000, while funded debt actually decreased $45,000,000. The next year, for the first time in many years, the amount of stock outstanding exceeded that of the entire funded debt.

With the return of normal conditions in 1897, the trend in favor of bond issues instead of stock as a means of railway financing once more became pronounced. At the present time mortgage indebtedness has again so far increased as to constitute, in the opinion of conservative students, a menace for the future. The extent of this resort to bonds, rather than stocks, is shown by the accompanying table.

PAR VALUES—TOTAL OUTSTANDING SECURITIES, ALL RAILROAD CORPORATIONS—JUNE 30, 1906.

Funded Debt.	
Mortgage Bonds	$7,646,472,000
Collateral Trust Bonds	1,303,329,000
Income Bonds	167,698,000
Equipment Obligations	241,425,000
Plain Bonds, Debentures, Notes, etc.	571,760,000
	$8,930,687,000
Stock.	
Preferred Stock	$1,588,169,000
Common Stock	6,524,931,000
	$8,113,101,000
Total Outstanding Securities	$17,043,788,000

The complete reversal of the tendency during the lean years 1893-7 is made manifest. The two forms of capital, representing ownership and indebtedness respectively, remained about even until 1902; but since that year bond issues have so far predominated, that in 1907 they exceeded capital stock per mile of line by nearly ten per cent. Otherwise stated, there were outstanding nearly $5,000 more of bonds per mile of line than of share capital. Thus it has come about, that despite the relatively low rate of return upon bonds, fixed charges in the form of interest in 1907 absorbed fifty-three per cent. of the total charges against railway income on account of capital.

Only two exceptions to this trend in favor of bonds have occurred of late. For the year 1900 the increase in stock was more than two and a half times as great as the increase in funded debt; but, as the statistician of the Interstate Commerce Commission remarks, this can hardly be interpreted as a healthful tendency, since the increase in indebtedness alone exceeded the probable cost of railway construction during the year. During 1906, and perhaps as a result of President Roosevelt's campaign in favor of regulation of stock issues by Federal authority, four trans-continental roads alone speedily announced an increase of approximately $350,000,000 in share capital. This was a difficult time, when bonds for improvements, like the St. Paul extension to the Pacific Coast, were unsaleable. Funds could be secured only by issues of short term notes or of new stock, carrying valuable "rights" to participating shareholders. The publicly-announced change of policy of the Union Pacific road since the death of Mr. Harriman, whereby new financing will be accomplished by stock issues rather than the sale of bonds, is significant. There is general recognition of the fact that mortgage indebtedness has been excessive during the decade to 1910.

Several distinct causes for this relative preponderance of bond issues in recent years are traceable. These causes are quite different from those of the extensive bond issues at a genera-

tion after the Civil War. In those years stocks were almost always below par. To issue new stock at par was an impossibility. To issue it for less than that figure entailed heavy financial loss. Bonds alone could be issued to sell at or near their face value. This condition has radically changed now-a-days. The general level of market prices of high grade railway stocks is now well above par. It would appear as if it would be easier to raise new capital by sales of shares. That it has not been done requires some explanation. In the first place, prolonged relative prosperity and steady growth of income always invite increased borrowing. Bonds are readily saleable in good times. Capital borrowed yields larger returns than prevalent interest rates, on the loans; and stockholders are liberally rewarded by focusing these increased earnings on a fixed capital stock. Also, it is far easier to insure continued control of a property with a relatively small capital stock, if closely held. If not thus held, of course, a small capital stock renders speculative raids the more easy. This is well exemplified by the pitiful history of the Cincinnati, Hamilton & Dayton. New bond issues do not invite speculative raids, such as that by which the control of Louisville & Nashville was secured in 1902. Moreover, sale of bonds only can be resorted to either for drawing upon European stores of capital, or the huge investment surpluses of the great insurance companies and savings banks. Stock sales are more apt to be restricted to private investors; while institutions and trustees, even in the most conservative states like Massachusetts, are often permitted to purchase railway bonds, if properly secured and if not issued in excess of the outstanding capital stock. Hand-to-mouth financing also usually leads in the direction of mortgage loans. Great enterprises like the Pennsylvania or New York Central terminals in New York, extending over many years of construction, may at any time be embarrassed by an abrupt cloture of financial resources. Forced repeatedly, as in 1903, 1906 and 1907, to the issue of short term notes at high rates of interest, in order to carry out interrupted undertakings, these loans at maturity have been refunded by the sale of long-term bonds under more normal conditions.

The contrast between old-fashioned financing on the basis of a share capital with a small debt, and modern resort to large borrowing was never more strikingly illustrated than in the reorganization of the Chicago & Alton road after 1898. Under a conservative management eight per cent. dividends were paid upon a small capital, and the surplus earnings were used either for improvements or to diminish the bonded debt. Within seven years to 1906, without change of the capital stock, by a complicated series of questionable operations, the bonded debt was expanded from $33,900,000 to $114,600,000.* Leaving details as to the public phase of such transactions aside for future consideration, the important point to note is that by substitution of new low-rate long-term bonds for maturing high rate ones, the increase of fixed charges was still kept within the bounds of net earnings. Interest charges were in fact expanded from $2,790,000 to $3,470,000, or less than one-quarter. In the meantime the total bonded debt had increased more than threefold. The company was safely solvent, to be sure; but all earnings now went to bonds instead of primarily supporting a large share capital. And this share capital once possessing real investment worth was now degraded to a speculative foot ball. This extreme example of land rather than stock capitalization is valuable as [illegible] the motives at work in the period of prosperity after 1900. A bond was a bond,—without inquiry as to its character or security. They could be disposed of in unlimited amounts almost without question.

The main reason for the recent relative expansion of bond issues, however, is their intimate relation to the consolidation of once independent properties into great systems. Analysis shows that among these extensive recent borrowings, collateral trust bonds have played a very large part. One railway after another, beginning with the New York Central purchase of the Lake Shore in 1898, has acquired connecting companies by offering its own bonds, secured by deposit of the purchased shares as collateral, in exchange for the stock of the merged company. An enormous volume of such bonds, constituting mortgages, not of real property but of other securities, has been put forth since 1899. About 15 per cent. of the entire indebtedness of active companies in 1906 was collateral trust bonds of this sort, aggregating $1,303,000,000. These securities are of course merely duplication of pre-existing issues and, as already explained, cannot be regarded as expanding the railway capitalization of the country by anything like their face value.

Finally it should be noted that a large proportion of these bond issues since 1901 have been of the so-called convertible sort. Such bonds after a certain specified date, as their name implies, may be exchanged for capital stock at an agreed ratio.

The reasons for the popularity of the convertible bond, revived after more than a generation of disuse, are numerous. But their appeal to speculatively-minded investors, tempted in an overloaded market since the appearance of the great industrial companies by other forms of investment, and their usefulness in permitting gradual growth of share capital through conversion, *pari passu* with the growth of earnings incident to extensive improvements, are sufficient for mention in this connection. Were these convertible bonds to be withdrawn from our account, the apparent over-expansion of railway borrowing in proportion to share issues would be materially reduced. And yet, despite all these considerations, the rapidly augmenting mortgage indebtedness of American railways in recent years deserves serious attention.

Evidences are not wanting that the pendulum is at last once more swinging away from borrowing as a resource for new capital. At the end of 1909 large issues of capital stock have been put forth by such roads as the Pennsylvania, New Haven, New York Central and Chicago & Northwestern. Some of these companies, like the New Haven, were waterlogged with bonds, until they had violated the provisions of Massachusetts laws aiming to keep funded debt less than share capital. Some were so rapidly expanding their earnings that a broader dividend basis was evidently warranted, or was at all events expedient in order not to excite public comment by high rates of earnings upon the existing capital stock. And pending Federal legislation, contemplating an official oversight and control of all capital issues in future, probably was not without effect. Whether such a reaction in favor of stock issues may be expected to assume large proportions, so long as great industrial companies are bidding for new capital in competition with railways, will remain to be seen.

The proportion of stock to bonds in different parts of the country varies widely. But it may be noted in this connection that in 1907 funded debt constituted only 52.3 per cent. of the total in New England. It ranges about the same in the Middle Atlantic states; and is lower only in the trans-Missouri territory; where by reason of the exceptionally low bonded debt of the Great Northern system, mortgage indebtedness is less than 47 per cent. of the total capitalization. In the southern states, on the other hand, the proportion of bonds rises to the extreme of 64.5 per cent. Difference between individual companies are often striking. An abnormally high bonded indebtedness occurs in the following companies, the percentage of capital stock to total capitalization in 1907 being given in each case: For the Atlantic Coast Line, 26; the Louisville & Nashville, 32; the Northern Pacific, 34; Chicago, Burlington & Quincy, 39.6; the Wabash, 43.6; the Baltimore & Ohio, 45; the Illinois Central, 53.8. The opposite extreme of a high proportion of share capital in relation to bonds is exemplified by the Great Northern with 58 per cent., and the Union Pacific with 75 per cent. of its capitalization in the form of stock.

*[illegible] is described in an article on Stock Watering in the [illegible], October, 1911, p. 706 *et seq.*

BROWN'S DISCIPLINE.

A correspondent in the Northwest asks us to inform him about Brown's Discipline—discipline for railway employees without suspension from duty. Fifteen years ago this was a live subject, but latterly we have assumed that this method of managing the punitive part of railway discipline, being in force on many thousands of miles of railway, was pretty well known; but the present inquiry, with others which reach us occasionally, indicate that perhaps there is need of a little more explanation.

The essential features of the system are (1) a record of demerits to be kept against each employee, one demerit being estimated as equal to one day of suspension, as practiced under former conditions where suspension was the punishment for offences too grave to be settled by reprimand and not sufficiently serious to warrant dismissal; (2) a rule by which a certain aggregate of demerits shall subject the employee to dismissal, or at least to the consideration of the question of dismissal, by the superintendent; (3) (on some roads) a clear record for twelve months, or some given number of months, serves to wipe out demerits previously accumulated; (4) bulletins, omitting names of persons, describing cases of negligence or misconduct for which employees have been charged with demerits, these bulletins to be posted at division headquarters for the instruction of all employees.

The Louisville & Nashville, which abolished suspensions many years ago, still keeps up the practice of issuing, for the benefit of employees, an annual circular, giving the results of the operation of the system for twelve months; and from the last annual pamphlet of this kind we quote the following:

Number of employees subject to the system—

Enginemen	1,350
Firemen	1,485
Conductors	1,004
Brakemen	2,233
Baggagemen	128
Porters	136
Yardmen	1,775
Hostlers	129
Operators	1,060
Agent-operators	378
Callers	70
Towermen	43
Draw tenders	20
Section foremen	862
Bridge foremen	104
	10,777

Number of "book suspensions" (491 twice, 203 three, 70 four, 30 five, 4 six, 7 seven, 1 eight and 1 nine times) 4,904

Wages saved to employees—

552	enginemen	11,041 days	$50,425
234	firemen	3,248 days	7,838
571	conductors	10,215 days	37,180
706	brakemen	9,880 days	22,701
32	baggagemen	450 days	1,060
9	porters	95 days	106
794	yardmen	12,040 days	32,337
62	hostlers	1,087 days	2,583
7	switch tenders	80 days	134
2	towermen	40 days	80
61	callers	765 days	970
253	operators	5,075 days	9,294
68	agent-operators	965 days	1,654
99	section foremen	2,125 days	3,693
1	bridge foreman	20 days	56
			$170,117

Number of reprimands	465
Number of discharges, accumulated bad record	9
Number of discharges, other causes	952
Number of credit marks given	18
Number of suspensions cancelled	569

It will be understood that the amounts entered under the heading of wages saved represent the sums which the men would have lost if they had been actually suspended and required to lie off, instead of being subjected simply to a "book suspension."

Following are extracts from the Louisville & Nashville.

DISCIPLINE RULES.

". . . Disloyalty, dishonesty, intemperance, insubordination, willful negligence, making false reports or statements, and concealing facts concerning matters under investigation, will be dischargeable offenses. . . .

"A discipline record book will be kept in the superintendent's office. . . . There will also be kept in this book a credit account, in which record will be made of excellent conduct, deeds of heroism, loyalty, etc.

"Bulletins will be issued weekly, stating the cause for each case of discipline. . . . Where the company's property is damaged by a failure to observe the rules, or by carelessness, the expense to the company will be shown in the bulletin.

"A book giving a history of each employee from the time he enters the company's service will be maintained. . . .

"A suspension of fifteen days or less charged against an employee will be considered cancelled by a perfect record for one year. A suspension of more than fifteen and not to exceed thirty days will be considered cleared by a perfect record for two years. Suspensions amounting to more than thirty days and not to exceed sixty days will require three years clear record for their cancellation. Suspensions in excess of sixty days, occurring in a period of one year, will call for the special consideration of the board.

"A complimentary bulletin will be issued every twelve months in the prescribed manner, giving employees who have a perfect record for one year a special credit." [Each such employee is named in the bulletin.]

A sample complimentary bulletin lies before us, being that for the Kentucky division for the year ending on October 1 last. In this we find 33 names of enginemen, 49 of firemen, 5 of hostlers, 3 of engine watchmen, 30 of conductors, 70 of station agents and operators, etc.; the list including brakemen, switchmen, train baggagemen, train porters, yard masters, section foremen and carpenter foremen. Discipline of station agents is not recorded in bulletins like that of trainmen, but a notice, similar to a bulletin, is mailed to each agent. Similar action is taken in the case of train despatchers. In this division bulletin a telegrapher, two brakemen, a section foreman and an agent are specially commended, by name, for discovering dangerous defects in moving trains. A broken wheel and a broken truck discovered by the brakemen were in trains other than their own.

On the general question of how "Brown's discipline" is faring in the country as a whole we find no evidence of any marked change since the publication of our brief survey of the subject in our issue of August 20, 1909. This reform makes rather slow and halting progress, like woman suffrage. Indeed a parallel between the two is suggested. In the field of political ethics, as in that of the relation of railway officers to their employees, people seem to find it difficult to reconcile theory and experience. Woman suffrage is making progress in spite of weakness in its doctrines and in spite of the strength of the arguments against it, because its theory is hard to refute. And the abolition of suspensions finds favor for a similar reason. Officers who suspend offenders claim for that plan a high measure of efficiency; but at the same time no one is able to shake the unanswerable dictum that an employee who cannot be disciplined without being deprived of a month's wages is a low-grade man who ought to be dismissed.

The line from Nagoya, Japan, to Hachioji, near Tokyo, has been opened to traffic. This mile is 224 miles long and represents an outlay of $17,500,000. There are 95 tunnels, with a total length of 113,378 ft. The tunnel on the Sasago pass is over two miles long. This is the longest tunnel in Japan. There are 350 bridges on the line with a total length of 24,265 ft. The Torii tunnel is situated 3,189 ft. above sea level, which is the highest point reached on any Japanese railway. There are 506 small bridges and 47 stations on the line. Construction work has been very difficult, as the line traverses mountainous country almost entirely.

TRAIN ACCIDENTS IN OCTOBER.[1]

Following is a list of the most notable train accidents that occurred on the railways of the United States in the month of October, 1911. This record is based on accounts published in local daily newspapers, except in the case of accidents of such magnitude that it seems proper to write to the railway manager for details or for confirmation.

Collisions.

Date.	Road.	Place.	Kind of Accident.	Kind of Train.	Kil'd.	Inj'd.
2.	Atch., T. & S. F.	Crozier.	hc.	P. & F.	1	1
5.	N. Y., N. H. & H.	Great Bar'ton.	xc.	P. & F.	0	4
9.	Boston & M.	Amesbury.	hc.	P. & F.	0	20
10.	Cleve., A. & Col.	Foleys.	rs.	F. & F.	1	0
10.	Balt. & Ohio.	Worthington.	hc.	F. & F.	0	7
13.	Balt. & Ohio.	Chicago.	rc.	F. & F.	2	0
13.	C., C., C. & St. L.	W. Liberty.	rc.	F. & F.	1	0
13.	Penn.	Marble Cliff, O.	rc.	F. & F.	5	6
14.	N. Y., N. H. & Hart.	Berlin.	xc.	F. & P.	2	5
15.	Missouri Pac.	Gilmore J'c'n.	hc.	P. & F.	7	22
20.	Texas & P.	Marshall.	xc.	P. & F.	1	16
22.	N. Y., N. H. & H.	Hartford.	xc.	P. & F.	0	5
28.	Union Pac.	Rock Springs.	hc.	P. & F.	3	12
29.	Chi. G. West.	Randolph.	rc.	P. & F.	1	3

Derailments.

Date.	Road.	Place.	Cause of derailmt.	Kind of Train.	Kil'd.	Inj'd.
2.	Del., L. & W.	Ray.	b. rail.	P.	0	0
3.	West. Md.	Intersection.	.....	P.	0	16
3.	Atch., T. & S. F.	Laguna.	d. track.	P.	2	4
6.	W[illegible]	Delphi.	ms.	F.	0	0
8.	[illegible] & O.	Lingo.	.....	F.	6	0
8.	Atlanta & W. P.	West Point.	unx.	P.	0	2
8.	Cent. Ga.	Buchanan.	malice.	P.	3	25
10.	Seaboard A. L.	Cordele.	.....	P.	0	21
10.	Del., Lack. & W.	Del. Water Gap.	b. wheel.	P.	0	2
[illegible]	Chi., R. I. & P.	Malvern.	unx.	P.	1	17
12.	[illegible]	Bellingham.	.....		[illegible]	3
12.	Cent. Ga.	Fort Valley.	malice.	P.	0	5
17.	N. O., Mobile & C.	McLain.	unx.	P.	1	30
18.	Trinity & B. V.	Normangee.	cow.	F.	1	2
18.	Balt. & Ohio.	Lore City.	b. rail.	P.	0	3
[illegible]	Balt. & Ohio.	Columbus.	b. wheel.	P.	0	2
20.	Knoxv. & B.	Morristown.	d. track.	P.	0	4
20.	P., C., C. & St. L.	Indianapolis.	ms.	P.	1	7
[illegible]	Chi., M. & St. P.	Chicago.	boiler.	F.	0	4
28.	Trinity & B. Val.	Ventura.	boiler.	F.	[illegible]	0
28.	Chicago & E. I.	Attica.	unx.	F.	1	[illegible]
29.	Cin., H. & Dayton.	Xenia.	unx.	F.	[illegible]	0
[illegible]	Fort Worth & D.	Bellevue.	malice.	P.	[illegible]	0
30.	[illegible]	[illegible]	d. wheel.	P.	0	50

The most important accident in this list is the collision which occurred at Gilmore Junction, Neb., on the fifteenth, in which seven persons were killed. This accident was reported in the *Railway Age Gazette* of October 20, page 802. The circumstances were investigated by a coroner's jury, and we have the somewhat unusual result of a verdict in which the main cause of the collision is correctly stated. It will be remembered that, according to the original account, the conductor and engineman of the freight left South Omaha without examining the train register. The coroner's jury finds that, in addition to this, these men [illegible] from No. 155, at South Omaha, [illegible] which was to be met at Gilmore Junction, and [illegible] further find that the poor keeping of records at [illegible] is not a sufficient excuse. The [illegible] goes on to give further particulars, and in [illegible] points out a lack of necessary knowledge of train [illegible] that the conductor had had experience with train registers, and [illegible] the difference (or lack) between the [illegible]

[illegible]

of preventing collisions and the use of an efficient block system, will recognize the force and the exact accuracy of the main statement quoted above.

In the rear collision at Marble Cliff, Ohio, on the thirteenth, an eastbound freight train ran into the rear of a work train, and the victims were laborers riding in the caboose of the work train. This caboose was an ordinary box car and was occupied by 24 men. It was crushed by the engine of the freight and nearly all of the victims suffered wholly from scalding by steam from the engine.

The collision at Berlin, Conn., on the fourteenth was due to a freight train of fifteen cars becoming uncontrollable while being switched at a station which was on a steep grade. The cars had run only about 2,000 ft. when they struck a standing passenger train.

In the collision at Rock Springs, Wyo., on the twenty-eighth a westbound freight train standing on a side track was run into by an eastbound passenger train. This was caused by the misplacement of the switch leading to the side track immediately before the passenger train reached it; this having been done by a brakeman, who, for some unaccountable reason, thought he was throwing another switch.

In the derailment at Malvern, Ark., on the eleventh a passenger was killed, the rear car of the train having been overturned. It is supposed that the derailment was due to a defective frog.

The train derailed at Xenia, Ohio, on the twenty-ninth was a freight train drawn by two engines, and the accident happened on a trestle 50 ft. high. Eighteen cars fell to the bed of the stream below. The engine and thirteen cars passed over the bridge safely.

Electric Accidents.—Of the thirteen accidents to electric cars reported in the newspapers as having occurred in the United States in the month of October, three are reported as resulting fatally. At Rochester, Mich., on the ninth, in a butting collision, two persons were killed and eleven injured. It is said that the collision was due to the wrong indication of the motorman's watch and that the failure of the watch was caused by its having become magnetized. At Philadelphia, Pa., a car was derailed because of excessive speed on a bridge, killing the motorman; and near Steubenville, Ohio, a motorman was killed in a collision in a dense fog.

Construction work is under way on the first railway in Uruguay for which Americans have obtained a concession. This is the Trans-Uruguayan Railway, and is being built by the Pan-American Transcontinental Railway Company, New York. The main line, which will be about 370 miles long, starts from Colonia, opposite to Buenos Aires, Argentina, and runs almost due north to San Luis, on the northern frontier, where it will be linked up with the Brazilian system. The concession also provides for an extensive scheme of agricultural colonization along the line. The total mileage, including branches, will be 425. Work began in the central section some months ago and is being pushed forward north and south simultaneously with remarkable rapidity, over 1,000 men being employed. Steamers are arriving weekly from New York with large cargoes of railway material, all of American origin; 50,000 tons of rails have already been shipped and the bridges and other structures will call for a further large amount of steel material. Eight hundred thousand ties of Louisiana oak have been purchased, and a steamer recently arrived, bringing a record load of [illegible] ties for the border. Cement for the station comes from New York. The rolling stock, on a large scale, is being supplied by American firms. About one-half of the line receives a state guarantee of 5 per cent. on the construction capital, but the remainder is without guaranty. It is hoped to have the first section of 30 miles, from Durazno to Trinidad, open to traffic in December. The entire line will take some years to complete.

Shop Section.

THE publisher of the *Railway Age Gazette* has bought the *American Engineer and Railroad Journal,* the oldest and best monthly railway mechanical paper in the world, and will continue it as an independent publication. Beginning with the January, 1912, issue of the *American Engineer,* the Shop Section of the *Railway Age Gazette* will be transferred to the former paper, and all subscriptions to the Shop Edition of the *Railway Age Gazette* will be filled by substituting the *American Engineer.* The reason for this change is that our work in the interests of shop efficiency and economy has grown to such proportions that the results, when reduced to type, have become too great a burden for any one issue of the *Railway Age Gazette.* Again, our plans for the future with respect to mechanical department problems that must necessarily be covered thoroughly in the columns of the *Railway Age Gazette,* because of their value and interest to officers in other departments, influenced the change. While it will now be necessary for most of the mechanical department officers to read both the *Railway Age Gazette* and the *American Engineer,* the publisher feels that they will be amply repaid. As to the shop foremen and others more directly concerned with railway shop matters, the change will be decidedly for the better. The *American Engineer* will not only continue the prize competitions and other special features of the Shop Section of the *Railway Age Gazette,* but more pages will be added to include news of a kind that has been barred in the past through lack of space.

WE owe an apology to those who contributed to the shop kink competition which closed September 15. The number of kinks which was received was so large and some of them were so similar to kinks which we had previously described that the judges, owing to the pressure of other affairs, have been unable to render a decision in time for announcement in this issue. We trust that this delay will be overlooked on the part of those who are interested.

A SHOP kink competition will be held, closing March 15, 1912. As in the previous competitions of this kind a prize of $50 will be awarded for the best collection of three kinks; more than this number may be submitted allowing the judges to select what they believe to be the best three in each collection. A prize of $25 will be awarded for the second best collection, and other collections that are accepted for publication will be paid for at our regular space rates. Shop kinks may be submitted which are used in any shop, repair yard, or department under the control of the mechanical or motive power officers. Blueprints, drawings, photographs or rough sketches may be used as illustrations.

ALTHOUGH the results in the recent competition on reclaiming scrap material were very satisfactory, yet there were many phases of the question which were not considered, and we have been asked to have another competition on this subject. It will close February 15, 1912, and a prize of $35 will be given for the best article and one of $20 for the second best. Other articles which are accepted will be paid for at our regular space rates. The results of the first competition on this subject were published in our issue of September 1, 1911. A careful study of these articles will undoubtedly suggest ways in which other shop foremen can consider this question to advantage.

TOO much importance cannot be placed on the necessity for not only providing safeguards for dangerous parts of machine tools and other shop equipment but also in training the workmen not to abuse them. George Bradshaw, the author of the article on Shop Safety Appliances and Safety Education, on page 1115 of this issue, has had a wide and extended experience on investigating the causes of accidents on railways and in railway shops. His experience has been that no safety appliance is safe in the hands of an unsafe man. Many preventable accidents are not due so much to the lack of safety devices, as to indifference and negligence on the part of the employees.

THE Paint Shop Practice competition, which closed November 15, was very successful. The first prize of $35 was awarded to C. E. Copp, master painter of the Boston & Maine, Lawrence, Mass., who submitted an article on Paint Shop Practice. The second prize of $20 was awarded to J. H. Pitard, master painter, Mobile & Ohio, Whistler, Ala., who submitted an article on The Protective Value of Paints for Steel Structures. The other competitors were T. J. Hutchinson, foreman painter, Grand Trunk, London, Ont., on Freight Car Painting; A. G. Pancost, draftsman, Elkhart, Ind., on Paint Shop Kinks; N. J. Watts, foreman engine painter, Nashville, Chattanooga & St. Louis, Nashville, Tenn., on Locomotive Painting; and J. H. Whittington, master painter of the Chicago & Alton, Bloomington, Ill., on Coach Cleaning. The first and second prize articles appear in this issue; the others, all of which are of a high grade will be used in later issues.

DO not forget the competition that closes December 15, a full announcement of which was made on page 886 of our issue of November 3. The railways have been forced to practice the strictest economies during the past year and the necessity for increasing the efficiency of the mechanical department by cutting out all waste and lost motion, has been very great. We want a number of good articles telling of improvements which have been made during the year in any shop or department which is interested in the repair and maintenance of locomotives, cars or other mechanical department equipment. It is not necessary that the person who contributes the article should have originated the scheme or improvement which is described, but the author of such an article should in all cases try to give the proper credit for it. As noted in the last Shop Section, the article may include the description of any improvement that has been made in the shops, engine houses, or repair yards, whether in the organization, in the methods of operation, rearrangement of equipment, new devices or shop kinks, the reclaiming of scrap material, or any other feature which may have increased the efficiency of the department in which it is used. A prize of $35 will be awarded for the best article and one of $20 for the second best article. Other articles which are accepted for publication will be paid for at our regular space rates.

MR. SYMONS is correct in his suggestion in a letter in this issue that we did not make one of his statements quite clear in reporting his paper on "The Practical Application of Scientific Management to Railways," which he read before the October meeting of the Franklin Institute. This was purely unintentional on our part. By a rough process of elimination he reduced the number of employees on a railway, to which scientific management might possibly be applied, to one group, the machinists and other shop employees. He then went on to say that scientific management could be applied to only a small proportion of these. If we restrict the meaning of scientific management to include only the

detailed methods which are used by Mr. Taylor, and which are being applied in such establishments as the Taber Manufacturing Company, then Mr. Symons' estimate as to the possible number of railway employees to whom it could be applied is generous. But he goes on to show that the application of scientific management methods on the Santa Fe did not produce the results claimed for it. Scientific management as applied to that road is not at all similar to the methods which are used by Mr. Taylor, but is a modification of them. If we accept the definition of scientific management implied from the first part of Mr. Symons' paper we would be forced to the conclusion that no such thing as scientific management was ever used on the Santa Fe. While the Santa Fe may not have profited very much by the betterment methods, yet there is much in the methods which were used that is good. At any rate it must be admitted that the railways at large have found many things in the Santa Fe practice which they have been able to apply to advantage. Mr. Symons should not overlook the fact that there are no signs of labor trouble in the mechanical department of the Santa Fe, although most of the roads in that territory are now having difficulty in this respect. Mr. Milner was not criticizing Mr. Symons' paper when he spoke of the cost of turning tires, but rather added to or amplified it.

THE RIGID FREIGHT CAR TRUCK.

THE relation between freight car truck design and truck maintenance has never been properly analyzed, and the indefinite and often erroneous opinions on the subject have led to a variety of designs for freight trucks, which differ greatly in essential principles. Some of these are correct in design and, therefore, economical in maintenance and operation, while many others are the opposite. The arch bar truck with the transom bolted or loosely fitted, so universally used in the older and lighter freight equipment, has served as a type or model for the more recent designs with cast steel side frames and loosely connected transoms. The paramount idea governing such design has been that in making truck repairs the bolster could be easily removed and the sides readily disconnected from the transom. This form of construction may be termed the loose-connected truck. The cast or pressed steel side frames have also been used in numerous designs where they are rigidly connected by rivets to the transom, and such designs may be termed rigid trucks.

The latter type of construction was adapted to the ordinary arch bar truck side prior to 1888 in the Thielsen truck, which was used in large numbers by the Burlington and North Western systems, and is now in service under many thousands of their cars. In this truck the arch bars are held square by two vertical channels, and the rigid attachment to the sides has a large rivet area. Theoretically, the rigid truck, which maintains the axles parallel and the wheels normal on a curved track, should cause the least flange friction, and, therefore, less rail and flange wear and less tractive resistance than the loose truck which does not follow the curve with the wheels normal to the rails. The economy of the rigid truck, due to these advantages, should more than offset the savings resulting from the greater convenience and ease of repairs which has always caused shopmen to be partial to the loose truck.

An interesting discussion of these relations will be found in the paper on "Some Experiments on Trucks," by George G. Hood, read at the September meeting of the Western Railway Club, and partially reproduced in another part of this issue. The author is to be congratulated on his intelligent study of the subject and on the clear manner in which he has discussed a question which is rather difficult to treat in a readable and interesting way. He has fairly considered the merits of each type of truck, and his reasons and statistics, strongly favoring the rigid type, were not controverted by any serious remarks in the club discussion. The paper principally refers to the tests on the friction of freight trucks on curves made by Professor L. E. Endsley at Granite City, Ill., which were fully reported in our issue of March 24, 1911, page 691. The reasons which led up to that test were stated as follows:

The railway literature gave little in the way of information, and there seemed to be no record of experiments or tests along the line under investigation. The railway men consulted were so at variance in their opinions and presented so little tangible and reliable data that this source of information was also disappointing. The facts as far as obtainable pointed strongly to the rigid truck as being the most scientific in construction, but to just what degree it was better, had not been determined. It was, therefore, decided to make an elaborate investigation of the subject by actual test. As many thought it desirable to have a loose connection between the transom and the frame for the purpose of easily replacing the truck bolster on account of failure, it was decided to check up the records of two companies which had sold 1,700,000 truck bolsters in 15 years, under a guarantee of five years' service. It was found that the replacement under the guarantee amounted to only one bolster on 500 cars in five years, or one-tenth of 1 per cent., and the cost of dismantling and reassembling the riveted joint would be less than five cents per car per year, an item so insignificant that the design or construction merely for the purpose of easy exchange of truck bolsters may be regarded as unnecessary. The merits of the two types of trucks, rigid or loose, must, therefore, rest on their tractive qualities and not on the cost of repairs to bolsters. For this reason the tests of the relative friction of such trucks on curves were undertaken.

A number of facts were developed during the test which were not set forth in the published report, and some of these are discussed in the abstract of the paper which we publish in this issue. In the discussions at the September and October meetings of the Western Railway Club, the advocates of the loose truck, although they admitted that it did not track well on curves and caused more friction, claimed that on tangents the reverse was true. The rigid truck was also regarded as dangerous on account of its tendency to derailment. No reference was made to authentic tests sustaining these theories, and these objections to the rigid truck are met more easily by a comparison of freight trucks with passenger and engine trucks. It is a common experience that freight trucks under loaded cars on curves produce a screeching sound with a high note, indicating excessive flange friction, undue wear of wheel flanges and rail, and increased train resistance. This must be due to the fact that the wheels are not normal to the curve, but tend to advance in the direction of a tangent. The operation of passenger trucks on the same curved track is not attended by the noise referred to, and it is fair to conclude that they operate with much less flange friction. All passenger trucks are rigid in the sense used in this discussion, and the constant effort is to maintain them square and rigid by means of knee-irons and wide gusset plates to prevent sharp flanges as far as possible. Six-wheel passenger trucks have a rigid wheel base twice as long as that of the average freight truck, but they move smoothly and quietly on curves and tangents, and if they did not, and tracked like many loose freight trucks, it would not be possible to run passenger trains on the present fast schedules.

Improvements in freight equipment should naturally follow passenger design so far as principle is concerned, and that form which has proved so successful in the severe requirements of passenger service should answer well for freight service. The same argument can be used in meeting the claim that rigid freight trucks are more liable to derailment than loose ones, and a further proof of the incorrectness of the opinion may be found by reference to the service of the four-wheel trucks under the front end of locomotives. These have a wheel base only about 10 in. longer than that of freight trucks, and they are more rigid and held more accurately in line than is possible with a freight truck. The four wheel engine trucks are used for the very purpose of guiding the locomotive and preventing derailment. The first remedy proposed to prevent the tendency to de-

railment of a locomotive is the application of a four-wheel square and rigid engine truck, and this has come to be regarded as the essential type of truck in the wheel arrangement of passenger locomotives on account of its safety feature with regard to derailment. It is difficult to understand, therefore, why a rigid freight truck should be considered objectionable in this respect. The Granite City tests showed that a truck which is square and rigid, so as to hold the axles radially with the curve, will cause considerably less resistance than a loose truck. As there is in service a very large number of loose freight trucks, and it seems to be the prevailing type under new equipment, and as there is no general agreement among mechanical officers as to which type of truck is best, it is important that an elaborate and serious investigation of this subject should be made by the railway companies.

MECHANICAL ARTICLES DURING NOVEMBER.

THE following articles of special interest to mechanical department readers, and to which Shop Number readers may wish to refer, have appeared in the weekly issues of the *Railway Age Gazette* since that of November 3, 1911:

Mallet Locomotives for the Southern Pacific. The Southern Pacific has recently received 12 Mallet locomotives for use in passenger service on the Sacramento division of the Central Pacific. Each of these will replace two ten-wheel engines, thus avoiding the necessity of double heading passenger trains. The locomotives were described in detail in the issue of November 10, page 952.

Electric Power for Railway Shops. Abstract of a committee report presented at the Chicago meeting of the Association of Railway Electrical Engineers. The best type of electric power is considered for different railway shop uses. November 10, page 955.

Extension Car Step. Description of a device for use on passenger cars in place of the step box. November 10, page 962.

Combustion Chamber and Hollow Brick Wall. An account of tests made on the Central of Georgia with this device, which was designed by F. F. Gaines, superintendent of motive power, and a description of its application to a ten-wheel freight locomotive on the Chicago Great Western. November 10, page 963.

War Department Endorses Scientific Management. A modified form of the Taylor system of shop management has been in use in the Watertown, Mass., arsenal for two years. The article contains abstracts from the report of Brigadier General Crozier, giving a brief outline of the methods used, together with some comments by Secretary of War Stimson. November 10, page 966.

Steel Postal Car Design. The weight of American passenger cars is excessive and should not be exceeded in new designs. Designs should be developed for future postal cars which will furnish maximum strength and stiffness for a given weight. November 17, page 983.

Fireless Locomotive. Description of a steam storage locomotive which has recently been constructed for the National Cash Register Company. November 17, page 990.

Electric Train Lighting. Abstract of an extensive report on this subject which was presented before the recent meeting of the Association of Railway Electrical Engineers. November 17, page 991.

Flexible Metallic Roof for Box Cars. A description of a type of roof which has been designed for greater flexibility than wood and which will have a longer life. November 17, page 997.

External Locomotive Throttle. W. F. Buck, superintendent of motive power of the Atchison, Topeka & Santa Fe, has designed a valve, primarily for use on locomotives equipped with superheaters, which will overcome the disadvantages of the common inside throttle valve. November 17, page 999.

Leakage of Grain from Box Cars. Suggestions are made as to how the loss from this cause, which is a matter for serious concern, may be reduced to a minimum. November 24, page 1040.

Proposed Specification for Postal Cars. This specification has been drawn up by a sub-committee of mechanical officers of the Special Committee on Relations of Railway Operation to Legislation after a conference with a committee from the Post Office Department and the chief engineers of a number of car building companies. The committee will hold a meeting in Washington on December 4 to consider any modifications that may be suggested. November 24, page 1049.

Economies Effected by Mallet Locomotives on the New York Central & Hudson River. The introduction of twenty-six Mallet locomotives has increased the operating capacity of the single track Pennsylvania division 40 per cent. without the construction of a single mile of track. This type of locomotive was adopted for use on this division after an extensive series of tests, which are described in the issue of November 24, page 1054.

Opportunities for Economy on Railways. The first article of a series on this subject by L. C. Fitch, chief engineer of the Chicago Great Western, considers the question of locomotive fuel. November 24, page 1059.

Threatened Strike of Rock Island Shop Employees. A full statement of the points involved in the pending controversy, as issued by the management, is reproduced. November 24, page 1069.

Letters to the Editor.

UTILIZING SCRAP IRON.

Omaha, Neb., November 24, 1911.

To the Editor of the Railway Age Gazette:

I have read with much interest the article on "A Little More on the Scrap Proposition," by C. C. Leech, which appeared in the *Railway Age Gazette* of November 3. He says: "On one occasion an officer at a large division shop would not allow any small pieces of iron to be kept at the iron rack, because they spoiled its general appearance; consequently much good iron, in lengths varying from 1 to 2 ft., found its way to the scrap bin. Blacksmiths and iron workers are usually very glad to get hold of short pieces for small jobs, especially where the piece-work system is in operation, as much time is saved by not having to carry in and cut off a long bar. While we would not advocate turning the iron rack and its surroundings into a small edition of the scrap yard, it is certainly advisable, and in the interests of economy, to discriminate in favor of the short pieces and not arbitrarily send all to the scrap."

Mr. Leech has very carefully pointed out a fault, but, having suggested no remedy, the question remains unanswered as to whether the cuttings or short pieces should be sent to the scrap bin or be allowed to remain at the rack. I do not believe the correct answer is to be found either in the bin or at the rack. If sent to the scrap bin, we suffer a loss equal to the difference between the market values of merchant bar iron and No. 1 wrought scrap, and if left at the iron house, the inevitable result is, of course, an untidy rack. It is an open secret that blacksmiths, boiler makers and machinists needing a small piece of iron or steel often find it necessary either to go themselves or send their helpers to the iron house to get a bar from the rack, take it to the shop, cut off what they need, weigh it, and return the balance to the rack before they can proceed with their work. In seeking to avoid the necessity of doing this we decided to try placing a small shear adjacent to the iron rack. This we did, and the results have been truly surprising. We obtained a motor driven shear, capable of cutting a flat bar 1 in. x 6 in., or a round bar 2½ in. in diameter. This was installed opposite the unloading track at the iron rack, and was properly housed in a small building erected for the purpose and large enough to accommodate the shear and operator. At this machine is cut all iron of special lengths required for shipment to road points, besides much of the material used in the Omaha shops, not including, however, small rounds for bolts, which are, of course, taken to shop in large quantities and cut on quick action machines. Shopmen wanting small pieces of iron come to the shear-man, who, if there are not short pieces on hand, cuts from a full bar and returns the balance to the rack, provided, of course, that the piece left over is of sufficient length for further general use; otherwise it is put in a special rack provided for that purpose at the rear of the shear-house. The shearman also finds time between jobs to cut up much of the old iron that accumulates from demolished cars, etc.

Instead of locating the shear at the side of the narrow gage track, which would necessitate carrying the iron from the car to the shear, it is placed so that the narrow gage track leads direct to the face of the machine, and bars loaded longitudinally on a push car can be passed endwise from the car to the shear, the jaws of which are the same height from ground as the top of the push car. This avoids lifting, thus enabling one man to handle this work. The narrow gage track leading to opposite side of the shear is depressed in a pit, deep enough to permit the cut iron to drop from the shear through a chute to the push car without handling. Back of the shear-house, where it is out of sight, we have erected a small rack, in length equal to the width of the building and deep enough to accommodate pieces about 2 ft. long, in which all cuttings are stored, properly sorted. This plan not only obviates the necessity for sending short

pieces to the scrap yard, but at the same time enables us to keep our iron rack in a neat and tidy condition, besides affording a ready market for cuttings at their real value, giving quick service to shopmen wanting them, and saving the time, labor and expense of workmen carrying the bars to and from the big shears in the shop.

W. S. WILMOTH,
Foreman Iron House, Union Pacific.

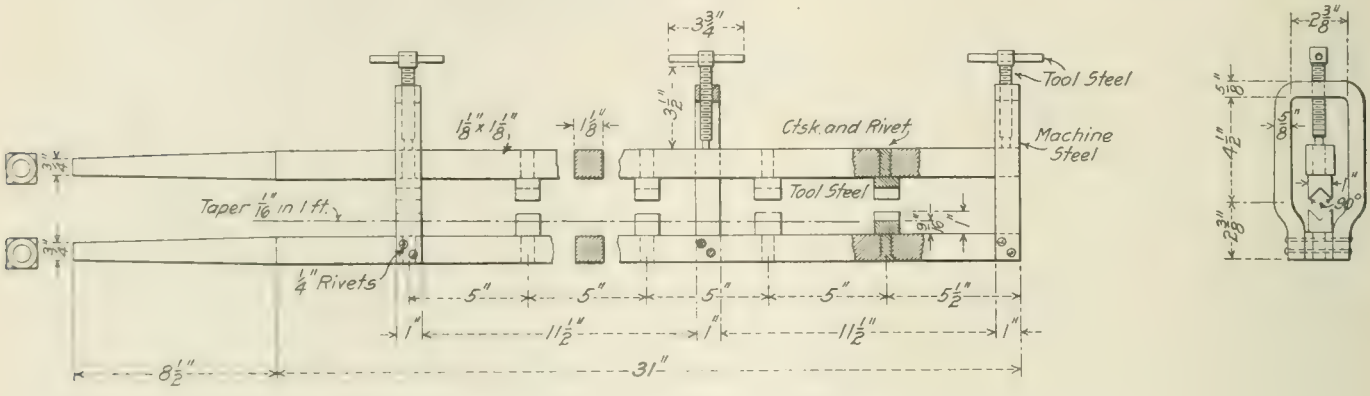
CLAMP FOR TEMPERING REAMERS.

Topeka, Kansas.

To the Editor of the Railway Age Gazette:

At the last convention of the American Railway Tool Foremen's Association (*Railway Age Gazette,* August 4, 1911, page 224), the question was raised concerning the prevention of long reamers from bending while being tempered. The clamp shown in the accompanying illustration is one that we have used with very good success. The frame reamers for the entire system are made in our shop, their length ranging from 17½ in. to 28½ in.; by using this clamp the number of reamers bent during tempering is only 2 per cent. of the total output. The clamp is 39½ in. long and is provided with five sets of V-blocks spaced 5 in., center to center. These blocks are set in two bars, as shown in the illustration, and are made so that a line through the bottom of the V's has a taper of 1-16 in. in 1 ft., thus allowing for the taper in the reamer. Three screw clamps are used to hold the reamer in the blocks and are placed 12½ in. apart.

Member of the American Railway Tool Foremen's Ass'n.



Clamp for Holding Long Reamers During the Process of Tempering.

EFFICIENT MANAGEMENT.

Los Angeles, Cal.

To the Editor of the Railway Age Gazette:

To say the railways are not economically managed not only casts a serious reflection on the officials, but really charges inefficiency to 1,500,000 faithful employees. I, therefore, felt that the efficiency engineers were "asleep at the switch," and was deeply interested when the *Railway Age Gazette* opened its pages and offered substantial inducement for special essays on scientific management in the railway shop.* The judges said: "None of the articles submitted are properly discussions of the subject—the Application of Scientific Management to a Railway Shop—and it looks that way.

The trend of the essays you published is individualism, personality—or, if you please, the man, for as Napoleon put it, "Men are nothing, the man is everything." A man to carry "a message to Garcia"—concentrated energy. Actions speak louder than words—management, executive ability, comprehensive hand [illegible] of men in the system. Scientific management it will

* [illegible] was published in the issue of July 7, 1911.

Actions, deeds, results, are what is wanted—the ratio of operating expenses to gross earnings reduced to a minimum.

On page 56 of the *Railway Age Gazette,* July 7, 1911, are some intensely interesting statistics from which the following are taken:

Maintenance of Equipment for Eleven Months of Fiscal Year, 1911.

Pennsylvania Railroad	$27,079,337
New York Central	15,926,841
Burlington	13,312,406
Atchison, Topeka & Santa Fe	13,052,008
Illinois Central	11,371,543
Southern	8,823,207
Louisville & Nashville	8,737,421
Chicago & North Western	8,569,647
Rock Island	8,372,615
Pennsylvania Company	8,085,491
Great Northern	7,143,032

These figures give one some idea of the magnitude of the expenditure in the railway shops to maintain equipment. As I understand it, the sole object or the question at issue in your competition was to get information as to how to reduce shop expenses permanently; wholesale discharge of shop men reduces pay rolls and saves wear and tear on shop machinery—this has been tried time and again, but has proved a short-sighted policy. You cannot skin your motive power and rolling equipment all the time—"you can't have the penny and the cake."

Locomotives and cars must be kept in repair, and it takes shopmen and engine house men to do it, as well as tools and materials. It is easy for a man sitting on a fence to say how shop expenses should be reduced and the output increased, but the men who work in railway shops know there is a limit to race track stop watches and speedometers. "You can lead a horse to water but you can't compel him to drink." What the men get pay days, whether it be for piecework or day work, that is the "human equation." The ambition, the hope, of the average shop man is for advancement and promotion. An increase in wages to meet the increased cost of living has had a wholesome tendency to make the mass of shop men better satisfied and more efficient.

The writer was a member of a railway shop club in the middle west; it developed a friendly spirit and increased loyalty to the employer. "All work and no play makes Jack a dull boy." The annual picnic in summer and the entertainments once a month in the winter were highly appreciated by all. It was a bracer, and it increased efficiency in the shop.

The interest taken by some roads in the education and training of its shop apprentices to become first-class mechanics is the true application of scientific management to railway shops and it means economy and efficiency in the near future without experimenting with costly theories.

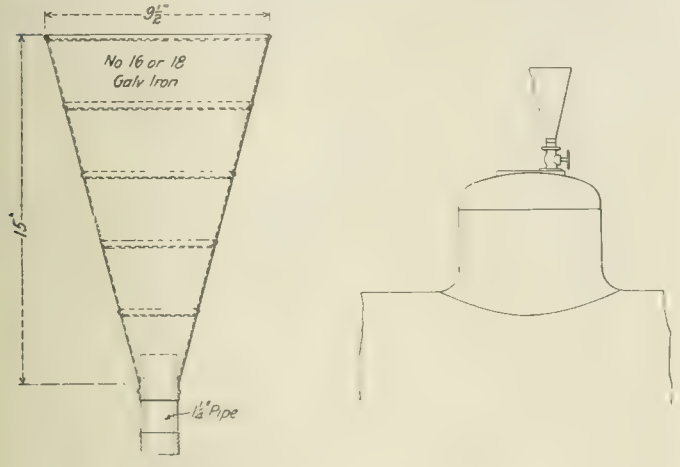
T. B. KEIM.

BLOW-OFF MUFFLER FOR ENGINE HOUSE.

Globe, Arizona.

To the Editor of the Railway Age Gazette:

The accompanying illustration shows a muffler that has been used in an engine house on the Arizona Eastern with very good results. It is placed on the dome of the locomotive and greatly reduces the noise that usually accompanies the blowing off of the steam when it is desired to relieve the pressure from the boiler. It is made of galvanized iron in the shape of a funnel and is fastened at the bottom to a piece of 1¼-in. pipe, which screws into one end of the blow-off valve. The funnel is 15 in. high and has five perforated partitions, as shown in the illustration. The top partition is punched with ⅛-in. holes, and the area of the opening is about 15 to 30 times the area of the 1¼-in. pipe. The intermediate partitions are punched with different size holes; the largest ones, in the bottom partition, are 1 in. in. diameter. However, the total area of the openings gradually increases from the bottom to the top partitions. This device has made it possible for one to talk with a reasonable effort while an engine was blowing off, which without the muffler it would be practically impossible to do. All the material is commercial and the first cost is nominal.



Blow-Off Muffler for Engine House Use.

John W. Ladlow.

HYDRAULIC JACKS.

Atlantic City, N. J., November 24, 1911.

To the Editor of the Railway Age Gazette:

There is no tool in an engine house that is more useful, does harder work, and gets cussed more than the hydraulic jack. If Job had worked in an engine house and had had a rush job requiring a jack, and after dragging it from the tool room and putting it in place under an engine, incidentally bruising a knuckle and having a few drops of hot water drop down the back of his neck, and then found that the jack would not work, he would never have made a reputation for patience. Instead he might have been convicted for manslaughter, if he had met the last man that used the jack at just about that time. Now, the jack probably did work good for the man that had used it before, and when it is taken apart nothing may be found wrong with it. In nearly every case of this kind the trouble is due to dirt or some foreign substance in the jack. If the proper precautions were taken with the jack liquid and in filling the jack, about one-half of the trouble would disappear. Did you ever see men filling a jack away from the tool room? Their hands may be thick with grease and grit, and the head of the jack may be in the same condition; as the filling plug is loosened the grease and dirt pile up around it and as soon as it comes out the dirt drops in. The liquid is then poured in, often without a funnel. The result is that some of the liquid spills alongside of the hole and washes the dirt in with it. I have also seen men overhauling a jack pour the dirty liquid out in a bucket, and after washing out the jack barrel, renewing the leathers and grinding in or renewing the valves, carefully pour back the dirty liquid. The dirt cuts the barrel, leathers and valves and a minute particle of it under a valve will render the jack inoperative.

All this trouble could be avoided if the jack liquid were carefully strained through a funnel having a very fine screen when the jack was being filled. The head of the jack around the filling plug hole should be carefully cleaned before the plug is taken out and the person handling the plug should have his hands clean of loose dirt and grit. Another bad practice is to wipe out the jack barrel with cotton waste when it is being overhauled. The lint of the waste sticks to the side of the barrel and when the jack is put to work it is liable to get under a valve and cause trouble. Such bad practices as leaving jacks in the pit, allowing them to lie lengthwise after being used, and filling them with water, kerosene or any other available liquid are too well known to require special attention being called to them.

Chas. Maier.

PRACTICAL APPLICATION OF SCIENTIFIC MANAGEMENT TO RAILWAYS.

Chicago, November 13, 1911.

To the Editor of the Railway Age Gazette:

The articles in the *Railway Age Gazette* of November 3, 1911, pages 886 and 899, on Efficient Management, have misrepresented the writer's position. You state that I do not define what I mean by the expression "scientific management," and that very few efficiency engineers could agree with me as to my understanding of the term, etc. This is very misleading, and is indicative of either a lack of information on the part of the writer, or a desire to create an erroneous impression.

You say "that the betterment work on the Santa Fe, which I criticize so severely, was based on broader lines than contemplated, etc., and that it is a waste of time to discuss results on the Santa Fe by means of figures from annual reports without thoroughly studying all of the conditions on the road during the time the figures cover, etc." The betterment work on the Santa Fe has not been criticized, and in handling the matter under consideration, I see no reason why it should be.

It is clearly set forth in my paper that answer is being made to testimony before the Interstate Commerce Commission in the recent rate case and to various newspaper and magazine articles with respect to scientific management of our railways, and in which it was claimed that great economies could be effected, and the Santa Fe road was not only cited as an example, but it was claimed that about $5,000,000 was saved to that company. In one item alone of locomotive repairs it was claimed that about $1,250,000 was saved. It was, therefore, quite proper to submit these figures to a test to determine questions of both accuracy and location. The result was just as I have stated, that the figures and statements will not bear analysis, as the high cost of locomotive maintenance in 1904 and 1905 was due to the shopmen's strike; consequently the reduction in cost in 1906 and 1907 would have followed the termination of the trouble, an important factor, on which those who have made claims of such great reductions in cost have so far remained silent, thus creating the erroneous impression that scientific management produced this wonderful result.

As to waste of time discussing certain figures—time cannot be wasted in any analysis of fundamentals, and as the claims of above mentioned economies were based on the railway company's annual reports it was not only proper but *necessary* to an intelligent understanding of the matter to display the figures and discuss them. As to the qualifying conditions mentioned, a glance at the paper will make this clear to any one. In addition to having made a thorough study I may with propriety add, that I was for many years connected with the Santa Fe, and

am thoroughly familiar with the conditions of which I write. These latter elements, however, are not pertinent to this case in which a large part of the reading portion of over 90,000,000 people has been led to believe that with one or possibly two exceptions our railways are inefficiently managed, and as proof of the great economies on one particular road the figures mentioned were given general public circulation. It is therefore perfectly proper for anyone else to submit these same figures to analysis and compare them with the cost on other lines.

Mr. Milner did not point out anything new on the tire question, or about other shop operations in equipment maintenance. These features are clearly and repeatedly declared in language void of ambiguity in my paper, and some 4 or 5 lantern slides were used to illustrate this point. Your statement that Mr. Milner brought out this feature of the fluctuating character of repairs is erroneous, misleading and at variance with the facts. Mr. Milner's remarks were an endorsement of my position on this matter.

You state that my conclusions are that scientific management is applicable to the machinists and other shopmen—243,347, or 16 per cent. of the total number of employees. On what ground this statement is based is beyond my comprehension. By a process of elimination I disposed of all employees by classes until only 16 per cent. were left, before a field was reached for the application of the plan. I said in the most unmistakable language that of over 75 per cent. of these, there are about 5 per cent. employed at work that would lend itself to this plan, and of the remainder about 12 per cent. But to be more than liberal I practically doubled my figures, placing them at 15 per cent. of the machinists and other shopmen to which I added the operators dispensed with, making the following reduction measured in men or money.

Possible Economies Conditioned.

Men, 32,404 ..... .0021 per cent. of total
In money, $28,658,474..... .0289 per cent. of total

How you can make this 16 per cent. with added comments I am unable to understand, when by no manner of juggling figures could it be made to reach 3 per cent.

It was not the purpose of my paper to define or discuss the multiplicity of features of scientific management, as this has been done by those who advocated its application to railway operation as a means of increasing net revenues in lieu of an increase in freight rates, and reference to the sources of information mentioned in my paper will make this so clear as to leave no room for criticism.

The reading portion of over 90,000,000 people have been told that scientific management would save $1,000,000 per day to our railways, and in pointing to the Santa Fe as an example of economy effected by this plan certain figures were given. It was, therefore, not only proper, but necessary to revise and comment on items of expense pertaining to the operation mentioned; otherwise what are thought to be erroneous statements would have remained unanswered, and the public would remain a false impression.

The Santa Fe is a splendid property, and is managed by experienced officers of well-known ability, who doubtless prefer that the real facts with respect to the extent of, and economy resulting from, the introduction of scientific management on their lines, so thoroughly advertised this year, be made known, particularly the items of locomotive maintenance cost in 1904 to 1907 inclusive, the marked fluctuations of which were due to the shopmen's strike.

The writer is not seeking to discredit in the least the good results that have, and will in future result from the labors of such able and distinguished gentlemen as Harrington Emerson, Frederick W. Taylor, F. B. Gilbreth, Charles L. Day, Chas. Hathaway, Alex Gantt, and others, in such fields of endeavor as their experience and life work have so ably fitted them. As I have many times employed specialists to aid in the solution of certain problems, likewise served in a similar capacity, I should therefore be able to judge impartially as to the scope of the work ordinarily covered, and the proportion of percentage this bears to the operation or management of a railway.

The entire maintenance of equipment charge is only about 20 per cent. of the operating expenses of our railways, and the probable field for the introduction of the scientific plans, to which my paper is addressed, is only a small portion of this 20 per cent.; probably less than one-quarter. Aside from this restricted field, there is today, and had been for years before this *"scientificana craze"* broke loose, an army of high grade efficiency engineers in the railway field (this includes the principal officers, heads of departments, etc.), many of them boring 4 in. holes with 2 in. augers, as it were; or in other words, showing about 200 per cent. efficiency for the manufacturing plants in their charge. With a few rare exceptions such additions, improvements or changes as might add to their efficiency or earning power are as well known to and better understood by the officers in charge, than they would be to specialists in the particular branches of work affected.

The claim that $1,000,000 per day, or $365,000,000 per year (which has now been raised to $2,000,000 per day, or $730,000,000 per year) can be saved by specialists, is tantamount to a direct charge against the managers of our railways, of the elements of either incompetency and dishonesty, or both, and the purpose of my paper was, as stated, to not only review the matter from a practical standpoint, but to invite such discussion and unprejudiced criticism as to not only make more clear the present public conception of scientific management and its limitations in railway operation, but to also emphasize the fact, that in no other line of human endeavor can there be found higher degrees of efficiency engineering than are now exemplified in the management of our railways. Therefore, the charge that there are now preventable wastes of approximately $730,000,000 per year deserves most emphatic denial, and a fitting rebuke to those responsible for it.

W. E. SYMONS.

BENEFITS DERIVED FROM CONVENTION ATTENDANCE.

November 23, 1911.

To the Editor of the Railway Age Gazette:

You hit on a good subject when you held the competition on the Benefits Derived from Convention Attendance. Unfortunately I have never been allowed to attend a convention of my fellow-craftsmen, although I have felt for some time that I would be able to greatly increase my efficiency by so doing. I like the way in which Mr. Reyer frankly gave his experience, showing that attendance at one convention of the General Foremen's Association had been the primary cause of practically revolutionizing his shop methods, and greatly increasing the efficiency of his shop.

I showed his article to one of my superior officers, and I am very hopeful of being able to go to the convention next year, as it seemed to impress him favorably. We have never had weekly meetings of foremen in our shop, as was suggested by Mr. Hall. The idea appealed to me, and I have had two such meetings of my foremen since the receipt of your issue of November 3. The effect has been very good. A number of little annoyances have been eliminated, which have bothered us for some time. When the bunch of us got together and these matters came up, we found it was comparatively easy to eliminate them by securing the co-operation of the various department foremen. The meetings seemed to brace the boys up in good shape and they are taking a great deal more interest in their work than they did before.

I have been wondering whether there would be quite so much talking about the need of efficiency men if we foremen were sent out occasionally to visit other shops and see what they were doing, thus broadening our viewpoint and giving us an opportunity to make improvements in our own plant.

A General Foreman.

PAINT SHOP PRACTICE.*

BY C. E. COPP,
Master Painter, Boston & Maine, Lawrence, Mass.

Car painting is only a part of a whole that is planned and executed at a plant constructed for the purpose of repairing railway equipment. The master painter is an important unit in the sum total, if he does his duty; he is indispensible, and it behooves him to perform his duties well. His importance should appear in the character and promptness of his work. He should classify it as much as possible and select his men so as to obtain the best efficiency. The painter's materials should come to him as nearly ready-prepared as possible. The paint factory has the facilities and space for the proper performance of this work that railway shops seldom afford. Also machine-mixed goods are better than the hand-stirred, to say nothing of fine grinding in suitable mills.

The real success in coach painting, so far as the exterior goes, lies in the priming and surfacing used. There are successful systems of primers and surfacers on the market from which experimental and exposure tests will reveal those best adapted for use, if one cannot put full confidence in the statements of reputable firms that handle them. The choice of these being made, the foreman painter's duty is to see that they are correctly applied and finished; the directions that accompany them are generally sufficient, barring variations in special cases. The old lead system that was made in the shop has merit, but it is too slow for the present time, and its use is also a menace to the health of the employees for the dust that is made while sandpapering is drawn into the lungs or through the pores of the hands. The use of lead should be limited to putty and its addition to prepared priming which gives it greater adhesion. The surface being finished, whether by block pumice rubbing or by sandpaper surfacers, the car is ready for the car-body color. Put sufficient outside finishing varnish into the color to give it binding property, but not enough to cause the gold to stick when gilding the letters or the varnish to crawl; then thin it to a working consistency with pure spirits of turpentine or a good substitute of turpentine, and apply with a 3- in. or 4-in. rubber-set brush. Two coats will make a good job. When the lettering and the stripping are finished it is better to allow it to stand until the next day, if there is time, in order that the gilding shall be hard enough to withstand dusting and varnishing. Then apply three good coats of outside finishing varnish, allowing at least a day between the coats—two days would be better if it is possible to take the time. It is better not to use any rubbing varnish on the exterior, as it is too hard drying and is apt to check and perish quicker than where an all-finishing job is done.

Enamels should be extensively used in car painting. By this is meant a union of color and varnish that is more properly called a "varnish color." This saves the operation of applying the color separately. It may be successfully applied on trucks, steps, platforms and clear-stories of all classes of passenger cars when they are properly primed and have a coated foundation. It should also be used in a similar manner on the interior of mail and caboose cars, using white for the ceilings of the mail cars, and whatever suits the fancy for the ceilings of the caboose cars. Enamels can also be used in part, or for the whole of baggage and milk car interiors. Milk car exteriors may profitably be painted in a combination of oil and enamel, without using any finishing coat of varnish, and the lettering may be done in gold-colored paint of the same nature. If finished in this way on a lead and oil foundation a durable job will be obtained; and if the car should not reach a shop again for 4 or 5 years there would be no chipping or peeling.

The iron work of passenger equipment, especially that above the platforms, should not be left to the last and finished in a hurry with quick-drying materials, as they will soon perish and peel, with rust as the inevitable consequence. This part of the work should be primed in advance with a suitable primer before being finished with the durable black varnish that is to follow. For this purpose avoid asphaltums and use carbon blacks ground in finishing varnish. Passenger car interiors are sometimes varnished too often, when in the shop for annual repairs. The bad results from this practice are seen in an accumulation of grime under the varnish, and worse still, it will crack into an "alligator finish" which can only be removed by a varnish remover applied at great cost. An interior properly finished when new ought to run in service, with regular cleaning, 3 or 4 years without revarnishing, and as long between subsequent varnishings. By a properly finished interior is meant one filled with a good paste filler, and then given one coat of shellac which is lightly sandpapered and followed with 2 or 3 coats, one over the other without rubbing, of a good elastic outside rubbing varnish. When hard enough, this is rubbed down to a level surface with pumice and water and is brightened up with some good renovator oil and then wiped dry.

FREIGHT CAR PAINTING.

Where paint sprayers are used for this class of work, the painting should be done in the yard or in separately built sheds, as the vapor from the machines is obnoxious to the workmen and makes an untidy shop, covering the windows so that a varnish remover is necessary to clean them. This method was in general use on our road until 1903 when, after returning from a visit to the shops of the Grand Trunk at London, Ont., I tried their method. A special 8-in. whitewash brush, made heavier for this purpose, was used with a handle about the length of a broom handle. One man would take the top-stretch, standing on staging, and another man the bottom-stretch, standing on the ground. With this system it was found that the work could be done better and faster than with the paint sprayer.

In the summer of 1909 a number of box cars were set aside to be painted, at a time when there were no passenger cars in the shop. In doing this work I made some time tests of the above mentioned method. The paint shop held about 18 or 20 cars, and as many more were placed in the yard in another shop. With eight men on this work, fourteen cars were finished per day. We gave them two coats each and stenciled them according to the M. C. B. standards. One man would easily paint four large cars per day with one coat, including the roofs. We did not paint the Fox trucks, although we could have included them, but we did stencil the journal sizes on them. Two crews of two men each would stencil seven cars per crew per day and clean their stencils when done. Even then, they would have time to help on the general painting. The work was all performed on piece-work rates and was kept account of by tying red tags to the journal box covers. On these tags were written the number of the car, capacity, weight, height, width, inside length, etc., and when the stencilers completed the day's work the tags were collected and turned into the office where the piece-work earnings were calculated. In every case these tags were used in making reports so that all mistakes were eliminated, the tags being kept for reference. This saved a lot of book memorandum records and worked like a charm.

The system of Belgian state railways in 1904 comprised 2,422 miles; and in 1902, 2,593 miles. The increase of 171 miles was brought about largely by the purchase of 98 miles of line owned by the Western Flanders Company, and the 14 miles of line owned by the Tremonde-St. Nicolas Company. The steady increase in traffic necessitated extensive enlargements of freight terminals and of yards. Train loads could not be increased, nor could heavier rolling stock be operated without laying heavier rails.

*Awarded the first prize of $35 in the competition on Paint Shop Practice which closed November 15, 1911.

MACHINE AND ERECTING SHOP KINKS.*

BY C. C. LEECH,
Foreman, Pennsylvania Railroad, Buffalo, N. Y.

LATHE CHUCK FOR METALLIC PACKING.

The details of a chuck for holding metallic packing, when it is being bored to size in a lathe, are shown in Fig. 1. The body *A* is made of soft steel and has a tapered shank which fits in the lathe spindle. The part *B* is bored out to take the collets *C*, which are made to slip in easily. The collet is held firmly in place by the standard nut *D*, which fits on the threaded portion of the body. This nut must, of course, be bored out large enough to clear the boring tool for the largest diameter of packing that is to be handled in the chuck. The recess or counterbore in the body *B*, which is 1¼ in. deep and 4 in. in diameter, allows room for the tool when it passes through the packing. In addition to holding the collet in place the nut *D* also has a bearing on the face of the packing, thus holding it tight while it is being bored. Any number of collets may be provided to suit the different classes of piston rod and valve stem packing. When the packing is too thin for the nut *D* to have a bearing on it the plate *E* is placed in the nut before screwing it on the body. This chuck will be found particularly advantageous when the different classes of packing are made in large quantities and the hole is left small in order that it may be bored to the correct diameter of the piston rod or valve stem when it becomes necessary to use it.

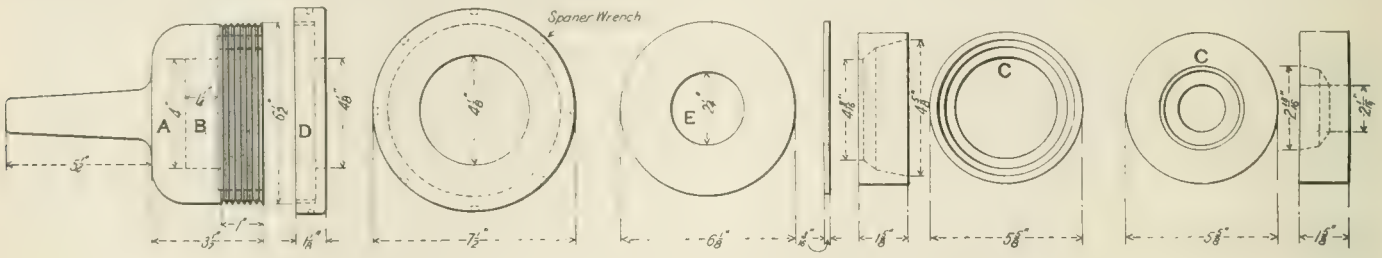


Fig. 1—Lathe Chuck for Holding Metallic Packing When Boring to Size.

CHUCKING BLOCKS FOR VERTICAL BORING MILL OR PLANER.

The chucking blocks shown in Fig. 2 are made of cast iron and will be found convenient for use on vertical boring mills or planers. They can be made in sets of 4, 6, or 8, and of varying

Fig. 2—Chucking Blocks for Vertical Boring Mill or Planer.

ROD BRASS CLAMPS.

The clamps shown in Fig. 3 are convenient for holding the parts of old rod brasses together when it is necessary to rebore them in a lathe, and also for new work. Considerable time and labor may be saved by having a number of sets of these clamps in the tool room suitable for the various classes of main rod brasses which are in use. With these clamps it is not necessary to sweat the parts of the brass together.

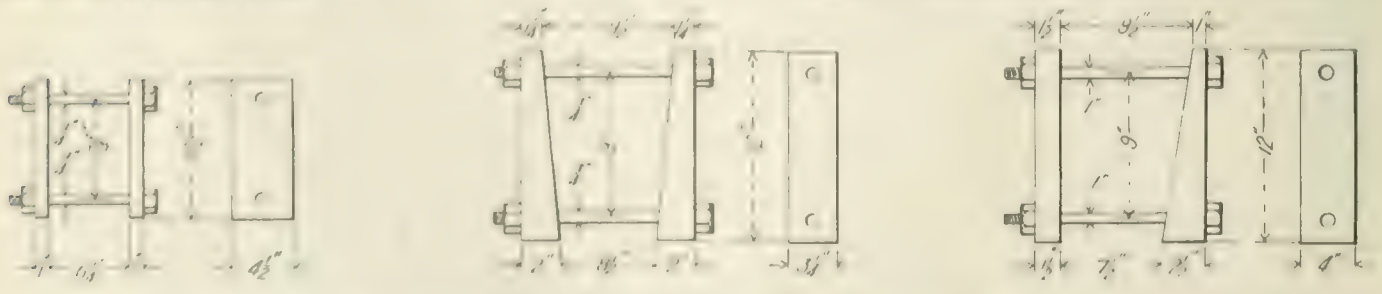


Fig. 3—Clamps for Holding Rod Brasses Together When Reboring.

ECCENTRIC BLADE BENDER.

The eccentric blade bender shown in Fig. 4 is different from any of those which have thus far been described in the *Railway Age Gazette*. The part *A* is forged to the shape shown, and is fitted with the clamps *B* at each end. The purpose of these clamps is to support the part *A* when it is hung on the eccentric rod, so that it may easily be adjusted to the proper position for making the bend or off-set. An ordinary horse shoe clamp is used for bending the rod. The part *A* may easily be moved along the rod.

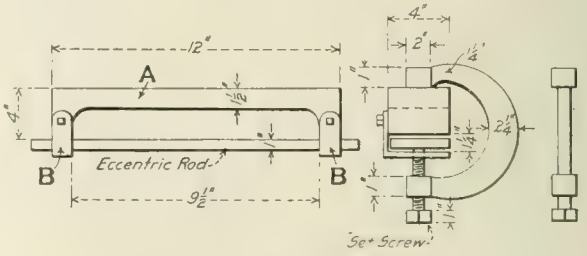


Fig. 4—Eccentric Rod Bender.

FORMING TOOL FOR METALLIC PACKING.

The forming tool for metallic packing, which is shown in Fig. 5, is used for finishing the packing after it has been roughed off.

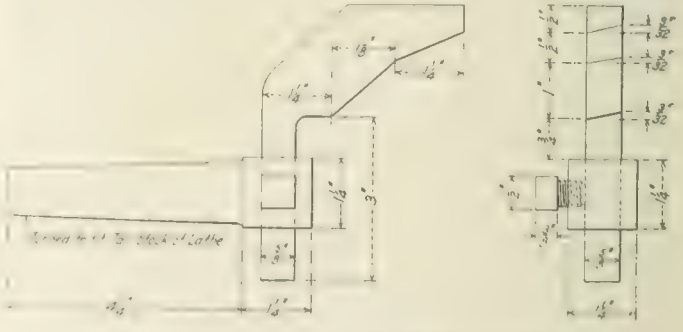


Fig. 5—Finishing Tool for Metallic Packing.

The shank of the tool is made to fit the tailstock of the lathe. It is fed against the casting, smoothing it up and finishing it to

the correct contour. The cutter may be adjusted in or out and is securely held in place by the set screw. One cutter is required for the piston rod packing and one for the valve stem packing.

CHUCK FOR VERTICAL BORING MILL.

A simple and effective chuck for holding tires and other work for boring and turning on a vertical boring mill is shown in Fig. 6. The body of the chuck is of cast iron and has a tongue

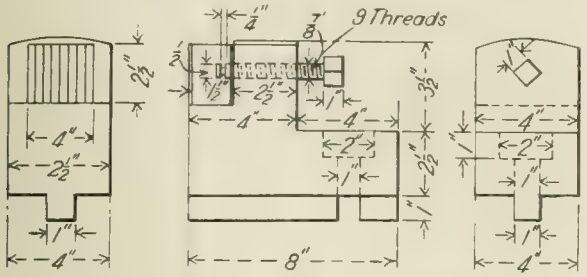


Fig. 6—Chuck for Vertical Boring Mill.

which fits in the slots on the table of the mill. Only one bolt is used to fasten each chuck to the table. The jaw is of hardened tool steel and has grooves cut in the face which grip the work. The jaw is forced against the work by the ⅞ in. steel set screw.

TIRE HEATER.

A cheap and effective tire heater, where gas is used, is shown in Fig. 7. The circular portion is made of ¾ in pipe, with ⅛ in. holes, spaced 2 in. apart, on the side toward the tire. There should be a sufficient number of these circular parts to take care of the different diameters of tires; it is not a good plan to open the pipe out for use with larger tires than it was intended for,

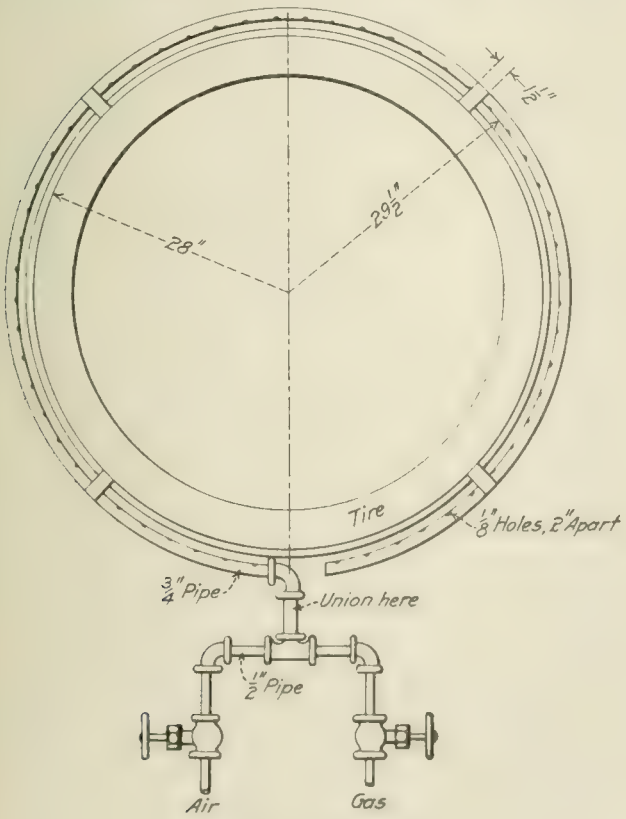


Fig. 7—Tire Heater.

as bending it back and forth soon causes it to break. The union which connects the air and gas pipes allows the ring to be detached and changed. Gas is used at a pressure of about 45 lbs. per sq. in. and air at about 75 lbs. per sq. in. In operation the piping which connects to the ring is at right angles to the position shown on the drawing.

TOOL STEEL.*

BY W. B. SULLIVAN.

Merely having a micrometer in the shop does not mean duplicate size tools; and merely having a pyrometer in the hardening room and a sclerescope in the testing room does not mean duplication of temperature and hardness. Experience in the use of these instruments, and their constant calibration and use, are the all important factors in the production of high efficiency tools. I cannot emphasize too strongly the importance of the constant checking up and the daily use of the above mentioned instruments. A few years ago, in about ninety cases out of a hundred, any lack of uniformity in the service rendered by the tools was attributed to the steel. Recent discoveries have proved that we have been working pretty much in the dark, and that 95 per cent. of the failures resulted from lack of knowledge on the subject of proper treating temperatures. It is a fact that degrees of temperature can only be approximated by the eye, and at best the *eye* method is guess work. This statement is made after years of experience in dealing with men who have had from 5 to 25 years of service at furnaces running the full range of heats. I have had five men vary 300 deg. on one furnace in endeavoring to take the temperature with the eye.

When 90 per cent. carbon steel is subjected to a uniformly increasing temperature, say from 100 deg. upward, ferrite and pearlite remain practically unchanged until the temperature reaches the neighborhood of 1,360 deg. Fahr. With increasing temperature at approximately this point they suddenly begin to decompose. When this change or decomposition begins to take place, the piece does not rise in temperature with the furnace, but lags behind for an interval, then accelerates slightly until approximately 1,460 deg. Fahr. is reached, or until the decomposition is completed, when it assumes the normal temperature of the furnace.

As heat is required to decompose the original minerals in the soft or annealed steel, the material absorbs a sufficient amount of heat to complete this change. This change is called the critical point. In this operation we have lost all traces of the original mineral condition, that is, ferrite and pearlite have both been decomposed and we have evolved what is known as martensite. By quenching at this point, the martensetic condition is preserved and the metal will be found hard and brittle. This martensite in a carbon steel is very sensitive to heat and decomposes very rapidly when heated, and if heated high enough is entirely decomposed, and the original ferrite and pearlite condition restored. It is, therefore, obvious that to anneal a piece of steel we should heat only high enough to decompose the martensite. If the material be annealed at a temperature where martensite is formed, it will be found to machine hard, as it will contain a portion of the hardening element. By a judicious application of heat we can obtain any combination of the three minerals. These changes take place at definite temperatures consistent with the material and the temperatures are determined by critical-point instruments.

Tools when properly handled should first be heated carefully and uniformly to the proper temperature and quenched. Having the complete structure developed, the effect of further heating only tends to produce overheating, and decarbonization; therefore, realizing that further heat is not only unnecessary, but if carried any considerable length, very harmful, we fix the point of temperature at which to treat and work as closely to it as practicable. (Then follows a description of the use and the calibration of pyrometers.)

Hardness.—As a general rule, the higher the temperature of the cooling medium, the lower the degrees of hardness. For this reason, it is advisable to maintain the temperature of the bath as nearly uniform as possible for a given piece; although it

*Abstract of a paper read before the New York Railroad Club, November 17, 1911.

will be found expedient to vary the temperature of the cooling medium for some forms of cutters, dies, etc. Cooling baths are of various types. Brine, water, oils of different character, lead, air, etc. As water extracts heat more rapidly than oil, a piece of tool steel, quenched in water will be harder than one quenched in oil; tool steel quenched in air will have a certain amount of hardness, but will be much softer than if cooled in oil.

There are several instruments that may be used successfully in determining hardness. The sclerescope method is based on the free fall in air of a ball of known weight, a known distance. There is a diamond point inserted in the ball, which point strikes the object or specimen being tested; the rebound, as indicated by a scale on the instrument, is the measure of the hardness. Our experience has been that this instrument has its greatest application to values of 75 and over, and great care must be taken in analyzing the results obtained by it, for different materials seem to give results characteristic of that material, and have no definite relation to hardness as shown by other materials.

The Brinell method is based upon sinking a ball into the object or specimen to be tested. A load of 3,000 kilograms is applied to a 10 mm. hardened ball, and the volume of the impression as indicated by measuring the diameter is the measure of hardness. This instrument cannot often be used on finished surfaces, as it leaves a permanent deformation. Its greatest application is found in values of 475 or under. Attempts have been made to give a factor for changing Brinell hardness values into sclerescope values, but our experience has been that different factors must be used for each grade of material, and even different factors when the same grade is hardened in oil and water.

If we were to harden a number of pieces of the same carbon content from the proper temperature, cooling them properly in water or brine, upon measuring their hardness there would be little variation found. If some of these were drawn at 300 deg., some 325 deg., some 350 deg., and so on up to 600 deg. Fahr., the hardness would be found to decrease proportionately to the amount of heat applied. If these pieces were tools sent out for test, and some held up and some did not, it would be an easy matter to determine how much leeway we had so far as physical condition was concerned. The question to be determined is how much toughness is required to hold the tool together?

After hardening at the definite temperature the amount of hardness required for the tool can be determined by drawing in oil, lead or saltpeter to a definite temperature and then measuring the hardness after cooling. An accurate record of the temperature and hardness, together with the performance of the tool, should be kept and note made as to how the tool failed and why. A careful analysis of these records will enable us to use such temperature in drawing and subsequent hardness values, as will largely eliminate failures and increase tool efficiency wonderfully.

Ten punches were treated in an open fire and drawn to a color. From their appearance all indicated reasonably uniform drawing. The hardness of these punches varied from 55 to 85 sclerescope test. The service test proved that for this class of work those having a hardness of over 80 were brittle and would not stand; three being over 80 broke after punching a few holes. Five having an average hardness of 77 were in good condition after 500 holes. Two having a hardness from 55 to 64 upset or bent after a very few holes. In this case the diameter of the punch was 13/16 in., and the plates 1¼ in. thick. Five punches were hardened and drawn to a definite temperature. All of these showed a hardness of 77-80 and all punched 600 holes and were in perfect condition.

A die block making an unusually hard forging was hardened and drawn to show a sclerescope hardness of 75. It made 60 forgings when it failed by cracking. Another block of the same grade of material was hardened and drawn to show a value of 70; after it made 600 forgings, it failed in the same manner as the first block. A third block of the same material was heated and drawn to a hardness value of 65, and was in fine condition after making 13,000 forgings.

From what has been set forth, it is evident that to get the best results from tool steels a certain amount of apparatus is necessary, and in the case of railway work it would seem to point to a central plant for the manufacture and hardening of tools. This would necessarily cause some inconvenience, but it would seem that this inconvenience would be more than offset by the results obtained, for it must be admitted that economy consists in getting out of the steel all there is in it.

DISCUSSION.

There was a general consensus of opinion throughout the discussion that it is of the utmost importance that the closest attention should be paid to the scientific treatment of steel in the hardening and tempering, and it was claimed that American mills are leading the world in the use of scientific methods in the manufacture of their product.

In working along these lines it is necessary that we should be able to express our results in numbers, in units of measurement that are capable of being accurately interpreted and which will form the basis for a reproduction. The indefinite use of determining temperatures and expressing them as light or dull cherry red or straw color must be discarded. We hear much of the "body" of steel, but the term is usually meaningless, except as indicative of the excellence of the steel that one is solicited to buy. In reality the expression may be summed up to mean the total of care that has been exercised in the selection of the materials and the work that has been put upon them in the making of the steel.

It was especially urged by speakers, as well as by the author of the paper, that the pyrometer should be used for the determination of the temperatures of heat treatment; not with the expectation that any one would use the method, but with the hope that some one may. It is believed that it can be used economically in the ordinary shop for tool dressing, just as it is used elsewhere in the manufacture of articles, large and small, which are so handled economically upon a commercial scale. This does not mean that the services of an expert tool dresser should be dispensed with, for just the contrary is the case, because of the many elements that are influential factors in the preparation of a tool for service, which include the chemical analysis, the method of cooling and the temper desired.

Further, in this heat treatment all tools should be quenched in oil, as better results may be obtained with oil than with water. It is impossible to give the temperatures at which the work should be done, but this can readily be obtained by experiment. It is a matter that will vary with the methods of cooling. For example, the temperature of the steel should be quite different if the metal is to be plunged into a powerful stream of water, so strong as to force itself into direct contact with the steel and so prevent the spheroidal condition, than if it were to be plunged into a quiet bath where the spheroidal condition may exist and the cooling thus take place more slowly, while the temperature of the bath may cause a still further modification of the proper temperature of the metal.

To controvert these claims for the scientific pyrometric treatment of tool steels, an instance was cited of a test of steel that had been made, in which the metal was treated by the blacksmith, and it was thought that good results had been obtained. The maker examined the tool and declared it spoiled and proceeded to harden and temper it himself, and failed to get anything like as good results; while it not infrequently happened that the blacksmith would dress a tool that would turn 45 driving wheel tires with one grinding which was considered pretty good.

It was also stated, in connection with the matter, that a pyrometer was not needed to determine the quenching temperature, because it had been found that at 2,250 deg. Fahr., a sort of feather edge jumped up on the angles of the tool. This is plainly visible in the clear atmosphere of a furnace, but probably could not be seen in the open fire of a forge.

The cutting qualities or durability of tools was discussed, and it was shown how there was a certain temperature for each and every grade of steel and degree of temper at which the tool would show the greatest durability from the standpoint of the rate of dulling of the edge. Attention was called to the well-known fact that where a tool dulls rapidly on light work, its durability can frequently be increased by increasing the speed. Further, that on finishing cuts, where a carbon steel will outlast a high speed steel, the latter will become the more durable if the speed is increased so that the tool will be heated to its crucial temperature at which the durability is greatest. These statements are checked by the well-known rapid dulling of cold tools and that this durability can be increased by warming them in the fire before putting them to work. And finally, this is emphasized by the fact that because one grade of steel has proved to be very efficient in the cutting of steel or iron, it may not be at all suited to the cutting of brass, and this regardless of the shape of the tool which, of course, cannot be taken into account.

Attention was called to the use of titanium as a purgative for steel, and it was stated by one speaker that he had a list of a dozen firms of steel makers, makers of tool steels, who were regularly using titanium, but that they were very secretive as to what they did with it. It was suspected that some of it at least was used in connection with the making of tool steels, but there is no definite knowledge abroad as to this. It would be interesting if they would own up to what they were doing, but it was not at all probable that they would.

As to the extent to which high speed steel is being used in this country, it is rapidly increasing. It was asserted that, in one locomotive shop, at least 95 per cent. of the tool steel used was of the high speed variety, and that the use of carbon steel is rapidly disappearing, except for brass finishing. If an attempt were made to get a workman to use carbon steel, who had become accustomed to the high speed, there would at once be great opposition to the change. The major portion of this steel is imported, though the quality of the American goods is fully equal to or superior to any made abroad.

It was urged that Americans take it upon themselves to imitate the Germans more closely, who are patriotic in their patronage of home industries. This was, too, of interest to the railways in the matter of freights, for though the actual tonnage of tool steel might be small, it was found that for every ton of such material shipped about 6 tons of supplies were needed.

As to uniformity of product, there should be no trouble in securing that; and, indeed, where an electric furnace is used it should be impossible to make a bar that was not uniform from end to end.

We were urged to imitate the Germans in their methods, and though they might have disregarded advanced methods 20 years ago, that was far from being the case at present. One speaker considered them far in advance of us, and thought that the Krupp works owed the greater part of its success to its great physical laboratory, where 500 assistants are employed, most of whom possess a doctor's degree. Here 20,000 chromium determinations are made every year and 480 carbon tests every morning. They make fatigue tests of all metal and are not content with merely dropping a weight on an axle, but make a large number of repeated stresses until the material fails. The same holds true regarding microscopic analyses. So when asked what percentage of their guns burst or rails broke, the superintendent said: "We never have a gun burst or a rail break." It is this tremendous reality of things in the German mind that is responsible for the advances made by that country in recent years.

In closing Mr. Sullivan stated that to get comparative results with the scleroscope tests for hardness, it was necessary to use similar specimens, and that it was his custom to use them about ¾ in. square. But even then, tests between different grades of steel were not strictly comparable.

ENGINE HOUSE KINKS.

BY THOMAS NAYLOR,
Engine House Foreman, Chicago, St. Paul, Minneapolis & Omaha, St. James, Minn.

SPRING PULLER.

The spring puller shown in Fig. 1 has proved very useful for removing trailer truck springs. It consists of a right and left hand threaded screw, one end of which fits in an arm fastened to the rails, as shown, and the other in an adjustable

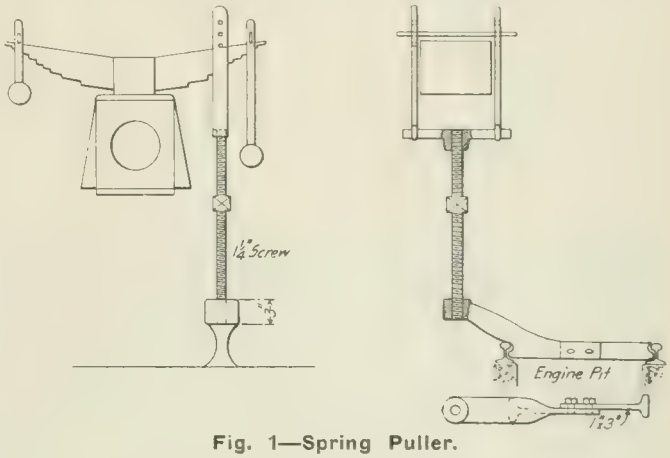


Fig. 1—Spring Puller.

yoke that is placed around the end of the trailer spring. The spring is pulled down by turning the screw. The arm that is held between the rails is easily adjusted by loosening the stud bolts which hold the two parts together. The slotted holes in one of the members allow sufficient play.

TRUCK FOR REMOVING TENDER WHEELS.

The truck shown in Fig. 2 is used for removing tender and engine truck wheels. With it the wheels may easily be moved in and out from under an engine or tender. The crotch of the truck is of wood and fits under the journal. One end of

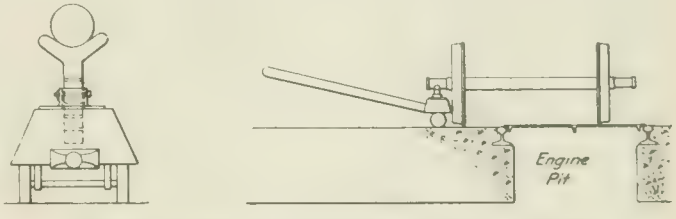


Fig. 2—Truck for Removing Tender Wheels.

the axle is lifted by pressing down on the handle of the truck and the wheels are removed by sliding one wheel on the plate that extends across the pit. One man is able with this device to slide a pair of wheels under a tender in a few minutes, and the liability of accidents is reduced.

CLAMP FOR CRACKED STEAM CHEST.

The clamp shown in Fig. 3 may be made to fit almost any steam chest of the slide valve type. A bar to extend across the front of the chest is made of 2½ in. x 1 in. iron, being en-

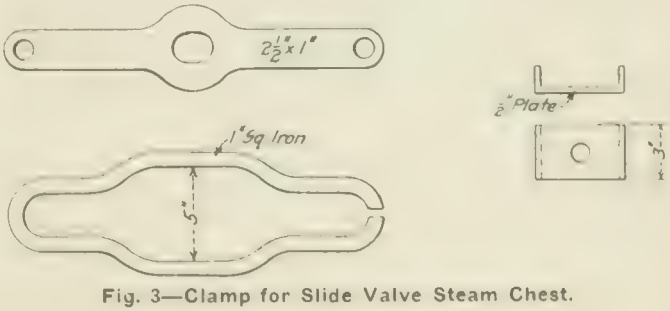


Fig. 3—Clamp for Slide Valve Steam Chest.

larged and cut out at the center, if necessary to clear any projection. The bar for the back end of the chest is made of 1 in. square iron in the shape shown, so as to allow it to be sprung over the valve rod and to clear the valve stem gland, etc. Two ½-in. plates, as shown, are fitted over each end of this bar. These are connected to the bar extending across the front of the chest by two large bolts. The device is easy to make, and has been used very effectually. If the crack should be on the end of the chest the same clamps may be used by bending one of the bolts to pass under the valve stem.

DON'TS FOR ENGINE HOUSE FOREMEN.

BY ANDREW C. LOUDON.

Don't get excited. If the yardmaster becomes so, it is no reason why you should follow suit. Keep cool and remember that he has his troubles. It doesn't matter to him personally if you don't turn the power out quickly. It is the superintendent and trainmaster that are after him, as well as after you. Getting excited won't get you over difficulties. The engine house foreman is a man who requires a cool head at all times.

Don't let the power stand outside after arrival. The quicker the engines enter the engine house, the quicker they will be ready to leave it. Organize your outside staff so that incoming engines will be handled expeditiously at the coaling plant and over the ash pit into the house.

Don't run around trying to oversee every detail of the engine repairs. Let your gang foremen look after the detail work, make them responsible for it, and if you haven't enough gang foremen get after the master mechanic till you get them. If you appoint the right men they will save their wages in a short time.

Don't let an engine pass through your shop without having a complete record of arrival and departure times, etc., and of the work done. See that your shopmen keep in touch with the office staff and give the latter whatever information is called for. Such records may be valuable in getting the company, your superior officers and yourself out of a hole.

Dont' try to put on airs with your men. You will gain no respect by it—rather the reverse.

Don't treat your men like a lot of animals. Remember they are human and have feelings. It is just as easy to give orders in a kind as in a rough manner, and they will be more quickly and willingly obeyed.

Don't be ashamed to admit you have made a mistake. To err is human. Let the memory of your mistake keep you out of the same and similar mistakes in the future.

Don't ridicule your men when they come to you with new ideas. You are not infallible and your methods can probably be improved upon. If a man has a good idea give him an opportunity to express its value. It may be a money saver.

Don't let the organization slip out of your hands. Keep your men friendly, but remember there is a point beyond which the dignity of your position should prevent their going.

Don't let one part of your staff work against another. They are all working for the same company and should work to the same end. Team work is necessary. If there is lack of it, and shifting the principal offenders about will not overcome it, get rid of them. Otherwise they will undermine your organization.

Don't hesitate about administering discipline impartially. If members of your staff do not live up to the standards which you set, tell them about it plainly. On the other hand,

Don't nag. If you do you will soon have a discontented, sulky lot of men.

Don't let the engineers running out of your terminal carry a 5-gal. can of valve oil, three or four monkey wrenches, about 7 lbs. of waste and two or three extra hand lanterns in their tank boxes. Look the engines over occasionally. On the other hand, don't be stingy. If an engineman has managed to save a little valve oil from his allowance, let him keep it. A little valve oil on a hot box will frequently get an engine in and prevent an engine failure and its accompanying delays.

Don't let anybody but your storeman into your storeroom. Insist on his allowing no one inside the counter.

Don't let your storeman give out extra oil to enginemen without your written order. If you do you will find your oil consumption increasing rapidly. Every engineman at the terminal will have bad valve seats and hot journals on his engine and will want extra oil.

Don't say hard words about the master mechanic because he asks you for information in a hurry when you are busy. Remember he has been through the mill and that he is just as busy as you are. He probably wants the information to answer questions of the superintendent motive power and has to depend on you for it.

Don't have everybody in a scramble cleaning up the place when you get word of a coming inspection. Give your men to understand that the place is to be kept neat at all times, that tools must be put away when not in use, and material must be picked up. Keep your shop neat all the time and you need not fear any inspection.

Don't allow anyone but the men you assign to the work to move engines around the shop tracks. It will end in damage to an engine or in someone getting hurt.

Don't allow enginemen to come around at the last minute to prepare their engines for a trip. Insist impartially on their getting around in plenty of time to be ready to leave on time.

Don't show partiality toward any particular shopman or men. It will breed trouble. The same applies to enginemen.

Don't let your superior officers, or anyone else, come into your shop and order your men about. You are in charge of the shop and responsible for the work. Stand on your rights.

Don't allow *anybody* to smoke in the shop. It looks bad and makes for poor discipline.

Don't shift the crews of engines coming into your terminal, whose home terminal is elsewhere, unless you cannot avoid it, and then wire the other man what you have done, so he will know where he stands. You wouldn't like the other fellow mixing up your crews.

Don't memorize the enginemen's schedule and try to settle every question that arises by a hard and fast rule. So far from being "hard and fast" there is nothing so easy of different interpretations as the average enginemen's schedule. When in doubt as to the right course to follow get half a dozen enginemen together and discuss the point. If it doesn't lead to a decision then and there, it will at least thrash out the doubtful parts and start you on the road to a decision.

Don't take chances. Until the work is properly done on an engine don't supply the engine for a train. Almost anything is better than an engine failure.

Don't cut down your staff too quickly. The lull in business may only be temporary. Wait for instructions from a higher office unless you are very decidedly overmanned.

Don't increase your staff unless you are sure an increase in business is likely to last and your appropriation is increased. An engine house staff should have considerable elasticity.

Don't put up with engines leaving the shop late and trying to excuse it. There is generally a reason for a continuation of shop delays—very often the slackness of some particular man.

Don't get in a rut. If you cannot get away to attend the conventions or to visit other shops, at least read what the other fellow is doing. Possibly he is handling a larger shop than yours and under greater difficulties. You can learn something from him.

Don't forget that the shop and the engines belong to the company and that you are there to do everything possible to move the company's business promptly. While you are arguing about "your" men and "your" engines, don't forget that the company expects service from "their" engines.

SHOP SAFETY APPLIANCES AND SAFETY EDUCATION.*

BY GEORGE BRADSHAW,
Assistant to the Claims Attorney, New York Central & Hudson River.

Safety work has been taken up within recent months by a few large railway systems, not in an incidental way, but systematically, in charge of a regular bureau or department, or some official. It will not be long before every road of consequence will maintain a well-organized and equipped bureau or department solely for the prevention of accidents. Every preventable railway accident is due to one of three, or to a combination of three, general causes.

First.—Defective or improper condition of way, structures, equipment, tools or appliances.

Second.—Improper methods of work, or operation.

Third.—Failure of one or more men to use proper care and diligence.

In other words, every preventable accident is due to some insufficiency or failure of material, method or man. Every plan for the prevention of accidents, however enthusiastically proposed, should recognize two facts: *First,* that many accidents can never be prevented. *Second,* that the devices or remedies proposed for those which can be prevented must be reasonable in expense and practical in application.

Fortunately, the remedies for accident prevention, so far at least as safety devices go, are numerous, easily applied and generally of little expense. Almost all machines, tools and appliances can be rendered reasonably safe for proper operation by the installation of safety guards and appliances, which, for the most part, can be constructed in the ordinary shop from scrap or other cheap material. There is hardly any limit to the extent of the application of these devices. Of course, in the purchase of new machinery it should be stipulated and insisted that all parts be guarded by the manufacturer to the fullest extent necessary. The proper time and the best time to apply safeguards to any machine is when it is made. But until recently manufacturers gave almost no attention to safeguards and they are not now giving the matter the attention which should be required of them by the purchasers of their machines. As a result there are thousands of machines in use, and more (though not as many as formerly) are being installed, without necessary safeguards. These machines should be protected by "home made" guards, some of which are here illustrated.

A screen of fine wire mesh may be used to prevent injury by flying chips, as shown in Fig. 1. The use of this screen may be varied and extended by attaching it to a self-supporting frame which may be moved to any place in the shop where chipping is being done.

A bulldozer effectively guarded by iron pipe railing and boiler plate guards is shown in Fig. 2. Machines of this nature present more than ordinary hazard, and the railing alone is not sufficient. All movable parts should, if possible, be completely enclosed.

Fig. 1—Note the Fine Mesh Wire Screen to Prevent Injury from Flying Chips.

A turntable provided with iron pipe railing—a secure wooden railing would answer the purpose—is shown in Fig. 3. Protection of this nature is especially advisable where snow and ice accumulate. The only criticism of this particular construction is that there should be no braces on the inside of the railing because of the liability of stumbling over them. It is difficult to provide sufficient light for a turntable owing to smoke or steam, or the shadow of the engine. Note the high and favorable location of the arc light for this table.

A timber planer protected by box guards made of boiler plate is shown in Fig. 4. These guards would be more effective if

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The article and the illustrations are taken from a book on "The Prevention of Railroad Accidents—A Heart to Heart Talk with Employees," which is now in preparation by the author, and which we are allowed to use through the courtesy of the publisher, The Norman W. Henley Publishing Company, New York.

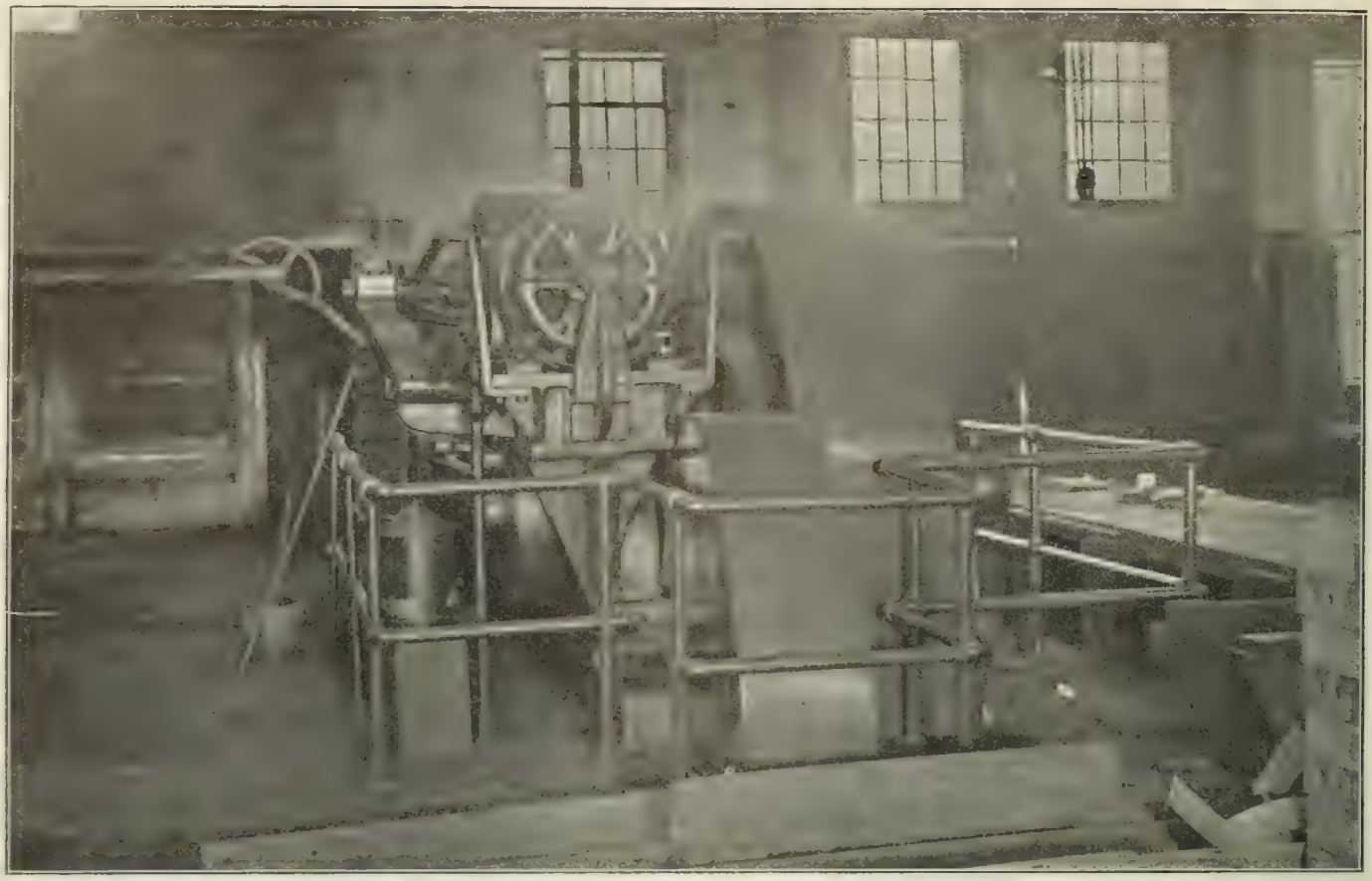


Fig. 2—Bulldozer Guarded by Iron Pipe Railing and Boiler Plate Guards.

Fig. 3—Turntable with Iron Pipe Railing. Note the Location of the Arc Light.

they extended completely over the wheels projecting beneath them, leaving no unnecessary exposure of movable parts. An example of complete and effective safeguarding of a driving wheel lathe is shown in Fig. 5. A strong box encloses all exposed gears and wheels.

The following are cheap, but effective, safety devices: A shield of ordinary flat glass about 4 in. x 5 in. in size attached to the front of the guard on dry grinding wheels, about 6 in. above the rest, prevents dust and sparks from flying into the operator's eyes, which is a frequent source of annoyance and injury. A "toe guard" around the edge of overhead platforms, stairways and walkways prevents tools or material from falling or being pushed off and striking some one working or passing beneath. It can be made by attaching a thin strip of board or metal around the edge of the structure so that it extends about 3 in. above the walk. Wood platforms (with the heads of all nails or screws sunk into the surface) placed on the floor in front of switch or panel boards, and of such size that one must stand upon them to reach the lever controlling the current, ordinarily afford safe protection from electric shock.

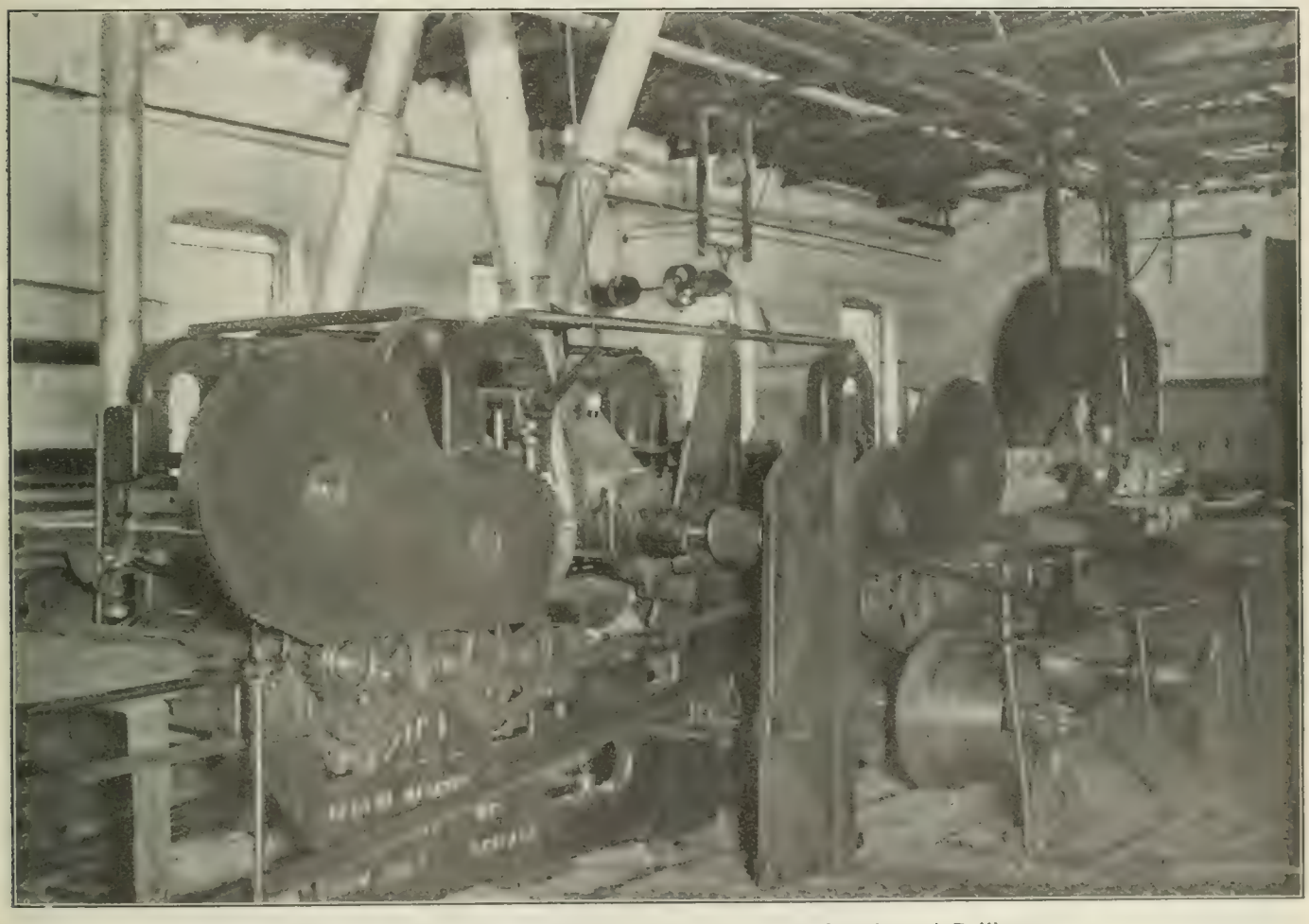


Fig. 4—Timber Planer Protected by Boiler Plate Guards and Railing.

CONSTRUCTION AND APPLICATION OF SAFETY GUARDS

It must not be supposed from what has been said that the construction and application of safety guards is a matter of such simplicity as to require little thought and skill. Quite the contrary. In the first place, intelligent workmen—even foremen in charge—generally need to have their attention called to the presence of danger and the necessity for guards, on the machines with which they work, by some man who makes a special study of safety. They are often entirely unconscious of dangers which confront them every minute of the day until some one points them out. The following illustrations show actual conditions which those exposed had not thought of as at all hazardous until safeguards were applied.

A heavy, sagging and fast moving leather belt over a work bench, just high enough to clear the heads of the men at the bench is shown in Fig. 6. These men are liable to be caught by the sag of the belt, or struck by it, if it should break. Protection was afforded by placing immediately beneath the belt a wide plank, supported by brackets from the side wall.

A large set screw on a revolving spindle, in such a position that the operator had to reach around the spindle, thus bringing his sleeve in contact with the screw, in order to reach the hand clutch, is shown in Fig. 7. Several men operated this machine each day to not one of whom had it occurred that the head of the screw was likely to catch the clothing and cause a broken arm or other serious injury. A set screw which caught the clothing of the operator breaking his arm is shown in Fig. 8. The foreman in charge of the shop containing this machine and the men working under him were all of superior intelligence, but until this injury was received, it had not occurred to any of them that this and similar set screws should be guarded. One of the greatest dangers is presented by these revolving set screws, bolt heads or nuts. They can easily be rendered safe, as shown by the illustration, Figs. 9 and 10.

A box guard provided for the gears at the end of a lathe is shown in Fig. 11. It is necessary to change these gears, and in this case the guard was constructed to rest on the floor and extend around the gears which could be reached by simply setting the guard aside. The only criticism of this construction is that the operator is liable not to replace the guard. Where possible, it is better to attach the guard to the machine by hinges, so that it will swing shut of its own accord.

Guards for gear wheels should extend entirely over the ex-

posed part of the gears, and both ends of the guard should be securely attached to machine. The best style of guard is the box guard, which completely encloses the wheels, and this style should always be used where feasible, If the wheels are solid and the sides smooth (no spokes, bolts or holes), there is no great necessity for complete enclosure and the rim guard is effective. Rim guards should extend over the teeth. Fig. 12 shows an improper form of rim guard (not enclosing the gear teeth) and improper attachment of the guard, one end being unsecured, which not only affords incomplete protection, but

Fig. 5—Driving Wheel Lathe Gears Effectively Protected by a Sheet Steel Box.

presents an additional danger, owing to the liability of one's clothing being caught on the loose end of the guard. Fig. 13 illustrates the proper form of rim guard properly secured to machine.

The safeguarding of circular saws is a most difficult problem. There are a great many different types of guards for this purpose. The one shown in Fig. 14 is believed to be the most effective, because it is self adjustable, is not complicated and can easily and cheaply be constructed by any good mechanic. The objection to most other forms of circular saw guards is that they depend partly or entirely upon the workman for adjustment, with the too frequent result that he (especially if a piece worker in a hurry) pushes the guard up entirely out of the way and operates the saw without any protection. The part *A* is a strong piece of metal of the same thickness as the saw, secured in position beneath the table and of sufficient length to permit an up-and-down adjustment to conform to different saw sizes. The part *B*, attached by the bolt at *C*, allows the end of the guard to rest on the table and to move freely upward to conform to different thicknesses of material used.

Pulleys, flywheels and other dangerous machinery near the floors should be protected not only by railing, but by complete enclosure with solid material or wire of fine mesh. Don't 'think that guards are unnecessary because one "has no business" to get near the particular part of the machine to be guarded. We are compelled to protect the careless as well as the careful man. The device, which is "fool proof," is the most effective.

When safety devices are provided the men should be compelled to use them. The man who deliberately refuses or persistently neglects to use a proper safeguard provided for his own protection shows a reckless disregard for the safety of himself and his fellow-workmen, which, if it does not in his particular case result directly in injury to some one, furnishes to all the men in the shop an impressive and baneful example of indifference, even contempt, for safety regulations.

WARNING SIGNS AND SYMBOLS FOR SHOP DANGERS.

In some shops guards are painted red. This should not be done to indicate danger, because if the guards have been properly designed and applied, there should be no danger. If this practice has any merit at all, which is questionable, it merely serves to render the guards conspicuous, thus perhaps enabling the foreman, in passing through the shop, easily to observe any

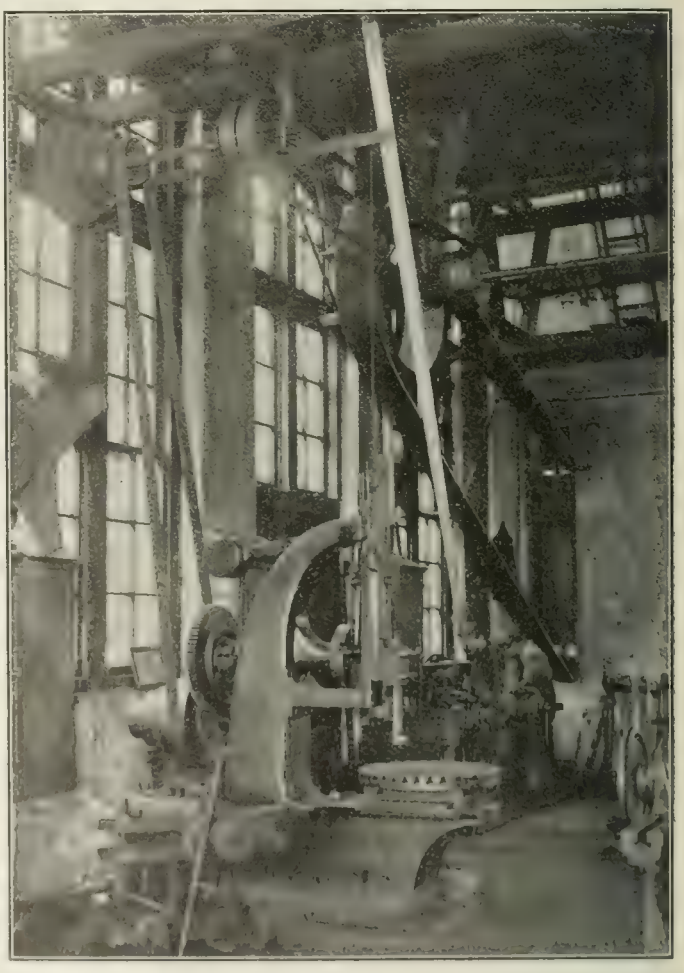


Fig. 6—Heavy High Speed Belt Which Should Be Safeguarded.

guard out of its proper position. But we hesitate to believe that there is in any shop such an adverse sentiment toward safety guards as to make precautions of this nature necessary. It is not advisable to apply a special color to the guards, but to use such indication, or some sign or symbol, only upon those parts of machines or at those places in the shop which, by reason of construction or environment, cannot be made entirely safe by guards.

A printed sign, as a means of calling attention to danger, is very unsatisfactory. It requires too much space, takes time

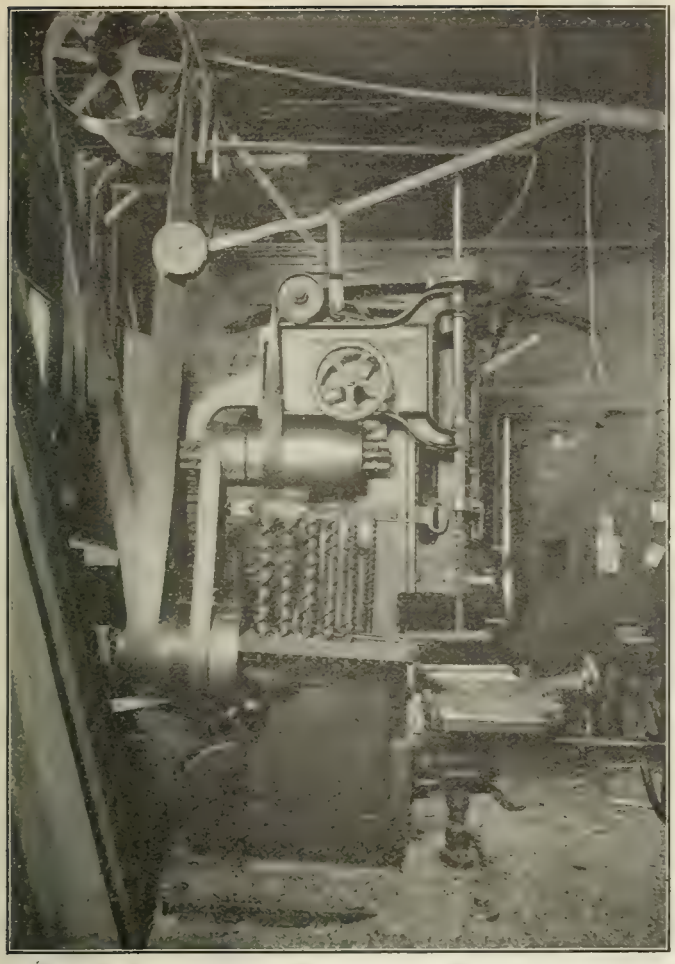


Fig. 7—Note Projecting Head of a Set Screw on the Spindle.

to read (which some workmen cannot do), and to reach all employees in the average large shop must be in many languages. What is needed is some simple distinctive and suggestive symbol, adaptable for use at all places and under all conditions, which, at a glance, will convey to all men a sense of danger of personal injury. Unfortunately, there seems to be no such symbol which has not already been so appropriated for other purposes as to have its meaning almost entirely restricted to its present application. The skull and cross bones, besides being difficult to execute, is too grewsome. The red cross is not available.

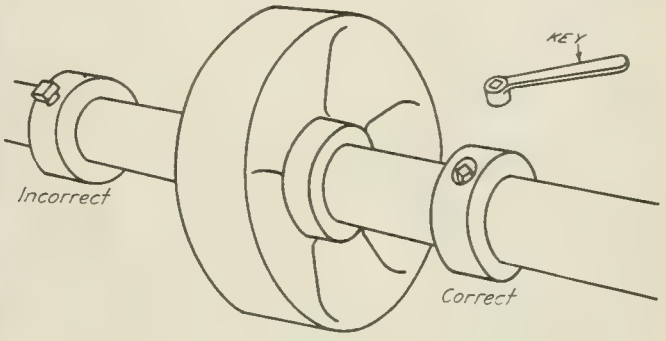


Fig. 9—A Good Method of Safeguarding Set Screw Heads on Revolving Parts.

The red flag is objectionable. Whatever symbol is selected—if ever any should be—will, of course, by use acquire the proper significance and become as peculiarly suited for the purpose as other symbols of long application. It is not, therefore, of vital importance what is adopted, provided it conveys an impression of danger and can be designed and produced with little expenditure of time or skill. Care should be taken in the use of warning signs or symbols to apply them only where there is a real danger, which cannot be overcome by safety guards. Their promiscuous and general application nullifies their effect.

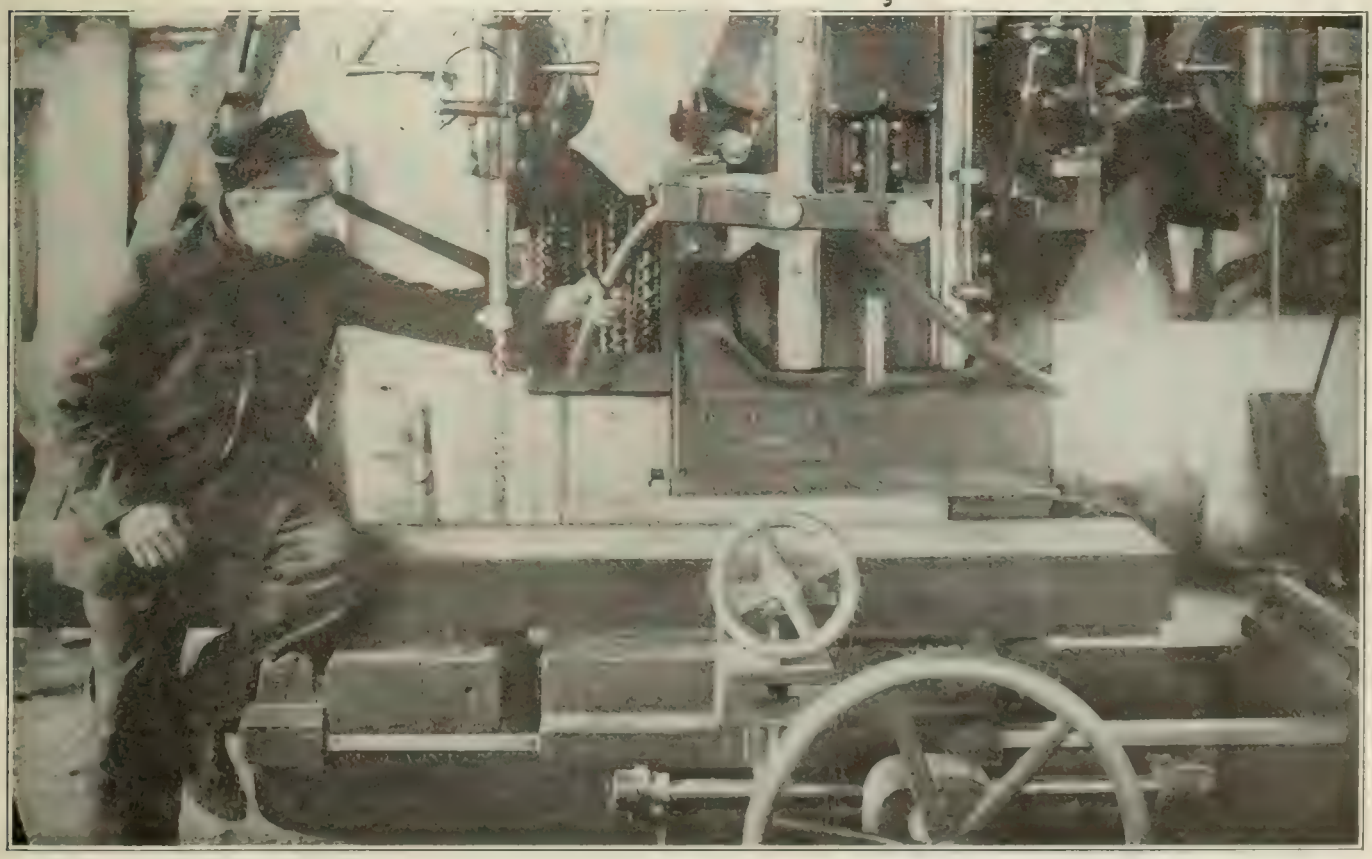


Fig. 8—Projecting Set Screw Which Caused a Serious Accident.

USES AND LIMITATIONS OF SAFETY DEVICES.

In any systematic plan for accident prevention it should be kept in mind that while safety devices are necessary and important they afford the means of preventing only a small percentage of accidents. Important as these devices are, we believe that in the public mind too much has been expected from their use. A study of the theory—aside from the practice of accident prevention—leads to this conclusion. If all men, at all times, were as careful and prudent as they could be, and, in theory, should be, there would be little need for safety devices; the

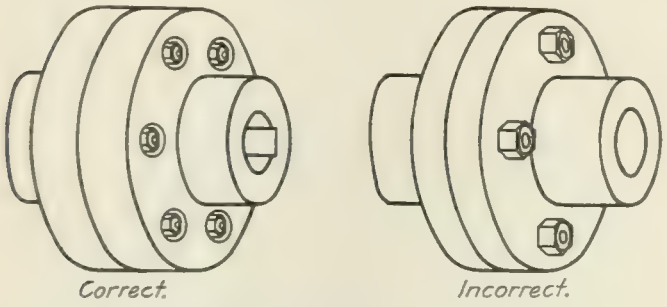


Fig. 10—Projecting Nuts on Revolving Parts Should be Safeguarded.

necessity for such devices is in inverse ratio to the careful and prudent habits of those by whom the devices are to be used. Indeed, there is in theory this objection to safety devices, that they tend to eliminate the necessity for personal thought and alertness. In other words, if it were possible to so cultivate the human element in our shops, yards and on our tracks, without reduction of output or other detriment, that accidents would, because of such acquired prudence of the employee, be thereby generally prevented, this method would be preferable to the use of safety devices. But as we cannot improve the human element to this ideal extent, we use safety devices to accomplish the purpose.

That too much consideration has been given to mechanical means of accident prevention and not enough to the human element is, we believe, clearly shown by experience. For many years railways have been introducing and extending safety devices and appliances on their tracks, trains and in their shops. We have had these appliances for years, and more of them each year. Yet for the last ten years (with the exception of one or two years) the number of employees of all classes, and the number of trainmen injured in proportion to the number employed has constantly increased. In other words, the personal injury record among employees has been going from bad to worse.

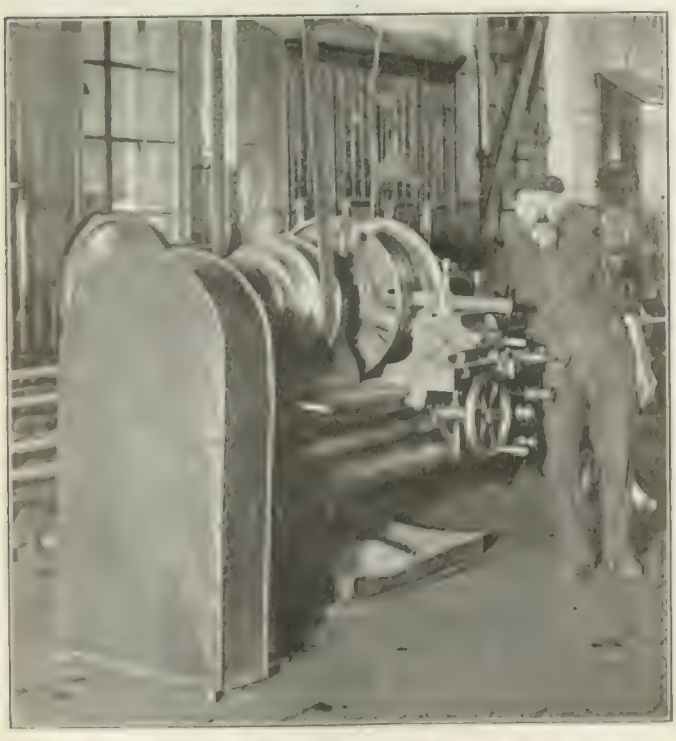


Fig. 11—Removable Safeguard for Lathe Feed Gears.

In Germany, where there are various museums of safety supported by government, and designed to foster the invention and introduction of safety appliances, and where, as a result of such stimulant and encouragement, these appliances are more ingeniously contrived and more generally used than in this country, it is still found, from reliable statistics, that as high as 48 per cent. of the accidents are preventable. The point is this: *No safety appliance is safe in the hands of an unsafe man.*

SAFETY EDUCATION.

It is a fact, clearly shown by statistics, that a majority of the preventable accidents are due to the third cause mentioned at the beginning of this article. Yet our efforts to prevent accidents have been confined almost wholly to the first and second causes. We have given, *not too much attention to material and method, but too little attention to man.* There is from all roads, especially from in and around shops, a constant stream of accidents due, not to any defect or insufficiency in material or method (unless to a lack of proper safety supervision), but to man—the human element. Railway men are not vicious. They are not, as a class, ignorant. But they have not been trained to think seriously of the sad results which may and do follow neglect of that personal duty, imposed by an authority prior and higher than the book of rules, to avoid injuries.

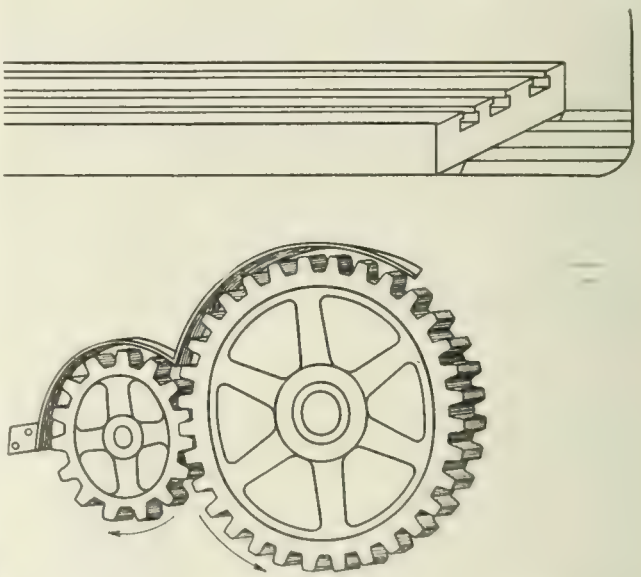


Fig. 12—Improper Form of Rim Guard for Gear Wheels.

Following are a few of the many almost daily examples of the effect of this indifference. Car repairers, trackmen and shopmen, in placing material or throwing aside scrap or rubbish, give little thought to its being kept clear of the space used by other employees in the performance of their duties. There are thousands of these unnecessary obstructions. Boards with nails projecting upward are placed and allowed to remain in and near traveled areas, and hundreds of employees are injured from this cause every year. One of the most absolute rules of all companies is that requiring car repairers, when under or about cars, to protect themselves by proper signals. This rule is so plainly necessary and of such vital importance that one would think self interest alone would be sufficient to insure compli

ance. Yet experience shows that with a little relaxation of vigilance on the part of those in charge, this rule is promptly and persistently violated by the very men whose lives depend upon its observance. Even with the greatest vigilance on the part of foremen, it is not at all unusual for men to be injured or killed in the violation of this rule.

It is unnecessary to extend this list. A study of railway personal injury records shows that every day scores of persons are injured or killed because some employee did, or failed to do, something which could not be foreseen and be made the subject of

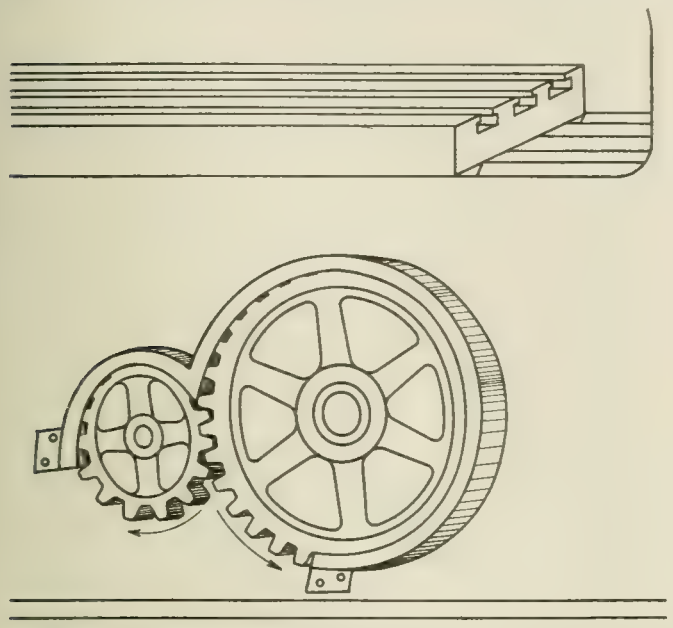


Fig. 13—Proper Form of Rim Guard for Gear Wheels.

a rule or of instruction and which, even if it could be anticipated, is so plain and simple, as to the duty imposed, that to make it the subject of detailed and specific instructions would almost seem an affront to one's intelligence. Indeed, safety efficiency cannot be procured, except to a limited extent, by specific rules and regulations. We have had plenty of rules and regulations for the performance of general duties, but the personal injury record of employees has been growing constantly worse.

It is true that we need more, not fewer, safety appliances, but we also need, and need badly, a vigorous campaign of edu-

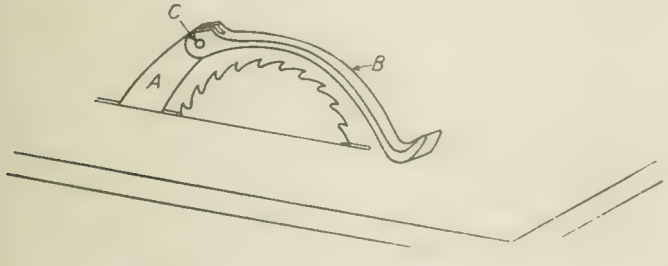


Fig. 14—A Good Guard for Circular Saws.

cation among employees for accident prevention. Safety appliances, plus this education, plus official supervision, with safety as the sole end and not an incidental consideration, will, in a few years, bring about a much desired change in our accident reports. The lesson to be impressed upon us by the large number of preventable accidents, due to some extent to a lack of safety appliances, but to a greater extent to the indifference or positive negligence of employees, is this: *We should, by systematic and persistent safety inspection, education and supervision, awaken the interest, quicken the understanding and strengthen the judgment of employees, so that their pride, intelligence and personal interest will bring about that effective co-operation with the management which will result in real safety efficiency.*

TRAINING OF APPRENTICES AND WORKMEN.*

BY L. L. COLLINS,

Bonus Inspector, Atchison, Topeka & Santa Fe, Albuquerque, New Mex.

The apprentice who enters a railway shop where a regular organized apprentice instruction system is in force has many advantages which were not offered years ago. The modern apprentice schools, which include every facility for learning, are a great help, especially where classrooms with drawing tables, drawing boards and instruments, models and lesson sheets are provided, and where an experienced draftsman acts as the instructor and teaches mechanical drawing and mathematics. Each apprentice usually attends school twice a week for a two-hour session. The morning sessions have proved to be the most productive, as the young men are brighter then, and can grasp things more readily. The method of teaching is different than that of the public schools. Each boy is advanced as fast as he is able, and a dull boy does not keep back the bright one. Nevertheless, the dull boy is given every assistance, special attention being given to help him.

The apprentice school teacher is supplemented by a shop instructor who teaches the boys in the shop. It is essential that a man in this position be of good moral character and a good mechanic. Good character is necessary, for as he is over a number of young men he is considered, more or less, as a standard or example, and usually has a great influence over the boys. At the age a young man is learning his trade every care should be exercised to develop his moral character as well as all his skill in the trade, for it will mean much to him later and will help to make an upright citizen of him. The apprentice should be governed by a set of rules, which may be few in number, but should be enforced to the letter.

The instructor's duties are sometimes trying, and considerable patience is often required when handling the young men, but kind treatment, with an occasional heart to heart talk, will generally have the desired effect. Under good treatment the young man will soon take an interest in his work and take hold of it with a vim. The idea of giving prizes to apprentices for excellence in efficiency has some advantages, as well as disadvantages. In considering a case where the railway company agrees to pay each apprentice who finishes his trade in a satisfactory manner and at a certain efficiency as a workman, a stipulated sum, would it not create a temptation to gain the efficiency no matter how it was done? On the other hand, one young man may be bright and another dull; the bright boy can easily hold his efficiency throughout his time, while the dull young man will have to work much harder to attain this efficiency, and the prize will be an incentive for him to do so. However, prize winners do not always make the best workmen.

Shops where only a few apprentices are employed and no apprentice school is provided should have a traveling instructor. He could handle three or four shops each week, and should be not only a school instructor, but a shop instructor as well. There are handy men and laborers who in their younger days did not have the opportunities which the young men now have, but who are desirous of advancement and learning. For these a night school might be established where for a nominal charge they could receive a course of training similar to that given the apprentices, with the exception, of course, of a shop instructor. The shop foreman could see to their instruction in the trade, provided the workmen showed sufficient inclination and ability. Some of these men will surprise you in the way in which they develop into first-class mechanics.

*Entered in the competition on the Instruction of Workmen and Apprentices, which closed April 15, 1911.

PROTECTIVE VALUE OF PAINTS FOR STEEL STRUCTURES.*

BY J. H. PITARD,

Master Painter, Mobile & Ohio, Whistler, Ala.

In view of the increasing use of steel and iron for structural purposes, the great strain it is designed to endure, the large amount of capital involved, and the consequent longer service naturally to be expected of it, as compared to wooden structures, the selection of suitable protective coatings becomes a matter of the highest importance. The eroding effect of oxygen on inorganic substances is a well-known scientific fact, and upon certain substances, such as unprotected steel, its destructive effects are rapid and ruinous.

There is quite a difference of opinion even among practical painters who have given much study to the subject as to the most suitable and enduring paint for this purpose. The exclusion of moisture, of which oxygen is a constituent, is the main point at which are aimed the efforts of the engineer, the painter and the paint manufacturer, in order to combat the ravages of oxidation. In recent years the manufacture of paints has been specialized to such an extent that the multitude of iron paint specialties are almost bewildering, and notwithstanding the high claims made for them, their virtues must be demonstrated by actual service tests. The construction of some steel structures is such as to render certain parts inaccessible for repainting, and the initial painting is the final one; therefore the selection of the most enduring paints, regardless of cost, for such parts, if not for the entire structure, is plainly of the greatest necessity. A combination of paints is necessary to secure the best results in the painting of steel and iron, as in other lines of painting.

Red Lead.—The paints generally used for the protection of steel and iron are red lead, carbon and the iron oxides. Of these three, red lead is perhaps the general favorite, its use for this purpose having met with variable success; as to its fitness there is much that may be said, both for and against it. Its protective value in damp situations has led to its general use on steel structures; but it is doubtful as to whether the same results can be obtained in dry situations. Red lead, being a strong natural and progressive dryer, when mixed with linseed oil will cause the oil to dry thoroughly hard, which, together with the close texture of the red lead makes an almost impervious coating. This is the whole secret of its protective value in damp places, but its progressive drying tendency becomes an element of weakness when placed in dry situations, especially when exposed to the sun. Under these conditions, aided by the heat of the sun, it burns out its life more quickly than where it is protected from the elements, or where it is submerged in water, as on the hull of a vessel. Better results may be gained by using red lead only as a first coating, and possibly a second coating, and finishing with one or two coats of a good elastic carbon paint. This method is especially suited to steel bridges or other exposed structures. The hard drying tendency of red lead in dry and exposed situations may be largely overcome by the addition of a small per cent. of some of the numerous paint oils, such as cottonseed oil, for instance, whose iodine value is considerably below that of linseed oil. A. H. Church, professor of chemistry in the Royal Academy of London, in his work on the Chemistry of Paints and Painting, says: "Red lead may be approximately represented by the formula Pb_3O_4. The paler and more orange tinted varieties contain an excess of protoxide of lead, often accompanied by a little carbonate. This pigment is peculiarly liable to discoloration in the presence of sulphuretted hydrogen; it acts energetically upon some paints, on the cadmium yellows, for example. It is quite inadmissible as a water-color and cannot be considered as safe in oil."

Red lead becomes a safer paint when its weak points are made known, for it may then be arranged in combination with other paints so that they will mutually strengthen each other and give better results. While it must be admitted that good results may be obtained by the intelligent use of red lead, it contains so much oxygen that it is liable to impart some of it to the iron it is supposed to protect and thus cause it to corrode. Especially is this true where the iron surfaces have not been thoroughly cleaned before painting. In such cases oxidation slowly continues until in some instances sheets of metal are perforated, while to outward appearances the paint is intact. It is, of course, obviously unfair to attribute the fault to the paint. The thorough removal of all rust preparatory to painting is of the greatest importance, not only in the case of red lead, but in the use of any paint intended for the protection of steel or iron. Red lead in some respects is not unlike japan drier, which in small quantities in combination with other paint compounds will cause the mixture to dry within a reasonable time; where japan alone is used as a protective coating it very soon becomes hard and brittle, and will flake or crumble off. Red lead being a progressive, and a strong natural dryer should have its tendency to excessively hard drying counteracted either by the admixture of non-drying inert substances, or by the use of some of the slower drying oils as suggested above. Rightly mixed and applied according to the varying conditions of service, red lead becomes an excellent metal protector.

Oxide of Iron.—Oxide of iron when mixed with linseed oil, although entirely different in nature from red lead, constitutes a metal coating of considerable merit. The quality of the oxide, however, is of course a determining factor. The essential requirements of an oxide for a metal coating are that it should be thoroughly dehydrated and free of sulphur or other injurious constituents, and finely ground. In some respects oxide of iron paints do not compare with red lead, as for instance in damp localities, for the reason that having no natural drying qualities, and being of a more porous nature, the pigment and oil do not reach that degree of cement hardness necessary to render it impervious to moisture; for this reason it would constitute an inefficient protector to the hull of a vessel, or to structures similarly exposed. In dry situations, where a sufficient number of coats are applied under proper conditions, the results will be equal to or better than red lead, and more economical. As oxide of iron has no natural drying qualities, artificial drying must be resorted to, and for this purpose a small proportion of red lead or litharge is superior to the liquid dryers. Oxide of iron paints also constitute an excellent top or finishing coat over a red lead under-coating where the color of the latter is objectionable. Experience has proved it to be superior to white lead for this purpose. To obtain the maximum durability from any of the group of iron oxides, they should be ground in linseed oil; if mixed with the oil in their dry state, the assimilation is imperfect and the durability is correspondingly less.

Carbon Black.—Carbon black when mixed with linseed oil was, until recently, much in general favor as a protective coating for iron and steel, but tests have demonstrated unmistakably that it has galvanic or electric properties which accelerate rust. This, however, is the case only when it is applied directly on the metal; as a top coating over red lead or other coatings, most excellent results may be obtained. Like the oxides, however, it is unsuited to damp localities. In dry places, or where exposed to sun and rain, it is superior to either red lead or the oxides. As in the case of other pigments, the quality of the carbon must be considered, as there are different kinds of carbon having varying degrees of merit. Carbon known as the old style lamp black when mixed with refined linseed oil constitutes the most durable paint for general painting upon either wood or iron, but in exceptionally damp localities, as on the hull of a vessel, it does not compare with red lead. Carbon is an inert pigment; it has no natural drying properties whatever; on the contrary, it carries a small per cent. of carbon oil, which greatly retards its drying, which, however, is more of a virtue than other-

*Awarded the second prize of $50 in the competition on Paint Shop Practice which closed November 15, 1911.

wise, since it counteracts the hard drying tendency so common to red lead, and thus adds to the elasticity of the coating. In general practice, when painting steel cars, steel bridges, etc., a first coating of red lead followed by two or three coats of carbon paints, will produce much better results than where red lead alone is used.

Linseed Oil.—To secure the best results in painting steel or iron structures with any or all of the above mentioned paints, the combinations should be arranged to suit the conditions. The basic part only of the paints considered above has been discussed. The other constituent, linseed oil, with which they are mixed, is of equal importance. There are several qualities of linseed oil, the quality being regulated perhaps more by the manner in which it is made than by adulteration, although there is more or less adulteration. Linseed oil has a strong affinity for oxygen, gaining about 13 per cent. of its weight by absorbing oxygen as it dries. This characteristic is somewhat detrimental to coatings on iron or steel, as more or less of the oxygen is imparted to the metal, resulting in oxidation. Raw linseed oil contains more or less soluble matter that is not to be found in the boiled oil, and for this reason the boiled oils make the best paint when mixed with carbon or the oxides; for mixture with red lead it should be boiled, but the litharge should be omitted, as the red lead is a natural dryer and needs no supplementing. Another feature of linseed oil, highly essential to durability, is its age, for its durability is in proportion to its age. Immature oil, although pure, will prove far less valuable than oil that has had one or more years aging.

Number of Coats.—A common error that is productive of most unsatisfactory results is an insufficient number of coats. The best results are obtained where the body of paint is of sufficient thickness to exclude moisture. This cannot be done with one coat of any kind of paint. The number of coats necessary in each case is governed by conditions and the thickness of the coatings, and by the kind of paints used. From three to five coats should be applied, according to conditions, with ample time between coats for drying.

The maximum protective value of any coating applied to steel or iron can only be obtained by having the metal free of moisture when the paint is applied. Painting raw iron in damp or frosty weather is generally productive of poor results, as the moisture becomes sealed up in the pores of the metal and oxidation soon results.

TIN AND COPPER SHOP KINKS.*

BY C. C. LEECH,
Foreman, Pennsylvania Railroad, Buffalo, N. Y.

BABBITTING BENCH.

A convenient bench for use in an engine house for babbitting and relining such parts as crossheads, shoes, driving box sides, bearings, etc., is shown in Fig. 1. It should be strong and arranged specially for this class of work. The bench shown is made of oak, strongly bolted together, and is covered at the top with an iron plate ⅜ in. thick. To protect the wood underneath, the iron plate is supported on iron strips 1 in. square and spaced on 7 or 8 in. centers, as shown on the drawing. The tool shelf underneath is used for the storage of the various formers and mandrils, and such other tools as are used in this work. A small gas furnace for heating soldering irons, and a larger one for melting purposes are located near the bench.

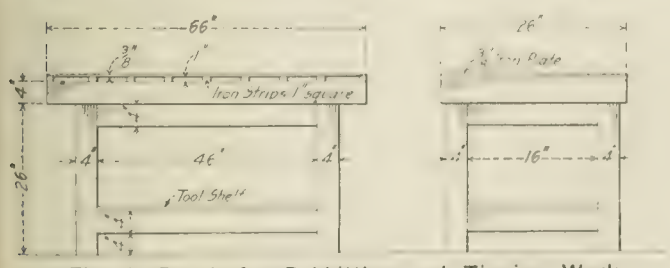


Fig. 1—Bench for Babbitting and Tinning Work.

BABBITT FURNACE.

The babbitt furnace, shown in Fig. 2, is placed near the bench, which is described above. It is of cast iron with substantial wrought iron legs. Openings are left in the upper part of the furnace to receive the square cast iron melting pots. The interior of the furnace is lined with fire brick, as shown. The air pipe enters the elbow in the gas pipe, thus allowing the air and gas to mix before it is discharged into the furnace. The supply of both the air and the gas is controlled by globe valves in their respective pipes. No burner is required other than the 1 in. pipe which enters the furnace underneath the center of each melting pot and within 2 in. of its bottom.

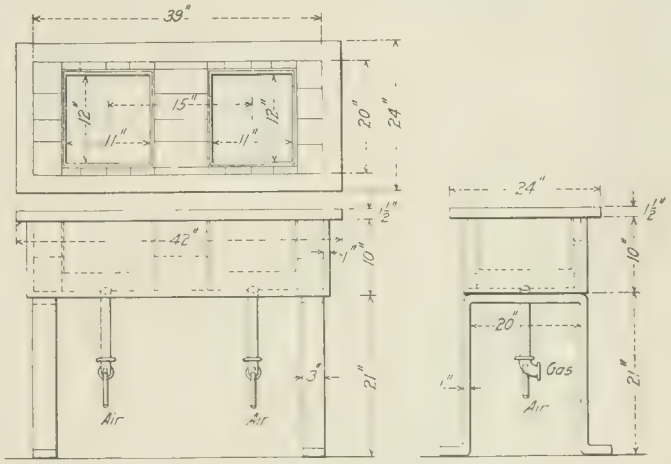


Fig. 2—Babbitt Furnace.

SOLDERING IRON FURNACE.

A furnace for heating soldering irons is shown in Figs. 3, 4 and 5. It is made of No. 14 iron, which is riveted to vertical ¾ in. x ¾ in. angle irons, which extend below the bottom of the furnace and serves as legs. The sides and top of the furnace have an inside lining of ¼ in. mesh screen, which is filled with fire clay.

The bottom of the furnace is open. The burner, which is con-

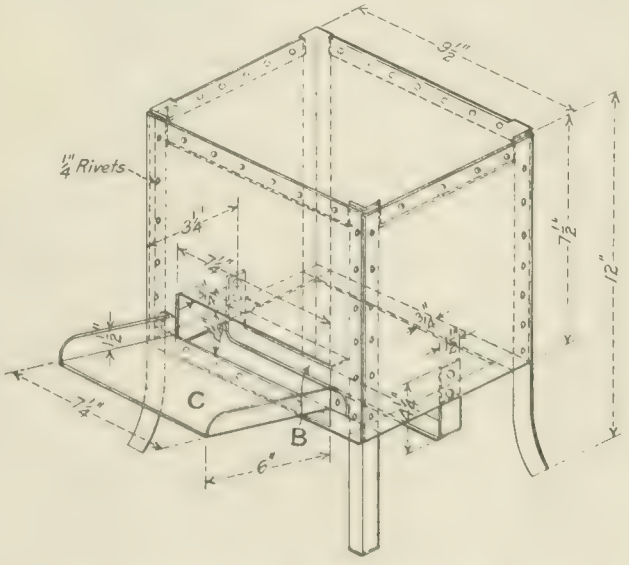


Fig. 3—Furnace for Heating Soldering Irons.

*These kinks are part of the collection which was submitted by Mr. Leech in the shop kink competition that closed May 15, 1911, in which he was awarded the first prize of $50.

structed of ½ in. T's and nipples is shown in detail in Fig. 5. It is supported by the bracket *B*, and has attached to it an air mixer, that is made from a 2 in. pipe sleeve with the ends plugged as shown. The soldering irons are laid on the shelf *C*,

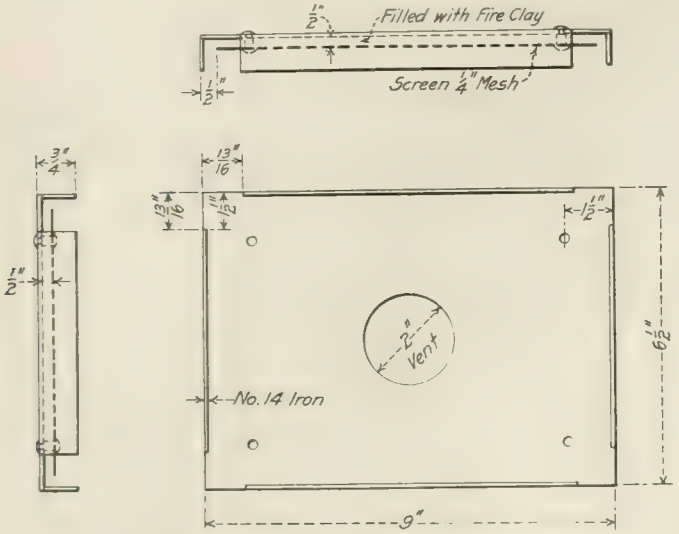


Fig. 4—Top of Furnace for Heating Soldering Irons.

which is attached to the front of the furnace, the copper ends of the irons extending over the flame. The furnace may be used either as a permanent fixture in connection with the babbitting

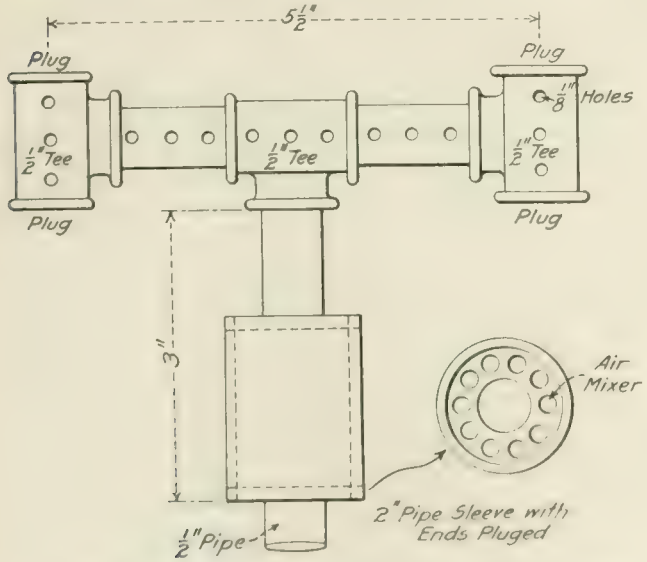


Fig. 5—Burner for Soldering Iron Heating Furnace.

bench, Fig. 1, or if advisable it may be used as a portable device, if the proper air and gas connections are provided at various places where it may have to be used in the shop.

BABBITTING ENGINE TRUCK BEARING.

The mandril for babbitting engine truck bearings, Fig. 6, is used in connection with the babbitting bench, Fig. 1. It is made

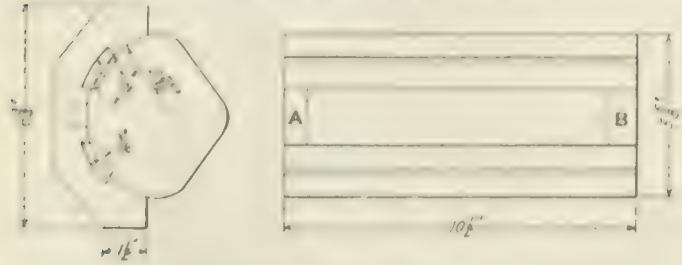


Fig. 6—Mandril for Babbitting Engine Truck Bearings.

of cast iron, and the side which comes in contact with the bearing is turned to the proper diameter, after which the slots are planed. The slots are tapered ⅛ in., being wider at the top end into which the metal is poured, thus facilitating the removal of the mandril. The two strips of babbitt can be connected across the ends by removing the metal at *A* and *B* on the mold.

MOLD FOR METALLIC PACKING.

The mold for metallic packing shown in Fig. 7 is made in two parts, which are hinged together. A tapered mandril of the proper size is placed between the two parts of the mold before they are closed and clamped together. After the metal has been

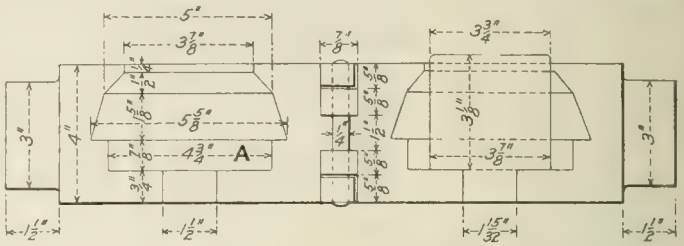


Fig. 7—Mold for Casting Metallic Packing.

poured the mold is opened and the casting removed. The mandril is driven out, after which the packing is ready to be bored, turned to size and divided into three rings or parts. The mold is, of course, made so that the casting is formed approximately to the proper shape and requires very little finishing. The part *A* on the casting is removed, its only function being to assist in holding the packing in the chuck while it is being machined.

EFFICIENT SHOP MANAGEMENT.

A most interesting and comprehensive address on The Economic Administration of Industrial Establishments was given before a joint meeting of The Altoona Railroad Club and The Engineering Club of Altoona, Pa., by John Calder, manager of the Remington Typewriter Works. The following extracts are taken from the introductory portion of the address which contained an outline of the broad principles that are followed by the Remington Company and which are applicable to any type of shop:

THE NEED FOR GREATER EFFICIENCY.

The function of organization in shop administration is not alone the important one of operating plants economically, but also to anticipate trade fluctuations, to measure up with care the prospective value and desirability of extensions, to check mere bigness of project and endeavor to make reasonable provision for a contracting expense of organization during a period of depression.

THE IMPORTANCE OF ORGANIZATION.

The primary object of organization is to bring brainy men together for work and action. A wise organization seeks and encourages men of ambition. It believes that the ambitious man is not necessarily dangerous. It knows that success demands an aggregation of strong individualities, free to contribute their quota of wisdom but loyally subordinating their individual preferences to the general policy once declared.

In order that its work may be well done and its action strong and forcible the organization must move forward as a harmonious unit. No amount of clever scheming alone will secure this. Herein lies the task and the genius of the organizer of men as distinguished from the mere systematizer of things. His work is much easier to talk about than to carry out, but it needs brief mention here.

The organizer's success will depend not merely, or even chiefly, on extended technical experience and close knowledge of the business, but upon his ability to select his assistants, to transfer

his own work to them and to inspire those assistants with his own ideas, his own energy and his own ability. Emerson says "Every great business is but the lengthened shadow of one man," and he is right. The modern administrator of industrial establishments is a manager of men rather than of things and the human factor touches his business on all sides. An organization, therefore, must have a strong, resourceful leader and a carefully selected, well trained, loyal and enthusiastic staff. This will only come through intimate contact with a man, not a mere machine or inanimate system. Having chosen men, frequently young men, for their record and potentialities, particularly for signs of executive ability, a not too plentiful quality, they should be expected to win solely on their merits and to make the most of the business by making the most of themselves. Unless the leader sees and plans for an opportunity for a useful career, not only for himself, but for his staff, he cannot reach the highest success.

The cold-bloodedness of some of the modern schemes for exploiting the higher human energies is not only repelling—it is a fatal defect.

THE SYSTEMATIZER.

Organization, though the greatest factor in business, implies co-ordination, or system, and not much can be accomplished without the aid of the latter. Business methods and apparatus, particularly those of mechanical and transportation concerns, are being closely scrutinized and many proposals made for securing greater internal economy. At such a time it is well to bear constantly in mind that any system, however attractive and justifiable in some of its features is, like the plant itself, worth no more than it can earn. No manufacturer is in business as a subject for experimentation which may not point the way, but merely warns others from following. All money and worry expended on system beyond the earning point is wasted.

An admitted experiment of measured duration and conclusive nature is one thing, but a shop revolution covering years of transition experiences is irretrievable and usually unsupportable. Dead uniformity and absence of scope in a system for individual initiative and incentive are not necessarily factors in securing what are the sole justifications for special outlays on system, viz., absolute certainty of increased economy, accuracy and despatch. In concerns in which system is an expensive hobby and not an economical tool, all kinds of extravagancies will creep in and will be justified by some philosophy which ignores common sense.

One of the claims brought before proprietors by some of the external practitioners of system is that it will not only render the efficiency of their business self-perpetuating—a most desirable end, if attainable—but that it will also enable them to become, to a large extent, independent of their managers and higher executives. This is a somewhat mischievous doctrine. No army of clerks, mechanically following planning instructions however perfect, can take the place of the full use and recognition of able engineering administrators and shop assistants under any conceivable works system. The human element in system, as well as in organization, is half of the problem, and there is a tendency to too great rigidity in most of the shop systems offered for general application. It is not a recommendation for any business system, imported from the outside, but rather the reverse, that it should insist upon absolute conformity to type in details without regard to the problem in hand and the great amount of experience already acquired from it. Some of the most practical modifiers of shop management are fully alive to this, but there is a tendency amongst the less wise to vigorously wield the new broom.

The best type of shop system is evolved, not from the outside, but in the shop itself through careful analysis of its special conditions and requirements by the responsible administrator thoroughly in sympathy with and experienced in advanced practice. *A busy and prosperous administration can sometimes be helped by system advice from the outside. It should never be controlled by it.* The most natural tendency of the outside adviser without responsibility for current product and profit is to stereotype the detail of his previous limited practice and dry up the springs of initiative and suggestion within the plant. The best system for any particular shop is that which will co-ordinate all the efforts of a good organization and which will draw out and suitably reward the best effort of every one concerned—not forgetting the employer. The most suitable management for so doing will never be exactly alike in any two cases, though the principles followed may be identical.

SCIENTIFIC MANAGEMENT.

It was to an already progressing and intensively developing shop practice that there was presented ten years ago scientific management. It appeared at first with a more modest title and made its appeal through the ordinary professional channels to the engineer. It was a worthy appeal based upon a quite unusual amount of self-denying investigation, but it did not receive the immediate consideration it deserved. This was partly because the straw man which it set up and repeatedly and vigorously knocked down was merely a lay figure and not really representative, as alleged, of the best existing shop practice. In the case of the more open minded and thoughtful engineers, ready to learn from any source, the science of the movement was accepted with considerable reservation and from the humanitarian point of view the illustrations used by the gifted author of the system laid it open to not unjustifiable attack and to the complaint that though a deeply interesting experiment had been made, it did not justify the far reaching generalizations based upon it.

In the ten years which have elapsed professional efficiency engineers with no such experience as the able author of scientific management have multiplied somewhat more rapidly than the demand for this service would warrant and quite recently scientific management itself has caught the fancy of the press and of the man in the street and has been let loose through a popular propaganda upon an indiscriminating public. It will come back to its moorings after a while. Actually the particular system described and advocated by Fred W. Taylor has made relatively little progress, and while economic administration of industrial establishments has been not a little quickened by its advent and discussion, the most of the general advance has been the result of causes operating before that event, and much of it has not been along the specific lines of such proposals in scientific management as are original with its author. The fact of the matter is that Mr. Taylor's scientific management is a very big and difficult task requiring professional ability of the highest order. Stripped of the data, apparatus and phraseology which have led careless readers to think of it as a new way of running machinery, of paying men, of avoiding labor trouble, of insuring dividends, etc., it is neither more nor less in its essence than a proposal to revolutionize our industrial life. Viewed in that light it is a most interesting and suggestive speculation which well repays close study by engineers. It presents itself to the shops in complete technical detail, a most expensive detail, and many businesses cannot contemplate the years of outlay involved before the returns promised should accrue. The author of the system is entirely frank on this aspect of the case and system practitioners whose promises have a "get rich quick" flavor are certainly not installing the genuine scientific management.

The writer believes thoroughly in the principles enunciated by Mr. Taylor, but is of the opinion that they are offered for application in a detailed system too complicated, rigid and unyielding for immediate application to every day needs. Shop management is an art rather than a science. It has to deal with too many unknown quantities and variables either to aspire to scientific rank or to adopt a fixed creed. Few individual businesses can afford the interference and expense involved in carrying out effectively the extensive scientific programme of the proposal under discussion. By professional societies or national agencies many shop problems still unsolved might possibly be greatly assisted without the risk of interfering with business but the installation of the whole machinery of scientific management has

been very seldom attempted. Nevertheless, though committal of a shop to one rigid programme of outside origin in all its implications—and the control of the business it must be remembered is an invariable stipulation—is not, in the writer's opinion, desirable; there is plenty of scope for more systematic analysis and regulation of shop processes and expenditures. The business world, and engineers in particular, owe much at present and will owe more to the ability and devotion with which the author of scientific management has elaborated and advocated his particular combination of things old and new.

THE PROPER USE OF SYSTEM.

There are several rules in regard to office and shop routine which the writer would recommend all managements to observe, irrespective of the class of work done.

First, have a well considered system of doing things, definite and business-like in all departments, not an imitation of something else, but one designed for your own case.

Second, see that a broad view of the subject is taken and provision made for properly dovetailing the various department systems.

Third, make the connection clear to all employees by the use of a chart. Such a table is self-interpreting and saves much explanation.

Fourth, have as little system and as few forms as possible. Make them a means, not an end. There are many daily items of shop practice being perpetuated in expensive card systems today of which no use whatever is being made, or is ever likely to be made.

Fifth, do not treat the system as a fetich. It is a good servant but a bad master. So much of it as is justifiable is merely organized common sense. Prune and pare your system until it gives the utmost economy and despatch.

Sixth, do not fail to note closely what your system costs and if it is really paying its way. Very few experts can answer that question. With many it is purely a matter of faith.

Seventh, be always on the outlook for improvements and suggestions from any responsible quarter and discriminating in adopting them.

The writer has spoken of useless records with reference to data which need not be recorded at all in permanent form. Some other records are useless, because their form renders them so for the purpose of frequent and rapid reference. Still other records are useless because they are inaccurate and unreliable. The writer has heard it urged, in all seriousness, that detailed shop and cost data cannot be trusted, but this is simply a plea for slovenliness which the users would not tolerate in their own technical spheres. It is just as easy and cheap to collect—almost automatically in a good system—correct figures as it is to record inaccurate ones, and the man who knows exactly what he is accomplishing will always come out ahead of his competitor who only thinks he knows.

VARIETY OF MANAGEMENT PROBLEMS.

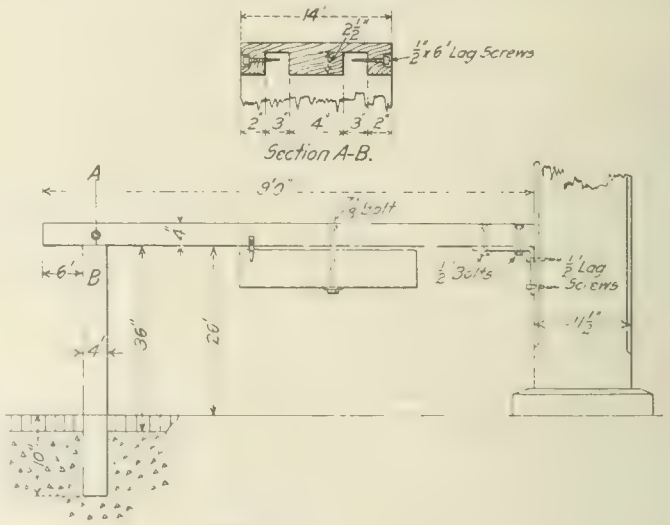
Systems of management are necessarily as various in their details as the business conditions which have to be met. The [illegible] of a concern manufacturing a thoroughly standardized product which, under no circumstances, will be allowed to [illegible] for [illegible] time. As a business policy [illegible] and the product may be out of date before the fact is realized. In such a business, however, at one sweep, many of the difficulties experienced by general engineering concerns, as discussed [illegible] and attention can be concentrated on a limited number of salient problems, the satisfactory solution of which [illegible] by gradual and experimental steps.

In a class of industries are problems like shipbuilding and *repairing and locomotive overhauling where the time during* which a large [illegible] is earning nothing is a grievous consideration. Between these extremes, namely, where cost is the governing factor to any hard and fast completion on the one hand, there are all possible variations, no [illegible] degree of which could be efficiently managed on precisely the same system.

It may be emphasized here that the underlying practical motive of our system is not indiscriminate speeding at the expense of the workers, but the securing by co-operation of the economies obtainable through either anticipating, or locating and removing all wasted time and ineffective or unnecessary effort and expense, whether clerical, manual or mechanical. It is directed towards enabling employee and capitalist alike, under the most favorable conditions to make the most of the opportunities of the working day and in so doing a very large part of the usual burden is removed from the shoulders of the employee and placed upon the organization.

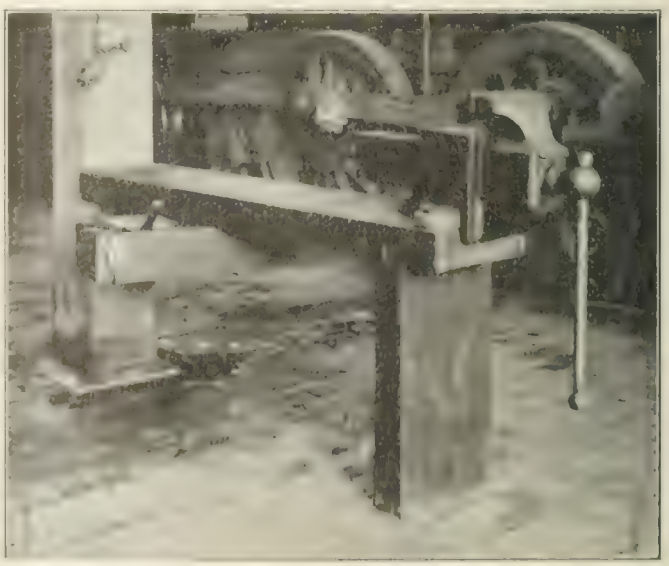
POST BENCH FOR ENGINE HOUSE.

There is usually very little bench room in an engine house and the work benches are generally placed where they will be as little in the way as possible. The illustrations show a post bench designed by J. E. Tisdale, general foreman of the Chicago



Engine House Post Bench.

& North Western shops, Huron, South Dakota. The convenience, utility and inexpensiveness of this type of bench are apparent. The location of the benches near the sides of the loco-



Post Bench for Engine House.

[illegible] the fitting and filing of side and main rod brasses a much easier task. The drawers are hung and swung on a bolt which passes through the center of the bench and drawer, allowing either end of the drawer to be opened toward the workman.

FREIGHT CAR TRUCK EXPERIMENTS.

The extensive series of tests of the friction of loose and rigid freight car trucks on curves, which was made by Prof. L. E. Endsley for the American Steel Foundries Company, was fully described in the *Railway Age Gazette* of March 24, 1911, page 691. At the September, 1911, meeting of the Western Railway Club, George G. Floyd, chief mechanical engineer of the American Steel Foundries Company, presented a paper in which he described some of the incidental features or "side lights" of the tests, which were not considered in the original report. The following abstracts are taken from his paper:

After the investigation of the square and loose trucks in service and before the testing plant was built, we had formed certain conclusions as the result of the investigation, as well as some opinions based upon the statements, experience and judgment of several railway mechanical engineers. While these conclusions and opinions had to be revised somewhat after the tests were run, our conclusions were in the main correct as to theory and as to what the results might be, and had to be revised only because the material effects had been somewhat underestimated. It did not take long to discover that trucks in service did get out of square; that is, in rounding a curve the side frame on the inside of the curve would move ahead of the frame on the outside of the curve. Just how much was a matter of doubt, or a matter of calculation, rather than of actual measurement. The greatest amount that any one suggested was 1¼ in. We were hardly prepared to find that it was nearly as much as 3 in.

We had expected to find that there might be 10 to 15 per cent. difference between the curve friction of loose and square trucks. We found as much as 150 per cent. between the best square truck and the worst loose truck. We had anticipated that the load on the truck and its speed would regulate the amount the truck would go out of square, but it seems from the tests that the truck will go out of square approximately the same amount every trip around the curve, regardless of its weight and speed. In fact, when it was merely pushed around the curve, slowly by hand, it would go out of square the same amount as when it went around it at high speed.

It was evident—as each truck tested went out of square an amount peculiar to itself—that there was something about its construction that acted as a stop to prevent further movement. Probably a wedging of the axle against the opening in the back end of the box and against the wedge and brass. It was noted, in that type of arch bar truck in which the columns were riveted securely to the channel, that the truck went out of square a less amount than those trucks in which the columns were bolted to the channel. This riveting of the column to the flanges of the channel made one less loose joint, and it may be that this one less loose joint introduced a stop at the columns, or column bolts, which brought the truck to a bearing in advance of the stop furnished by the journal and box. There was also found an indication that the longer a truck was in service, the more it would go out of square, this being no doubt due to a wearing away of the parts that stopped further movement of the truck, as well as a gradual loosening of the parts tending to hold the truck square.

An interesting experiment was made to determine what effect the time of service would have upon those parts of an arch bar truck that are supposed to hold the truck square. A car was accidentally found in the yard that had been out from the contract shop less than a month. It had a 50-ton truck of heavy construction and cast steel truck columns bolted to a heavy channel, with two long bolts reaching through both columns. These bolts were tight, as were all bolts about the truck. The truck was put on the testing plant and showed a very good test, one side frame moving ahead of the other only ¾ in. A duplicate of this truck in service one year showed a movement of a trifle over 1¼ in., and another in service 8 years showed almost 2 in. movement. When trucks are new, all the surfaces bolted together being rough and the bolts tight, the friction between the parts will prevent all but a slight movement. It is this small initial movement of the parts that brings about the final general looseness of the whole construction. The high points of the rough joint wear away, allowing the bolts to become loose, and then there is a still greater loosening of the parts in general by abrading, polishing or wearing away of the parts by friction. A bolted joint of this character is probably successful only when it is possible to so design it that all initial movement will be prevented.

It only takes a small movement of the spring channel to give a considerable motion to the side frames, one ahead of the other. One-sixteenth of an inch motion of the channel under the spring seat will allow the side frame at the opposite side of the truck to move forward or backward about ¾ in. to ⅞ in. That this initial motion exists in an arch bar truck, even when new, is not surprising when it is considered that the holes through the upturned flange of the spring channel for the horizontal column bolts are drilled 1/16 in. larger than the bolt, the holes in the arch bars are drilled 1/16 in. larger than the column bolts, and the hole through the column is cored usually ⅛ in. larger than the bolt passing through it—a possible 3/16 in. to 5/16 in. looseness to start with in the fit of the bolts. One does not have to look far to find reasons why the arch bar truck is a loose truck.

The fact that the arch bar truck does get out of square on a curve, the movement increasing with the age of the truck, probably accounts for the trouble and expense for the upkeep of columns, column bolts, spring plank, bolts, etc. There is a continual motion and straining of parts at this point. It is impossible to keep the bolts tight, and it is quite natural that the repair account should be heavy if the joint is to be kept up; it is quite natural also, if the joint is not kept in proper repair, that the truck will fail to give the expected service results.

The tests demonstrated that a bolted connection between the spring channel and one-piece cast-steel side frame, was of little or no value as a means for making a tight immovable joint that would hold the truck in square. The bolts were invariably found loose, and even after being tightened up thoroughly just before running a test, the joint, after a few runs, would loosen. An extended examination of cars in service indicated that the bolted connection was of little value, as the bolts were nearly always found loose. On the other hand, an investigation covering a period of almost two years, and including several thousand cars, showed that the riveted joint was developing no signs of looseness, and was performing well the duty for which it was designed.

Reducing the results obtained on the test track to a 5½ deg. curve brings out some interesting and startling information. A 5½ deg. curve is selected because it is possibly an average curve, and also because it makes a division by an even divisor. The small fractions are left out, in order to make round numbers. The draw bar pull in pounds per ton is found to be 9½ lbs. for the best square truck; 13.7 lbs. for the worst square truck; 11 lbs. for the best loose truck, and 17 lbs. for the worst loose truck. Broadly speaking, the difference between the square and the loose truck is due to a difference in truck construction. The difference between the best and the worst square truck is due almost entirely to the wheel condition. In tabulating the results, as a matter of convenience, all trucks that went out of square ½ in. or less were classed as square trucks, so the difference in friction between a truck absolutely square and one out of square ½ in. should be deducted from the total difference between the best and the worst square truck—the balance is chargeable to wheel condition. However, the difference between a truck square and one out ½ in. is a small amount. This fine line was not conclusively drawn in the tests, because of lack of time. It was reserved as one of the refinements to be run down in this year's test.

The difference between the best and the worse loose truck is

probably evenly divided between that due to truck construction and that resulting from wheel condition. The difference between the best square and the best loose truck is favorable to the square truck by 15.8 per cent.—and as between the worst square and the worst loose 24 per cent. in favor of the square truck. In both cases the difference may be said to be difference in truck construction. As between the best and the worst square truck, the difference is 44 per cent., largely wheel condition. Between the best and the worst loose truck, there is a difference of 54 per cent., possibly somewhere near evenly divided between truck construction and wheel condition. Between the best square truck and the worst loose truck is a difference of 79 per cent. The difference between the worst loose truck when run as a loose truck, and the same truck squared and run as a square truck, was somewhere near 40 per cent. in favor of the square truck, this difference being entirely due to truck construction.

The figures just given are from specific tests of specific trucks, and it is hardly correct to undertake to construct a series of averages from them when it is considered that the averages used in calculating train resistance for actual service must of necessity represent the average resistance of all trucks, as they come in service. Therefore, it might be well to state that the average difference between all the square trucks and all the loose trucks tested was approximately 24 per cent. in favor of the square truck, based on a 5½ deg. curve.

When the theory and reasons are known, it is not surprising that the curve friction of a loose truck should be greater than that of a square truck. Some very interesting experiments were made by whitewashing the rails on the curve and noting the difference in contact between the wheel and the rail with the truck square and loose. When a truck was run square, there was only one point of contact between the wheel and the rail. This was on the ball of rail and in the deep part of the throat of the flange of the wheel. When the truck was run loose, there were two distinct points of contact, one on top of the rail and one on the side of the rail, there being from ⅛ in. to ⅜ in. between these two lines, depending on how much the truck went out of square. In this case the whitewash was left on the ball of the rail, and the throat of the wheel did not show any contact with the ball of the rail. When the truck was stopped on the whitewash and run back the end of the mark on the side of the rail made by the flange was from 1 in. to 2½ in. in advance of the end of the mark on top of the rail, made by the tread of the wheel. It could be seen by sighting along the edge of the rail when the truck was in this position, that there was no contact between the throat of the flange and the ball of the rail.

When the square truck was rounding the curve, the throat of the wheel being in contact with the ball of the rail, and the axles square with the track, the outside wheel would climb up on the rail, enlarge itself an amount sufficient to make up for the difference in the length of the inside and outside rails, and the wheels would go around the curve without slipping—the friction being all rolling friction. But when the truck was running as a loose truck and got out of square, the throat was not in contact with the ball of the rail, and the flange being in contact with the side of the rail, acted as a shoulder so that the wheel could not [illegible] and climb the rail. Therefore, either the outside or the inside wheel had to slip the difference between the length of the two rails.

When the truck is running square the friction between the wheel and rail is rolling friction. But when the truck is running loose and gets out of square, there is not as much rolling friction as there was before, and in addition there is the sliding friction between the flange and the side of the rail, which must be overcome, and the slipping or sliding of the tread of the wheel on top of the rail that because of the difference in the length of rails, and the inability of the outside wheel to enlarge itself, owing to lack of throat contact with the ball of the rail. This was plainly audible by listening to the noise the truck made in going around the curve. When the truck was square it made just a single rumbling noise quite natural to a vehicle of this kind, but when running loose, in addition to the ordinary rumbling noise could be heard a loud flange song, and a distinct high sounding and piercing noise caused by the tread slipping on top of the rail. This latter noise was not a continuous one, but an intermittent noise, with very short intervals. The flange song was continuous.

There is also one other source of increased friction in the loose truck—the sliding friction. When a truck is running out of square, the axles are not square with the track; therefore, the wheels are not revolving in a plane parallel with the direction of the rails, and if it were not for the flanges, the tendency of the wheels would be to run to the right, or the left, as the case might be. The natural track for the wheels to make would be one diverging from the rails, and they would only track in a line with the rails by a certain amount of slipping. This point can better be illustrated perhaps by presuming the front wheels of a wagon turned the necessary amount to go around a street corner, and then locked in this position. One can readily see it would require an extra effort on the part of the horses to pull the wagon in a straight line, with the front wheels so turned and locked. The front wheels would revolve, but much slowed than the rear wheels, and they would also slip along the pavement.

It must be this slipping that causes the increased friction in loose trucks going out of square from nothing up to 1 in., and before the flange begins to make a contact with the side of the rail. It will be noticed from Professor Endsley's report, that there is a big jump in the friction between an inch, and 1½ in. out of square. It is thought that the increase in friction up to 1 in. out of square is caused by the gradual increase in the slipping action just noted above, and that along about this point is where the flange begins to make the sliding contact against the side of the rail.

It might be said that these tests, as they deal almost entirely with curve friction, do not interest the road that has almost all of its mileage straight track. This would be taking a somewhat narrow view of the matter. Owing to the great exchange or interchange of cars between the different railways, it is possible that the man on a road full of curves would be very much interested in the kind of a truck his straight track neighbor put under his cars.

It is not the idea that these tests are final, nor that they represent absolutely service conditions. They were given out merely for what they are worth, and in so far as they go. They are considered as a preliminary to a more serious test that it is hoped will be made by the railways themselves. It is felt, however, that the tests are a close approximation to what will be found in actual service, and are of sufficient value to be entitled to full consideration, pending more elaborate dynamometer tests in actual service.

These tests were run on a curve somewhat sharper than is found in ordinary main line track, with the idea that the differences would be more easily measured. After the season's work was finished and the results tabulated, it was decided to continue the work again this summer, with the view of determining, if possible, several things that could not be determined with a single curve.

There was considerable work laid out to be done, but it could not be finished last year. It was desired to carry on a somewhat different line of experiments, for which several curves seemed a necessity; therefore, the test track was entirely rebuilt, and a 3 deg., a 6 deg., and a 12 deg. curve added. The 3 deg. and the 6 deg. curves were laid with both new and old rails side by side, an arrangement having been made with the Missouri Pacific allowing the old rails to be taken out of service on main line 3 deg. and 6 deg. curves. This summer's work is not yet finished. It is expected that the plant will be in operation until the cold weather.

CAR DEPARTMENT KINKS.*

BY C. C. LEECH,
Foreman, Pennsylvania Railroad, Buffalo, N. Y.

HAIR PICKING MACHINE.

The hair in the coach seat cushions becomes pressed down and matted together after long service, and when the cars come to the shop for repairs it is necessary to remove it from the cushions and to thoroughly pick and pull it apart before replacing it. The machine shown in Fig. 1 has given very effective service in the performance of this work. It consists of a strong wooden framework carrying the wooden drum *D*, which is studded with a large number of pointed steel pins, as shown. At one end of the shaft on which the drum revolves is a pulley *A*, which is belted to the countershaft. Mounted on the same shaft as pulley *A* is gear *B*, which engages the gear *C*, and thus drives gear *E* on the end of the lower roller *R*, which is shown in the upper right-hand corner of the drawing. Another gear on the opposite end of roller *R* engages a gear which is mounted at the end of the shaft of roller *RR*.

The wooden drum is revolved in the direction indicated by the arrow in the lower left-hand illustration, and the rollers, which are driven by the trains of gearing, revolve in opposite directions and toward the drum. The hair, which is fed into the rollers from the table or trough *T*, comes in contact with the pins on the drum and is torn apart and separated. It passes over the drum and falls into a box underneath. The lower roller runs in boxes which are secured to the frame. The pressure between the rollers is controlled by the springs *S*, and may be adjusted to suit the conditions.

*These kinks are part of the collection that was submitted by Mr. Leech in the shop kink competition which closed May 15, 1911, and in which he was awarded the first prize of $50.

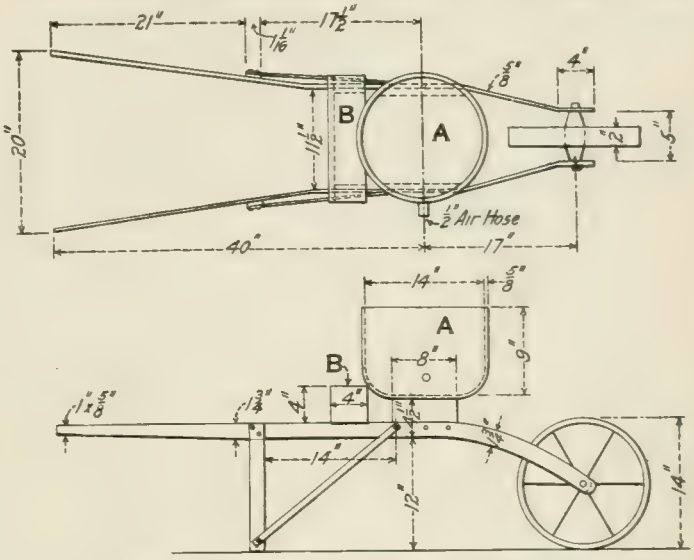


Fig. 2—Portable Rivet Furnace for Steel Freight Car Repairs.

PORTABLE RIVET FURNACE.

The fire pot, *A*, of the portable rivet furnace, which is illustrated in Fig. 2, is made from one-half of a 14 in. brake cylinder.

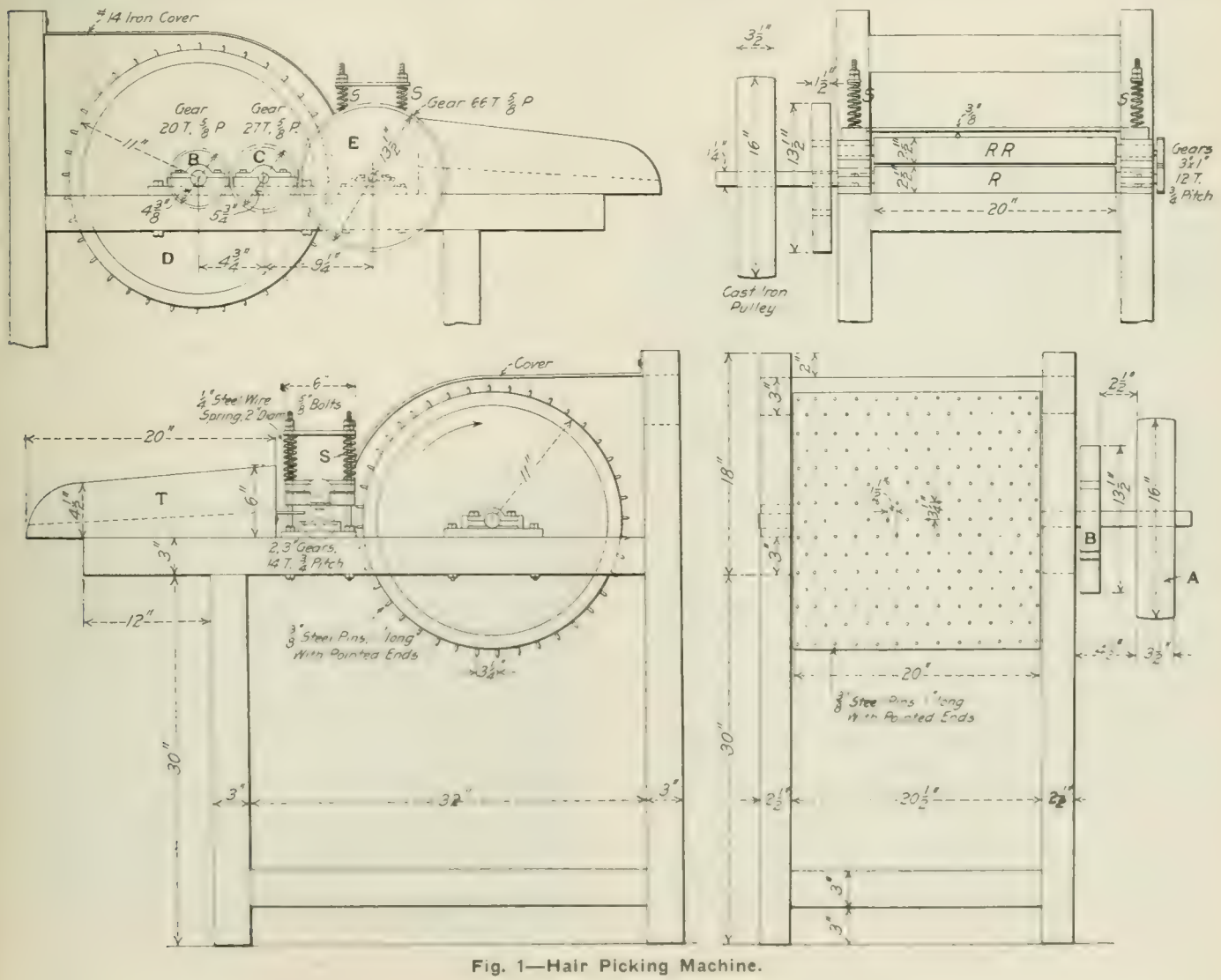


Fig. 1—Hair Picking Machine.

It is securely bolted to the ⅝ in. x 1¾ in. framework. The small box *B* is provided for holding the rivets. This forge has given very good satisfaction in connection with the repairing of steel freight cars.

ICE TONGS.

A simple but efficient pair of ice tongs, used by car cleaners or attendants when filling the water coolers in passenger cars, is shown in Fig. 3. They are made of 1/16 in. x ½ in. spring

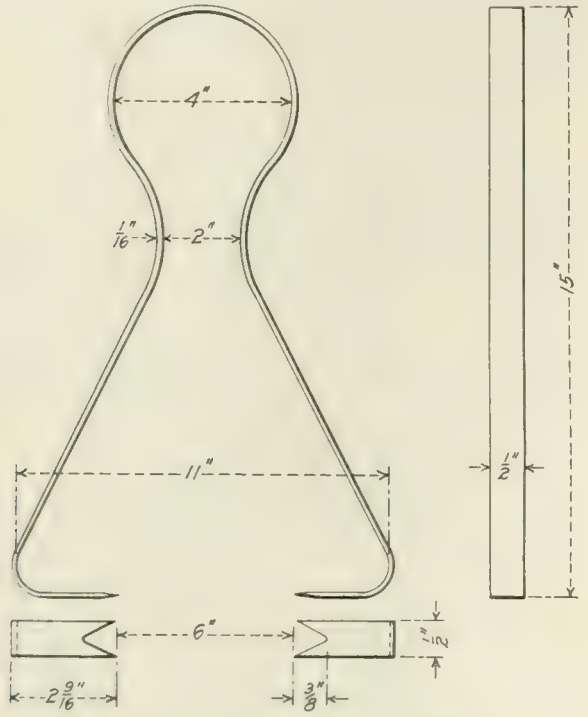


Fig. 3—Ice Tongs for Passenger Car Water Coolers.

steel. After the ice has been broken into lumps of the proper size the tongs are used for handling it while it is being washed and for placing it in the cooler, thus making it unnecessary for the operater to touch it with his hands.

The results of impact tests on riveted joints are given in *Der Eisenbau* of September by E. Preuss. Three small rectangular plates were rivited together, the middle plate being raised above the two outside ones so that it would be struck by a ram while the other two rested on an anvil. The slip of the middle plate beyond the outside plates was measured for the different impact blows given by raising the ram at varying heights and for various repititions of the blow. Static pressure tests were also made for comparison. From these tests the author arrived at the following conclusions: The slip produced by a blow of given striking energy is only slightly increased by repeating the blow. The slip is, roughly, a linear function of the energy of impact. In contrast herewith, in static tests [illegible] impact energy per square inch of rivet-shear section, the slip was greater for larger (1-in.) rivets than for small [illegible] To produce a given amount of slip, the required impact blow in pounds is 8,000 to 22,000 times as great as the required impact energy in foot-pounds. This figure is greater for large rivets than for small, and is smaller for a great amount of slip than for a small amount.

[illegible] Over certain sections of the road a speed of 65 miles per hour was attained. This is said to be the fastest train in Germany.

SHOP KINKS.*

BY W. H. SNYDER,

Assistant General Foreman, New York, Susquehanna & Western, Stroudsburg, Pa.

One of the following kinks is for use in the erecting shop or engine house, one for the boiler shop, and the last two for the car department.

DRILLING DRIVING WHEELS FOR HUB PLATES.

The clamp shown in Fig. 1 is used on a driving axle to support the end of a ratchet or air motor when drilling the driving wheels for hub plates. It is undoubtedly as important a time saver as any device of its kind. The great advantage over kinks which

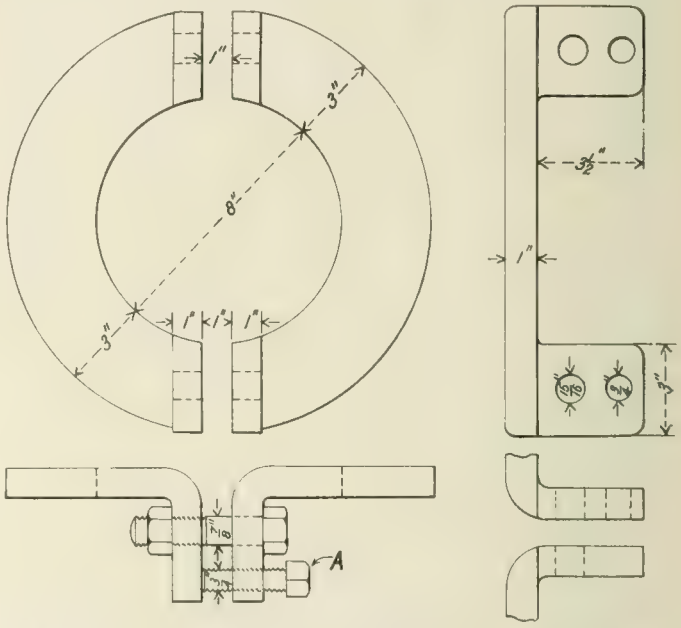


Fig. 1—Axle Clamp for Drilling Driving Wheels for Hub Plates.

have been used for this purpose is that all of the holes may be drilled with one setting of the clamp, whereas other devices usually have to be adjusted for each of the holes, thus wasting a considerable amount of time. In applying the clamp to the

*Entered in the competition which closed May 15, 1911. Mr. Snyder has contributed a number of collections of kinks since the Shop Edition was inaugurated, they will be found in the issues of November 5, 1909, page 878, January 7, 1910, page 37 (second prize); March 4, 1910, page 491, and July 7, 1911, page 41. He was also awarded the first prize in the car repair kink competition which closed December 15, 1910; the collection will be found in the issue of January 6, 1911, page 21.

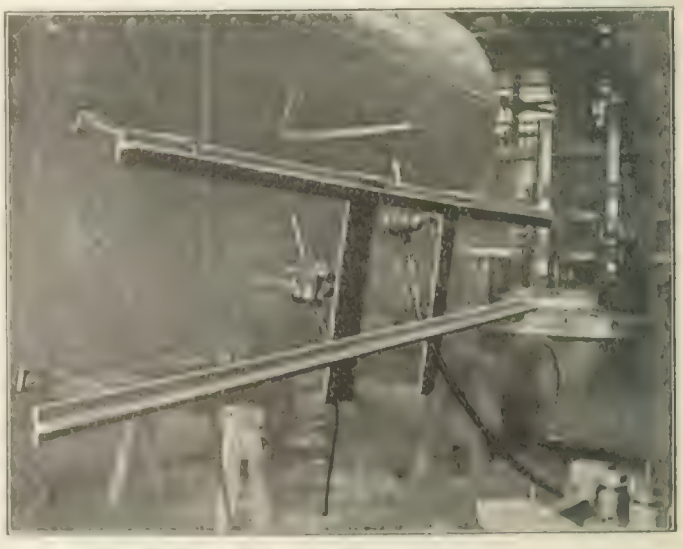


Fig. 2—Application of Device for Drilling Out Staybolts.

axle the set screws *A* are adjusted so that it will stand square when the bolts are tightened.

DRILLING OUT STAYBOLTS.

A handy arrangement used in connection with the drilling out of staybolts on the outside of a locomotive boiler when applying a new fire box, is shown in Figs. 2 and 3. The device will be found especially useful in a small shop where the facilities are limited.

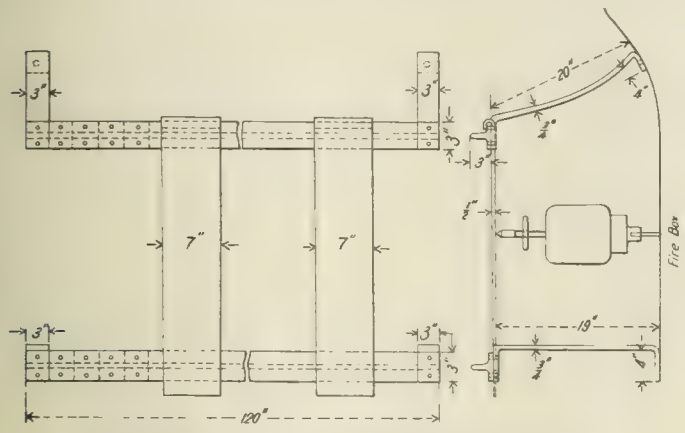


Fig. 3—Device for Use in Drilling Out Staybolts.

The uprights, which are 7 in. wide, are adjustable and may easily be moved along the framework. It is also possible to use several air motors at one time. The frame may be adjusted for different lengths of boilers by drilling a number of holes at one end, as shown on the drawing.

LIFTING CAR WHEELS.

The clamp shown in Fig. 4 is convenient for lifting car wheels or similar parts having holes through them near the centre of gravity. When the end of the clamp has been inserted through the hole the construction is such that any tendency to lift it will separate the ends of the clamp, and the harder it is necessary

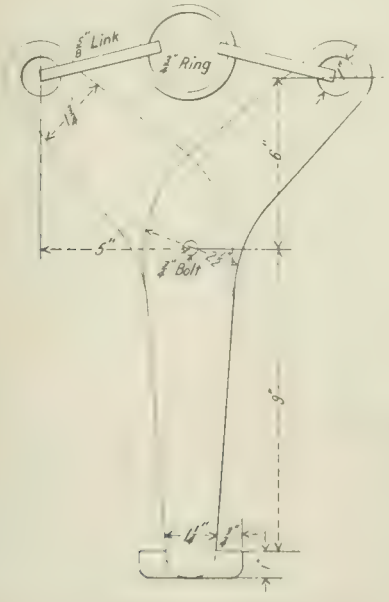


Fig. 4—Clamp for Lifting Car Wheels or Similar Objects.

to pull in order to raise the object, the tighter it will grip it. The clamp illustrated will go through a 2½ in. hole, and can be used in a hole as large as 10 in. in diameter without any danger of slipping.

FITTING SPRINGS IN ARCH BAR TRUCK.

A clamp, or press, for drawing down the tender truck springs preparatory to fitting them in an arch bar truck is shown in Figs. 5 and 6. It is a great time saver where much of this work is

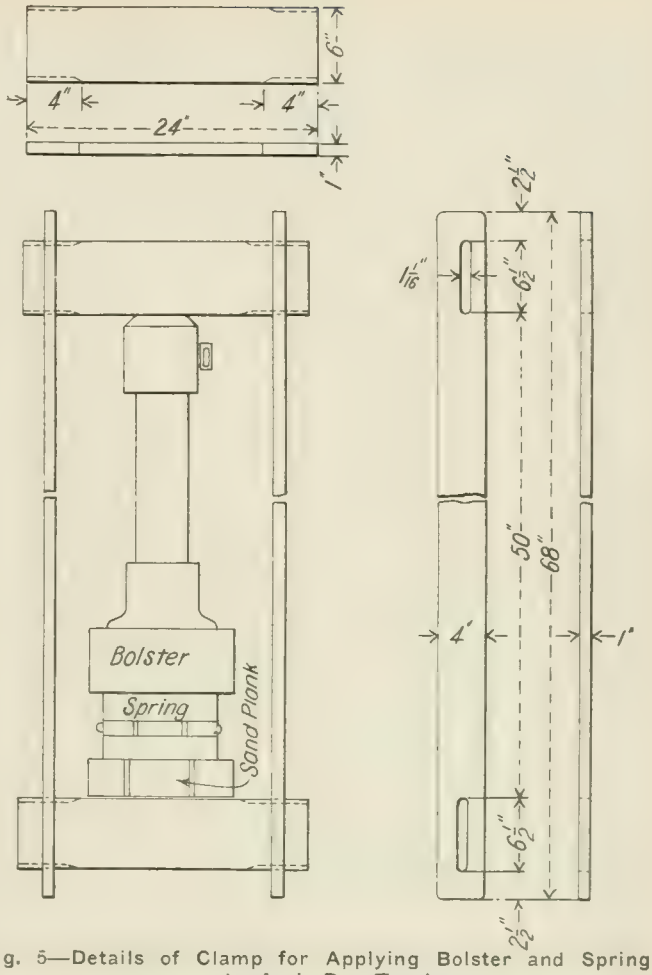


Fig. 5—Details of Clamp for Applying Bolster and Spring to Arch Bar Truck.

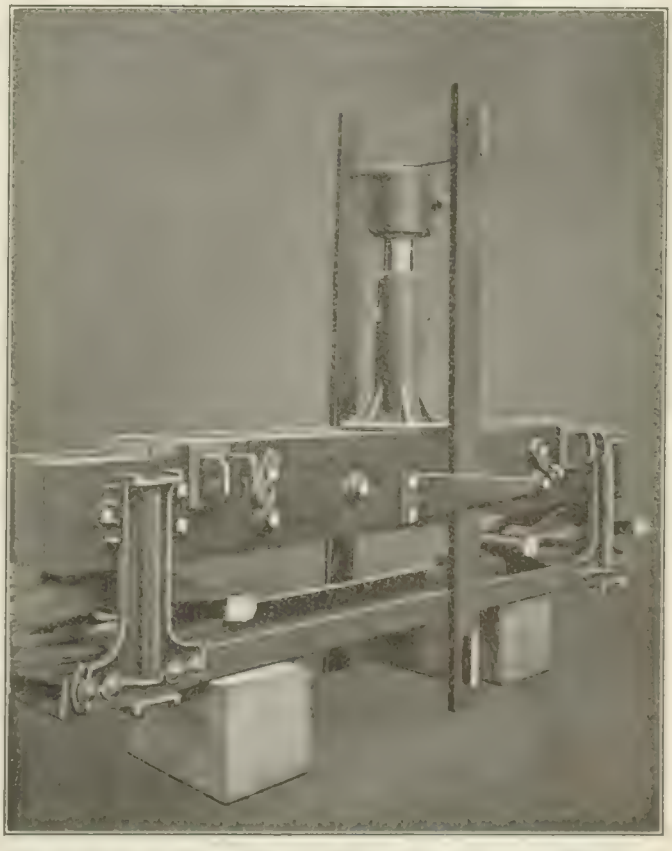


Fig. 6—Forcing Down the Bolster and Spring Preparatory to Fitting Them in an Arch Bar Truck.

to be done, and is simple and inexpensive in construction. The jacket is placed above the center of the bolster and the framework is slipped over it. The jack is then operated, forcing the bolster and the springs downward, as shown in the photograph. The arch bars are put in place and the column bolts are applied and drawn up tight, after which the jack is released; the clamp may be easily and quickly removed. A considerable amount of hand labor is done away with by its use. When overhauling a truck, and only one side requires drawing down, the device may be placed over the end of the bolster and operated as described above.

LOCOMOTIVE REPAIRS.

BY R. B. VAN WORMER,

General Foreman, Atlantic Coast Line, Waycross, Ga.

The Waycross, Ga., shop of the Atlantic Coast Line makes all of the heavy general repairs to locomotives on several divisions and outlying points of the system. The following method of handling these repairs, which has been worked out by careful study and experiment, is giving splendid results. As soon as it is decided to shop an engine for general repairs, and while it is still in service, the master mechanic sends in a detailed report of all the necessary repairs. This report also includes a similar statement from the engine house foreman, or general foreman, in direct charge of the engine, and frequently from the engineer. When the report is received at the shop it is used as the basis for another report, or bulletin, which covers all of the repairs which are needed, and also information as to parts which may have to be changed to new standards, or examinations of any appliances which are being tested, etc. Copies of this bulletin are distributed to all of the foremen so that they may prepare such new parts in advance as may be necessary.

The advantages of these reports have proved greater than was anticipated. In addition to cutting down the length of time required for repairs the individual characteristics of each locomotive are carefully studied by all concerned, and the tendency is for a more thorough inspection at outlying points both before and after the engine is shopped. The general foreman and engine house foreman on the division where the locomotive is used feel that the general repairs will be based more or less upon their inspection and the report which they send in. After the engine comes from the shop they examine it more carefully and comment or criticize accordingly. The repair shop management has the advantage of knowing in advance of defects in invisible or inaccessible parts, such as leaky dry pipes, cracked mud rings, etc. It also realizes that its work will be subjected to close inspection after it leaves the shop.

These reports often indicate parts which were repaired and placed in good condition a short time before the engine was shopped, and therefore do not need any attention. As each department keeps copies of the reports on file they can readily ascertain, the next time the engine is shopped, whether the repairs which they made have given proper service or not, and where improvements may be made in the methods of handling the work. As soon as the engine is shopped the time scheduled for making the repairs is shown on the usual bulletin boards, and a bulletin is also issued to each department, the first of each week, giving a list of all the engines which are scheduled to leave the shop that week, and those which are expected to be out for the following week. If, for any reason, a department finds that it cannot complete its share of the work in time it is expected to communicate at once with the general foreman's office. The bulletins not only serve the purpose of preventing one department from delaying the other, but all departments tend to keep the pace set by the one which is the most advanced with its work. As each bulletin covers a period of two weeks, it is possible to revise the second week if it is found possible to improve on the schedule. One of the main essentials of any well regulated shop is that each department be evenly balanced in good management and facilities for performing its part of the work.

The work done on an engine is confined, as far as possible, to applying repaired or new parts already on hand, as rapidly as the removal of the worn parts will admit. A clear distinction is made between the force which is utilized in removing and applying the parts and the force which is used in repairing old parts and manufacturing new ones. This theory, of course, cannot always be carried out in practice, especially where unusual boiler repairs are required, or when engines other than standard are repaired. However, the repairs are always carried on with this end in view. The success of the work depends to a great extent on how far the work can be specialized and the parts standardized.

The erecting and dismantling gangs in the erecting shop are subdivided into groups, each of which has a certain class of work to take care of for a certain section of the shop. One man is held responsible for the quality of the work and the time required for each operation. He is paid the same rate as the other mechanics, but is of the progressive type, willing to assume responsibility and leadership in the realization that his efforts will be appreciated. This practice applies to repairs other than those to the machinery; for instance, certain boiler makers are detailed for removing and applying tubes, staybolts, front end arrangements, ash pans, grates and riggings. Certain blacksmiths are detailed for the work that is to be done in the erecting shop, including thermit and oil welding, straightening frames or tail-bars in place, etc. Other men are detailed to remove and apply pilots, running boards, cabs, boiler lagging, jackets, etc.

The work is specialized to an even greater degree in the repairing or manufacturing of locomotive parts; each machine or group of machines has its particular work to perform and, as far as possible, the machine tools are arranged with a view to the work which is to be assigned to them. The smith shop is divided into groups of one or more forges, each of which has a certain class of work to perform.

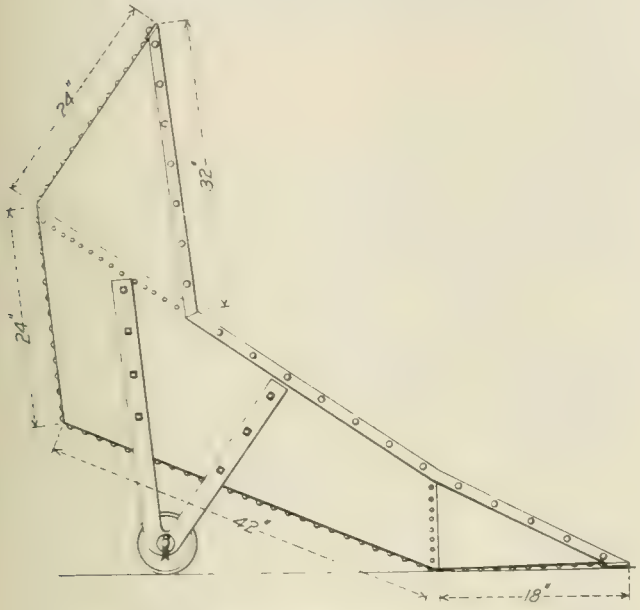
As the overhauling of the locomotive is handled by numerous groups, each of which, as far as possible, is in charge of a leading man, it is possible to locate the weak points at once and to gradually eliminate them, for the leading men are in position to know and understand at all times exactly what work is required and when. It is desirable to reduce the time that each engine is out of service to a minimum, and what is known as "working stock" is maintained for use in cases where exceptionally heavy repairs have to be made to certain parts. This working stock consists, in addition to the ordinary interchangeable parts, such as driving boxes, shoes and wedges, eccentrics, straps, tubes, frame bolts, etc., of engine trucks complete, tender frames complete with trucks, cabs, running boards with brackets, locomotive jackets, electric lighting outfits complete, ash pans, brake rigging, spring rigging, rods, pistons, etc. Whenever any part of this working stock is used the parts which it replaces are repaired and replaced in the working stock, thus preventing an accumulation of surplus stock. While most gratifying results have been obtained from the above methods, they are considered merely as a preliminary movement into a large field of opportunities.

There are 30,000 men employed on the Ichang-Wanhsien Railway, China, and construction trains are working out of Ichang, on the Yangtse Kiang river, for several miles. One tunnel, 1,000 ft. long, has been holed through, and another 6,000 ft. long is under way. The earth work is well up to Kweichow, a distance of 100 miles. At Ichang machine shops and station buildings have been erected. The line runs inland from Ichang and comes out at the Yangtse Kiang river near Hsiang Chi, about 90 miles distant. It then follows the river for about 30 miles, when it will again go inland along a route which has not yet been definitely determined upon.

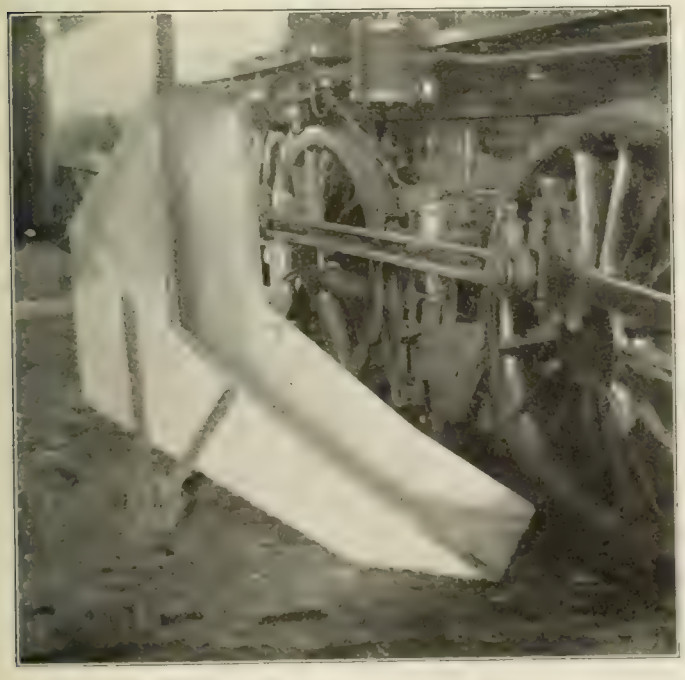
WATER DEFLECTOR FOR DRAINING BOILERS.

BY F. W. BENTLEY, JR.,
Chicago & North Western, Huron, South Dakota.

Many engine houses are not equipped with boiler blowing off lines, and the wash-out plugs are often pulled when a considerable amount of pressure remains in the boiler. The water leaping from the hole often drenches the nearest locomotive and floods the engine house floor. The accompanying illustrations show the details and construction of a deflector 28 in. wide, that may be made of galvanized iron at a reasonable cost. The edges are reinforced by ⅜ in x 1 in. strips. With this device in front of the plug hole the water is diverted back into the pit, leaving the floor and surrounding objects dry and undisturbed.



Galvanized Iron Water Deflector for Draining Boilers.



Water Deflector for Draining Boilers.

The Argentine government has ordered the Cordoba Central, 805 miles long, to install block signals throughout its line. It is estimated that the cost will be $117,000.

HANDLING MEN.

"Where there be many men, there be many minds," and often there are many ways of accomplishing the same results. This is perhaps as true in the matter of handling men as in any other human activity. But in these days of struggle for efficiency it may be of interest to take an example from practice and show the methods of a man who has been notably successful, not only in the physical results achieved, but in the interest, real live vital interest, that he has succeeded in creating among his subordinates. He works toward the accomplishment of five ends; an awakening of an interest in the success of the employing company, a pride in the work done, a personal loyalty toward himself, an increase in the skill and value of the individual and a knowledge that all of this makes for the personal advantage and advancement of the individual employee.

To do this implies that the man making the effort is built on broad and generous mental lines. He must feel the same interest in the welfare of his employers as though he owned the plant and its whole profit would accrue to him. He must take a personal pride in the character and quality of the output, the appearance of the plant and its efficiency. He must feel the same loyalty toward his board of directors that he hopes to arouse his men to feel for himself. He must be free from the sense that he has learned all that there is to know, but must continually struggle for more light, whether the lamp be held by a savant, or a sweeper of the shop floor, and he must be generous to let these be the controlling factors, regardless of his knowledge that they all make for his own profit and advantage.

Then, above all and through all, the man must "to himself be true, for thence it follows as the night the day, he can not then be false to any man." And this means a scrupulous keeping of a word once pledged.

He was only an assistant superintendent, let us say in a car repair shop, and he felt that it was quite possible to increase the output without increasing facilities. Work was being done by piecework and contract, but the contracting foreman seemed unable, or was it unwilling, to increase his output. So the assistant superintendent called him in. First he cleared his office of every one. And then:

"John, do you trust me?"

"Why yes, I think I do."

"I don't want you to think. Is it 'yes' or 'no.' ?"

"Why, I believe I trust you."

"No thinking or believing, is it 'yes' or no.'?"

"Yes."

"Then, this is the case. I am not satisfied with the number of box cars you are turning out. You can do better, but you are afraid to, lest I cut the price. Now, if you will go ahead and do your best, the present price shall stand for six months. Make all you can out of it, and then we'll consider a revision."

And John went, and soon box cars began to jump out of that shop from every nook and crany. They piled up. They filled the yards, and John's pay went up by leaps and bounds. Then the assistant was called in.

"Do you know what John is making?"

"Yes."

"Do you know that he is making much more than you?"

"Yes."

"Well, it won't do; it won't do. That price on cars will have to be cut."

"It can't be done. I have given my word that the present rate shall stand for six months.

"You had no right to do it. He is making too much money. The price must be cut?"

"It can't be cut. The cars are costing no more than they were, and you were satisfied. If the price is cut, I resign to take effect with the cut."

Again and again the same conversation took place until our man turned.

"That price can't be cut, you owe me $3,000. Take it and pay yourself out of it every week, as much as you think John is overpaid. And when it is gone, I'll give my notes to make it up to the end. I gave my word that the price would not be cut, and it won't."

The man was too good to lose, and so they fumed and fretted, but let it stand and John went on getting pay checks that dazzled him with their size. The fuss had been so great that seven months instead of six were allowed to pass before John was called in.

"Been doing well?"

"Great."

"Well the time has come for a cut."

"Yes, it really came a month ago."

"What shall it be?"

"Make your own figures, and I'll take them."

So ten dollars were cut off here and fifteen there, and twenty in another place, still leaving John's possible pay well above what it had been under the old regime, and the company saved money by the barrel when the saving once began. The assistant superintendent's reputation as a man of his word was established. The company got credit for being square, John's loyalty was assured and the cost of the output was dropped by a goodly percentage.

* * * * * *

He was in the foundry one day. The foreman was not very progressive. Timid, perhaps, because of ignorance.

"Don't you think you could use a molding machine on those cores?"

"No, no use to me."

"They've got one down at the ——— shop. Have you ever seen it work?"

"No. Their work is different."

"Better go down and look at it, just to satisfy a curiosity that you ought to have."

Ten days elapsed.

"Have you seen that molding machine down at the ——— shop?"

"Yes, but I hardly think I could use it."

"Couldn't you use it on that core?"

"Possibly. But I don't think we would save anything."

So it went on. The superintendent set that foundryman thinking for the first time in his life, and then kept him at it. Core after core was called to his attention, until at last——

"Oh, well, boss, if you want to get that machine, get it and send it along."

"Not much. If you want that machine you've got to ask for it."

But the man was thinking. He began to calculate what the machine would save. He watched the other fellow, and saw [illegible] one day.

"I say, boss, I wish you'd get one of those machines for me, I can make it work, and do it well."

[illegible] It was his. He had asked for it, and it simply had to make good. And it did.

* * * * * *

"What's the use. If I get up anything, the boss claims the credit for it; the company steals it and cuts prices, and I am [illegible]"

[illegible] set the example years ago, and it proved good to him. He didn't want credit for another and better shop plan. He didn't like to have it thought that his company was dishonest. So he said that he would pay for suggestions that were adopted, and suggestions began to drop in. Not particularly suggestions to be sure, but real money savers. An inclined plane for handling crankpins, a method of setting out teeth in a saw, a scheme for straightening bent rods. After that the man would go down the shop with head in the air and say:

"That's mine. The boss gave me $50 for that. It's the first money I ever made with my brains."

Pride of accomplishment. Loyalty because of a square deal. Anxious to help again, even if there were no money reward. Interest in the work for its own sake. Does it pay both sides?

* * * * * *

"I never had a chance."

Better say; "I never knew how to take advantage of my chances."

One man thinks it worth while pointing out the way to those who do not know. He was standing on an electric car next to a foundry apprentice.

"What do you do evenings?"

"Oh, I loaf around the streets until bedtime and then go to bed."

'Do you ever read anything?"

"No. It's pretty hard work."

"Better try. It's hard at first, but it comes easier, and the more you do it the better you'll like it. Don't take anything hard at first. Take a good story, Then when you come to like that, get some good technical book or paper about the foundry. You'll like it if you do."

Two weeks later. The same scene, the same people talking.

"Well! Done any reading?"

"Yes, I read half an hour every night, and it's getting easier."

"Fine, keep it up and make something of yourself."

Six months later. The same, but in the boss' office.

"Can you tell me something to read about my work?"

Is that boy the boss' friend? Is he worth anything more to the company than he was when he was loafing around the streets until bedtime? Was the talk worth while.

* * * * * *

He is a plain every day man. But he knows himself and he knows human nature. He knows that the average man loves and has a pride in what he initiates, and that if he can be directed to initiate properly, things are safe. So he arouses such a pride in the workman that he tries to imitate, and having once initiated he is bound to make a success of the thing proposed. He may work his men, but he works them of their own volition. He makes them believe in him, trust him and know that his word is good. He stands between them and outsiders, and above all gives them credit for every effort which they make and everything which they accomplish. It is not much. Merely the turning of attention to things proper and things desired, with the result that for loyalty to himself and his employers, for pride in their work, and a desire for self improvement, there are few who can show better results.

By the way, would the efficiency men consider this efficient?

[illegible] *Génie Civil des Chemins de Fer*, in an article on The Railways of Brazil, tells how the government of Brazil builds lines in accordance with public demand, and then leases them out either to the construction company or to some other concern to be operated. A great deal of difficulty arises when the operating company and the construction company are not the same, for in such cases the construction company exercises such stringent economy in its work that the operating company is greatly handicapped. Even the government, which pays for the work, is sometimes persuaded not to demand certain work which is really necessary. To this is due the large number of excessively sharp curves, the bad spacing of ties, the extremely light rails, etc., faults which are dearly paid for by the operating company in fuel or in abnormal maintenance of way expenses.

TESTING IRON AND STEEL FOR AIR AND SAND HOLES.

BY ETHAN I. DODDS.*

The object of the device shown in the accompanying illustrations is to locate air or sand holes in castings or forgings and in this way determine whether the material is fit for use. The arrangement consists of an electro-magnet, which slides over the work, allowing the lines of force from its poles to permeate through the metal. If these lines of force come in contact with a blow hole or sand hole the resistance is increased and will affect the current applied to the electro-magnet. This in turn will affect the intensifier or vibrator located in a sounding box. The sounding box is connected through ordinary telephone transmitters to the ear of the operator, who can in this way locate the flaws in the metal. The electro-magnets take their current from transformers, which are connected to alternating-current generators. As shown in Fig. 1, two electro magnets are used and they are mechanically connected; this gives better results where it is possible to use them in this way.

In developing this apparatus other devices were used, such as galvanometers and other sensitive electrical measuring instruments, but they were found to be so affected by the vibrations, caused by heavy moving masses that they were more or less impractical. With the present arrangement the imperfections can easily be located, and after a certain amount of experience the size of the holes can in a measure be estimated, the difference in the intensity of the sound being the measure of the size of the flaw. Figs. 2 to 7 illustrate how other types of electro-magnets are used for testing different parts.

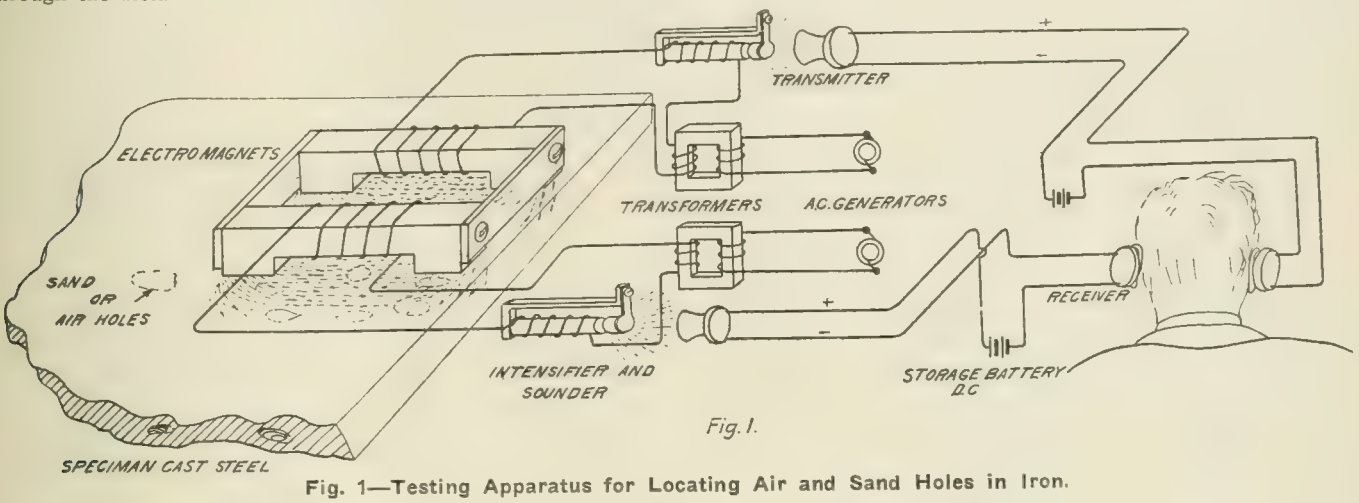
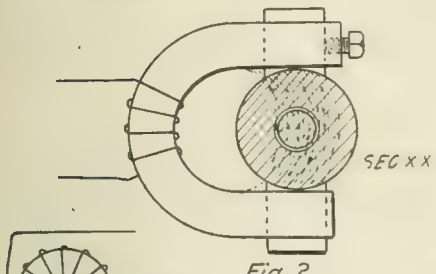
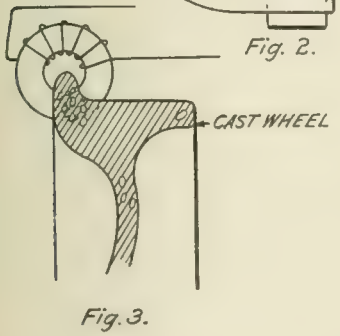
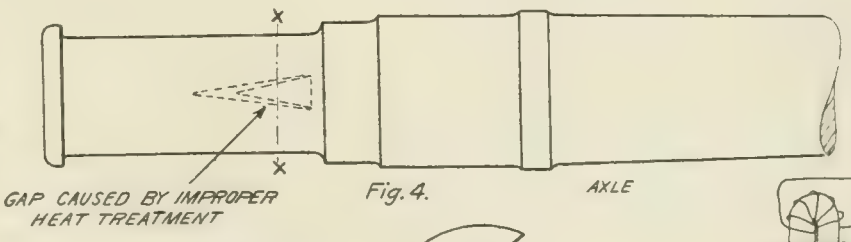
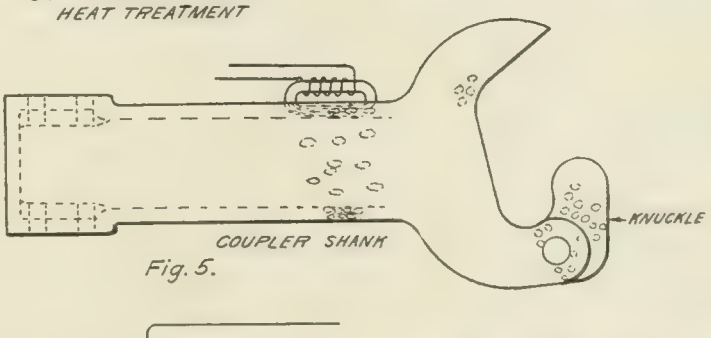


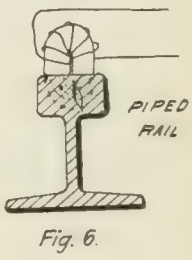
Fig. 1—Testing Apparatus for Locating Air and Sand Holes in Iron.

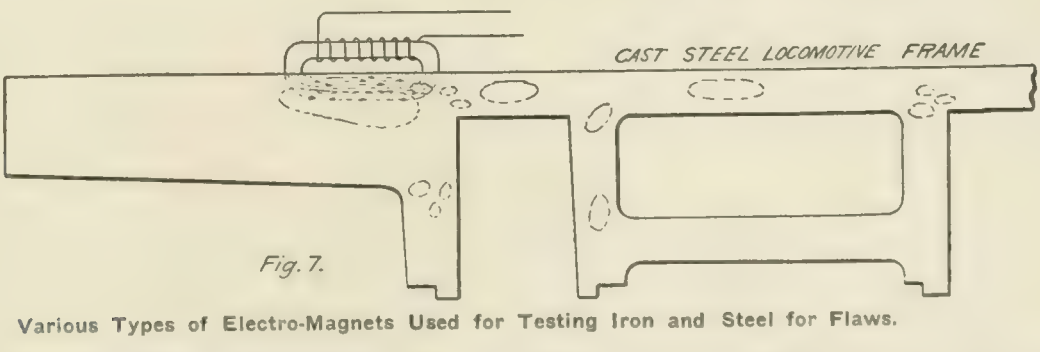












Various Types of Electro-Magnets Used for Testing Iron and Steel for Flaws.

*Mr. Dodd was with the Westinghouse Electric Company for a number of years, was mechanical engineer and chief engineer of the Pullman Company for three years, and assistant mechanical superintendent of the Erie for three years. The apparatus he suggests was the result of an extensive and expensive series of experiments extending over a long period. He says: "I have struggled along for several years with this at an enormous expense till I can hardly proceed further. Possibly some of your readers having a greater knowledge of physics and better fitted for research work of this class, and having more money to develop these ideas, can complete the work. I am not seeking pecuniary returns. If we could save a single life by the installation of this system I would be satisfied."

WHEEL AND AXLE SHOP KINKS.*

BY C. C. LEECH,
Foreman, Pennsylvania Railroad, Buffalo, N. Y.

DISMOUNTING WHEELS AND AXLES.

The arrangement of the wheel and axle shop is shown in Fig. 1. The system of overhead hoists and runways is such that the axles may easily be handled from one part of the shop to the other in the processes of dismounting, storing, finishing

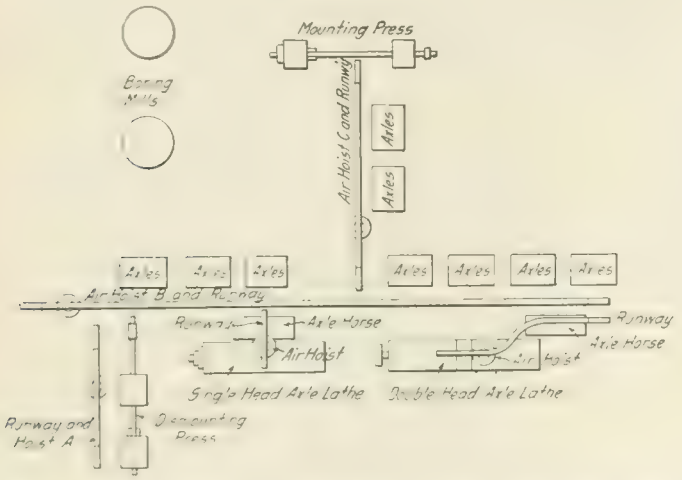


Fig. 1—Arrangement of Equipment in the Wheel and Axle Shop.

or mounting. The storage space is indicated by the locations marked "axles."

The press for dismounting the car wheels is shown in Fig. 2. One of the wheels has been pressed off and the end of the axle is supported by the hook *A*. This hook is suspended from the crane *C*, which swings around the pivot at its left hand end. The hand wheel *W* is used for adjusting the hook to the proper height. When the operator, who is engaged in rolling the wheel

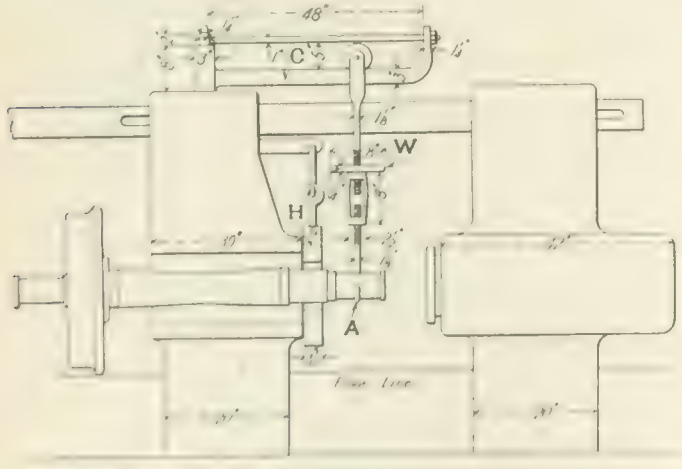


Fig. 2—Press for Dismounting Car Wheels and Axles.

machine; at the same time the second operator rolls the mounted wheel in such a direction that as the crane *C* swings outward and around, the wheel will slip into proper position in

lows it, passing in front of the press and out of the way of the

shaped blocks, *H*, of iron, which have openings large enough to slip over the axle between the wheel press carriage and the hub of the wheel, as shown in Fig. 2. The three sizes of U-blocks will take care of all of the different size axles which it is necessary to handle on the press. In the average axle shop it is not always feasible to group the different size axles together when pressing off the wheels, and this necessitates the frequent changing of the U-blocks. As they weigh from 200 to 500 lbs. apiece it is, of course, impractical to change them by hand. To overcome this difficulty a system of swinging cranes was devised, as shown in the end elevation of the wheel press, Fig. 3. The U-piece *H* is suspended from the crane *G* in such a way that when the crane swings forward the U will slip over the

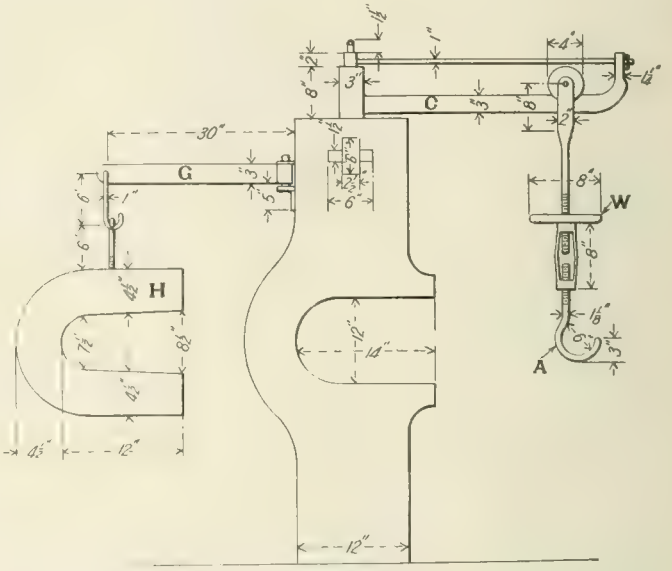


Fig. 3—End View of Press for Dismounting Wheels and Axles.

axle, as shown in Fig. 2. By having a crane for each U-piece, each with a different radius, and swung from different levels, it is possible to provide for three of the U-pieces and to quickly replace one by another as occasion demands.

ADJUSTING CAR AXLES IN LATHE.

After swinging an axle into a lathe, preparatory to turning, the operator enters one end on one of the lathe centers. It then becomes necessary to raise the other end slightly in order that the center may enter it properly. To do this the block or fulcrum *A*, which is shown in Fig. 4, is placed on the tool block of the lathe, the curved portion of the lever resting underneath

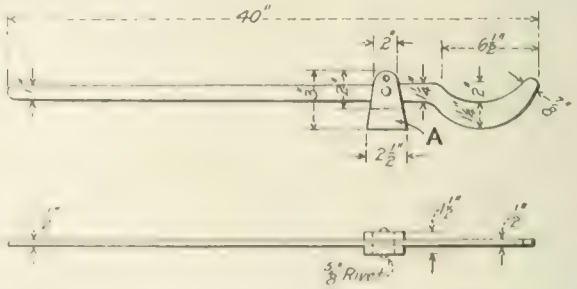


Fig. 4—Device to Adjust End of Car Axle to Height of Lathe Centre.

the journal of the axle. By pressing down on the end of the lever the axle may easily and quickly be raised to the required

AXLE HOISTS.

When both wheels have been pressed off, the axle is placed in the hook *F* of the air hoist *A*, Fig. 5, which operates on an overhead trolley, as indicated in Fig. 1. It is pushed about 12 ft.

beyond the press, and is delivered to the hoist *B*, which operates on a runway about 45 ft. long and at right angles to *A*. The axle and turning lathes and the spaces for the storage of axles, are placed parallel to the runway, axle horses being provided in front of each of the lathes. With this arrangement the

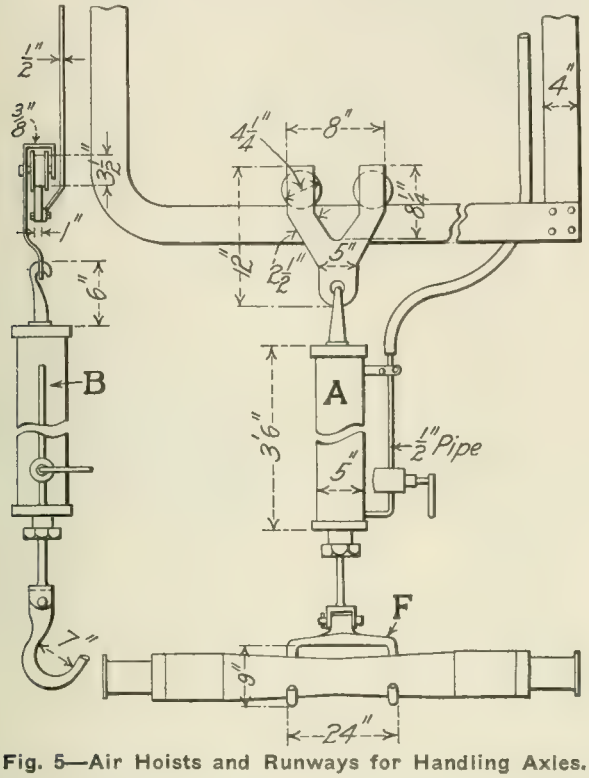


Fig. 5—Air Hoists and Runways for Handling Axles.

axles may quickly be handled to any desired point, and the workmen very soon become experts in handling them successfully and rapidly.

In handling the axles into a double head lathe where the drive is in the center, it is necessary to provide a special bracket or collar, as shown in Fig. 6, allowing them to be swung from one end. The operator quickly gets on to the knack of placing

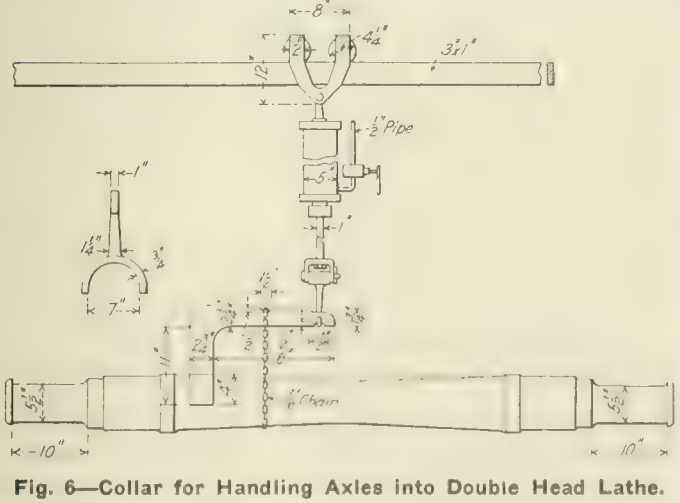


Fig. 6—Collar for Handling Axles into Double Head Lathe.

the bracket and chaining it in such a position that the axle will balance horizontally when it is hoisted from the floor. The hoist is arranged so that it raises the axle to the exact height of the lathe centers and holds it there while the centers are being adjusted.

The apparatus shown in Fig. 7 has been devised for the convenient placing of axles in a single head lathe. The various parts are forged from wrought iron or soft steel. The part *A* turns freely on the end of the air hoist piston rod. The part *B* has a flexible connection to *A* through the ¾-in. pin. The screw *C* fits in *B* and has a crosshead at its upper end which works freely on the end of the screw, sliding up and down in the slotted part of *B* when it is necessary to adjust the screw. The crosshead has a gage line on it, and the sides of *B* are graduated as shown, these graduations being used for a purpose which will be considered later. At the lower end of the screw is the double hook in which the axle rests as it is lifted from the floor into the lathe. The air hoist is hung at a height to accommodate the largest diameter axle. If an axle of any other diameter is handled the screw must be adjusted to bring the hook to the proper height. The graduations on *B* are carefully made to accommodate the different size axles and in changing from one size to another it is only necessary for the operator to adjust the screw until the line on the crosshead is in line

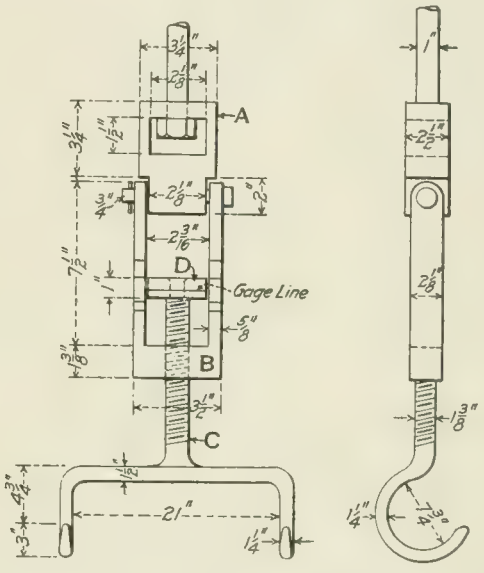


Fig. 7—Air Hoist Attachment for the Convenient Handling of Axles Into an Axle Lathe.

with the proper graduation on *B*. In this way the time is saved of going to the end of the lathe two or three times to see if the axle is at the proper height to fit the lathe centers.

PILING AXLES.

The device shown in Fig. 8 is constructed of 1½-in. piping, ells and tees, and is convenient for piling axles in the wheel shop. After the first lot of axles have been placed on the floor the ends *A* of the device are placed on the first or nearest axle, the legs of the horse resting on the floor and within reach of the air hoist. The remaining axles are lowered on the horse by the air hoist and are allowed to roll on the pile. The length

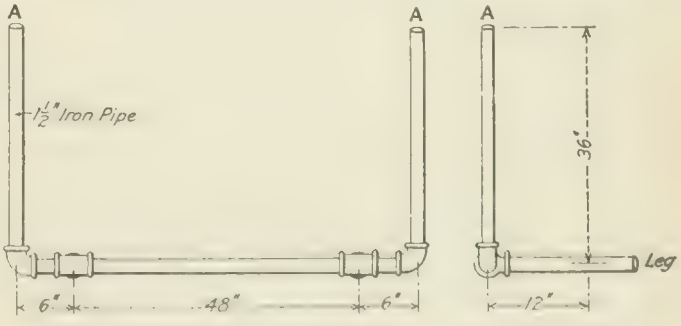


Fig. 8—Device for Piling Axles in the Wheel Shop.

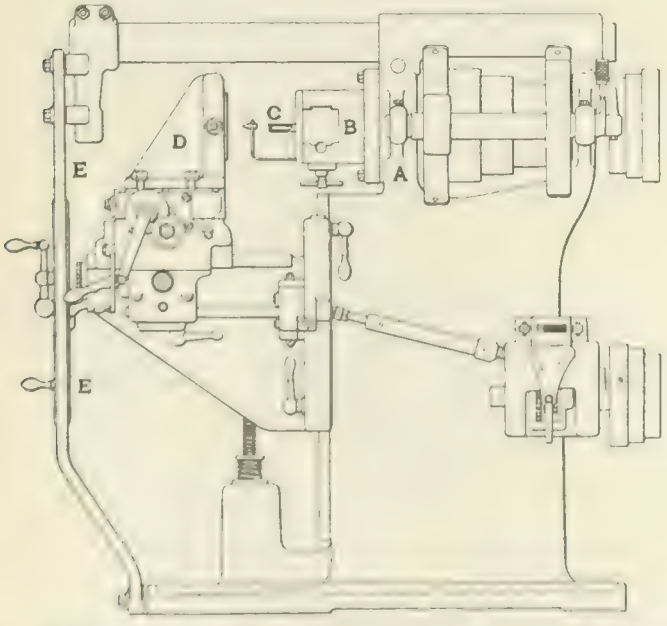
of the legs may be made such that one of the horses can be used for piling two rows of axles. The use of the device allows the axles to be piled on either side of and at right angles to the runway which carries the crane or hoist. In this way a number of piles may be placed within reach of the air hoist.

BORING SQUARE HOLES.

Attachments for drilling square holes have been made for lathes, milling machines and drills, but on account of the peculiar forces attendant in drilling square holes, these devices have not proved very satisfactory. They cannot be fastened rigidly enough to withstand the side thrust, caused by the eccentric jarring motion of the cutter, at right angles to the working spindle. The carriage of the average lathe does not offer sufficient stiffness to hold the working pieces rigidly in position, which is necessary to obtain perfectly square holes. Apparently this work can only be done satisfactorily with a special machine tool, in which the arrangements for cutting square holes are embodied in the design.

The R. K. LeBlond Machine Tool Company has designed a combination machine tool for the Niles-Bement-Pond Company, New York, which is not only adapted for milling square holes, but also possesses all the features of a standard milling machine. The principle used is the same as employed in other similar devices, namely, the revolution of a triangular shaped bit, similar to an end mill, in a stationary master guide, which in appearance is much like a regular drill chuck. This stationary guiding chuck is entirely different from all previous devices, being fastened directly to the column of the machine by means of a flange, which eliminates all lost motion.

The cutter *C* receives its motion from a special driving member which is fastened to the nose of the spindle. This driving member not only causes the cutter to rotate, but at the same time gives it freedom to travel eccentrically in the master guide. The whole arrangement for cutting square holes, simple in itself, is easily detached in a very short time, leaving the machine available for regular milling work. When cutting square holes in tough material it is best to first drill a round hole. For this

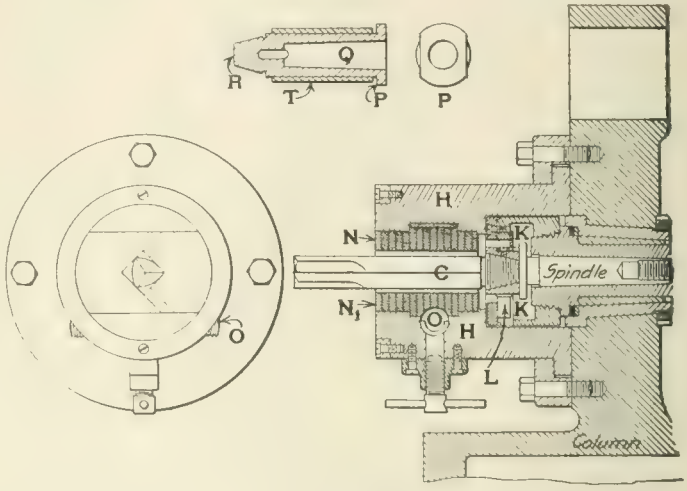


Milling Machine Designed for Boring Square Holes.

reason the machine is furnished with an appliance for operating ordinary twist drills which engages in the arrangement for boring square holes. Both operations may be done on the same piece in succession.

As the attachment for cutting square holes projects considerably beyond the nose of the spindle, it would, on a standard machine, decrease the working space in front of the cutter. Therefore, the column bearing the main spindle has been set back to gain the distance taken up by this projection, thus maintaining the full working range of the table. A special brace *b* is provided connecting the knee with the overhanging arm, as well as with the base of the machine, so as to secure absolute rigidity of the work on the table. The machine is arranged with two separate cross-feeds, one for the regular milling work, and the other for extra fine feeds, starting from .001 in., for the cutting of square holes requires a very fine feed. The work must be held absolutely rigid, and a special vise *D* is furnished with the machine for this purpose.

The accompanying illustrations show a side view and a partial horizontal cross-section through the square hole cutting attachment. *A* is the column of the machine, and *B* is the detachable



Cross-Section Through Square Hole Cutting Arrangement.

chuck which holds the square hole cutter *C*. The square hole attachment, shown in the cross section, consists of the driving member *K*, which is screwed to the nose of the spindle, and the stationary chuck *H*, which is bolted to the column. The driving member contains a floating driving dog *L*, into which the cutter *C* is screwed. Behind this dog is a floating thrust plate which takes up the end thrust of the drills. The stationary guiding chuck contains the master guide, which consists of two jaws *N* and N_1, forming an adjustable square guiding hole in which the drill *C* operates. *O* is a right and left hand screw of opening and closing the jaws in accordance with the size of the drill used.

For boring round holes in connection with the attachment for cutting square holes, a round bushing, having a regular Morse taper, is inserted in the square guiding hole, which serves as a bearing for the shank. The machine is furnished with a complete equipment for regular plain milling. The range for boring square holes is from ¼ in. to 2 in.

FOREIGN RAILWAY NOTES.

The East Indian Railway will open two new schools for the children of its native staff stationed at Asanol and Dinapore. This company has already provided 69 schools for the exclusive education of the native children, besides 23 well-kept institutions for the children of its European employees.

The authorities of the East Indian Railway find themselves in some difficulty in providing special train accommodation for the large influx of American tourists. It appears that the railway company has been requested to arrange for several special trains during the end of November and throughout December. If the visit of two ship loads of passengers had come at another period, the railway would not have had any difficulty in coping with the situation, but the arrival of one batch of tourists coincides with that of the King and Queen of England. The enormous passenger traffic which the East Indian Railway will be called upon to cope with during the next three months will exhaust all of its resources.

General News Section.

The Philadelphia & Reading has increased the pay of telegraphers and signal men, the increases ranging from $2.50 to $5.00 a month.

The government has begun suit in New Jersey against the Erie Railroad to recover penalties of $5,000 for violation of the hours-of-service law, the charge being that enginemen have been required to work longer than sixteen hours at a time.

The mail car in train No. 55 of the Atlantic Coast Line was robbed near Columbia, S. C., on the night of November 24, the robber holding up two mail clerks at the point of a pistol. After taking the registered letters, the robber pulled the bell cord, stopped the train, and escaped.

The boilermakers (and helpers) of the American Locomotive Company at Schenectady, N. Y., who have been on strike for nearly a month, returned to work in large numbers on the morning of November 23. Neither the company nor the men have given any details of the settlement.

In the federal court at Savannah, Ga., last week, the Grand Jury returned indictments against fifteen residents of Vidalia on a charge of obstructing the United States mails. The indictments were based on occurrences connected with the strike of firemen on the Georgia & Florida Railroad about two months since.

The Delaware, Lackawanna & Western and the Baltimore & Ohio have followed the example of the Chicago & North Western in establishing "committees of safety," and enthusiastic meetings were held last week on both of these roads. On the Baltimore & Ohio the membership of the divisional committees will be changed every six months; this with a view to keeping the interest of all concerned stimulated.

Because of the alarming rate at which the loss and damage expense of the Chicago & Alton and the Toledo, St. Louis & Western is growing, the management of these lines has created the position of supervisor of stations, with the object of securing the co-operation of station, yard, train and all other employees having to do with the handling of freight in devising ways and means of reducing the operations of the road to a more scientific basis. The management believes that the solution of the problem rests largely with its employees, and that the success of efforts to reduce these expenses will largely depend on the personal interest shown in these efforts by all concerned. F. E. T. Pearne, whose appointment to the new position is announced elsewhere in this issue, will report to the superintendents in charge of their respective divisions such matters as his observation may warrant. He will send copies of his reports to the freight claim agent when they relate to the handling of freight.

Texas & Pacific's Reasons.

According to a press despatch from New Orleans, Vice-President T. J. Freeman, of the Texas & Pacific, denies that his road has vitiated any traffic contract with the St. Louis & San Francisco. He says: "A tentative proposition was submitted to the directors of the Texas & Pacific and they voted it down unanimously. No agreement was ever made by the Texas & Pacific permitting the 'Frisco to use its rails into New Orleans. The 'Frisco wanted us practically to turn our road over to them. We were to give them all the local rights enjoyed by our line at all local points. Further, the 'Frisco wanted to pay only a small portion of the maintenance costs of the line when, to all intents and purposes, the larger part of the business to move over the line would be 'Frisco's. The total expenditure for improvements called for would have amounted to about $2,000,000."

Not on the Railways.

Eighty-nine persons have been killed and several hundred injured in automobile accidents in the streets of New York since January 1, and Colonel Edward S. Cornell, secretary of the National Highways Protective Society, who has studied the records, says that "joy riding, drunken chauffeurs, ignorant owners of cars and irresponsible and reckless 'night hawk' cabmen are responsible. The 'joy riders' and the 'night hawk' cabmen are the most dangerous factors to life and limb in the city. In thirteen cases during the month of October the operators of motor cars causing serious accidents fled, thus violating the law in another way."

A New Kind of Slumber.

"Ethereal asphyxia or aerial somnipathy," was what was the matter with C. P. Rodgers, the aviator, when he fell near Compton, Cal., at the close of his transcontinental flight. Rodgers asserts that this is what caused the deaths of many other aviators. It lurks in the pockets of the upper air strata and creeps irresistibly upon the senses of an aviator, lulling him into dreamy unconsciousness. Rodgers was at an altitude of a thousand feet, he says, when he felt a sleepy sensation creeping over him and realized his peril. When about a hundred feet from the ground he went to sleep. The air had a peculiar odor, like chloroform or ether. In proof that it was not the rarefied air or weak heart he points to the fact that he lost consciousness only a hundred feet up.

The foregoing may or may not be a contribution to scientific knowledge; we cannot decide. The new terms, however, will be of interest to railway superintendents' clerks who have to record the cases of locomotive enginemen who lose control of their machines, as did Rodgers, but who can give no explanation of the trouble. It is painful to have to record that the engineman lied, as so often seems necessary. "Somnipathy" may sound better.

Rock Island Shopmen.

The threatened strike of the shop employees of the Rock Island lines has been averted by the acceptance of the proposition made by the company to the International officers of the unions on October 10. This proposition was at first rejected, but after reconsideration it was accepted on Monday of this week. The letter of acceptance, signed by the International presidents gives as the reason for accepting the terms offered the great losses and hardships which would have been imposed on the company, the employees and the public in the case of such a strike. The demands made by the men and the action taken by the company on each were printed in the *Railway Age Gazette* November 24, page 1069. The new schedule now agreed on is the same as the one in effect before the negotiations were started, both as to working conditions and rates of pay, except that employees in the service of the company traveling on the road will be allowed $1.50 a day expenses instead of $1.25. It is emphatically denied by the company that the federation of shop employees has been recognized at any time during the negotiations. A settlement has been made with each individual craft, the schedules being drawn up with separate termination clauses, and being signed by representatives of each craft and the railway officers. These individual schedules are the only ones that contain the rates of wages and exclusive service conditions. Any grievance existing on the part of a craft will be negotiated by the committee of that craft, the general committee coming into conference only when desired by the local craft. No strike can be called except by a conference of the crafts.

Railway Disaster in France.

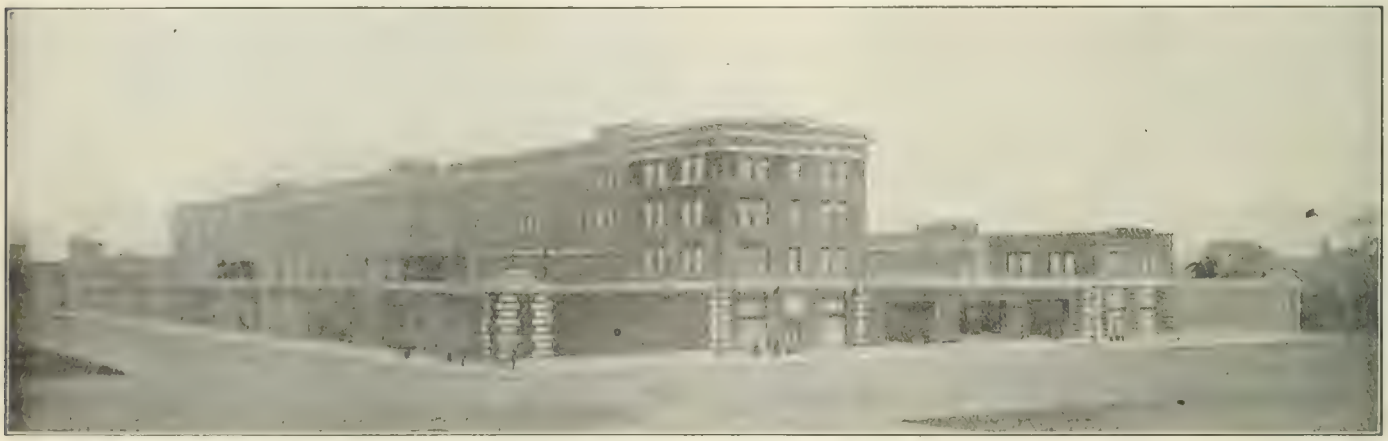
A press despatch from Saumur, France, November 23, reports the destruction on the morning of that day of a passenger train on the state railway by the failure of a bridge at Montreuil-Bellay, caused apparently by a flood in the Thouet river. Thirty or more persons were drowned, and survivors who succeeded in climbing through the windows of the cars and clinging to the roofs were compelled to remain in that position throughout the day, while hundreds of persons on the shore of the river were unable to asisst them. At night, however, military engineers reached the place with pontoons and succeeded in taking off eleven persons. The engineman of the train saved himself by catching hold of a pig, being carried along by the flood, the

animal towing him to the shore. The flood had done considerable damage previous to the bridge disaster, and all the boats in the locality had been carried off. A man who rowed out from the shore in an effort to save a child who was on the train was himself drowned.

New "Soo Line" Freight House in Chicago.

The Minneapolis, St. Paul & Sault Ste. Marie has announced its plans for an independent freight terminal in Chicago, the execution of which plans is subject to the granting by the city council of permission to cross the necessary streets and alleys and for the vacation of portions of two streets. The terminal is to be built by the Central Terminal Railway, an Illinois corporation, and leased to the Soo. The tracks of the Baltimore & Ohio Chicago Terminal Railroad will be used from Forest Park, where connection is made with the main line of the Soo, to Halsted and Fifteenth streets, from which point two new tracks will be built by the Central Terminal to a 14-track elevated freight terminal extending from Fourteenth Place to Twelfth street, between Canal and Clinton streets. Passenger trains will use the Illinois Central terminal as at present, although it is planned ultimately to use the Baltimore & Ohio station at Harrison street and Fifth avenue.

Outbound and inbound freight houses, each 500 ft. x 80 ft. in area, will extend from Twelfth to Thirteenth street. They will be of an attractive style of architecture and will be equipped with modern freight handling apparatus, including three elevators in the inbound freight house and a hoist capable of handling a freight car between the ground and elevated levels. The inbound freight house will be four stories high, and the outbound freight house two stories. Between these houses there will be three driveways, the middle drive being on an incline to the elevated track level. South of Thirteenth street there will be a 12-track team yard extending to Fourteenth street, with an inclined driveway reaching from the street to the track level. The entire layout will be elevated above the streets, starting from the present completed elevation of the Baltimore & Ohio Chicago Terminal near Halsted street. The elevation will be supported on a reinforced concrete structure similar to the viaducts already built in the city. This development will be an important addition to the railway facilities west of the river, being but a short distance south of the proposed site of the new union station and Pennsylvania freight houses.



Proposed Soo Line Freight Terminal in Chicago.

Real Life in the Train Despatcher's Office.

The following [illegible] is taken from an address by J. W. James, train despatcher of the Buffalo, Rochester & Pittsburgh, which was delivered before the last annual meeting of the Train Despatchers' Association. Mr. James made an earnest plea for the exercise of honesty, intelligence and devotion to duty, telling his hearers that there will be no doubt about recognition of their efforts by their superior officers if only they will put into their work the enthusiasm of which they are capable. He also called attention to the value of employees' magazines, such as are published by the Erie, the Illinois Central and other roads; and reminded the members of the association of the good use to which these periodicals could be put, to promote efficiency and loyalty. The incident quoted below bears unmistakable evidence of genuineness; but it is to be hoped that cases of the kind are not common.

It's 3:59½ p. m. Here comes Jones our second despatcher. "Hello, kid, how they coming?" is his salute to the first trick man, who is an old man. Turning aside to a young conductor in the hall, he says, "How do, old scout?" Goes to work 4:02 p. m. While looking over his transfer, he turns his head to the window, notices a lady passing. "Gee! look at that blonde," he says to the elder gentlemen in waiting (Voice on wire, "82 here." "Minute; making transfer.") Turning to the first trick man again, he says: "That blonde reminds me of a coincidence today—I met a swell looker at the show." (Voice on wire, "Local is ready." "Hold them minute, I'm making transfer.") "She put her lamps on me and it was all off with your uncle Bill." (Voice on wire, "Can you give No. 80 five minutes on 95?" "No, tell him he lost five minutes asking for it.") "That's Murphy," says Jones, "he is one of those guys that always lacks five minutes. And so we took in all the moving picture shows in town." (Voice on wire, "76 coming. Will I kill this dead one and let 'em go?" "Yes, hang her on the nail, kid, and I'll give you a number later.") "Lot of nice people spoke to her, too, but she wouldn't tell me what her name was." (Voice on wire, "Can you take a rush message?" "No, give it to the brass pounder. It's about having inspector on hand to rebrass old man's car. I'll tell the kid with a large forehead to answer you.") "She handed me a line of talk about always wanting to know a real, true blue, railway man. One that was high up."

Later on in the evening a few trainmen entered, all enjoying a hearty laugh over some joke. "Do we bother you, Jonesey, old boy?" inquired one of them as he was leaning over the sheet. "No, go as far as you like," was the reply. "Say, Jones, I want to ask you a question—If I get to C and find only two loads to pick up and have time to make D for 82, wouldn't you pass them up and save all that delay?" All of them were listening for Jones' reply to Ryan's question. "Sure thing; tell operator to lay low and hand them to some following train. I can fix it on the sheet."

Operator on the line hears the racket in despatcher's office and jokingly inquires what it is. Jones says, "Why, that's Ryan making a rough house." The operator in turn gives this information to the conductor of a train who is at his station. As they pull out, this is the conversation in that caboose: "That Jones is a fine fellow—well, the whole bunch are on the square. Jones never turned in a fellow since he's been there." Flagman gets in his, "Well, Smith isn't very handy with his pencil either." Finally they come to the winning qualities of the third trick man, Brown. Head brakeman says, "Brown's the boy, he don't care and they know it; but he's got the ability and can stick as long as he likes." "Yes," replied the conductor, "and he is wiser than they think he is—we were out the other night and Brown and I unloaded a few. He was feeling pretty good and put me wise to a few things. Don't mention, however, what I said about his

taking on a couple; he wasn't piped to the gills, just had a comfortable skate when he went to work." A few days passed and Jim Barrett comes in to see Brown about a rejected time slip. "You remember that turn I made the other night?" and Brown said he did. "Well, they only allowed me straight mileage on that. I have a good notion to hand this over to our committee." "I don't blame you one bit," says Brown. "These $40 guys," referring to timekeepers, "make me tired. They think their efforts are appreciated and they get company-struck right in the beginning." Continuing Brown says, "We are not getting what is coming to us, either, but you cannot get those guys together for the reason so many of them prefer to be fanned with an ostrich feather with the label, 'Official' on it."

Railway Educational Association.

In March of this year the post office department thought it had discovered a use of the mails for fraudulent purposes and so seized the books of the Railway Educational Association, Brooklyn, N. Y., of which George H. Baker is president. This association is a correspondence school for locomotive firemen and brakemen, and guarantees, when the course has been finished, to find work for the student or refund one-half the tuition fee. As witnesses for the prosecution, the government found 82 men, out of the thousands who had been students, who were disgruntled for some reason and who were willing to testify. In the course of the search for witnesses, many railway officers were addressed and from them the district attorney received many letters praising the work of the school and insisting on its value and reliability, even going to the extent of urging that the suit be abandoned.

On the stand, 80 of the 82 students for the prosecution testified that no misrepresentations had been made and that they had not obtained positions because they had declined those offered. Then seven master mechanics and trainmasters, summoned by the government, testified that they employed Mr. Baker's students and gave them the preference over the ordinary applicant for a position. For the defense, about 70 students testified as to the value of the course. Through it they had received immediate employment at wages of from $75 to $90 a month, and many of them were now earning from $175 to $185 as enginemen. Following these came a number of men who had known Mr. Baker for many years, all of whom testified as to the value of the course of instruction. Among these witnesses were: B. A. Worthington, receiver, Wheeling & Lake Erie; F. A. Delano, president, Wabash; J. F. Deems, until recently general superintendent of motive power, New York Central Lines; George L. Fowler, consulting engineer; E. T. White, superintendent of motive power, Baltimore & Ohio; Chas. Chambers, superintendent of motive power, Central of New Jersey, and between 20 and 30 others. Even a letter from the assistant comptroller of the Navy, testifying to the value of the work, was admitted. It is rarely that any man has been able to muster such an array of witnesses of high standing in his behalf, and probably never before to confute such a charge. The testimony of the defense throughout showed not only the high character of the instruction issued by the school, but the standing of Mr. Baker himself as a fuel expert, simply corroborating what is already well known in railway circles. It also appeared that his instructions have been adopted by some 95 roads, representing about one-third the total mileage of the country, and that more than 50,000 copies have been issued. After a trial lasting seven weeks the case was submitted to the jury on November 21. In this jury there was not a single railway man or a man who would be expected to know anything of steam engine or railway work, so that, while honest and earnest, it was incapable of weighing the evidence for what it was worth. The result was a disagreement, but it certainly is not probable that the case will be renewed.

Pennsylvania's Influence in the South.

It is rumored, although officially denied, that the Pennsylvania Railroad is looking toward establishing closer relations with the Atlantic Coast Line. The *Wall Street Journal* says:

The Pennsylvania sought an influence in the affairs of the New Haven and obtained a directorship, though the purchase of anything like control was out of the question. With its connecting railroad and bridge over Hell Gate completed, the New Haven-Pennsylvania affiliation will occupy the dominant position in regard to traffic between New England and the middle Atlantic states. The two will be increasingly powerful in the coastwise traffic, both by land and by water.

An interest in the Atlantic Coast Line would in many ways be a natural extension of this field. No other road, not even the Seaboard, has such a coastwise system as the Coast Line. It not only parallels the coast, connecting up such important ports as Norfolk, Wilmington, Charleston, Savannah, Brunswick and Tampa, but it owns and operates a network of feeders from the interior to the coast points and, by tracking and its control of the Louisville & Nashville, reaches the Gulf of Mexico at Pensacola and New Orleans, shipping centers that are expected to feel the impetus of the Panama canal opening.

Through Michael Jenkins, of Baltimore, one of its directors, the Coast Line enjoys a warm commercial friendship with the Merchants' & Miners' Transportation Co., which operates a fleet of twenty-five or thirty steamers in the coastwise trade between Boston and Jacksonville. New Haven, by the way, owns the half of this steamship company's stock not owned by Mr. Jenkins and his associates. If the opening of the Panama canal is to develop the business of the southeastern seaboard as much as most people suppose, it is apparent that the Pennsylvania, with its own lines deeply rooted in the manufacturing and coal mining center of the country, would be advantaged by extending the sphere of its influence directly southward, by land and water.

Pennsylvania itself has no points of contact with the Coast Line, but they connect by means of the union line between Washington and Richmond. Furthermore, the Louisville & Nashville, which the Coast Line controls, touches the Pennsylvania lines at Cincinnati, Louisville and St. Louis. The Norfolk & Western, which the Pennsylvania controls, touches the Coast Line at Norfolk, Richmond and Roanoke, from the latter of which places the joint line of the Norfolk & Western and the Coast Line extends to Winston-Salem.

Big Four, a Vanderbilt road, has recently made a traffic agreement with the Louisville & Nashville, establishing thereby a direct route from Chicago and the middle states to the gulf. It is difficult to believe that the Pennsylvania can look on with equanimity while other trunk line systems take such steps to guard themselves against possible unfavorable effects from the opening of the canal.

None of these considerations prove that Pennsylvania has any intention of buying into Coast Line, but all of them bear on the growing importance of the southern through lines in relation to the other transportation systems of the country.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

Air Brake Association.—F. M. Nellis, 53 State St., Boston, Mass.

American Association of Demurrage Officers.—A. G. Thomason, Boston, Mass.

American Association of General Passenger and Ticket Agents.—W. C. Hope, New York; next convention, Seattle, Wash.

American Association of Freight Agents.—R. O. Wells, East St. Louis, Ill.; annual, June 18-21, Chicago.

American Association of Railroad Superintendents.—O. G. Fetter, Carew building, Cincinnati, Ohio; 3d Friday of March and September; annual, March 17, Chicago.

American Electric Railway Association.—H. C. Donecker, 29 W. 39th St., New York.

American Railway Association.—W. F. Allen, 75 Church St., New York.

American Railway Bridge and Building Association.—C. A. Lichty, C. & N. W., Chicago. Next annual convention, third week in October, 1912, Baltimore, Md.

American Railway Engineering Association.—E. H. Fritch, Monadnock Block, Chicago; annual convention, March 19-21, 1912, Chicago.

American Railway Master Mechanics' Association.—J. W. Taylor, Old Colony building, Chicago. Annual convention, June 17-19, Atlantic City, N. J.

American Railway Tool Foremen's Association.—M. H. Bray, N. Y., N. H. & H., New Haven, Conn.

American Society for Testing Materials.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.

American Society of Civil Engineers.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

American Society of Engineering Contractors.—J. R. Wemlinger, 13 Park Row, New York; 2d Tuesday of each month, New York.

American Society of Mechanical Engineers.—Calvin W. Rice, 29 W. 39th St., New York. Annual meeting, December 5-8, New York.

Association of American Railway Accounting Officers.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.

Association of Railway Claim Agents.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 22, 1912, Los Angeles, Cal.

Association of Railway Electrical Engineers.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago.

Association of Railway Telegraph Superintendents.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.

Association of Transportation and Car Accounting Officers.—G. P. Conard, 75 Church St., New York; December 12-13, Louisville, Ky.

Canadian Railway Club.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.

Canadian Society of Civil Engineers.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

Car Foremen's Association of Chicago.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

Civil Engineers' Society of St. Paul.—D. F. Jurgensen, 116 Winter St., St. Paul, Minn.; 2d Monday, except June, July and Aug., St. Paul.

Engineers' Society of Pennsylvania.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

Engineers' Society of Western Pennsylvania.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

Freight Claim Association.—Warren P. Taylor, Richmond, Va.; annual, May 15, Buffalo, N. Y.

General Superintendents' Association of Chicago.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

International Railway Congress.—Executive Committee, rue de Louvain, 11 Brussels; 1915, Berlin.

International Railway Fuel Association.—D. B. Sebastian, La Salle St. Station, Chicago.

International Railway General Foremen's Association.—L. H. Bryan, Brown Marx building, Birmingham, Ala.

International Railroad Master Blacksmiths' Association.—A. L. Woodworth, Lima, Ohio.

Iowa Railway Club.—W. B. Harrison, Union Station, Des Moines, Ia.; 2d Friday in month, except July and August, Des Moines.

Master Boiler Makers' Association.—Harry D. Vought. 95 Liberty St., New York; annual convention, May 14-17, Pittsburgh, Pa.

Master Car Builders' Association.—J. W. Taylor, Old Colony building, Chicago. Annual convention, June 12-14, Atlantic City, N. J.

Master Car and Locomotive Painters' Association, of United States and Canada.—A. P. Dane, B. & M., Reading, Mass.; next annual convention, second week in September, 1912.

New England Railroad Club.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

New York Railroad Club.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

Northern Railway Club.—C. L. Kennedy, C., M. & St. P., Duluth, Minn; 4th Saturday, Duluth.

Omaha Railway Club.—H. H. Maulick, Barker Block, Omaha, Neb.; second Wednesday.

Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

Railway Club of Pittsburgh.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh

Railway Industrial Association.—G. L. Stewart, St. L. S. W. Ry., St. Louis, Mo.; annual, May 12, 1912, Kansas City, Mo.

Railway Signal Association.—C. C. Rosenberg, Bethlehem, Pa.

Railway Storekeepers' Association.—J. P. Murphy, Box C, Collinwood, Ohio.

Richmond Railroad Club.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

Roadmasters' and Maintenance of Way Association.—L. C. Ryan, C. & N. W., Sterling; September, 1912, Buffalo, N. Y.

St. Louis Railway Club.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

Society of Railway Financial Officers.—C. Nyquist, La Salle St. Station, Chicago.

Southern Association of Car Service Officers.—E. W. Sandwich, A. & W. P. R.R., Montgomery, Ala.

Southern & Southwestern Railway Club.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

Toledo Transportation Club.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio.

Traffic Club of Chicago.—C. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.

Traffic Club of New York.—A. Schaps, 290 Broadway, New York; last Thursday in month, except June, July and August, New York.

Traffic Club of Pittsburgh.—D. J. Wells, Law, Pittsburgh, Pa., meetings

Traffic Club of Western New York.—J. F. Mackie, 7012 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.

Transportation Club of Buffalo.—J. M. Sells, Buffalo, 3rd Thursday

Transportation Club of Detroit.—W. B. Hooley, L. S. & M. S., Detroit.

Traveling Engineers' Association.—W. O. Thompson, N. Y. C. & H. R.,

Western Canada Railway Club.—W. H. Rosser, P. O. Box 1767, Winnipeg, Man., except June, July and August, Winnipeg.

Western Railway Club.—J. W. Taylor, Old Colony building, Chicago, 3d Tuesday in month, except June, July and August.

Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago, 1st Monday in month, except July and August, Chicago.

Wheeling & Lake Erie Railway Club.—A. E. Rose, B. & O., Baltimore, Md.; annual, January 16-18, Chicago.

Traffic News.

At the Curtis Bay pier of the Baltimore & Ohio, at Baltimore, November 23, the new collier Newton was loaded with 7,029 tons of cargo coal, and 545 tons of bunker coal in 4 hours, 35 minutes, which is said to be the world's record for speed in loading a ship.

The canal terminal amendment to the constitution of the state of New York, voted on at the last election, is said to have been adopted, though the official return of the vote has not yet been issued. This amendment provides for the establishment by the state of adequate basins, docks and buildings for the accommodation of the traffic which is expected to be carried by the enlarged Erie canal. The proposition contemplates the acquisition and improvement of property at New York, at Buffalo and at the principal cities between Buffalo and the Hudson river. In those counties not adjacent to the line of the canal there was a majority of votes against the amendment, and it is estimated that the final and complete vote will show only a small majority in favor of the terminals.

James J. Hill, chairman of the board of directors of the Great Northern, who now and then gives advice to the farmers in terse and forcible language, turned his attention at Chicago the other day for a moment to the farmers in the railway world; and he declared his belief that many of the lectures given in the trains which travel around the country are of doubtful benefit, for the reason that they do not effectively reach the persons most concerned.

The agricultural department at Washington reports that during the past year its representatives have taken part in the management of 71 instruction trains which have been run over various railways throughout the country, traveling altogether 40,000 miles. The department finds in existence 12,000 fair associations having 246,000 members. Secretary Wilson says that the farmers are so interested in this new means of instruction that the demand for lecturers is far beyond the power of the states to supply. He gives figures showing the appropriations made by different states during the past year for "institute work." Most of the states have made considerable increases over the year before.

An Unusual Manifesto.

The president of the Commuters' League of New Jersey, speaking of the proposed increase in fare by the Hudson & Manhattan is quoted in the New York papers as follows: "While the commuters of New Jersey who use the uptown tube will regret the necessity of the increase, I believe they will recognize the justice and propriety of the same. I have made a complete analysis of the situation in respect to the necessity for increased revenue and I am convinced the proposed increase in fare is entirely justified. My observation is that the commuters of New Jersey do not expect nor desire that transportation shall be furnished to them at a loss to the operating company.

"The policy of the McAdoo company and its attitude to the public has been uniformly correct. The road has been operated with due regard always to the public interest. The company has also done the right thing in stating frankly to the public at the very outset the reasons why the increase in rate is necessary."

The New York Central's Division of Rates with the Rutland.

The minority stockholders' committee of the Rutland Railroad, which has for a number of years been attempting to compel the directors to declare dividends on the cumulative preferred stock, have issued a circular to minority stockholders describing a suit which has been brought against the New York Central & Hudson River, claiming that the division of rates between the two railways had been entirely unjust to the Rutland. The suit has actually been brought and one witness for the Rutland examined but not as yet cross-examined, and it is expected that the taking of testimony alone will extend over a considerable period of time, possibly as much as six months. The circular to the minority stockholders quotes a number of rates which tend to show that when taken on a mileage basis, the division between the New York Central and the Rutland

has been very unfavorable to the Rutland. An examination of way bills, etc., was made by an accountant representing the committee, it is understood, with the permission of the New York Central, and it is pointed out by the legal department of the New York Central that the rates quoted in the circular are in many cases very misleading, since they do not show terminal charges or any charges which the New York Central was compelled to pay to other companies to which the freight was forwarded, such, for instance, as lighterage companies. Another claim of the Rutland committee is that freight has been diverted so as to give the New York Central the long haul in preference to giving it to the Rutland. This the New York Central says is so far from true that in many instances freight that would naturally move over the Central has been routed over the Rutland, through a policy of trying to develop the subsidiary property.

Traffic Club of New York.

At the meeting of the Traffic Club of New York, held at the Waldorf-Astoria, November 28, the following officers were elected for the ensuing year: President, E. G. Warfield, vice-president and general manager, Seaboard & Gulf Steamship Company, New York; vice-presidents, A. F. Mack, traffic manager, United States Steel Products Export Company, New York; W. C. Hope, general passenger agent, Central of New Jersey; F. X. Quinn, agent, Pennsylvania; W. J. Love, assistant freight traffic manager, International Mercantile Marine Company, New York; G. H. Stevenson, traffic manager, General Chemical Company, Phillipstown, N. Y.; treasurer, F. C. Earle, general traffic manager, Manhattan Navigation Company., New York; secretary, C. A. Swope, eastern freight agent, Louisville & Nashville; assistant secretary, H. L. Derby, traffic manager, Casein Manufacturing Company, New York.

INTERSTATE COMMERCE COMMISSION.

Reparation Awarded.

Southern Queen Range Co. v. Cincinnati, New Orleans & Texas Pacific et al. Opinion by the commission:

Second-class rate for loose steel sheets L. C. L. from Brackenridge, Pa., to Chattanooga, Tenn., found unreasonable and fourth-class rate found reasonable. (21 I. C. C., 608.)

E. J. Gorman v. Chesapeake & Ohio. Opinion by the commission:

Additional transportation charges paid by a passenger on account of an error of the defendant's agent should be refunded. (21 I. C. C., 613.)

Floridin Company v. Seaboard Air Line et al. Opinion by the commission:

Through the shipper's mistake, a carload shipment was consigned to Hamburg, Germany, via Savannah, Ga. The error was discovered before the car reached Savannah and instructions were given to send the car to Buffalo, N. Y., on the joint through rate from point of origin to Buffalo. The commission finds that the shipment was not similar to a through movement and that the defendant was right in charging the sum of the local rates for the movement that the car actually performed. (21 I. C. C., 610.)

Complaint Dismissed.

C. C. Foolmer & Co. v. Bellingham Bay & British Columbia Railroad et al. Opinion by the commission:

A carload shipment which was consigned via a lake steamship line arrived at the dock on November 2, and the tariff of the steamship line provides that after November 1 shipments would be subject to forwarding all rail and all rate rates if in excess of available vessel capacity. The shipment in question was forwarded all rail, which is not found to be unreasonable. (21 I. C. C., 617.)

Milling-in-Transit on Corn.

F. S. Johnson & Co. et al. v. Atchison, Topeka & Santa Fe. Opinion by the commission

Corn millers at St. Joseph, Mo., and Kansas City can buy their corn west of these cities, mill it at these cities and ship through to the Pacific coast on the through rate from point of origin to destination, while millers at Milford, Neb., and Firth are required by the rules of the Santa Fe to buy their corn east of their mills if they are to enjoy the through milling-in-transit rate to the Pacific coast. The commission finds that this is not undue discrimination, and therefore dismisses the complaint. (21 I. C. C., 637.)

Variation of 1 per Cent. Allowed in Reweighing Coal.

Sunderland Brothers Co. v. Chicago, Burlington & Quincy et al. Opinion by the commission:

The present rule of the Chicago. Burlington & Quincy, which provides that shippers shall pay switching charges plus $1 for reweighing, and that way bill charges shall be readjusted in accordance with the actual weight, is found unreasonable, and the commission orders that the rule be made so as to provide that when the reweighing does not show a variation of 1 per cent. from the original weighing, the original charges will not be changed and reweighing charge shall be retained by the railway; but if more than 1 per cent. variation is shown, original charges shall be readjusted and reweighing charge returned to the shipper. (21 I. C. C., 632.)

Advanced Rates on Plaster Refused.

In re suspension of advanced rates on cement plaster from stations in Oklahoma to stations in Texas. Opinion by Commissioner Meyer:

The commission finds that the proposed rate of 17 cents per 100 lbs. on cement plaster from stations in Oklahoma to stations in Texas would be unjust, and that the rate from Alva and certain other stations in Oklahoma to Fort Worth, Tex., and Dallas should not exceed 13 cents C. L. minimum 40,000 lbs., and that the rate from Cement, Marlow, Chambers and McAlester, in Oklahoma, to Fort Worth, Tex., and Dallas should not exceed 10 cents. Under the long and short haul clause the defendants have filed with the commission applications affecting rates to intermediate points. These applications will be passed on later. (21 I. C. C., 591.)

Terminal Allowances at Buffalo.

Buffalo Union Furnace Co. et al v. Lake Shore & Michigan Southern et al. Opinion by Commissioner McChord:

The Buffalo Union Terminal Railroad serves the Buffalo Union Furnace Company and other industries. The complaint says that the defendants make switching allowances to terminal roads serving blast furnaces and iron industries in New York, Pennsylvania, Ohio and Illinois. It is the custom of railways, the complaint says, to perform the switching service themselves, or, where it is performed by other companies, to make an allowance for this switching service with the single exception of the Buffalo Union Terminal Railroad, which is an affiliated company with the Buffalo Union Furnace Company. The defendants claim that the circumstances are not the same with the B. U. T., and they also claim that such different treatment of different localities is not, as a matter of law, in violation of the Act to Regulate Commerce. The commission finds that there is abundant evidence that a similarity exists between the case of the Cleveland Furnace Company and the Buffalo Union Furnace Company, and that they both sell pig iron in the same market. The South Buffalo Railway does all of the internal switching for the Lackawanna Steel company and the steel company owns nearly all of its stock. It now gets $2.50 per car for this internal service. While in common law no obligation rests on the carriers to pay for the spotting of cars at any of the furnaces mentioned, yet a different question is presented if the carriers voluntarily undertake to perform this duty for some and refuse it to others. The commission believes that the present case comes under the second and third sections of the act and involves no more than that the Buffalo Union Furnace Company should be placed on equality with other furnaces. The defendants claim that the South Buffalo Railway is a common carrier serving many industries, while the Buffalo Union Terminal serves only one industry; but the commission does not find it necessary to decide whether or not either terminal railway is a common carrier, because the Cleveland Furnace Company at Cleveland serves only one industry and is closely analogous to the Buffalo Terminal, and the fact that the Cleveland company is given an allowance for switching makes the refusal to give the Buffalo company an allowance, an undue discrimination. (21 I. C. C., 620.)

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF SEPTEMBER, 1911. (SEE ALSO ISSUE OF NOVEMBER 17.)

Name of road.	Mileage operated (U.S.)	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
		Freight.	Passenger.	Total, inc. misc.	Maintenance: Way and structures.	Maintenance: Of equipment.	Traffic.	Transportation.	General.	Total.					
Ann Arbor	291	$133,778	$53,772	$188,873	$25,587	$16,736	$4,039	$59,895	$7,444	$113,701	$75,172	$1,128	$13,986	$63,314	$19,972
Atlanta & West Point	90	87,483	41,284	133,451	13,473	19,227	4,270	30,098	6,010	73,528	40,023	98	5,189	34,932	758
Atlanta, Birmingham & Atlantic	331	224,803	56,140	291,784	26,711	46,742	16,030	95,130	10,082	194,698	100,086	.....	10,500	89,586	49,144
Atlanta, Knoxville & Northern	196	87,181	49,319	136,534	19,419	10,325	2,406	93,508	989	126,647	93,587	3,009	7,000	83,578	12,141
Atlantic & St. Lawrence	136	30,841	5,850	36,710	4,610	19,167	3,930	46,788	2,808	119,273	—7,936	.....	6,658	13,694	4,749
Canadian Pacific Lines in Maine	235	51,441	19,332	71,773	18,341	12,260	4,910	31,694	3,387	70,592	6,681	.....	7,000	—319	2,266
Central of Georgia	1,216	811,441	317,578	1,184,362	133,085	238,841	38,132	374,487	37,086	811,701	472,661	5,488	47,400	430,749	141,505
Central of New Jersey	611	1,101,683	500,641	1,668,616	220,943	305,789	28,826	602,988	36,781	1,204,397	1,060,719	34,944	94,093	1,001,570	259,731
Chicago, Rock Island & Gulf	476	161,196	58,884	241,185	29,860	15,795	9,038	69,339	6,977	130,999	103,186	—187	6,512	96,487	12,301
Detroit, Toledo & Milwaukee	196	167,843	70,017	254,705	21,738	25,930	6,767	87,864	4,379	146,888	73,177	—88	2,880	70,209	18,125
Fort Worth & Denver City	488	284,151	144,148	447,101	30,993	63,953	7,762	126,685	13,175	242,478	206,733	308	12,000	194,515	—8,419
Georgia, Southern & Florida	265	103,484	71,710	208,651	22,540	37,689	6,195	77,233	9,149	152,806	55,845	.....	9,407	46,438	1,766
Grand Trunk Western	847	1,001,206	213,577	1,296,557	68,532	85,767	18,406	215,289	12,029	400,023	196,534	—138	31,635	164,761	32,543
Illinois Central	2,911	4,135,888	853,180	6,274,017	98,962	103,842	8,905	186,633	14,944	413,286	285,741	.....	42,970	242,771	—84,718
International & Great Northern R. R.[1]	1,212	344,241	117,364	476,345	41,140	62,066	14,886	181,072	32,817	331,961	144,344	—69	16,500	127,775	30,730
Lexington & Eastern Railway	277	407,213	97,303	548,976	34,397	56,886	8,856	143,899	12,770	256,808	292,118	69	16,500	255,549	—
Louisville & Nashville	4,875	4,735,828	1,338,337	6,294,592	338,195	337,015	72,193	889,038	58,870	1,671,311	1,127,281	37	99,127	1,118,191	30,540
Kansas City, Mexico & Orient	600	133,783	32,708	166,730	42,564	29,984	8,604	66,364	7,718	155,234	10,986	.....	6,750	4,236	—537
Louisiana & Arkansas	550	130,254	24,415	166,303	19,403	17,077	6,318	56,587	6,306	105,591	60,712	.....	4,600	56,112	39,113
Missouri, Kansas & Texas	1,745	1,035,352	366,373	1,481,942	275,314	200,915	35,632	407,503	38,657	956,021	525,921	730	58,626	466,565	98,505
Missouri Pacific	3,916	1,614,263	436,963	2,250,173	470,059	464,750	69,364	930,340	74,967	2,009,480	240,693	1,935	82,600	156,158	—269,850
New Orleans, Texas & Mexico	348	77,865	18,659	98,943	25,721	11,484	4,098	43,926	6,229	91,458	7,485	.....	1,552	5,934	—3,499
Northwestern Pacific	416	135,386	183,016	363,159	50,328	40,250	3,590	112,933	9,479	216,580	145,579	.....	12,855	132,724	27,384
Philadelphia & Reading	1,014	2,954,640	644,129	3,757,237	402,908	712,751	43,419	1,177,103	64,725	2,400,906	1,356,331	19,362	90,121	1,285,572	—70,422
Pittsburg, Shawmut & Northern	240	186,529	9,549	217,989	17,345	24,386	33,398	3,647	79,715	38,274	.....	.....	1,598	36,676	10,957
Port Reading	21	98,872	—	99,572	8,310	695	33	44,594	79	53,710	45,862	—23	3,800	42,039	—32,753
St. Louis, Iron Mountain & Southern	3,314	1,888,203	579,443	2,501,509	470,685	418,770	57,061	789,549	69,429	1,805,494	697,315	—3,274	81,765	612,276	96,648
San Pedro, Los Angeles & Salt Lake	1,112	439,682	291,758	748,298	146,036	130,701	31,310	368,076	17,548	593,671	154,628	—3,147	24,700	126,781	29,345
Southern Air Line	3,046	1,273,957	368,492	1,887,566	275,347	277,916	55,887	617,870	56,734	1,283,754	553,812	—383	75,000	478,429	34,810
Spokane, Portland & Seattle	550	247,497	195,301	497,183	51,186	35,665	5,359	125,786	10,548	228,544	198,739	987	42,200	157,526	—158,866
Sunset	58	58,010	16,962	78,511	7,735	1,388	15	23,097	207	32,442	46,069	.....	3,389	42,680	—9,823
Trinity & Brazos Valley	462	166,373	38,873	211,208	30,247	22,630	9,248	83,203	11,598	156,326	54,882	.....	5,835	49,047	45,895
Ulster & Delaware	128	58,737	38,320	100,313	16,470	10,589	1,566	42,764	2,523	73,912	26,401	83	3,300	23,184	—9,314
Western Maryland	543	519,809	100,734	667,823	96,806	79,940	13,070	215,593	11,521	416,930	250,893	153	21,000	229,740	—17,161
Western Pacific	934	424,058	100,747	537,690	95,587	48,721	27,851	188,518	22,087	382,764	154,926	—3,364	14,350	137,212	—
Western Ry. of Alabama	133	74,182	40,700	122,607	17,766	20,164	4,936	30,954	7,470	81,290	41,317	—263	4,612	36,442	3,792
THREE MONTHS OF FISCAL YEAR, 1912.															
Ann Arbor	291	$343,341	$180,568	$560,383	$72,958	$53,558	$13,582	$181,619	$22,148	$343,865	$216,518	$5,170	$41,956	$179,732	$57,585
Atlanta & West Point	90	166,552	138,482	315,577	37,749	57,595	14,808	89,358	15,308	215,018	100,559	435	15,567	85,427	17,146
Atlanta, Birmingham & Atlantic	331	581,357	192,374	782,606	82,235	122,715	48,075	279,924	27,300	560,249	222,357	.....	31,500	190,857	65,422
Atlantic City	106	253,191	633,985	885,638	59,758	32,147	10,645	349,370	4,616	456,536	429,102	11,903	21,000	396,199	35,196
Atlantic & St. Lawrence	136	193,224	104,488	332,497	127,631	62,913	12,599	138,286	8,692	350,121	—17,624	.....	19,976	—37,600	—11,616
Canadian Pacific Lines in Maine	233	124,529	60,232	202,651	75,950	38,028	15,094	88,665	9,795	227,532	—24,881	.....	21,000	—45,881	42,452
Central of Georgia	1,215	2,035,547	1,039,208	3,310,269	419,590	662,295	104,956	1,064,785	107,711	2,359,337	950,932	20,888	142,200	829,620	61,461
Central of New Jersey	671[2]	4,445,980	1,721,022	6,497,137	661,441	913,492	96,175	1,841,475	114,125	3,626,708	2,870,429	198,249	282,120	2,786,558	555,426
Chicago, Rock Island & Gulf	476	457,125	167,238	674,383	101,321	47,079	29,536	219,037	23,517	420,590	253,793	—778	25,515	227,500	51,230
Detroit, Toledo & Milwaukee	196	331,665	219,160	625,512	72,588	76,492	21,390	254,901	12,834	438,205	187,307	—172	8,639	178,496	101,167
Fort Worth & Denver City	454	721,350	460,066	1,242,824	91,072	177,805	23,435	359,593	37,476	689,380	553,444	1,856	36,500	515,088	24,516
Georgia, Southern & Florida	345	294,180	215,490	587,420	62,861	115,430	19,663	229,918	26,891	454,763	132,657	.....	28,221	104,436	—5,248
Grand Trunk Western	847	984,959	666,923	1,765,274	239,409	257,966	59,030	642,609	39,992	1,239,006	526,268	—427	94,905	430,936	171,851
Illinois Central	351	1,617,668	269,808	2,016,951	288,545	293,736	24,498	549,905	44,285	1,200,969	815,982	.....	126,015	689,967	—167,195
International & Great Northern R. R.[1]	1,159	1,184,447	518,997	1,819,898	253,595	258,308	51,052	752,751	79,061	1,394,768	425,130	—701	56,500	367,929	22,295
Kansas & Michigan	175	781,632	98,635	895,964	106,364	133,954	6,973	250,415	19,574	517,280	378,684	—2	27,547	351,135	—19,137
Kansas City, Mexico & Orient	756[4]	362,493	99,743	486,733	116,272	101,143	25,967	199,892	22,781	466,055	—39,322	.....	20,250	59,572	—41,549
Louisiana & Arkansas	550	351,955	74,135	459,110	63,567	45,964	17,748	162,986	19,220	309,485	149,625	.....	13,800	135,825	72,936
Missouri, Kansas & Texas	1,743	2,821,524	1,187,493	4,274,371	807,326	657,042	101,653	1,286,035	123,728	2,975,784	1,298,587	—2,406	175,636	1,120,556	140,785
Missouri Pacific	3,916	4,706,985	1,343,338	6,664,739	1,323,638	1,479,803	194,115	2,792,024	218,343	6,007,923	656,816	—5,490	247,800	403,526	—826,707
New Orleans, Texas & Mexico	268	213,011	59,072	292,179	65,109	38,885	13,337	132,990	20,208	270,529	21,650	.....	3,104	18,546	4,777
Northwestern Pacific	416[5]	428,112	634,814	1,130,594	152,141	121,733	11,286	341,625	27,485	654,270	476,324	.....	38,424	437,900	23,093
Philadelphia & Reading	1,014	8,320,908	1,935,714	10,759,257	1,190,782	2,118,498	126,816	3,410,528	200,489	7,047,113	3,712,144	67,264	271,524	3,507,884	—197,866
Pittsburg, Shawmut & Northern	240	295,462	31,144	332,115	46,907	70,006	3,305	94,976	11,381	226,575	105,540	.....	4,777	100,763	49,059
Port Reading	21	245,754	—	252,160	27,557	884	93	84,792	437	113,763	138,397	—2,975	11,400	124,022	—34,068
St. Louis, Iron Mountain & Southern	3,314	5,173,251	1,612,774	7,285,163	1,375,102	1,294,793	163,744	2,321,989	208,370	5,363,998	1,921,165	—9,257	245,295	1,666,613	191,156
San Pedro, Los Angeles & Salt Lake	1,113	1,260,487	835,179	2,227,913	444,916	423,766	92,660	822,761	51,047	1,835,151	392,762	—9,804	74,375	308,583	24,920
Southern Air Line	3,046[6]	3,367,887	1,244,024	5,151,310	777,740	801,845	160,082	1,788,795	157,169	3,685,631	1,465,679	683	222,000	1,242,996	101,561
Spokane, Portland & Seattle	550[7]	688,175	540,850	1,302,887	136,035	116,091	23,748	326,519	31,593	633,986	668,901	8,880	126,600	551,181	—137,809
Sunset	58	219,977	52,264	282,610	30,472	4,027	64	66,866	897	102,326	180,284	.....	10,169	170,115	1,924
Trinity & Brazos Valley	462	341,999	117,320	478,209	81,447	76,725	30,551	214,820	30,530	434,073	44,136	.....	12,835	31,301	109,829
Ulster & Delaware	128	179,572	193,653	389,984	48,461	32,890	6,050	133,794	7,393	228,588	161,396	23	9,900	151,519	—3,510
Western Maryland	543	1,489,231	322,909	1,893,603	271,662	212,037	36,830	610,359	36,348	1,167,236	726,367	865	63,000	664,232	—111,307
Western Pacific	934	1,092,803	329,420	1,459,855	241,422	119,229	84,467	528,543	62,843	1,036,504	423,351	—9,431	43,050	370,870	—
Western Ry. of Alabama	133	182,889	122,123	329,458	57,658	64,017	15,197	89,718	19,002	245,592	83,866	—651	13,837	69,378	10,245

[1]Report of I. & G. N. *R. R.*, I. J. Freeman, Receiver, to September 15; I. & G. N. *Ry.* September 16 to 30, 1911; [2]Totals to September 15, inclusive, only; increase or decrease for combined operations. Mileage operated on September 30, 1910—[3] 631 miles; [4] 740 miles; [5] 376 miles; [6] 3,027 miles; [7] 429 miles. — Indicates Deficits, Losses and Decreases.

Class Rates from Seattle to Points in Washington and Montana Ordered Finally Reduced.

Portland Chamber of Commerce v. Oregon Railroad & Navigation et al. Transportation Bureau of Seattle et al. v. Northern Pacific et al. Opinion by Commissioner McChord:

The original order of the commission, 19 I. C. C., 265, reduced class rates by 20 per cent. from Tacoma, Wash., Seattle, and Portland, Ore., to points in Washington, Oregon, Idaho and Montana. Carriers were ordered to keep account of their losses through these reductions, and the total losses on the O. R. & N., O. S. L., G. N. and N. P. are estimated at $489,070. This includes a large sum for indirect loss, the direct loss for a year being only $126,921. Even including the large estimated indirect loss, the total loss amounts to less than 1 per cent. of the roads' net operating revenue, and the financial condition of the defendants appears to be such that the commission need not hesitate to establish the rates which it has found to be reasonable. In the present instances there seems to be no reason why the eastbound distributing rates from Portland, Seattle and Tacoma should not be constructed on a mileage basis, and an order of this nature will, the commission thinks, result in a more satisfactory adjustment than the establishment of particular rates to representative destinations. Such an order is therefore made. (21 I. C. C., 640.)

STATE COMMISSIONS.

The California State Railway Commission has ordered the reduction of the rates for berths in sleeping cars between San Francisco and Los Angeles to a uniform price, $1.25. The order is to take effect December 15. Under the existing tariff the rate for one passenger is $1.50; for two passengers $2.50; for three passengers $4, and for four passengers $4.50.

COURT NEWS.

In the United States Court at New Orleans, November 18, the American Chicle Company was indicted, by the Grand Jury, on ten counts, for violating the interstate commerce law in giving false valuations on shipments of chewing gum.

In the Federal court at Buffalo, N. Y., November 27, the Grand Jury returned indictments against the Delaware, Lackawanna & Western for violation of the law in carrying hay free of charge. It appears that the hay was the property of the railway company, or of its coal mining interests, and was intended for use in the mines.

The Supreme court of New Jersey has sustained the Public Utilities Commission of that state in requiring the railways to sell season tickets to Jersey City, Hoboken and Camden. The long standing practice of all the roads has been to sell no season tickets to these towns, thus compelling persons requiring such tickets to buy to New York or Philadelphia. In doing this they pay, nominally for ferry service, not used.

The United States Circuit Court of Appeals at New Orleans, November 23, confirmed the judgment of the lower court sustaining the railroad commission of Louisiana in its order reducing rates for the transportation of cotton seed and cotton products on the Texas & Pacific, the decision being written by Judge Newman. The commission ordered the reduction on the ground that the rates prescribed by the railway were excessive as compared with those on other railways in that state and in some instances unjust to certain localities. A master, reporting to the lower court, had decided in favor of the railway, basing his opinion partly on a valuation of the road, in which he estimated the value as equal to that of the outstanding stock and bonds. The court rejected this valuation as omitting consideration of important elements as laid down by a decision of the Supreme court of the United States. The master was also criticized for failing to allow a presumption in favor of the correctness of the commission's action. The court finds the evidence wholly insufficient to overcome this presumption.

Dining cars have recently been put in service on some of the Indian railways and are said to be rapidly becoming popular.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

R. A. Brand, freight traffic manager of the Atlantic Coast Line, at Wilmington, N. C., has been elected fourth vice-president, with office at Wilmington.

A. B. Eldredge, first vice-president and general attorney of the Duluth, South Shore & Atlantic at Marquette, Mich., has been elected president, with office at Marquette, succeeding W. F. Fitch, resigned effective November 30.

H. J. Horn, assistant to president of the New York, New Haven & Hartford, will on January 1, become vice-president in charge of the operating department, Samuel Higgins, general manager, who has been on leave of absence for several months, having resigned, effective December 31.

W. G. Van Vleck, second vice-president and manager of the Galveston, Harrisburg & San Antonio and the Texas & New Orleans, has been appointed vice-president and general manager of those lines and Morgan's Louisiana & Texas Railroad & Steamship Company, the Louisiana Western, the Houston & Texas Central, the Houston East and West Texas and the Houston & Shreveport, with office at Houston, Tex. H. M. Mayo has been appointed assistant to the president of all those lines.

Operating Officers.

See an item regarding the New York, New Haven & Hartford, under Executive, Financial & Legal Officers.

L. M. Betts has been appointed car accountant of the Belt Railway Company of Chicago, with office at Auburn Park, Chicago.

W. W. Walker, general freight agent of the Duluth South Shore & Atlantic, at Duluth, Minn., has been appointed general manager.

Y. M. Martin has been appointed assistant superintendent of the Houston & Texas Central, with office at Houston, Tex., succeeding W. T. Hall, promoted.

C. H. Hubbell, general inspector of transportation of the Chicago, Rock Island & Pacific at Chicago, has been appointed superintendent of telegraph of the Rock Island Lines, with office at Chicago, succeeding J. G. Jennings, deceased.

F. B. Irvine, assistant superintendent of the Texas & New Orleans and the Galveston Harrisburg & San Antonio, at Houston, Tex., has been appointed superintendent, with office at Houston, succeeding A. S. Johnson, resigned.

C. D. Peckenbaugh, superintendent of the Sterling division of the Chicago, Burlington & Quincy at Sterling, Colo., has been appointed superintendent of the Sheridan division, with office at Sheridan, Wyo., in place of F. G. Robbins, absent on account of illness. F. R. Mullen, trainmaster at McCook, Neb., succeeds Mr. Peckenbaugh.

F. E. T. Pearne, freight claim adjuster of the Chicago & Alton and the Toledo, St. Louis & Western, has been appointed supervisor of stations, with office at Chicago, the duties of his position being to see that stations are properly operated in respect to organization, and particularly as to the proper handling of freight. See item in General News Section.

E. R. Bissell, superintendent of the Lake Erie & Western at Lafayette, Ind., has been appointed assistant superintendent of the Lake Shore & Michigan Southern, with office at Chicago, succeeding F. M. Smith, promoted. E. V. Brogan, trainmaster of the Eastern division of the Lake Shore at Erie, Pa., has been appointed assistant superintendent of that division, with office at Buffalo, N. Y., succeeding W. F. Schaff, promoted. A. E. Lloyd, assistant trainmaster of the Eastern division at Collinwood, Ohio, succeeds Mr. Brogan, and J. P. Freeman succeeds Mr. Lloyd.

The Western division of the Canadian Northern has been divided into the Central and Western divisions, and J. R. Cameron, general superintendent at Winnipeg, Man., has been appointed assistant general manager, with jurisdiction over all lines, and

office at Winnipeg. A. Wilcox, superintendent at Port Arthur, Ont., has been appointed general superintendent of the new Western division, with office at Edmonton, Alb., and A. E. Warren, superintendent at Winnipeg, has been appointed general superintendent of the Central division, with office at Winnipeg. M. B. Murphy succeeds Mr. Warren.

L. H. Phetteplace, whose appointment as general superintendent of the Carolina, Clinchfield & Ohio, in charge of operation and maintenance, with office at Erwin, Tenn., has been announced in these columns, was born on April 30, 1871, at Smithsburg, Md., and was educated in the high schools of Washington county. He began railway work on June 30, 1888, as a messenger boy on the Western Maryland Railroad, now part of the Western Maryland Railway, and learned telegraphy while in that position. Two years later he became operator on the Pocohontas division of the Norfolk & Western, and was made despatcher in November, 1892. He was promoted to chief despatcher in March, 1900, and became assistant trainmaster in June, 1904. In September of the following year he was made trainmaster of the same road, and in October, 1908, he was appointed superintendent of the Carolina, Clinchfield & Ohio, which position he held at the time of his recent appointment as general superintendent of that road.

Wilbur T. Hall, whose appointment as superintendent of the Houston & Texas Central, with office at Ennis, Tex., has been announced in these columns, was born June 30, 1865, at Lewis Center, Ohio. He was educated in the county graded schools, and began railway work in 1885 with the Cleveland, Cincinnati, Chicago & St. Louis as a brakeman. He was later telegraph operator and switchman on that road, and in 1891 went with the Cleveland, Lorain & Wheeling, where he was consecutively, telegraph operator, train despatcher, yardmaster and conductor. In 1904 he left the Cleveland, Lorain & Wheeling, which had been absorbed by the Baltimore & Ohio in 1900, and from November, 1904, to August, 1905, was engine foreman on the Houston & Texas Central. He was then made chief clerk to the superintendent of terminals at Houston, and from February of the following year until November, 1908, was yardmaster at Houston. He was promoted to trainmaster on November 18, 1908, and to assistant superintendent on August 1, 1909, from which office he has just been promoted.

A change has been made in the operating organization of the Pere Marquette by which three new divisions have been created. F. Hartenstein, superintendent at Grand Rapids, continues in charge of the Grand Rapids division, with jurisdiction over the line from Detroit to Chicago and several branches therefrom; A. R. Merrick, superintendent at Saginaw, Mich., continues in charge of the Saginaw division, which comprises the line from Toledo, Ohio, to Ludington, Mich., three branches from Saginaw, Mich., several other branches, Plymouth station and yards and Baldwin station and yards; W. K. Tasker, superintendent at Detroit, Mich., has been appointed superintendent of the Buffalo division, with office at Port Huron, Mich., this division comprising the line from Port Huron to Grindstone City, several branches from Port Huron, the lines from Walkerville to St. Thomas, from London to Port Stanley, from Sarnia to Rondeau, from Windsor to Walkerville Junction, and the ferry service at Port Huron; J. E. Church, trainmaster at Detroit, Mich., has been appointed superintendent of the Ionia division, with office at Ionia, Mich., his jurisdiction extending over the lines from Grand Ledge to Big Rapids, including the station and yards at the latter place and several other branches; W. H. Romoser, trainmaster at Grand Rapids, Mich., has been appointed superintendent of the Petoskey division, with office at Traverse City, Mich., his jurisdiction [illegible] from Clary to Honor, and from Big Rapids to Berry.

Traffic Officers.

J. H. Ketner has been appointed assistant to the general freight [illegible] with office at Norfolk, Va.

[illegible] has been appointed assistant general freight agent of the San Pedro, Los Angeles & Salt Lake, with office at Los Angeles, Cal.

James Mercer, general freight agent of the Atlantic Coast Line for the lines south of Charleston, S. C., at Savannah, Ga., has been appointed freight traffic manager, with office at Savannah, succeeding, R. A. Brand, promoted. C. McD. Davis, assistant general freight agent at Wilmington, N. C., succeeds Mr. Menzies, with office at Savannah, Ga., and Robert N. Nash, chief clerk, in the freight traffic department, succeeds Mr. Davis, with office at Wilmington. See Executive, Financial and Legal.

E. S. Morgan, commercial agent of the New Orleans & Northeastern, the Alabama & Vicksburg and the Vicksburg, Shreveport & Pacific at Dallas, Tex., has been appointed general western agent of the Queen & Crescent Route, with office at Dallas, his jurisdiction to extend over the above lines and the Cincinnati, New Orleans & Texas Pacific and the Alabama Great Southern. W. H. Timberlake, who has been commercial agent of the two latter roads at Dallas, has been appointed commercial agent of all the lines, with office at Houston, Tex. L. R. Gardner, traveling freight agent of the three roads first mentioned at Dallas, has been appointed traveling freight agent of the system, with office at San Antonio, Tex., where a new office has been opened. G. C. Whitney has been appointed traveling freight agent, with office at Dallas. G. F. Kay has been appointed soliciting freight agent, with office at Houston.

Engineering and Rolling Stock Officers.

G. C. Millett has been appointed engineer of the Atchison Topeka & Santa Fe Coast Lines, with office at Los Angeles, Cal., succeeding R. J. Arey, resigned.

H. S. Elliott, assistant engineer of the Erie Railroad at Jersey City, N. J., has been appointed division engineer, with office at Hornell, N. Y., succeeding H. C. Landon, resigned to go to another company.

E. H. Harlow, master mechanic of the Atchison, Topeka & Santa Fe Coast Lines, at Richmond, Cal., has been appointed terminal master mechanic, with office at Richmond, and John Pullar, division foreman at Los Angeles has been appointed master mechanic of the Valley division, with office at Fresno, Cal.

Frank L. Burckhalter, whose appointment as district engineer of the Southern Pacific Company, with office at Portland, Ore., has been announced in these columns, was born in California in 1879. He graduated from the University of California in 1900, and in August of that year became a rodman on the Southern Pacific. He was afterward an instrument man, and from February, 1902, to March 1, 1906, was in the maintenance of way department, where he was consecutively assistant engineer, section foreman and roadmaster. On the latter date he became division engineer at Bakersfield, Cal., and in December, 1908, was transferred to Los Angeles, Cal., as division engineer, from which office he was promoted as above on November 1, 1911.

OBITUARY.

M. H. Elkin, division engineer of the Lehigh Valley, died on November 26, at Delano, Pa.

Andrew A. Gallagher, until about four years ago district passenger agent of the Missouri Pacific, with office at Cincinnati, Ohio, died at the residence of his mother in Houston, Tex., on November 23.

L. P. Cunningham, one of the promoters of the Memphis, Carthage & Northwestern, now a part of the 'Frisco System, and for four years president of the M. C. & N. W., died at Joplin, Mo., on November 20.

C. W. Spencer, for three years, 1905-1908, general manager of the eastern lines of the Mackenzie-Mann railways, and formerly for 18 years an officer of the Canadian Pacific, died at Montreal, November 23. Mr. Spencer was born October 31, 1857, at Kempville, Ont., and began railway work in May, 1871, with the Canadian Pacific. Until 1874 he was operator and clerk at Ottawa Station, and was later assistant agent. He then held various positions in the operating department of the Canadian Pacific, until May, 1881, when he became traffic superintendent. The following June he was appointed assistant superintendent, and in August, 1884, he became assistant general superintendent. From October, 1887, to May, 1903, he was general superintendent of the Eastern division, and from May, 1903, to September, 1905, was general superintendent of transportation of the Eastern lines on the same road. Mr. Spencer went to the Mackenzie-Mann System (Canadian Northern) in September, 1905, as general manager, since January, 1908, he had [illegible]

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Virginian Railway is in the market for 12 mikado locomotives and 4 Mallet (2-8-8-2) locomotives.

The New York Central Lines have ordered 30 locomotives from the Baldwin Locomotive Works, in addition to the 50 locomotives recently mentioned.

The Illinois Central, as mentioned in the *Railway Age Gazette* of November 10, has ordered 40 mikado locomotives from the Baldwin Locomotive Works and 10 Pacific type locomotives from the American Locomotive Company. These locomotives will have the following dimensions:

	Mikado	Pacific
Type	Mikado	Pacific
Simple or compound	Simple	Simple
Weight on drivers	218,300 lbs.	150,500 lbs.
Total weight	283,850 lbs.	245,000 lbs.
Diameter of cylinders	27 in.	25 in.
Stroke of pistons	30 in.	26 in.
Diameter of drivers	63 in.	75 in.
Type of boiler	Radial stay	Radial stay
Working steam pressure	175 lbs.	180 lbs.
Heating surface, tubes	3,835 sq. ft.	2,689 sq. ft.
Heating surface, firebox	235 sq. ft.	1,865 sq. ft.
Heating surface, total	4,070 sq. ft.	2,875.5 sq. ft.
Tubes, number	262 and 36	189 and 26
Tubes, outside diameter	2 in. and 5⅜ in.	2 in. and 5⅜ in.
Tubes, length	20 ft. 6 in.	20 ft.
Firebox, type	Wide	Wide
Firebox, length	120⅝ in.	102 in.
Firebox, width	84 in.	71⅞ in.
Firebox, material	Steel	Steel
Grate area	70 sq. ft.	51 sq. ft.
Tank capacity	9,000 gals.	9,000 gals.
Coal capacity	15 tons	15 tons
Superheater	Schmidt	Schmidt

CAR BUILDING.

The Norfolk Southern has ordered 500 box cars from the American Car & Foundry Company.

The Chicago, Rock Island & Pacific has ordered 400 automobile cars, 250 flat cars and 25 caboose cars from the Western Steel Car & Foundry Company.

The Grand Trunk has ordered 1,000 box cars from the Pressed Steel Car Company in addition to the 2,000 cars mentioned in the *Railway Age Gazette* of November 17.

The Northern Pacific is said to be in the market for from 1,000 to 2,000 box cars, 1,000 to 2,000 refrigerator cars, and from 500 to 1,000 gondola cars. This item has not been confirmed.

IRON AND STEEL.

The Baltimore & Ohio has ordered 425 tons of structural steel from the Ft. Pitt Bridge Works.

The Illinois Central has ordered 500 tons of bridge steel from the American Bridge Company.

The Chicago & Alton has ordered 150 tons of bridge steel from the American Bridge Company.

The Spokane, Portland & Seattle has ordered 100 tons of bridge steel from the American Bridge Company.

The New York Central has ordered 800 tons of structural steel from the McClintic-Marshall Construction Company.

The Chicago, Indianapolis & Louisville has ordered 400 tons of structural steel from the Lackawanna Bridge Company.

General Conditions in Steel.—The Steel Corporation is receiving new business at the rate of between 35,000 and 40,000 tons a day and is expected to show a substantial increase in orders this month over last. If new business continues to be received at the present high rate until the end of the year, it is believed that the production for 1911 will establish a new high record. Manufacturers are satisfied with the outlook, for they feel that since they managed to make ends meet while the railways were not buying, conditions will show a great improvement now that the railways have entered the market.

Supply Trade News.

The Safety Car Heating & Lighting Company, New York, has declared an extra dividend of 1 per cent. in addition to the regular quarterly dividend of 2 per cent.

At the annual meeting of the stockholders of the Sherwin-Williams Company, Cleveland, Ohio, Thomas Madill, manager of the Chicago office of the company, was presented with a handsome gold watch on which was engraved "Presented to Thomas Madill by the Sherwin-Williams Company, in commemoration of 25 years of faithful service, September, 1886-1911."

L. R. Pomeroy has opened an office as consulting engineer at 50 Church street, New York. He is prepared to design railway and industrial plants, to advise as to the rehabilitation of shops, to analyze machine tool operation with reference to electric and effective operation, and to make reports and appraisals of railway and manufacturing properties. Mr. Pomeroy has been chief engineer of the railway and industrial division of J. G. White & Company, New York, assistant to the president of the Safety Car Heating & Lighting Company, New York, special representative in the railway field for the General Electric Company, Schenectady, N. Y., and assistant general manager of the Schenectady Locomotive Works. Prior to that he was engaged as a special railway representative for the Cambria Steel Company, Philadelphia, Pa., Latrobe Steel Company and Carnegie Steel Company, Pittsburgh, Pa., and was secretary and treasurer of the Suburban Rapid Transit Company of New York. His earlier experience was in commercial pursuits, bookkeeping, special auditing, drafting and designing cars.

TRADE PUBLICATIONS.

The Louisville & Nashville.—The passenger department of this company has published an attractive folder on Cuba and how to get there. The different portions of the island are described in an interesting manner and the points of interest in Havana are given with brief descriptions of each. A list of the best hotels throughout Cuba, with their prices, is also included.

Railway Electric Equipment.—The General Electric Company, Schenectady, N. Y., has issued bulletin No. 4891, composed principally of illustrations of the electrical equipment of various railways throughout the country. These illustrations comprise interiors of the power stations, both main and sub-stations, and the rolling stock of various railways. Included among these illustrations are two portable sub-stations.

Rail Braces.—The Beaver Dam Malleable Iron Company, Beaver Dam, Wis., has published an illustrated leaflet on its improved rail brace. The feature of this brace is that it has rises at the spike holes to prevent the spike from being driven so far that a claw bar cannot be driven under it to draw out the spike. The brace is made of malleable iron and is claimed to withstand the deteriorating effects of the atmosphere and drippings of brine from refrigerator cars better than steel.

Tools.—The McCrosky Reamer Company, Meadville, Pa., has published catalog No. 3 of its "Time and Money-Saving Tools," in which descriptions are given of McCrosky adjustable reamers, Ideal adjustable high-speed machine reamers, Wizard quick-change, chucks and collets, Wizard variable speed and reversing attachment, Wizard friction drive and Noneeda-Tang collets, Wizard turret tap holders, McCrosky expanding mandrels and Searchlight universal lamp brackets. Prices are included.

Asphalt Floors.—The Standard Asphalt & Rubber Company, Chicago, has published an illustrated booklet in which it describes the advantages and wearing qualities of Sarco asphalt mastic floors. It is claimed that heavy trucking, instead of injuring these floors, is good for them. The strength to resist traffic is given by a graded mineral aggregate which reduces the percentage of voids. The elastic and waterproof qualities are attained by filling the voids with Sarco matrix and flux. Specifications for these floors are given and a number of illustrations of installations are included, together with a few examples of results with brief summaries of the adaptability of these floors to the several classes of construction.

Railway Construction.

New Incorporations, Surveys, Etc.

Algoma Central & Hudson Bay.—An officer of the Algoma Eastern, which operates a line from Sudbury, Ont., to Crean Hill, 23 miles, writes that grading work is now under way on an extension from Crean Hill to Little Current. The section from Crean Hill to Whitefish, 43.5 miles is under contract to the Superior Construction Company, Sudbury, and from Whitefish to Little Current, 18 miles, to the O'Boyle Construction Company, Ltd., Sault Ste. Marie, Ont. Track laying is under way on the Crean Hill end. Track has already been laid on some sidings. R. S. McCormick, chief engineer, Sault Ste. Marie, Ont. (August 25, p. 390.)

Algoma Eastern.—See Algoma Central & Hudson Bay.

Angelina & Neches River.—An officer of this company, which operates a line from Keltys, Tex., east to Naclina, 19.9 miles, writes that work is about finished on the extension from Naclina northeast to Chireno, 10.7 miles. J. S. Moore was the contractor. S. W. Henderson, vice-president and general manager, Keltys. (June 19, p. 1332.)

Ashland & Western.—An officer writes that this company, which operates a line from Ashland, Ohio, southeast to Custalaga, 25 miles, has projected an extension from Ashland, north to Wellington, 20 miles. N. P. Ramsey, vice-president and general manager, Ashland.

Atlantic & Western.—An officer of this company, which operates a line from Sanford, N. C., southeast to Jonesboro, thence east to Broadway, 12 miles, writes that surveys are being made for an extension from Broadway, south to Lillington. F. G. Hatton, vice-president, Roanoke, Va.

Bayfield Transfer Railway.—An officer of this company, which operates a line from Bayfield, Wis., via West End and Bayfield, to Red Cliff, about 18 miles, writes that an extension has been projected from Russells west to Superior, 50 miles. J. M. Smith, vice-president, Duluth, Minn.

Beaumont, Waco & Northern.—According to press reports this company, which was recently incorporated in Texas, is planning to take over the Keith Company's logging line (the Beaumont & Saratoga Transportation Company) which extends from Voth, Tex., northwest, 12 miles, also the Miller-Vider Company's line (the Riverside & Gulf) from Milvid, southwesterly, 10 miles. The plans call for building a connecting line, 22 miles long, between these roads. J. F. Keith, president; J. G. Reaves, vice-president and general manager, Beaumont. (November 17, p. 1036.)

Boston & Maine.—This company has bought land, it is said, at Lynn, Mass., to be used for four-tracking work, in connection with the abolition of grade crossings. A. B. Corthell, chief engineer, Boston.

Bowling Green Northern.—An officer writes that the company is planning to begin construction work in the near future. About 90 per cent. of the right-of-way has been secured. The route is from Bowling Green, Ky., northeast to Mammoth Cave, thence northwest to Grayson Springs, 50 miles. Malcolm H. Crump, chief engineer, Bowling Green.

Canadian Pacific.—An officer writes that work is now under way on the Esquimault & Nanaimo, from Duncan's B. C., to Cowichan lake, 19 miles; also from McBride Junction to Courtenay, 40 miles. Hayes & Peppin and the Westholme Lumber Company, both of Victoria, are the contractors. A further extension is projected from Courtenay to Campbell river, 35 miles. J. G. Sullivan, chief engineer, Winnipeg, Man.

[illegible] Company.—An officer writes that it is expected to have all of the work finished to complete a 40-mile line from Willits, Cal., which is on the Northwestern Pacific, to Fort Bragg, by January next. L. J. [illegible] John G. French, superintendent, Fort Bragg.

Carlton & Coast.—This road, which is operated by the Carlton Consolidated Lumber Company, from Carlton, Ore., to Tillamook Gate, about 12 miles, will extend its line to Tillamook, 23 miles. Surveys are now being made. M. L. Johnson, chief engineer, Carlton.

Central Idaho.—See Union Pacific.

Chattanooga, Rome & Atlanta.—Organized in Georgia with $2,000,000 capital, to build an interurban line to connect Chattanooga, Tenn., with Atlanta, Ga., about 85 miles. S. W. Divine, associated with capitalists of Chattanooga are back of the project.

Chicago, Anamosa & Northern.—An officer writes that a contract has been given to the L. E. Myers Construction Company to build an extension from Coggon, Iowa, northwest to Quasqueton, about 15 miles. Track has already been laid on nine miles. The work is fairly heavy. There will be a 300-ft. steel bridge. H. Kiene, president, Dubuque.

Denver & Intermountain.—An officer of this company, which operates a line from Denver, Colo., via Lakewood to Golden, 13 miles, writes that plans are being made to build an extension of 10 miles. William G. Smith, president and general manager, Denver.

Des Chutes Railroad.—See Union Pacific.

Dodge City & Cimarron Valley.—Incorporated in Kansas with $3,600,000 capital, to build a line from Dodge City, Kan., to Kolman, N. M. The incorporators are said to be officers of the Santa Fe.

Durham & South Carolina.—An officer of this company, which operates a line from Durham, N. C., south to Bonsal, 31 miles, writes that work is now under way by the J. T. McKenney Construction Company, Lynchburg, Va., on an extension from Bonsal, southeast to Rawls, 12½ miles. R. A. Honeycutt, chief engineer, Durham, N. C. (October 20, p. 815.)

Eureka & Palisade.—A contract has been given to Chadwick & Sykes, it is said, for re-building the line from Eureka, Nev., north to Palisade, 84 miles. G. D. Abbott, superintendent, Palisade. (November 17, p. 1036.)

Esquimault & Nanaimo.—See Canadian Pacific.

Fairchild & North Eastern.—An officer of this company, which operates a line from Owen, Wis., southwest to Fairchild, 38 miles, writes that an extension has been projected from Fairchild west to Cleghorn, 30 miles. W. Foster, vice-president and general manager, Fairchild, Wis. (September 22, p. 575.)

Fernwood & Gulf.—An officer of this company writes that an extension has been projected from Kokomo, Miss., northeast to Columbia, 12 miles. The road is now in operation from Fernwood east to Kokomo, 32 miles. W. D. Hurt, chief engineer, Fernwood, Miss.

Fresno & Eastern (Electric).—Incorporated in California with $1,500,000 capital to build from Fresno, to Shaver in the Sierra forest reserve, 78 miles. The incorporators include F. M. Meigs, Oakland, Cal., A. B. Dodd, San Francisco, and George A. Aldrich, Audubon, N. J.

Grand Junction & Grand River Valley (Electric).—An officer of this company, which operates a line from Grand Junction, Colo., to Fruita, 16 miles, writes that an extension has been projected from Grand Junction northeast to Clifton, 6 miles. F. E. Phillips, chief engineer, Grand Junction.

Gulf, Florida & Alabama.—An officer writes that this company has bought 63 miles of road from Cantonment, Fla., to Local, Ala., and has given contracts to Charles Merrit, Pensacola, Fla., and the Eastern Construction Company, to build 18 miles between Pensacola and Cantonment, on which work is now under way. Surveys are being made from Local, Ala., to Jasper, 210 miles. G. A. Berry, chief engineer, Pensacola. (November 17, p. 1036.)

Gulf Line.—An officer writes that preliminary surveys are now being made for an extension from Camilla, Ga., to the gulf of Mexico. R. W. Watson, president, 37 Wall street, New York City. (September 8, p. 493.)

Houston, Texas & Central.—An officer writes that contracts have been let to Owen, Levy & Owen, Moore Burnet building, Houston, Tex., for grading work on 13 miles in Lee county, Tex.

This work is on a section of the branch line under construction between Stone City on the Brazos river, and a point at or near Giddings. E. B. Cushing, chief engineer, Houston, Tex. (November 10, p. 975-C.)

Hudson & Manhattan.—An officer writes that this company has completed work, during the past year, on an extension of 1.25 miles from Barrow street, Jersey City, N. J., to Portal, near Prior street. J. V. Davies, chief engineer, New York City.

Indian Creek Valley.—An officer writes that this company has projected an extension from Jones Mills, Pa., to Rockwood, 50 miles. S. M. Faust, chief engineer, Connellsville.

Kentucky & Tennessee Railway.—An officer writes that work is now under way from Hopple, Ky., to Rockcreek, 5 miles. A. M. Cook, Oz, is the contractor. The company now operates a line from Stearns, east to Oz, 10.5 miles. W. T. Culver, vice-president and general manager, Ludington, Mich.

Liberty-White.—An officer writes that work is now under way on an extension from Kaigler, Miss., to Tylertown, 15 miles. W. M. White, president and general manager, McComb, Miss. (September 29, p. 616.)

Maston, Alma & Southbound.—An officer writes that work is now under way by the Alma Lumber Company, building a four-mile extension to Rowland, N. C. A. J. McKinnon, president, Maxton. (June 23, p. 1674.)

Minneapolis, St. Paul & Sault Ste. Marie.—An officer writes that work is now under way by Foley Bros., Welch & Stewart, St. Paul, Minn., building from Frederic, Wis., north via Webster, Danbury, Markville, Minn., Cloverton, Kingsdale, Belden and Harlis to Boylston, Wis., 73 miles, which is nine miles south of Superior. Track laying has been finished to Kingsdale, 43 miles. There will be a steel bridge 300 ft. long over the St. Croix river with a 1,430-ft. trestle; a 1,600-ft. bridge over the Black river; 1,440-ft. steel bridge over the Nemadji river, and a 75-ft. steel bridge, with a 1,590-ft. trestle over the Clam river. Thos. Greene, chief engineer, Minneapolis, Minn. (June 2, p. 1296.)

Oregon Short Line.—See Union Pacific.

Oregon Washington Railroad & Navigation Co.—See Union Pacific.

Pennsylvania Railroad.—This company has let contracts for new construction work, including six miles of track elevation for six tracks, in place of the present four surface tracks, through Rahway, N. J., and Linden, and the elimination of fourteen grade crossings. The elevation in the immediate vicinity of Rahway will be three miles long, and grade crossings will be eliminated at St. George's avenue, Inman avenue, Hazlewood avenue, Commerce street, Milton street, Cherry street, Irving street, Poplar street, Main street, Grand street and Scott avenue. A new station will be built in Rahway; it will be of the most modern type with island platform similar to those at Greenburg, Pa., and West Philadelphia, Pa. In Linden the crossings at Wood avenue, Stiles street and Linden road will be eliminated. New stations will be built at Linden and Scott avenues. The work at Rahway and Linden will necessitate constructing an embankment of nearly 2,000,000 cu. yds. of earth, and will require approximately 150,000 cu. yds. of masonry. The bridges over the streets will consist of steel girders with solid reinforced concrete floors similar to those recently constructed on the elevation at Bristol, Pa. The contractors are the Keystone State Construction Company and James McGraw, both of Philadelphia, Pa. With the completion of this work the company will have eliminated every grade crossing in the thickly populated sections on the New York division. At Bristol, work has just been completed on an entirely new line which eliminates every grade crossing.

Quebec Central.—Application will be made to the Quebec legislature for permission to build a branch through Megantic, Lothbiniere and Levis counties. The projected route is from a point on the main line between Thetford Mines and Broughton, to a connection with the proposed branch from Scotts to Quebec. J. H. Walsh, general manager, Sherbrooke, Que.

Salt Lake & Idaho.—See Union Pacific.

San Diego & Arizona.—An officer writes that work is now under way from Valle Redondo, Lower Cal., Mex., to La Puerta, 11.9 miles, and in the United States from Coyote Wells, Cal., to Dixie, 12.4 miles. Robert Sherer & Co., Los Angeles, Cal., and Edgar Bros., El Centro, are the contractors. Surveys are being made between La Puerta, Lower Cal., Mex., and Coyote Wells, Cal., 73.9 miles. E. J. Kallright, chief engineer, San Diego, Cal. (September 15, p. 545.)

San Francisco, Napa & Calistoga.—This company, which was recently incorporated in California with $2,000,000 capital and headquarters at San Francisco, announces that it will build from Vallejo to Napa and Calistoga via St. Helena, with branches into Lake, Solana and Sonoma counties. The main line is to be 72 miles long. The incorporators include T. V. Maxwell, G. C. Earl, N. H. Spaulding and C. C. Sullivan. (November 24, p. 1081.)

San Pedro, Los Angeles & Salt Lake.—An officer writes that work is now under way from Moapa, Nev., to St. Thomas, 21.73 miles, and track has been laid on 5.06 miles. The company has also finished work on the high line in the state of Nevada from Guelph to Barclay, 86.9 miles, replacing 84.44 miles abandoned or line changed. This work included the construction of a number of tunnels and new bridges. E. G. Tilton, chief engineer, Los Angeles, Cal.

Southern Pacific.—A contract has been given to Twohy Brothers, it is said, for building 23 miles of the Willamette Pacific, on the Eugene-Coos Bay line in Oregon. The first section to be built is from Eugene, westward. The new line is, eventually, to be extended south along the Pacific coast to Marshfield. W. Hood, chief engineer, San Francisco, Cal. (October 20, p. 816.)

Twin Mountain & Potomac.—An officer writes that work is now under way building from Keyser, W. Va., south via Burlington, thence to Twin Mountain, about 26 miles. The work is being carried out by the company's men. Maximum grades will be 4 per cent. There will be a steel bridge of 50 ft. and another of 90 ft. The principal commodities to be carried will be fruit and lumber. Track laying has been finished on one mile. E. A. Russells, general manager; J. Clyde Lewis, chief engineer, Keyser, W. Va. (July 28, p. 198.)

Union Pacific.—The report of this company and auxiliary companies, which includes the Oregon Short Line and the Oregon-Washington Railroad & Navigation Co., for the year ended June 30, 1911, shows that there was a net increase of 490.63 miles in mileage of railways owned; 67.29 miles in railways owned jointly; 156.21 miles in railways operated under trackage rights and 169.25 miles in sidings. The changes in line, completed or in course of construction, during the year, were as follows:

Union Pacific.—St. Vrains, Colo., to Grant Mine, 4.90 miles.

Oregon-Washington Railroad & Navigation Company.—Dalles, Ore., to Des Chutes, 14.32 miles; Yoakum, Ore., to Pendleton, 11.44 miles; Hay Canyon, Ore., 1.92 miles.

Construction was also under way on the following lines, as well as on about 185 miles of additional main track as follows:

Union Pacific.—Northport, Neb., to Gering, 30.64 miles, track laid on 5.84 miles, grading finished on 12.43 miles, and grading under way on 10 miles; Rock Springs, Wyo., to Kilpecker Creek, 10.40 miles, track laid on 7.45 miles, grading finished on 2.95 miles; Dent, Colo., to Fort Collins, 25.25 miles, track finished on 24.89 miles, and grading finished on 0.36 miles.

Oregon Short Line.—Rupert, Idaho, to Bliss, 72.78 miles, track laid on: 63.78 miles, and grading finished on 9 miles; Burley, Idaho, to Oakley, 22.09 miles, track laid on 22.06 miles, and grading finished on 0.02 miles; Ashton to Driggs, 37.50 miles, track laid on 4.47 miles, grading finished on 7.98 miles, and grading under way on 20 miles; Montpelier to Paris, 9.50 miles, track-laying has been completed; Caldwell westerly via Greenleaf, 11.31 miles, all of the track laying has been completed. Nyssa to Homedale, 26 miles, grading finished on two miles and grading under way on 7.79 miles.

Central Idaho Railroad.—Richfield, Idaho, to Taft, 58.20 miles, grading finished on 0.37 miles, and grading under way on 7.86 miles.

Salt Lake & Idaho.—Burley, Idaho, to Kelton Summit on the Utah-Idaho line, 60.50 miles, grading finished on one mile, and grading under way on 17.08 miles.

Oregon-Washington Railroad & Navigation Company.—Albina, Ore., to Mock Battom, 1.25 miles, track laying has been finished; Cosmopolis-North River line, in the state of Washington, 12 miles, track laid on 6.32 miles, grading finished on 4.98, and grading under way on 0.70 miles; Spokane to Ayer Junction, 103.95 miles, grading finished on 66.41 miles and grading under way on 35.54 miles.

Des Chutes Railroad.—Des Chutes, Ore., to Redmond, 10 miles, grading finished on 9.25 miles, and grading under way on 0.75 miles.

Willamette Pacific.—See Southern Pacific.

RAILWAY STRUCTURES.

Abilene, Tex.—The Abilene & Southern roundhouse was burned on November 17, with an estimated loss of $25,000.

Brownsville, Tex.—The St. Louis, Brownsville & Mexico has let the contract for building a freight house 240 ft. x 30 ft., to replace the structure recently destroyed by fire. The new building will cost about $14,000.

Charter Oak, Cal.—The Southern Pacific will build a new station, it is said, at Charter Oak.

Colfax, Wash.—The Spokane & Inland Empire has given a contract to J. R. Good & Co., for building a passenger station at Colfax. (November 3, p. 932.)

Frederic, Wis.—See Minneapolis, St. Paul & Sault Ste. Marie, under Railway Construction.

Linden, N. J.—See Pennsylvania Railroad, under Railway Construction.

Lynn, Mass.—See Boston & Maine, under Railway Construction.

Portland, Ore.—The report of the Union Pacific for the year ended June 30 shows that a large amount of money was spent during the year for new bridges, trestles and culverts. This work included the new steel bridge over the Willamette river at Portland, also the renewal of bridges on various sections made necessary by the construction of second main track. There was also a large amount of money spent for new buildings.

Rahway, N. J.—See Pennsylvania Railroad, under Railway Construction.

San Bernardino, Cal.—The Atchison, Topeka & Santa Fe will make improvements and additions to its shops at San Bernardino, Cal. It is said that a new blacksmith shop will be built. The estimated cost of the improvements is $250,000.

Spokane, Wash.—The plans submitted by the Chicago, Milwaukee & Puget Sound, for the construction of concrete viaducts over Helena, Medelia, Hogan, Perry and Denver streets, have been approved by the Board of Public Works.

Victorville, Cal.—A contract has been given by the Atchison, Topeka & Santa Fe to the Sharp-Fellows Company, Los Angeles, Cal., for erecting a concrete retaining wall at the bridge over the Mojave river near Victorville.

Wheaton, Ill.—The Aurora, Elgin & Chicago has let the contract for building a one-story brick passenger station 35 ft. x 100 ft., to cost about $25,000. H. R. Wilson & Co., Chicago, are the architects.

The Northern Railway, Siam, has been completed to Sala Me Puak, and trains are running regularly to that point. It is now [illegible] to extend the line about four miles northwesterly to Den Chai, and make that the terminus of the railway for the present. From Den Chai a road could be made to Phrae by the [illegible] and there might be run over this to carry passengers and freight in connection with the trains. The ground between Den Chai and Phrae is almost level, and the cost of a road will be much less than that of one from Sala Me Puak to Phrae. Den Chai is also preferred as a terminus, because it is [illegible] affording plenty of room for the construction of sheds and tracks for railway yards, whereas the level [illegible] is not extensive. The expense of leveling [illegible] would be very heavy.

Railway Financial News.

Ashville & East Tennessee.—Control of this road, which runs from Ashville, N. C., to Weaverville, has been bought by John H. Carter, of Ashville.

Buffalo, Rochester & Pittsburgh.—Hampton F. Kean has been elected a director, succeeding Lanfear Norrie, deceased.

Cincinnati, New Orleans & Texas Pacific.—Daniel Willard, president of the Baltimore & Ohio; W. F. Loree, president of the Delaware & Hudson, and M. R. Wait have been elected directors, succeeding William Cotter, president of the Pere Marquette; George W. Perkins, until recently a member of the firm of J. P. Morgan & Co., New York, and Norman B. Ream, resigned.

Fitchburg-Railroad.—This company has asked the Massachusetts railway commission for authority to issue $1,200,000 4½ per cent. bonds, the proceeds to be used to refund $100,000 Brookline & Pepperell bonds maturing December 1, and to reimburse the Boston & Maine for additions and betterments.

Minneapolis, St. Paul & Sault Ste. Marie.—It is understood that arrangements have been made for the sale of $6,000,000 4 per cent. bonds, to be secured by a first mortgage on the Soo's terminals which are to be built at Chicago.

New York Central & Hudson River.—See an item in regard to this company's relations with the Rutland Railroad in Traffic News.

Norfolk Southern.—This company has taken over the Raleigh & Southport, the Durham & Charlotte and the Aberdeen & Asheboro. The roads acquired have an aggregate mileage of 228 miles. The Raleigh & Southport was financed by F. J. Lisman & Co., New York, and these bankers made the negotiations for the sale of the other two roads.

Redmond & Co., New York, are offering $5,762,000 first and refunding mortgage 5 per cent. bonds of February 1, 1911-1961, of the Norfolk Southern at 101. The bonds are secured at the rate of not less than $11,500 per mile on over 508 miles of road, and of this mileage, 215 miles is subject to the first lien of these bonds. The remaining 293 miles is subject to underlying liens averaging about $10,720 per mile.

Pennsylvania.—See an item in regard to this company's possible relations with the Atlantic Coast Line in General News.

Rutland.—See an item in regard to this company's relations with the New York Central & Hudson River in Traffic News.

FOREIGN RAILWAY NOTES.

About 50,000 coolies have been employed steadily during the year on the Kirin-Chanchun Railway, Central Manchuria. A temporary mountain line is proposed over the Tumenling pass, to be used until the tunnel is completed. Seventy per cent. of the earth work is reported completed, and it is expected that rails will be laid to Kirin by the end of the year.

The construction work of connecting India with Ceylon is progressing rapidly. There are 150 piers, the span being 40 ft., and in addition there is a 200 ft. Scherzer rolling bridge, over the Pamban channel. The work is progressing simultaneously from both ends, the work on the Indian side being of an exceptionally difficult nature. The founding of the pier is a matter of unusual difficulty owing to the uneven and fissured bottom and also to the strong current. The work of sinking the piers is making considerable progress, and it is estimated that at least one pier per week will be completed. The construction of coolie lines, segregation camp and hospital is also proceeding rapidly. The work of constructing the north and south piers at Dhanushkodi will be taken in hand shortly. Among the works to be started in the near future are the residence of the marine superintendent, huts for coolies, and coal storage grounds. Owing to a difference of opinion regarding the bridge across the Pamban channel, the work on the Indian side was very much delayed, while the Ceylon government in the meantime has been forging ahead and got at least one year's start at Talai Mannar. Vigorous efforts are being made to make up for lost time, and it is hoped to commence the service in August, 1913.

ANNUAL REPORT

UNION PACIFIC RAILROAD COMPANY—FOURTEENTH ANNUAL REPORT.

REPORT OF THE BOARD OF DIRECTORS.

INCOME FOR THE YEAR.

The gross revenues and expenses of the Union Pacific Railroad and Auxiliary Companies, after excluding all offsetting accounts between them, were as follows:

	This Year	Last Year	+ Increase. —Decrease.
Average miles of railway operated during the year	6,678.29	6,296.22	+ 382.07
TRANSPORTATION OPERATIONS.			
Gross operating revenues	$87,201,971.38	$88,506,465.44	—$1,304,494.06
Outside operations—revenues	1,781,136.43	1,721,626.76	+ 59,509.67
Total revenue	$88,983,107.81	$90,228,092.20	—$1,244,984.39
Operating expenses	$47,907,772.31	$45,148,270.47	+$2,759,501.84
Outside operations—expenses	1,900,061.68	1,790,638.87	+ 109,422.81
Taxes	3,464,147.20	3,264,347.51	+ 199,799.69
Total expenses and taxes	$53,271,981.19	$50,203,256.85	+$3,068,724.34
Operating revenues over expenses and taxes	$35,711,126.62	$40,024,835.35	—$4,313,708.73
Charges.			
Interest on funded debt in hands of the public (Table 15)	$12,623,281.83	$12,455,577.15	+ $167,704.68
Sinking fund requirements	12,013.33	16,013.33	— 4,000.00
Hire of equipment—balance	1,742,562.63	1,923,095.63	— 180,533.00
Rentals for lease of road—balance	15,676.73	14,928.71	+ 748.02
Total	$14,393,534.52	$14,409,614.82	— $16,080.30
Deduction:			
Rentals from joint tracks, yards and terminal facilities—balance $147,716.49			
Miscellaneous rentals—balance 111,320.89			
Miscellaneous income 2,560.34	261,597.72	378,418.51	— 116,820.79
	$14,131,936.80	$14,031,196.31	+ $100,740.49
Surplus from transportation operations after payment of charges	$21,579,189.82	$25,993,639.04	—$4,414,449.22
Application of Surplus.			
Dividends on stocks of Union Pacific Railroad Co.:			
4 per cent. on preferred stock	$3,981,744.00	$3,981,760.00	— $16.00
6 per cent. on common stock	12,995,742.91	13,022,319.50	— 26,576.59
Dividends on preferred stock of the Oregon Railroad and Navigation Co. in hands of the public	.....	240.00	— 240.00
	$16,977,486.91	$17,004,319.50	— $26,832.59
Surplus after payment of dividends	$4,601,702.91	$8,989,319.54	—$4,387,616.63
INCOME OTHER THAN FROM TRANSPORTATION OPERATIONS.			
Interest on bonds owned of companies other than Oregon Short Line Railroad and Oregon-Washington Railroad and Navigation Cos. (Table 16)	$1,392,569.01	$1,521,083.16	— $128,514.15
Dividends on stocks owned of companies other than Oregon Short Line Railroad and Oregon-Washington Railroad and Navigation Cos. (Table 17)	14,560,702.00	15,262,078.00	— *701,376.00
Balance of interest on loans and on open accounts other than with Auxiliary Companies	2,016,541.69	2,559,720.18	— 543,178.49
Rentals from steamships	304,800.00	304,800.00	
Net income from lease of unpledged lands and town lots	26.54	928.13	— 901.59
Miscellaneous income	87,089.76	87,318.40	— 228.64
Total	$18,397,668.50	$19,514,827.87	—$1,117,159.37
Less—Miscellaneous payments	1,097.27	2,776.52	— 1,679.25
Total income other than from transportation operations	$18,396,571.23	$19,512,051.35	—$1,115,480.12
Deduction:			
Dividends on stock of Union Pacific Railroad Co.:			
4 per cent. on common stock	8,663,828.60	8,681,546.35	— 17,717.75
Surplus income other than from transportation operations	$9,732,742.63	$10,830,505.00	— $1,097,762.37
Total surplus from transportation operations and from other income after payment of dividends	$14,334,445.54	$19,819,824.54	—$5,485,379.00

*Resulted principally from a dividend of $438,000 received last year on common stock, Southern Pacific Co., exchanged for preferred stock and from a decrease this year of $206,862 in dividends on preferred stock of Chicago & Alton R. R. Co.

The results of the year's operations, compared with those of the preceding year, were as follows:

	Increase.	Decrease.	Per Cent
Average miles of railways operated	382.07	.....	6.07
Gross operating revenues and revenues from outside operations	.....	$1,244,984.39	1.38
Operating expenses and expenses of outside operations	$2,868,924.65	.....	6.11
Taxes	199,799.69	.....	6.12
Transportation revenue over expenses and taxes	.....	4,313,708.73	10.78
Income other than from transportation operations	.....	1,115,480.12	5.71
Total income	.....	5,429,188.85	9.11
Interest on funded debt and other charges	100,740.49	.....	.72
Surplus over interest and charges	.....	5,529,929.34	12.15

ASSETS AND LIABILITIES.

The assets and liabilities of the Union Pacific Railroad and Auxiliary Companies are shown in detail in Table No. 5. The securities owned are stated after eliminating all offsetting accounts between the companies, thus dealing only with the securities in the hands of the public, the assets collectible from the public, and the liabilities payable to the public.

The increase or decrease in assets or liabilities since last report, briefly stated, is as follows:

Increase in Assets:

Cost of railways, equipment, and other property as detailed under Capital Expenditures			$39,295,633.40
Stocks and Bonds:			
Balance of profit realized by Oregon Short Line Railroad Co. from the sale of Northern Securities stocks and stocks received in exchange therefor		$53,728,678.46	
Stocks and bonds disposed of or acquired, as detailed in Tables 9, 10 and 11:			
Stocks sold	$22,555.00		
Stocks of proprietary companies retired	339,000.00		
Bonds sold	157,200.00		
Bonds of proprietary companies retired	4,236,500.00		
Bonds transferred to other accounts	161,000.00	$4,916,255.00	
Less			
Stocks purchased	$1,075,147.49		
Stocks acquired in settlement of accounts	305,186.41		
Bonds purchased	200,881.00		
Bonds acquired in settlement of accounts	876,600.00	2,457,814.90	
Stocks and bonds disposed of in excess of stocks and bonds acquired		2,458,440.10	
Balance			51,270,238.36
Demand loans to Southern Pacific Co.			9,105,736.44
Other demand loans and time deposits			1,450,000.00
Loans to San Pedro, Los Angeles & Salt Lake R. R. Co.			1,168,860.00
Loans to Utah Light & Railway Co.			971,345.51
Cash on hand			3,088,923.06
Contingent unadjusted accounts			57,156.68
			$106,407,893.45
Material, fuel and supplies		$100,717.14	
[illegible] Proprietary Companies		267,804.77	
[illegible] accounts		1,184,237.45	
			1,552,759.36
Net cash to [illegible]			$104,855,134.09

Increase in Liabilities:

Capital stock	[illegible]	
Funded debt	[illegible]	
[illegible] Proprietary Companies	[illegible]	
[illegible]	[illegible]	
Contingent unadjusted accounts	672,332.83	
[illegible]		
[illegible] equipment, and miscellaneous property	724,741.17	
		33,736,850.16
[illegible]		$71,118,283.93

The increase in the book value of stock and bonds owned results from the expenditures made during the year, as detailed in the table referred to.

[illegible] Northern Securities Company stock and the securities received in the distribution of said company's assets. Pending final adjustment, the entire proceeds from the sales of these securities were treated as a credit against the cost of stocks and bonds, thus diminishing the book cost of all stocks and bonds by the amount of the profits realized from their sale. The investment stocks, costing $223,795,629.80, are shown in detail in Table No. 10. On June 30, 1911, their market value was about $267,000,000.

The profits realized by the Oregon Short Line Railroad Company from its original investment in the 824,918.71 shares of the capital stock of the Northern Securities Company and from the sale of the stocks which it received under subscription rights to the stocks of the Great Northern Railway Company and the Northern Pacific Railway Company received in the distribution of the assets of the Northern Securities Company were $58,684,157.76. Of this sum $4,955,479.30 was taken up by the Oregon Short Line Railroad Company in its Profit and Loss account in the year 1905; the remaining $53,728,678.46 was taken over this year. This year the profit was distributed as a dividend on the shares of the Oregon Short Line Railroad Company, all of which are owned by the Union Pacific Railroad Company.

CAPITAL EXPENDITURES.

The charges to capital account other than for stocks and bonds in companies other than the Union Pacific Railroad and Auxiliary Companies, amounted to $39,295,633.40, and were as follows:

For account of extensions and branches, viz.:

Union Pacific Railroad Company:		
Callaway to Gandy, Nebraska..	$10,752.78	
Northport to Gering, Nebraska.	235,928.98	
O'Fallons to Northport, Nebraska	8,424.23	
Pine Bluffs, Wyoming to Brown[illegible], Nebraska	1,909.67	
Rock Springs to Coal Fields, Wyoming	89,752.65	
Onaga to Marysville, Kansas..	79,730.33	
Cloverly to Hungerford, Colo[illegible]	[illegible]30.10	
Dent to Fort Collins, Colorado.	477,624.46	
Grants Mine to La Salle, Colo[illegible]	[illegible]65.73	
[illegible] to Briggsdale, Colorado	7,358.96	
[illegible] to St. Vrain, Colorado	61,625.86	
	$1,087,013.75	
Credit: Line Stromsburg to Central City, Nebraska	91.20	
		$1,086,922.55
Oregon Short Line Railroad Company:		
Ashton to Driggs, Idaho.....	$321,860.68	
Burley to Oakley, Idaho.....	150,792.55	
Caldwell to Mile Post Eleven, Idaho	79,107.43	
Montpelier to Paris, Idaho....	136,786.21	
Moreland to Aberdeen, Idaho.	4,047.24	
Nyssa to Homedale, Idaho.....	73,540.08	
Rupert to Bliss, Idaho.....	370,108.67	
Twin Falls to Rogerson, Idaho	11,345.56	
	$1,147,588.42	
Credit: Line St. Anthony, Idaho, to Yellowstone, Montana....	850.71	
		1,146,737.71
Oregon-Washington Railroad & Navigation Company:		
Blakes, Oregon to Lewiston, Idaho	$[illegible]118.49	
Coyote to Stanfield, Oregon....	1,270.80	
Grays Harbor Line, Washington	476,469.83	
Portland, Oregon to Seattle, Washington	[illegible]19.65	
[illegible] to [illegible], Oregon	[illegible]60.70	
[illegible] to [illegible], Washington	[illegible]30.46	
Spokane Terminals, Washington	251,353.85	
[illegible] to Odessa, Washington	[illegible]1.17	
Yakima Division, Washington.	488,548.10	
	$[illegible]	
[illegible]	[illegible]	
	[illegible]	
		[illegible]
[illegible] Short Line Railroad Company..	.....	853,587.62

Buildings, Structures and Improvements:			
Enginehouses, shops, machinery, tools, etc.	$522,482.22		
Roadway buildings, machinery, tools, etc.	22,152.89		
Station buildings, terminal yards, and appurtenances	874,134.69		
Water and fuel stations.....	431,809.01		
Other buildings—general service	814,024.57		
		2,164,603.38	
Equipment:			
Additions and improvements to existing equipment	$36,451.37		
174 locomotives	3,328,722.69		
179 passenger-train cars	1,473,719.11		
7,639 freight-train cars	6,171,908.11		
775 work equipment	256,169.07		
	$10,263,970.35		
Less:			
1 locomotive, 7 passenger-train, 1,320 freight-train and 285 work equipment cars, vacated during the year.....	914,457.87		
		9,349,512.48	
			19,283,175.13
Advances during the year, not taken over into "Cost of railways, equipment and appurtenances":			
For the construction and acquisition of new lines	$3,624,208.07		
For terminal lands and other property.....	75,152.97		
For rolling stock	165,259.57		
			3,864,620.61
Payments for account of ocean steamships "Bear" and "Beaver"			58,972.44
Improvements to Northern Pacific Terminal property, Portland, Oregon			4,744.73
Total charges			$42,055,773.08
Amount received from the Trustee of the Union Pacific Railroad Company's First Railroad and Land Grant Mortgage, in payment for expenditures for additions, betterments and improvements, etc., not otherwise provided for	$1,350,000.00		
Surveys and construction expenditures on lines subsequently abandoned, written off to "Profit & Loss"	641,050.25		
Abandoned property not to be replaced.....	165,487.11		
Transferred to other accounts.....	595,653.28		
Adjustment in amount heretofore deducted from "Cost of railways, equipment and appurtenances" on account of the difference between the face value of stocks and bonds of the Auxiliary Companies retired this year and their cost to the purchaser.....	7,949.04		
			2,760,139.68
Net charges to capital account			$39,295,633.40

EQUIPMENT.

The changes in the equipment during the year were as follows:

	Condemned, Destroyed, Sold or Transferred to Another Class and Credited to "Equipment"	Added and Charged to "Equipment."		Owned by Union Pacific Equipment Association.	Total.
		By Purchase.	By Acquisition of New Lines		
	Number.	Number.	Number.	Number.	Number.
[illegible]	[illegible]	[illegible]110	(e) 11	(d) 76	(e) 197
[illegible]	...	37	...	*10	21
Baggage and mail cars...	...	16	...	*16	...
[illegible] passenger cars	...	1	4	...	5
Business cars	...	1	...	...	1
Chair cars	...	5	...	25	30
Dining cars	...	11	2	...	13
Motor cars (gasoline)...	...	2	2	...	4
Observation cars	...	4	...	1	5
[illegible]	1	12	1	*31	12
[illegible]	6	6		34	40
Narrow gauge cars.....	...	...	10	...	10
[illegible]	[illegible]	[illegible]19	[illegible]	[illegible]	[illegible]141
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1,876
Box automobile cars.....	...	...	...	500	500
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	110
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	631
Furniture cars	107	...	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	107
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	451
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	499
[illegible]	[illegible]	59	...	...	59
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]4,23[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

(k) The original cost of these 1,320 freight-train cars was $761,602.31.
(l) The cost of these 5,342 freight-train cars was $5,351,550.72.
(m) The cost of these 1,284 freight-train cars was $1,198,147.98.
(n) The cost of these 2,394 freight-train cars was $2,536,174.71.
(o) The cost of the total 4,232 freight-train cars was $4,013,523.99.
(p) The original cost of these 285 pieces of work equipment was $104,242.23.
(q) The cost of these 550 pieces of work equipment was $227,745.81.
(r) The cost of these 217 pieces of work equipment was $225,735.91.
(s) The cost of these 613 pieces of work equipment was $681,582.93.
(t) The cost of the total 1,380 pieces of work equipment was $1,135,064.65.

The total original cost of all the equipment condemned, destroyed, sold or transferred to another class and credited to "equipment" was $914,457.87.

The total cost of all equipment added and charged to "equipment" by purchase was $8,165,032.04; and by acquisition of new lines, $1,597,004.71.

The total net cost of all equipment owned by the Union Pacific Equipment Association was $56,185.87.

The grand total cost was $9,818,222.62.

*Credit—Sold to Union Pacific Railroad, Oregon Short Line Railroad and Oregon Railroad & Navigation Companies.

‡The greater cost of the steel cars added during the year has exceeded the cost of the greater number of wooden cars vacated.

The original cost, salvage value, and amount charged to the operating expenses of the equipment retired during the year were as follows:

	Total.	Locomotives.	Passenger-Train Cars.	Freight-Train Cars.	Work Equipment.
Original cost (estimated if not known)	$914,457.87	$10,352.89	$38,260.44	$761,602.31	$104,242.23
Proceeds from sale or salvage value	293,026.93	2,645.31	16,798.02	239,734.76	33,848.84
Charged to operating expenses	$621,430.94	$7,707.58	$21,462.42	$521,867.55	$70,393.39

The locomotives added during the year averaged 119.63 tons total weight of engine, without tender, and 88.70 tons upon drivers, and freight-train cars 48.44 tons capacity.

The number of locomotives and cars of standard gauge owned and the total and the average capacity of freight-train cars at the close of the year were as follows:

Standard Gauge.	This Year.	Last Year.	Increase.	Per Cent.
Locomotives	1,324	1,133	191	16.86
Total weight, excluding tender (tons)	117,486	95,596	21,890	22.90
Average total weight, excluding tender (tons)	88.74	87.82	.92	1.05
Total weight on drivers (tons)	95,504	78,841	16,663	21.13
Average total weight on drivers (tons)	72.13	69.52	2.61	3.75
Passenger-train cars	948	824	124	15.05
Freight-train cars	28,896	26,043	2,853	10.95
Total capacity (tons)	1,180,547	1,014,311	166,236	16.39
Average capacity (tons)	41.60	39.59	2.01	5.08
Work equipment	5,781	4,686	1,095	23.37

The equipment owned by the respective companies is shown in Table No. 24. The changes during the year, the capacity, and the service of all equipment are shown in Tables Nos. 30, 31 and 32.

TRANSPORTATION OPERATIONS.

The results of the year's transportation operations compared with those of the preceding year are as follows:

	This Year.	Last Year.	Increase or Decrease.	Per Cent.
Average miles of railway operated	6,678.29	6,296.22	382.07	6.07
Revenues.				
Freight	$59,964,363.73	$61,479,679.70	—$1,515,315.97	2.46
Passenger, including excess baggage	20,981,404.90	20,814,819.96	166,584.94	.80
Mail and express	4,637,739.26	4,509,434.37	128,304.89	2.85
Switching, rentals, and all other sources	1,618,463.49	1,702,531.41	—84,067.92	4.94
Total, rail lines	$87,201,971.38	$88,506,465.44	—$1,304,494.06	1.47
Outside operations—revenues	1,781,136.43	1,721,626.76	59,509.67	3.46
Total revenues	$88,983,107.81	$90,228,092.20	—$1,244,984.39	1.38
Operating Expenses.				
Maintenance of way and structures	$10,445,203.37	$9,915,481.65	$529,721.72	5.34
Maintenance of equipment	9,208,724.95	9,074,653.39	134,071.56	1.48
Traffic expenses	2,021,491.93	1,985,017.61	36,474.32	1.84
Transportation expenses	23,991,335.10	22,208,261.51	1,783,073.59	8.03
General expenses	2,241,016.96	1,964,856.31	276,160.65	14.06
Total, rail lines	$47,907,772.31	$45,148,270.47	$2,759,501.84	6.11
Outside operations—expenses	1,900,061.68	1,790,638.87	109,422.81	6.11
Total expenses	$49,807,833.99	$46,938,909.34	$2,868,924.65	6.11
Operating revenues over expenses	$39,175,273.82	$43,289,182.86	—$4,113,909.04	9.50
Freight Traffic. (Commercial Freight Only—Way-bill Tonnage)				
Tons of freight carried	14,807,161	15,312,211	—505,050	3.30
Tons of freight carried one mile	5,803,802,346	5,997,233,894	—193,431,548	3.23
Revenue per mile of road	$8,716.88	$9,764.54	—$1,047.66	10.73
Revenue per *revenue train* mile (a)	$4.43	$4.62	—$0.19	4.11
Average revenue per ton per mile	1.003 cents	1.024 cents	-.021 cents	2.05
Average distance carried	391.96 miles	391.66 miles	.30 miles	.08
Passenger Traffic.				
Revenue passengers carried	8,574,527	8,306,930	267,597	3.22
Revenue passengers carried one mile	934,002,700	960,734,984	—26,732,284	2.78
Revenue from passenger trains per mile of road	$3,836.18	$4,022.14	—$185.96	4.62
Revenue from passenger trains per *revenue train mile* (b)	$1.48	$1.63	—$0.15	9.20
Average revenue per passenger per mile	2.199 cents	2.122 cents	.077 cents	3.63
Average distance carried	108.93 miles	115.65 miles	—6.72 miles	5.81

(a) Revenue freight trains and all mixed train miles.
(b) Revenue passenger trains and all mixed train miles including miles run by motor cars.

Compared with the preceding year, the per cent. of operating expenses (including expenses of outside operations) to the gross revenues (including revenues from outside operations) was as follows:

	Rail Lines Only.		Rail Lines and Outside Operations.	
	This Year.	Last Year.	This Year.	Last Year.
For "Maintenance" (*Maintenance of Way and Structures, and Maintenance of Equipment*)	22.54	21.46		
For "Operation" (*Traffic Expenses, Transportation Expenses and General Expenses*)	32.40	29.55		
Total	54.94	51.01	55.97	52.02

The operating revenues and operating expenses for the year distributed among the respective primary accounts provided for in the classification of the Interstate Commerce Commission are shown in Table No. 26. The details of passenger and freight traffic are shown in Tables Nos. 27 and 28.

The expenses of the rail lines for "Maintenance" increased $663,793.28, or 3.50 per cent., and for "Operations" $2,095,708.56, or 8.01 per cent., a total increase of $2,759,501.84, or 6.11 per cent.

This increase was in part the result of higher wage schedules, and increase in the average miles of railways operated and maintained of 382.07 miles, or 6.07 per cent., and in the mileage of locomotives in revenue service of 1,278,346 miles, or 3.70 per cent.

There were in service 27 gasoline motor cars. The mileage of these cars aggregated 626,980 miles, or 3.95 per cent. of the total revenue passenger train mileage and is included in the mileage statistics.

In the following statements the operating expenses, although distributed as provided for in the classification of the Interstate Commerce Commission, have been combined under comprehensive titles of accounts so as to present the year's expenses in a concise form:

Maintenance of Way and Structures.

	This Year.	Last Year.	Increase or Decrease.	Per Cent.
Average miles of railway operated and maintained—first and additional main tracks	7,298.30	6,800.46	497.84	7.32
Ballast	$61,327.57	$83,295.97	—$21,968.40	26.37
Ties	1,741,332.70	1,825,730.78	—84,398.08	4.62
Rails	245,218.70	280,674.92	—35,456.22	12.63
Frogs, switches and other track material	790,243.87	844,805.60	—54,561.73	6.46
Total material for roadway and track	$2,838,122.84	$3,034,507.27	—$196,384.43	6.47
Repairs of roadway and track	4,007,725.26	4,236,874.39	—229,149.13	5.41
Bridges, trestles, and culverts	980,787.10	448,674.58	532,112.52	118.60
Buildings, grounds and appurtenances	1,505,716.36	1,243,315.24	262,401.12	21.10
Snow and sand fences and snow sheds	17,980.46	16,345.65	1,634.81	10.00
Electric power, telegraph and telephone lines	119,525.38	97,348.51	22,176.87	22.78
Superintendence	630,933.73	583,232.41	47,701.32	8.19
Stationery and printing	36,122.25	29,223.37	6,898.88	23.61
Other expenses	58,955.26	35,169.23	23,786.03	67.63
Property abandoned	249,334.73	190,791.00	58,543.73	30.68
Total	$10,445,203.37	$9,915,481.65	$529,721.72	5.34
Cost per mile—all main tracks operated and maintained	$1,431.18	$1,458.06	—$26.88	1.84

The expenditures for bridges, trestles, and culverts include $176,423.45 for account of the new steel bridge over the Williamette River at Portland, Oregon, $244,114.97 for renewal of bridges over the Snake and the Kaw Rivers, and expenditures for the renewal of bridges in various other localities made necessary by the construction of second main track. The increase in expenses for buildings, grounds, and appurtenances resulted principally from expenditures amounting to $143,368.72 incurred in rearranging signals and interlocking plants in connection with construction of second main track.

	This Year.	Last Year.	+ Increase. — Decrease.
Miles of new steel rails	287.24	268.90	+ 18.34
Per cent. of renewal of all rail in track, including sidings	3.01	3.09	— .08
Number of burnettized ties	1,336,463	1,453,287	—116,824
Number of other ties	907,266	741,219	+166,047
Total number of ties	2,243,729	2,194,506	+ 49,223
Equal to miles of continuous track	805.07	954.13	—149.06
Per cent. of renewal of all ties in track, including sidings	8.44	9.01	— .57
Number of tie plates	1,558,832	2,251,758	—692,926
Equal to miles of continuous track	279.66	402.10	—122.44
Number of continuous rail joints	179,598	153,089	+ 26,509
Equal to miles of continuous track	280.62	239.20	+ 41.42

The weight of rails per yard in main line and branches at the close ofthe year was as follows:

Miles of First and Additional Main Tracks Operated, and Maintained.	Total.	90 Lb.	85 Lb.	80 Lb.	75 Lb.	70 Lb.	67 Lb.	65 Lb.	62 Lb.	60 Lb.	56 Lb.	Less Than 56 Lb.
Main Line	4,425.26	1,621.28	32.60	1,479.49	639.71	550.60	.....	98.07	.....	3.21	.14	.16
Branches	3,037.88	21.26	1.41	32.31	350.37	656.59	29.52	2.78	22.56	1,121.36	588.71	211.01
Total	7,463.14	1,642.54	34.01	1,511.80	990.08	1,207.19	29.52	100.85	22.56	1,124.57	588.85	211.17
Per cent. of total miles of track	100.00	22.01	.45	20.25	13.27	16.18	.40	1.35	.30	15.07	7.89	2.83
Per cent. last year	100.00	17.50	.50	23.02	11.76	18.14	.44	.....	.33	16.44	8.54	3.33

Transportation Expenses.

	This Year.	Last Year.	Increase or Decrease.	Per Cent.
Locomotives, fuel for	$7,776,415.11	$7,084,790.58	$691,624.53	9.76
Locomotive service, other than fuel	5,207,384.40	4,805,010.50	402,373.90	8.37
Train service	3,895,415.09	3,650,239.34	245,175.75	6.72
Station and terminal service	4,694,578.08	4,397,029.15	297,548.93	6.77
Ferry and river service	14,056.97	.....	14,056.97	
Injuries, loss, damage, and other casualties	1,173,560.75	1,174,849.28	—1,288.53	11
Superintendence	994,193.71	880,857.76	113,335.95	12.87
Stationery and printing	198,757.34	186,185.93	12,571.41	6.75
Other expenses	36,973.65	29,298.97	7,674.68	26.19
Total	$23,991,335.10	$22,208,261.51	$1,783,073.59	8.03

The increase in these expenses resulted from the greater mileage run by locomotives in revenue service and from the higher prices paid for locomotive fuel.

The work done by the transportation department of the rail lines over that of last year is shown in the following table:

	Increase.	Decrease.	Per Cent.
Total operating revenues	.....	$1,304,494.06	1.47
Transportation expenses	$1,783,073.59	.....	8.03
Revenue passengers carried one mile	.....	26,732,284	2.78
Mileage of cars in passenger service	9,444,841	.....	9.92
Locomotive mileage with passenger and mixed trains, including helping	1,752,568	.....	11.04
Tons of commercial freight carried one mile	.....	193,431,548	3.23
Tons of commercial and company freight carried one mile	71,228,899	.....	.98
Mileage of cars in freight service	9,856,023	.....	2.23
Locomotive mileage with freight and mixed trains, including helping	.....	189,501	1.27
Total locomotive mileage in service for which the attendant expenses are charged to "Transportation Expenses".	1,278,246	.....	3.70

The average number of tons of freight per train, and loaded cars per train (excluding caboose), and the tons per loaded car for the respective companies for the year were:

Commercial and Company Freight (Way-Bill Tonnage).	*Tons per Train. Tons.	+Increase. —Decrease. Tons.	Per Cent.	Loaded Cars per Train. Cars.	+Increase. —Decrease. Cars.	Per Cent.	Per Cent. of Loaded Car Mileage to Total Car Mileage.	Tons per Loaded Car. Tons.	+Increase. —Decrease. Tons.	Per Cent.
Union Pacific R. R. Co.	561.35	+17.90	3.29	26.73	+.66	2.53	74.01—1.98	21.00	+.15	.72
Oregon Short Line R. R. Co.	598.57	+ 8.66	1.47	23.11	+.38	1.67	73.34— .50	25.90	—.05	.19
Oregon-Washington R. R. & Nav. Co.	491.01	—10.02	2.00	20.74	—.39	1.85	83.16+ .10	23.67	—.04	.17
Average, all lines	558.64	+10.75	1.96	25.02	+.36	1.46	74.93—1.37	22.33	+.11	.50

*Ton miles per revenue freight train and all mixed train miles.

The cost per locomotive mile run in revenue service and in non-revenue service for which the expenses are charged to "Transportation Expenses" was

	This Year.	Last Year.	
For fuel for locomotives	21.64 cents.	20.45 cents.	+1.19 cents.
For all transportation expenses	66.79 cents.	64.15 cents.	+2.64 cents.

General Expenses.

	This Year.	Last Year.	Increase or Decrease.	Per Cent.
Salaries and expenses of general officers	$164,747.80	$194,902.42	—$30,154.62	15.47
Salaries and expenses of clerks and attendants	1,045,529.05	900,050.95	145,478.10	16.16
Law expenses	278,077.84	271,923.65	6,154.19	2.26
General office expenses	114,300.64	105,002.82	9,297.82	8.85
Stationery and printing	154,734.47	118,323.61	36,410.86	30.77
Insurance	170,767.19	160,169.18	10,598.01	6.62
Pensions	68,449.19	50,527.41	17,921.78	35.47
Other expenses	244,410.78	163,956.27	80,454.51	49.07
Total	$2,241,016.96	$1,964,856.31	$276,160.65	14.06

By order of the Board of Directors.

ROBERT S. LOVETT,
Chairman of the Executive Committee.

UNION PACIFIC RAILROAD AND AUXILIARY COMPANIES.
NO. 4—PROFIT AND LOSS FOR THE YEAR ENDED JUNE 30, 1911.

DEBITS.

Premium on Utah & Northern Railway Co. bonds in sinking fund sold	6,365.37
Uncollectible accounts written off	38,044.55
Adjustments in accounts	37,250.46
Estimated liabilities for operating expenses and taxes of the Oregon Railroad & Navigation Co. not of record on date of sale of railways and property to the Oregon-Washington Railroad & Navigation Co.	523,266.17
Balance June 30, 1911	186,914,930.80
Total	$191,410,886.09

CREDITS.

Balance June 30, 1910		$115,796,646.87
Balance income from transportation operations (Table No. 2)	$4,601,702.91	
Balance income other than from transportation operations (Table No. 3)	9,732,742.63	14,334,445.54
Difference between $87,675 face value Union Pacific R. R. Co. Twenty Year Four Per Cent. Convertible Bonds retired and cancelled and $50,100 par value common stock issued in exchange therefor		37,575.00
Profit from sales of Northern Securities stock and stocks received in exchange therefor	$58,684,157.76	
Less: Amount taken up in Profit and Loss year ended June 30, 1905	4,955,479.30	53,728,678.46
Profit on sales of securities other than investment stocks		55,366.14
Sinking fund contributions and income from sinking fund investments		24,004.31
Interest on construction advances included in the cost of the railways purchased by the Oregon Short Line Railroad Co. and the Oregon-Washington Railroad & Navigation Co.		*3,426,734.83
Interest accruing prior to July 1, 1910, on other advances		150,467.02
Difference between proceeds from sale of property and amount charged on books		80,532.01
Proceeds from sale of unpledged lands and town lots		50,694.49
Liabilities written off		73,083.07
Old accounts collected		3,078.63
Expenditures by Oregon Railroad & Navigation Co. for additions, betterments and equipment since reorganization in 1898 to December 23, 1910, which were in former years charged to "Income Account", included in the purchase price of the property		3,649,579.72
Total		$191,410,886.09

*Interest as authorized in the "Classification of Expenditures for Road and Equipment" prescribed by the Interstate Commerce Commission, effective July 1, 1907.

UNION PACIFIC RAILROAD AND AUXILIARY COMPANIES.
NO. 5—ASSETS, JUNE 30, 1911.
(Excluding stocks and bonds owned by Auxiliary and Proprietary Companies and all offsetting accounts between them.)

	This Year.	Last Year	Increase or Decrease
Capital Assets.			
Cost of railways, equipment and appurtenances	*$478,844,052.15	$406,781,240.74	$72,062,811.41
Advances for construction and acquisition of new lines	8,131,040.03	36,870,601.98	—28,739,561.95
Terminal property and other lands	13,371,596.28	14,107,251.79	—735,655.51
Building and [illegible]	8,990,311.86	12,341,244.85	—3,350,932.99
Ocean [illegible]	6,191,862.92	6,132,890.48	58,972.44
	$515,528,863.24	$476,233,229.84	$39,295,633.40
Stocks and bonds as detailed in Tables Nos. 9, 10 and 11	259,831,380.01	208,561,011.65	51,270,338.36
Trust funds	266,105.34	261,862.44	4,242.90
	$775,626,218.59	$685,056,103.93	$90,570,114.66
Current Assets.			
Demand loans, Southern Pacific Co.	$20,007,305.41	$10,901,568.97	$9,105,736.44

Loans to San Pedro, Los Angeles & Salt Lake R. R. Co.	1,168,860.00	.....	1,168,860.00
Loans to Utah Light & Railway Co.	5,498,108.14	4,526,762.63	971,345.51
Cash	12,171,011.27	9,082,088.21	3,088,923.06
Demand loans and time deposits	28,900,000.00	27,450,000.00	1,450,000.00
Agents and conductors	582,529.43	1,042,116.17	—459,586.74
Traffic and car service	13,626.17	100,304.27	—86,678.10
Income accrued to June 30, on securities owned	4,625,691.00	4,939,580.50	—313,889.50
Individuals and companies.	3,177,674.25	3,922,489.88	—744,815.63
U. S. Government transportation	502,725.82	403,059.61	99,666.21
Deposits against matured and called bonds	3,000.00	3,000.00	.....
Material, fuel and supplies.	12,530,439.60	12,631,156.74	—100,717.14
	$89,180,971.09	$75,002,126.98	$14,178,844.11
Deferred Assets.			
Individuals and companies..	$394,910.68	$78,087.27	$316,823.41
Contingent Assets.			
Unadjusted accounts	$790,235.72	$733,079.04	$57,156.68
Due from proprietary companies	1,043,942.23	1,311,747.00	—267,804.77
Land and town lot contracts..	2,411,289.78	2,749,622.94	—338,333.16
	$4,245,467.73	$4,794,448.98	—$548,981.25
Total assets	$869,447,568.09	$764,930,767.16	$104,516,800.93

*The sum of $18,771,091.13 received to date from the Improvement and Equipment Fund and $13,310,236.52 appropriated from "Income Account," a total of $32,081,327.65 has been applied as a credit against this cost.

UNION PACIFIC RAILROAD AND AUXILIARY COMPANIES.
NO. 5.—LIABILITIES. JUNE 30, 1911.

(Excluding stocks and bonds owned by Auxiliary and Proprietary Companies and all offsetting accounts between them.)

LIABILITIES.	THIS YEAR.	LAST YEAR.	INCREASE OR DECREASE.
Capital Liabilities.			
Union Pacific Railroad Co.:			
Common stock	$216,627,800.00	$216,577,700.00	$50,100.00
Preferred stock	99,543,600.00	99,544,000.00	—400.00
Stocks of Auxiliary Companies in hands of the public, viz.:			
Oregon Railroad & Navigation Co.:			
Common stock	.....	20,100.00	—20,100.00
Preferred stock	.....	3,410.00	—3,410.00
Oregon-Washington Railroad and Navigation Co.:			
Capital stock	1,500.00	.....	1,500.00
Total stocks	$316,172,900.00	$316,145,210.00	$27,690.00
Funded debt (excluding bonds owned of Auxiliary and Proprietary Companies), Table No. 14	329,232,380.00	297,449,150.00	31,783,230.00
	$645,405,280.00	$613,594,360.00	$31,810,920.00
Current Liabilities.			
Coupons matured but not presented	$109,752.64	$152,767.74	—$43,015.10
Coupons due July 1	3,437,927.50	3,190,130.00	247,797.50
Interest accrued on bonds and loans to June 30	1,373,950.49	1,425,009.50	—51,059.01
Dividends due but uncalled for	45,797.50	43,176.50	2,621.00
Dividends payable July 1st and October 2nd	12,822,119.50	12,819,797.00	2,322.50
Mortgage bonds satisfied	3,000.00	3,000.00	.....
Vouchers and pay rolls	7,425,541.48	6,143,765.45	1,281,776.03
	$25,218,089.11	$23,777,646.19	$1,440,442.92
Deferred Liabilities.			
Taxes assessed but not due..	$1,558,720.41	$1,347,919.09	$210,801.32
Hospital department	103,882.32	96,175.19	7,707.13
	$1,662,602.73	$1,444,094.28	$218,508.45
Contingent Liabilities.			
Insurance fund	$410,358.83	$410,670.16	—$311.33
Reserve for depreciation on steamships, on rolling stock leased to other companies, and on miscellaneous property	1,192,478.53	1,917,219.70	—724,741.17
Union Pacific Coal Co.	1,617,402.82	2,022,467.50	—405,064.68
Union Pacific Land Co.	.....	68,267.21	—68,267.21
Due to proprietary companies	3,942,802.66	3,149,772.31	793,030.35
Principal of deferred payments on land and town lot contracts	2,411,289.78	2,749,622.94	—338,333.16
Unadjusted accounts	672,332.83	.....	672,332.83
	$10,246,665.45	$10,318,019.82	—$71,354.37
Balance to credit of profit and loss (Table No. 4)	$186,914,930.80	$115,796,646.87	$71,118,283.93
Total liabilities	$869,447,568.09	$764,930,767.16	$104,516,800.93

UNION PACIFIC RAILROAD AND AUXILIARY COMPANIES.
NO. 6. RECEIPTS AND EXPENDITURES FROM ALL SOURCES, YEAR ENDED JUNE 30, 1911.

EXPENDITURES.

Capital Expenditures.		
Extensions and branches	$5,686,400.71	
Balance of cost of properties acquired by Oregon Short Line and Oregon-Washington R. R. & Nav. Co.	18,026,117.48	
Additions and betterments	14,414,917.11	
Expenditures for construction and acquisition of new lines, terminal lands and property, and for rolling stock	3,864,620.61	
Advances for ocean steamships	58,972.44	
Miscellaneous improvements	4,744.73	
	$42,055,773.08	
Deduct for:		
Receipts from Improvement and Equipment Fund	$1,350,000.00	
Surveys and construction expenditures on lines subsequently abandoned, written off	641,050.25	
Abandoned property not to be replaced	165,487.11	
Transfers and adjustments in accounts	603,602.32	
	$2,760,139.68	
Increase in Assets.		$39,295,633.40
Stocks and bonds	$51,270,238.36	
Demand loans to Southern Pacific Co.	9,105,736.44	
Other demand loans and time deposits	3,590,205.51	
Cash	3,088,923.06	
Unadjusted accounts	57,156.68	
Total increase	$67,112,260.05	
Less decreases:		
Material, fuel and supplies	$100,717.14	
Due from proprietary companies	267,804.77	
Current cash accounts	1,184,237.45	
Total decrease	$1,552,759.36	
		65,559,500.69
Total		$104,855,134.09

RECEIPTS.

Capital Liabilities.		
U. P. R. R. Co. common stock issued in exchange for Twenty Year Four Per Cent. Convertible Bonds retired and cancelled	$50,100.00	
O. W. R. & N. Co. capital stock sold	1,500.00	
U. P. R. R. Co. First Lien and Refunding Four Per Cent. Bonds sold	7,275,000.00	
U. P. R. R. Co. First Lien and Refunding Four Per Cent. Sterling Bonds exchanged for Dollar Bonds	6,405.00	
O. W. R. & N. Co. First and Refunding Four Per Cent. Bonds sold	24,625,000.00	
	$31,958,005.00	
Deduct for:		
U. P. R. R. Co. preferred stock acquired	$400.00	
O. R. R. & N. Co. preferred stock retired	20,100.00	
O. R. R. & N. Co. common stock retired	3,410.00	
U. P. R. R. Co. Twenty Year Four Per Cent. Convertible Bonds retired and cancelled.	87,675.00	
O. S. L. R. R. Co. Income "A" Bonds acquired	23,500.00	
O. S. L. R. R. Co. Income "B" Bonds acquired	12,000.00	
	$147,085.00	
Increase in Liabilities.		$31,810,920.00
Current cash accounts	$1,658,640.04	
Due to proprietary companies	319,698.46	
Contingent unadjusted accounts	672,332.83	
Total increase	$2,650,671.33	
Less decrease:		
Reserve for depreciation on steamships, equipment, and miscellaneous property	724,741.17	
Profit and Loss.		1,925,930.16
Gross operating revenues	$88,983,107.81	
Interest, dividends and other income	22,449,046.38	
	$111,432,154.19	
Profit on Northern Securities stocks	53,728,678.46	
Expenditures for additions, betterments and equipment charged to "Income Account" in former years	3,649,579.72	
Difference between $87,675 face value Union Pacific R. R. Co. Twenty Year Four Per Cent. Convertible Bonds retired and cancelled and $50,100 par value common stock issued in exchange therefor	37,575.00	
Miscellaneous receipts	73,083.07	
Total receipts	$168,921,070.44	
Deduct for:		
Operating expenses	$49,807,833.99	
Taxes	3,464,147.20	
Interest on funded debt and other charges	14,393,534.52	
Dividends on preferred and common stocks	25,641,315.51	
Discount, commission and expenses on bonds sold	2,995,734.25	
Miscellaneous expenses and charges	1,500,221.04	
Total expenditures	$97,802,786.51	
		71,118,283.93
Total		$104,855,134.09

UNION PACIFIC RAILROAD AND AUXILIARY COMPANIES.
NO. 9.—STOCKS OWNED OF OTHER COMPANIES, JUNE 30, 1911.

COMPANY.	TOTAL OUTSTANDING JUNE 30, 1911.	TOTAL OWNED BY THE UNION PACIFIC RAILROAD AND AUXILIARY.	+INCREASE. −DECREASE. DURING YEAR.
Camas Prairie Railroad	$4,000,000.00	$4,000,000.00	.....
Central Idaho Railroad (a)	220,000.00	220,000.00	+ $198,000.00
Green River Water Works	225,000.00	225,000.00	.....
Ilwaco Railroad	.....	.....	—(b) 315,000.00
Kansas City Terminal Railway	1,000,000.00	100,000.00	.....
Leavenworth & Topeka Railway	50,000.00	25,000.00	.....
Leavenworth Depot & Railroad	150,000.00	50,000.00	.....
McKeen Motor Car	1,000,000.00	550,000.00	+ 550,000.00
Ogden Union Railway & Depot	300,000.00	150,000.00	.....
Oregon & Washington Railroad	1,000,000.00	999,300.00	.....
Pacific Fruit Express (c)	10,800,000.00	5,400,000.00	.....
Rattlesnake Creek Water	78,300.00	78,300.00	.....

Riverside Homestead	100,000.00	100,000.00		.....
St. Joseph & Grand Island Railroad:				
Common	4,600,000.00	3,956,400.00	+	875,900.00
First Preferred	5,500,000.00	2,429,340.00	+	1,014,240.00
Second Preferred	3,500,000.00	2,719,100.00	+	904,100.00
Salt Lake & Idaho Railroad. (a)	160,000.00	160,000.00	+	144,000.00
San Francisco & Portland Steamship	500,000.00	500,000.00		.....
San Pedro, Los Angeles & Salt Lake Railroad	25,000,000.00	12,500,000.00		.....
Short Line Land & Improvement	100,000.00	50,000.00		.....
Topeka Iron	110,000.00	55,000.00		.....
Union Depot & Railway (Denver)	400,000.00	240,000.00		.....
Union Depot (Kansas City)	.....	.....	—	45,000.00
Union Land	10,000.00	10,000.00		.....
Union Pacific Coal	5,000,000.00	5,000,000.00		.....
Union Pacific Equipment Association	100,000.00	100,000.00		.....
Union Pacific Land	100,000.00	100,000.00		.....
Union Pacific Water	500.00	500.00		.....
Utah Light & Railway:				
Common	2,052,250.00	1,852,350.00	+	2,825.00
Preferred	3,996,500.00	3,842,875.00	+	2,000.00
Yakima Valley Transportation	500,000.00	499,700.00	+	499,700.00
Total, 1911	.....	$41,922,865.00	+	$3,830,765.00
Total, 1910	.....	38,092,100.00		.....

(a) 10 per cent. paid. (b) Retired by sale of property to Oregon-Washington Railroad & Navigation Company. (c) $5,400,000 owned by Southern Pacific Company.

Of the total $41,922,865.00 owned in 1911, $99,400.00 Union Pacific land stocks were pledged and the remainder unpledged. Of the total $38,092,100.00 owned in 1910, $99,400.00 were pledged and the remainder unpledged.

UNION PACIFIC RAILROAD AND AUXILIARY COMPANIES.
NO. 10.—INVESTMENT STOCKS OWNED, JUNE 30, 1911.

COMPANY.	Total. Par Value. Owned by the Union Pacific R. R. Co. and the Oregon Short Line R. R. Co.	Increase or Decrease During Year.	Deposited Under Oregon Short Line Refunding Mortgage. (a)
Baltimore & Ohio Railroad.			
Common Stock	$32,334,200.00	.....	$10,255,400.00
Preferred Stock	7,206,400.00	.....	7,206,400.00
Chicago & Alton Railroad.			
Preferred Stock	10,343,100.00	.....	.....
Chicago & Northwestern Railway.			
Common Stock	4,018,700.00	—$50.00	.....
Chicago, Mil. & St. Paul Ry.			
Preferred Stock	1,845,000.00	.....	.....
Illinois Central Railroad.			
Capital Stock	22,500,000.00	.....	.....
New York Cent. & H. R. R. R.			
Capital Stock	17,857,100.00	.....	8,000,000.00
Northern Securities.			
Stubs	724,900.00	.....	.....
Railroad Securities.			
Common Stock	3,484,420.00	$1,020.00	.....
Preferred Stock	1,936,400.00	500.00	.....
Southern Pacific.			
Common Stock	126,650,000.00	.....	108,000,000.00
Total, 1911	$228,900,220.00	$1,520.00 —50.00	$133,461,800.00

(a) Of the total $100,000,000 of bonds outstanding under this mortgage, $55,000,000 are a free asset in the treasury of the Union Pacific Railroad Co.

UNION PACIFIC RAILROAD AND AUXILIARY COMPANIES.
NO. 11.—BONDS OWNED BY OTHER COMPANIES, JUNE 30, 1911.

COMPANY.	Total Outstanding June 30, 1911.	Total Owned by the Union Pacific Railroad and Auxiliary Companies.	+Increase. —Decrease. During Year.
Atch. Union Depot & R. R. Second Mortgage 5%	$31,500.00	$4,500.00	.....
Cheyenne County, Colorado. Refunding 5%	.....	26,200.00	.....
Green River Water Works. First Mortgage 6%	194,000.00	194,000.00 —	$4,000.00
Idaho Northern Railroad. First Mortgage 5%	.....	..... —(b)	875,000.00
Second Mortgage 5%	.....	..... —(b)	160,000.00
Illinois Railroad. First Mortgage 6%	.....	..... —(b)	305,000.00
Leavenworth & Topeka Ry. First Mortgage 6%	250,000.00	125,000.00	.....
Leavenworth, Topeka & S. R. R. First Mortgage 5%	150,000.00	63,000.00	.....
Northern Pacific Terminal. First Mortgage 6%	3,416,000.00	217,000.00 +	43,000.00
Ogden Union Railroad & Depot. First Mortgage 5%	326,000.00	163,000.00	.....
Oregon, Wash. & Idaho R. R. First Mortgage 6%	.....	..... —(b)	3,000,000.00
Payette Valley Railroad. First Mortgage 6%	44,000.00	44,000.00	.....
Payette Valley Irrigation R. R. First Mortgage 6%	140,000.00	140,000.00 +	140,000.00
Rattlesnake Creek Water. First Mortgage 6%	146,000.00	146,000.00	.....
San Pedro, Los Angeles & Salt Lake Railroad. First Mortgage 4%	48,825,000.00	24,417,000.00 +	974,000.00
Sharon Township Railroad. First Mortgage 6%	15,000.00	15,000.00 +	15,000.00
Southern Pacific. 4% Terminal Convertible	81,151,000.00	927,000.00	.....
4½% Twenty Year Gold	227,000.00	66,000.00 +	1,000.00
Utah Light & Power. Consolidated Mortgage 4%	1,115,000.00	2,000.00	.....
Utah Light & Railway. Consolidated Mortgage 5%	1,485,000.00	993,000.00	.....
Collateral Trust 6%	175,000.00	5,000.00 —	36,000.00
Union Pacific Coal. First Mortgage 5%	(a) 5,000,000.00	3,354,000.00 —	153,000.00
Union Pacific Land. First Mortgage 4%	5,381,840.00	5,381,840.00 —	464,160.00
Total, 1911	.....	$36,283,540.00 —	$3,824,160.00
Total, 1910	.....	40,107,700.00	.....

(a) $1,646,000 held by Union Pacific Coal Co. sinking fund. (b) Retired by sale of property to Oregon-Washington Railroad & Navigation Co.

Note.—Of the total $36,283,540.00 owned in 1911, $23,443,000.00 San Pedro, Los Angeles & Salt Lake first mortgage 4 per cent. bonds and $5,381,840.00 Union Pacific land first mortgage 4 per cent. bonds were pledged and the remaining bonds were unpledged. In 1910, of the total $40,107,700.00, $5,846,000.00 were pledged and the remainder were unpledged.

UNION PACIFIC RAILROAD AND AUXILIARY COMPANIES.
NO. 27.—GENERAL OPERATING RESULTS, YEAR ENDED JUNE 30, 1911.

	This Year.	Last Year.	Increase or Decrease.	Per Cent.
Av. mls. of way operated	6,678.29	6,296.22	382.07	6.07
REV. AND EXPENSES.				
(Rail Lines and Outside Operations.)				
Gross revenues	$88,983,107.81	$90,228,092.20	—$1,244,984.39	1.38
Gross expenses	49,807,833.99	46,938,909.34	2,868,924.65	6.11
Revenues over expenses.	39,175,273.82	43,289,182.86	—4,113,909.04	9.50
Ratio of exp. to gross rev.	55.97	52.02	3.95	7.59
(Rail Lines Only.)				
Total operating revenues.	87,201,971.38	88,506,465.44	—1,304,494.06	1.47
Operating expenses	47,907,772.31	45,148,270.47	2,759,501.84	6.11
Net operating revenue...	39,294,199.07	43,358,194.97	—4,063,995.90	9.37
Ratio op. exp. to tl. op. rev.	54.94	51.01	3.93	7.70
Op. rev. per mile of road	13,057.53	14,057.08	—999.55	7.11
Op. exp. per mile of road	7,173.66	7,170.69	2.97	.04
Net op. rev. per m. of rd.	5,883.87	6,886.39	—1,002.52	14.57
Op. rev. per *rev. t.* m.(a)	3.00	3.21	—.21	6.54
Op. exp. per *rev. t.* m.(a)	1.65	1.64	.01	.61
Net op. rev. per *rev.t.*m.(a)	1.35	1.57	—.22	14.01
TRAIN MILES.				
Freight trains—revenue..	11,719,366	11,995,708	—276,342	2.30
Pass. trains—revenue....	15,259,338	13,737,766	1,521,572	11.08
Mixed trains—revenue...	1,432,242	1,283,930	148,312	11.55
Special trains—revenue..	23,081	63,225	—40,144	63.49
Total train miles—loco..	28,434,027	27,080,629	1,353,398	5.00
Motor cars—revenue....	626,980	522,395	104,585	20.02
Tl. t. m. in rev. service.	29,061,007	27,603,024	1,457,983	5.28
LOCOMOTIVE MILES.				
Frt.—rev., light and help.	13,252,088	13,594,954	—342,866	2.52
Pas.—rev., l. and help.(b)	16,158,511	14,559,308	1,599,203	10.98
Mixed—rev., l. and help.	1,469,841	1,316,476	153,365	11.65
Special—rev., l. and help.	30,969	76,490	—45,521	59.51
Total *traffic* miles	30,911,409	29,547,228	1,364,181	4.62
Switching	4,331,630	4,405,689	—74,059	1.68
Tl. m. in rev. service (b)	35,243,039	33,952,917	1,290,122	3.80
Mls. in non-rev. serv.—included in "Trans. Exp."	537,665	549,541	—11,876	2.16
M. in other non-rev. serv.	1,228,945	1,111,700	117,245	10.55
Total locomotive miles(b)	37,009,649	35,614,158	1,395,491	3.92
CAR MILES.				
Frt. cars, loaded—revenue	329,078,939	327,436,361	1,642,578	.50
Frt. cars, empty—revenue	110,125,338	101,689,023	8,436,315	8.30
Caboose—revenue	11,768,231	11,991,101	—222,870	1.86
Tl. frt. car and cab.—rev.	450,972,508	441,116,485	9,856,023	2.23
Tl. f. c. and cab.—non-rev.	650,482	424,372	226,110	53.28
Tl. frt. car and caboose.	451,622,990	441,540,857	10,082,133	2.28
Passenger cars—revenue.	103,683,015	94,337,752	9,345,263	9.91
Motor cars and tr.—rev.	954,330	854,752	99,578	11.65
Total pass. cars—rev. (c)	104,637,345	95,192,504	9,444,841	9.92
Tl. pass. cars—non-rev..	237,038	198,397	38,641	19.48
Spl. cars—frt. & cab.—rev.	315,406	350,334	—34,928	9.98
Special cars—pass.—rev..	88,399	475,346	—386,947	81.40
Total special cars	403,805	825,680	—421,875	51.09
Av. No. loaded frt. cars in frt. tr.—East or North.	25.29	24.46	.83	3.39
Av. No. loaded frt. cars in frt. tr.—West or South	24.75	24.85	—.10	.40
Av. No. loaded frt. cars in freight trains	25.02	24.66	.36	1.46
Av. No. ld. and emp. frt. c. in frt. tr. (excl. caboose)	33.40	32.31	1.09	3.37
Ratio of ld. frt. car mlge. to total frt. car mlge.(d)	74.93	76.30	—1.37	1.80
Ratio of emp. frt. c. mlge. to total frt. car mlge.(d)	25.07	23.70	1.37	5.78
Av. No. cars in pass. tr..	6.00	6.12	—.12	1.96
MISCELLANEOUS.				
Av. cost of m. of w. & str. per mile of main tracks	$1,431.18	$1,458.06	—$26.88	1.84
Av. cost of rep. & replace. per mile per annum	3,712.32	3,656.45	55.87	1.53
Av. cost of rep. & replace. per pas. tr. car per an.	1,045.78	1,286.66	—240.88	18.72
Av. cost of rep. & replace. per frt. tr. car per an.	107.95	121.68	—13.73	11.28
Trans. exp. per tl. *train mile* in rev. service.(a)	82.55 cents	80.46 cents	2.09 cents	2.60
Trans. exp. per *loco. mile* used in "Trans. Exp."	66.79 cents	64.15 cents	2.64 cents	4.12

(a) Based on "total train miles in revenue service. (b) Excluding miles run by motor cars. (c) Includes mileage of passenger train cars in all trains. (d) Excludes non-revenue and caboose mileage.

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NOT only did the figures themselves in the Wabash annual report plainly indicate that the company was imperatively in need of additional capital to make improvements, but President Delano emphasized this fact by calling attention to the present unfavorable position of the Wabash as compared with its competitors. A change, therefore, was pretty plainly forecast. On Tuesday last, at the request of the Equitable Trust Company, New York, trustees of the first refunding and extension mortgage bonds of the Wabash, Robert Goelet, Edwin Hawley, Alvin W. Krech and Winslow S. Pierce were elected directors, succeeding W. H. Blodgett, E. B. Pryor, J. Gould and E. T. Welles. E. T. Jeffreys has been succeeded as chairman of the board of directors by Winslow S. Pierce, and an executive committee has been appointed consisting of the new directors and General Oldfield, [illegible] directors. It is announced that Kuhn, Loeb & Company, New York, will act as bankers for the road. No announcement has been made as to what form a reorganization of the company's finances would take. Reversing the procedure in the Missouri Pacific case, the election of directors took place first and the announcement of Kuhn, Loeb & Company's connection with future financing was made subsequently.

THE views of Mr. Foster, the Canadian minister of trade and commerce, as expressed at the recent dinner of the Canadian Club in New York City, are unique, not to say reactionary, in their bearings on the railway economics of Canada. Nova Scotia, to be sure, wants to sell her apples in the United States. But Mr. Foster wants them sent to the northwest provinces, which, he thinks, in turn ought not to trade with Oregon, but send their products to eastern Canada. Transcontinental markets thousands of miles away are thus to be substituted for markets nearby, with corresponding burdens on both producer and consumer. The proposition is interesting as going the ordinary theory of protection one better. That theory primarily is intended for the benefit of the producer, with secondary results of national development, including diversity of industries. But here is a theory that not only puts "nationality" first, but ties it up to the idea of the long haul and protective patronage of the railways. But Mr. Foster goes even further. Internal railway traffic is, in his view, the main thing, the traffic to and from the railways of the United States a thing to be discouraged and its common benefits to producer, consumer and carrier to be ignored. How such *dicta* will square with the desire of a good many of the Canadian border communities for trans-boundary trade is an interesting speculation of the future. Included with that speculation is the query how the theory squares with the invasion of New England by the Grand Trunk and the substitution of New England railway port terminals for those of the Canadian Maritime Provinces—the Grand Trunk, by the way, with the Grand Trunk Pacific, being now a highly subsidized system. But Mr. Foster's exposition throws a fresh light on two points: the shapings of the policy of a national government once it has become a heavy and direct investor in railways, and the force of the campaign cry, "Canada for the Canadians," which last September defeated reciprocity.

THE confession of the McNamaras that they dynamited the *Los Angeles Times* building is of interest to all labor union members and to all who have unions to deal with. Violence marks most strikes. This is true of strikes on railways as well as elsewhere, despite the fact that the members of railway brotherhoods are the finest classes of workingmen in the United States. It often has been charged, and has been as often denied, that the leaders of the unions either incited this violence, or countenanced it, although they might be, in public, repudiating and condemning it. Here is one case where a high officer of a large labor union—confronted by inevitable conviction of murder—confesses that he not only incited, but personally participated in, crimes of the most heinous kind. This will not tend to destroy the belief entertained by many persons that the leaders of many other labor organizations, while not perhaps actively participating, have had knowledge, both before and after their happening, of many lawless attacks on the property of employers against whom they were striking and the persons of those employed to fill the places of the strikers. Before the McNamaras confessed, labor leaders all over the country expressed the greatest confidence in their innocence, although they knew nothing of the evidence against them, and denounced their prosecution as a "capitalistic conspiracy against union labor." Since the McNamaras confessed, these same labor leaders have been vehemently denouncing them and demanding that they be hung. Cynical persons might say that, in view of all the circumstances, these denunciations seem to have been called forth rather by the making of the confessions, which may injure the cause of union labor, than the committing of the crime which cost so many lives.

The whole incident ought to be a lesson to all persons connected with labor organizations. As already indicated, it does demonstrate that strike violence has at times been directly chargeable to labor leaders, and that the unions need to be more careful about the kind of officers they choose. It also shows that sometimes, at least, the truth about such crimes will come out, and that then the harm done to unionism will be very great. Fortunately, most of the railway labor brotherhoods are led by men of ability and character, and are honestly opposed to lawlessness. But there has very recently been lawlessness in connection with strikes on railways; for example, in connection with the shopmen's strike on the Illinois Central. If the law-abiding members of labor unions act according to their best interests they will discountenance such conduct by their fellows and insist on their brotherhood officers doing so.

THE correspondent, "Operation," makes a most pertinent suggestion in commenting on Mr. Fritch's views, on another page, when he directs attention to the necessity of carefully designing locomotives to suit the special conditions for which they are to be used, in order that they may be operated with the greatest economy and efficiency. There have been instances, and comparatively recent ones, where certain types of locomotives have been ordered by some roads more because the particular type happened to be popular when the order was placed than because it was especially suited for the service in which it was to be used. The results in some cases, at least, may well be imagined. On the other hand there have been numerous notable examples recently of locomotives which have been carefully constructed to be used for certain specific conditions, and have given excellent results. As an example, we have the Mallet locomotives, which were responsible for increasing the operating capacity of the Pennsylvania division of the New York Central 40 per cent., as noted in the *Railway Age Gazette* of November 24, 1911, page 1054. The Mallet locomotive which was first tried out on this division had been designed for use on another part of the system where it had given satisfactory results, but the preliminary tests soon showed that it would have to be considerably modified for effective use on the Pennsylvania division. It was returned to the builders and a number of changes were made. The modified design was found to give such effective service that the consolidation locomotives which had been used formerly were entirely replaced by the Mallets of the new design. Another instance was the designing of the special Mountain type locomotives for use in heavy passenger service on the Chesapeake & Ohio, as described in the *Railway Age Gazette* of September 22, 1911, page 555. These locomotives are used on 96 miles of mountainous district and are hauling ten to twelve-car trains; the Pacific type locomotives which were used formerly were able to handle only six-car trains. Still another instance is the Mikado locomotives for burning lignite, which are being so successfully used by the Oregon Railroad & Navigation Company, as described in the January 27, 1911, issue of the *Railway Age Gazette*, page 167. Undoubtedly there are many cases between the two extremes mentioned above where [illegible] would undoubtedly give far better results had the design been better suited to the service for which they are being used. Often improvements can [illegible]

THE [illegible] orders given within four weeks exceeded those for months before. There has been considerable speculation as to the cause [illegible]

ment and supplies had sunk was one of them. Another, doubtless, was that the car surplus went pretty low in the latter part of October. Then, most roads had been retrenching severely; it was becoming imperative for some to begin to buy unless their equipment and track were to be allowed to get into bad condition; and when some begin to order others promptly follow suit for fear that so many orders will get in ahead of their own that there will be excessive delay in filling them. It is an interesting and important question whether the increase in orders is merely a temporary "bulge," or the beginning of a buying movement that will continue. Probably it will be some time before orders will equal those back in the palmy days of 1905, 1906 and the early part of 1907; but it is impossible to believe that they will not continue to exceed what they have been, on the average, during the last four years. The railways have been out of the market, comparatively speaking, for a long time. This has been partly because of the agitation regarding regulation; partly because general business conditions have been unfavorable. The agitation regarding regulation is growing less; public opinion about the roads is more intelligent and favorable than in a long time; there is no threat of heavy reductions in earnings by regulation, except that involved in the Pacific coast rate cases. Labor is showing more disposition to be reasonable in its demands. There are signs of an improvement in general business conditions; the increase in purchases by the railways themselves will help stimulate that improvement. Furthermore, railway purchases have for some time been relatively so small that in many cases they must be increased if the properties are not to be allowed to deteriorate unduly. The car surplus on November 22 showed a decrease as compared with November 8, whereas at this period it has usually shown an increase. Various facts indicate that the available supply of cars is getting too low. Now, orders for equipment cannot be filled instantaneously; and if there should be in the fall of 1912 one of those big increases in traffic such as took place in the years before the panic of 1907 there might be, unless meantime many new cars and locomotives were acquired, a congestion of traffic that would cause heavy losses to both commercial interests and the railways and once more inflame public sentiment against the roads. On the whole, assuming that earnings and the money market will be such that it can be done, there seems good reason why railway buying should be very substantially larger for some time to come than it has been for some time in the past; and, in view of conditions alluded to, there appears ground for believing not only that it should be, but that it will be.

LOCOMOTIVE DRIVING SPRINGS.

TECHNICAL articles on driving springs are comparatively few, and the subject has not been treated in as comprehensive a manner as its importance would seem to demand. It is not our purpose to supply this deficiency, but rather to help set in motion the investigations which are necessary for a proper measure of the relation of the cost of spring maintenance to that of the other principal details of locomotives, and the adoption of a new specification for locomotive springs, which will include methods of manufacture. The Master Mechanics' Association has not considered the subject in recent years, and its earlier treatment has little value when applied to modern practice. The specification for plate spring steel has remained the same for years, with the requirement of 1 per cent. carbon, and it is not at all certain that this is the correct proportion for maximum economy, especially when the steel has an alloy content.

The spring space on large locomotives is about the same as that for small or medium size ones, but the maximum load per axle has now reached 60,000 lbs., or about double that on many engines of moderate size still in service. The load on the driving springs has increased in the same proportion, but the length of the springs remains about the same, and it is not possible to obtain the same flexibility with the heavy spring with numerous plates. While the normal working stress may be the same the inertia of the mass and the friction of the plates

prevent the easy motion which is obtained in the lighter spring. The increased number of plates is attended by a greater lack of uniformity in the tempering and strength of the steel in any complete spring, and, consequently, there is greater stress in some plates than in others, and the weak ones finally break. There is then added to the ordinary wear the expense due to reduced mileage and to the replacement of the spring.

On certain British railways the number of driving spring failures amount to 15 per cent. per annum, and it is probable that in this country the percentage is still greater. The actual work of repairing springs has become so great in amount that most of the larger railway systems in the United States have a separate department for spring repairs, equipped with special machines similar to those used by the spring manufacturers. Little attention has been given to possible improvements resulting from the use of a more suitable grade of steel, or to the proper heat treatment of spring steel. It is true that alloy steel has been used to a limited extent, but the alloy manufacturer has been more enterprising in demonstrating the advantage of improved spring steel than the spring maker. The latter and the railways must work together in a more systematic investigation of the economic value of alloy steels for springs. There is the objection of increased cost, but is the information at hand to show whether or not it would be good business policy to pay 20 to 30 per cent. more for a grade of steel which would double the life of springs? The difficulties connected with such an investigation are complicated by the fact that while the good results might be obtained from springs made at one shop the expensive steel might easily be spoiled or so treated at another shop that no additional life would be obtained from the springs. This naturally leads us to the heat treatment of steel and the facilities for such operations.

It has been shown by tests that the elastic limit of 1 per cent. carbon steel can be made to vary from 80,000 lbs. per sq. in. to 240,000 lbs. per sq. in. by changes in the heat treatment, the low figure representing samples annealed in lead, while the high figures are for steel hardened in water at a high temperature with the temper drawn at a much lower temperature. The elastic limit of tempered steel may be as low as 140,000 lbs. per sq. in., depending on the temperature at which it is drawn. To secure the desired strength and obtain uniform results requires careful and accurate work. The heat treatment of spring steel is a delicate task, requiring proper methods of heating the steel uniformly to the proper temperature, and cooling it in a medium whose temperature and heat conductivity can be kept nearly constant. It is surprising that the spring maker has been able to gage the higher temperature for quenching and hardening by the color with sufficient accuracy to get fairly uniform results, but the lower temperature for drawing the temper is below red heat, and its degree must be gaged in a rough way by the appearance of the flame in the furnace.

Electric pyrometers have been devised for measuring the temperature of the furnace, and of the bath used in quenching, and also for recording these temperatures by a Bristol gage; but such refinements have not come into regular use in spring manufacture. They were used in a series of tests made by the Baldwin Locomotive Works in 1907, and the results of different heat treatments on the transverse electric limit of spring steels were reported in a paper read by Lawford H. Fry at the Copenhagen Congress of the International Society for Testing Materials, in September, 1909. During the past year the Pennsylvania Railroad has conducted similar experiments with scientific refinement; these tests have included steels of different contents of carbon with different heat treatments, and the results have had a marked effect on prolonging the life of locomotive driving springs.

There is a large field for investigation and an opportunity for a reduction in the cost of locomotive repairs, which is now well started, but is not being pushed to the extent of bringing these refinements of spring manufacture into regular use. The railway testing engineers should frame a new specification for plate springs which would include more accurate and uniform heat treatments. The costs of maintenance of plate springs per locomotive per year should be known so that a proper estimate can be made of the increased price which could be profitably paid for springs which will give a much longer service than those now in general use.

THE EXPANSION OF RAILWAY COMMISSIONS.

THE development of the state railway commissions of the country during the last few years has been characterized by the great expansion of the powers of those bodies. This has been true in the cases where the railway commission has been allowed to retain a distinctive and separate organization. But it has been even more marked in the many cases where the old railway commissions have evolved under legislative enactment into public utility bodies, with jurisdiction over about every corporation that has a public or quasi-public relation. State railway commissions were originally such pure and simple ones, with very limited powers over the steam lines exclusively. The extension of powers to the street railways was easy and logical. But now they are fast becoming merged into general public utility commissions where the railway is but one branch of commission energy. The double commission of New York state is perhaps the most conspicuous example. But Connecticut, after her railway commission has existed for 57 years, has merged it in a general utilities body with greatly increased functions; and in Massachusetts a movement seems to have definitely begun for merging four public service commissions in one—economy and uniformity being among the arguments used in its favor. Many state legislatures are soon to meet again. And, although the pace of anti-railway law making visibly diminished last year, it will be strange if the movement toward the conversion of the railway commission into the amplified public service commission does not persist.

This progressive and steady change from special commissions to general commissions is one of importance from several viewpoints. It is obvious that it almost necessarily shifts the functional character of a commission's work. A commission with but one objective—say, for example, the gas and electric light commission of Massachusetts—can be special experts themselves and in a large sense join both judicial and administrative labor. But expand its jurisdiction to steam roads, street railways, telephone and water companies and the rest, its functions then change fundamentally. Its range of duties becomes too large for individual energy and judgment. It must rely more and more on delegated powers, on expert testimony, on a group of inspectors likely to be very numerous and of uncertain and varying, if not doubtful, capacity. The commission thus becomes, in a decided way, judicial, and may often be almost legislative, as is the case not seldom with courts. As a centralized body with a good deal of patronage, the change has evidently its dangers. That, however, depends much on the personnel of the utilities commissions. Their greatly increased responsibilities accentuate the old argument against the old evils of partisan patronage and, probably, in the long run will tend to prevail against it. There are some responsibilities from which even the office-seeking politician will recoil, and it must, at least, be said that the office of a general public utilities commissioner, even though the salary be large, will never be sought as a sinecure—or, if sought, not long held as such.

Turning from the civic to the railway viewpoint, the change from special to general in state commissions has both its advantages and disadvantages. Expert testimony, as has been said, appears likely to figure much more generally in the decisions of the general commission than of the old special commission, especially when large interests are at stake. Genuinely expert evidence should be welcome to every railway corporation, and even masquerading inexpert evidence cannot be much worse than an inexpert commission acting on its own evidence. Real expert testimony is also a direct check on any demagogical commission tendencies. It may also be said that broader diffusion of com-

mission duties makes the railway less of a target than heretofore. On the other hand, a railway company seeking a positive ruling may suffer from the same cause of diffused and complex duties of a general commission and from its vexing delays, often when the most simple matters are up for decision. Just here is one of the worst vexations in the transition from the separate railway commission to the general utilities body. Is it within human power for such an organization to cover both intelligently and promptly its greatly widened field of duties, especially in a large state?

With all these drawbacks attending the evolution of the old state railway commissioner into a general public utilities official, there is in other directions some room for optimism. He will be better paid. He will, in consequence, be more often than heretofore a man who, whether in successful trade or profession, is willing to give his time to public duty. The increased responsibilities of the place will call for more discretion on the part of the appointing power, usually the governor of the state; and, finally, this new stage of commission evolution almost surely marks the extinction of railway commissionerships as sinecures. This last, alone, is a clear and positive betterment, and is in the direction of securing, sooner or later, that individual quality of training, judgment and integrity without which any state commission fails, and with which a state commission may get along even in the face of the complicated interests which now so deepen the problem—and deepen it not only in state but in federal relations.

RAILWAY BONDS AND MUNICIPAL BONDS.

ATTENTION has of late been called to the decline in price, and consequent increase in the return to the investor, of the American railway bond. The truth is that the decline is but part of a pretty general fall of bonds of all corporations reaching over the last year or two. Actual tabulation of quotations in such a matter are apt to be illusory, as they vary so much with the periods and the particular classes of the securities selected. Yet in such an analysis, remembering that the prices of the highest group of securities is a test, one might point to figures showing that three months ago fifteen different issues of railway bonds of the "savings bank" class sold on an average as high as 4.16 basis of yield to the investor. Or, to be more specific, one finds that recently the New York City "long" 4s have been selling at par, while the first mortgage long 4s of the Union Pacific have been selling a little above it. But certain special causes connected partly with increase of debt, extravagance and the law of supply and demand detract from the value of the quotations of New York City issues as a standard. More suggestive is the statement of the *Wall Street Journal* that "From the first half to the last half of this decade . . . the average rise in yield of all municipal bonds was about 0.37 points, or 10.62 per cent. of itself as compared with 0.11 points or 2.66 per cent. of the yield of railway bonds." But the classes of securities in each case here selected for the comparison of yield to the investor are not given.

As a test, though not an absolutely accurate and just one, of [illegible] ago which reads: "The city of New Britain, Conn., has awarded [illegible] a basis of 4.12 per cent." Yet the city of New Britain is a prosperous New England municipality, perfectly solvent, with a [illegible] in 1900, a gain of nearly 56 per cent.

Why anything like exact returns based upon market quotations [illegible] the higher grade of railway bonds of the savings bank type. A long list of railway bonds legal for savings bank investment in New York thus show a variation in the investment return of three-quarters of 1 per cent. A legislature in a New England state, a few years ago, opened to savings bank investment the bonds of a western railway which has since gone into the hands of a receiver. Municipal bonds, whether open to savings bank investment or not, have also their considerable mutations in price. They are affected by the size of the municipality, the extent of the local market, the amount of the debt of the municipality itself, its ratio to the assessed valuation or revenue of the city, town, village or school district, the state laws bearing on debt limitation and, perhaps above all, tax exemptions or lack of them. The same matter of taxation bears directly on the market price of the railway bond too. Some states tax railway bonds severely, other states give them liberal exemptions. One state takes the tax out of the holder of the railway bond, another state out of the railway corporation, and a third state commutes the high local tax on the bond for a lower tax to be paid to the state treasury. All these divergent conditions bear upon the market price and must obscure any railway and municipal comparison based upon the market quotation.

When, however, the appeal is made to more familiar and general facts the investment situation in the case of the railway bond versus the municipal security is outlined more clearly. What has actually come to pass during a period of somewhat prolonged depression has been the rise of influences prejudicial to the railway bond. Unlike the municipal bond, it has had to resist the sentimental force of the fall of its outlying stock and of junior bonds and debentures. It has had to face the two market competitions of large issues of industrial and street railway bonds, all making a higher return. In the case of the private investor these two investment rivalries have undoubtedly forced down the municipal security also; but, on the other hand, the municipal security has probably had the advantage over that of the railway of more stable "institutional" demand and absorption, nor has it had to meet state and federal regulation, except in the matter of statutory restriction of municipal debt—an influence promoting and not injurious to municipal credit. Where the municipal bond has undoubtedly suffered has been in too lavish municipal expenditure, resulting large expansion of issues in proportion to municipal capital and revenue, and the market effects in supply and demand. But even allowing for that, the way in which the "good" railway bond has apparently nearly or quite nearly held its own against the municipal security is remarkable. It is more impressive still as an index of the stability of railway credit if the theorem of the *Wall Street Journal* that the railway bond has comparatively more than held its own is accepted.

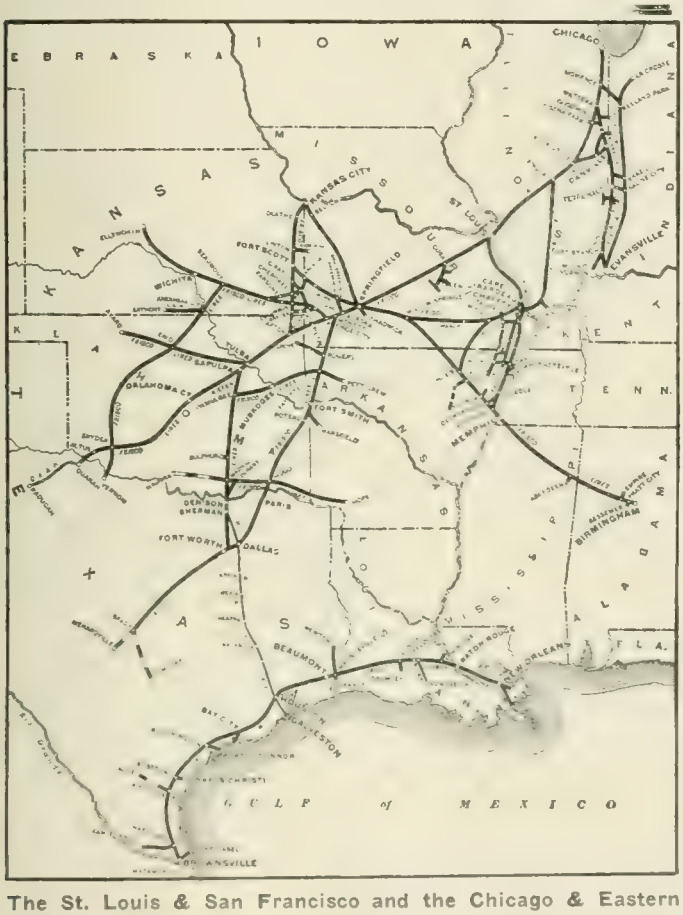
ST. LOUIS & SAN FRANCISCO AND CHICAGO & EASTERN ILLINOIS.

A GOOD deal of information about the future outlook of the St. Louis & San Francisco and its present financial standing is conveyed by the statement of the fact that, in the fiscal year ended June 30, 1911, 276 industrial plants were located on the lines of the Frisco itself, with an estimated capacity of 59,000 carloads per year, and on the Chicago & Eastern Illinois, 50 new industries, with an estimated capacity of 10,500 carloads; and that the company is at present paying well over 6 per cent. for money to make additions and improvements, as shown by the sale to Speyer & Co., New York, a few days ago, of $2,553,000 general lien 15-20 year 5 per cent. bonds which were offered to the public by the bankers at 89, yielding 6⅛ return on the investment.

Although the St. Louis & San Francisco and the Chicago & Eastern Illinois are operated separately, but with many of the same officers, it is proper to study the results of their operation as one property, since, as far as physical plant is concerned, the C. & E. I. forms a highly valuable Chicago division for the St. L. & S. F. Although operating conditions in many ways are quite different on the Frisco itself from those on the C. & E. I., there is no greater difference than between different divisions on many other properties. The Frisco itself in its annual

report gives both a separate statement for its own property and a combined statement showing the operations of the two properties. Taking the two properties together, they operate a little over 6,000 miles of railway, and in 1911 earned gross $55,440,000, or $2,520,000 more than in 1910. Expenses were greater by $1,030,000 and taxes by $330,000, so that operating income totaled $15,630,000 in 1911 and $14,470,000 in 1910. On both the Frisco and the C. & E. I. there is an increase of something over 1 per cent. in freight revenue, but on the Frisco an increase of 13.7 per cent. in passenger revenue, and on the C. & E. I. an increase of 12.2 per cent.

With this increase in passenger business, and in the light of increases in wages, we might expect to find operating expenses much higher in 1911 than in 1910; but, as has been mentioned, the increases in operating expenses were not large. The saving, however, was made entirely in maintenance. On the C. & E. I. maintenance of way cost $1,150,000 in 1911, or almost exactly



The St. Louis & San Francisco and the Chicago & Eastern Illinois.

the same as in 1910; increases in the cost of maintaining joint track and of slightly larger sums spent for other track material being offset by decreases in the sums spent for roadway and track (track labor largely); removal of snow, sand and ice; and bridges and trestles. On the St. Louis & San Francisco, maintenance of way cost $5,470,000 in 1911, or 5.3 per cent. less than in 1910; and the smaller sum spent was due very largely to the fact that 15.59 per cent. less was spent on bridges, trestles and culverts; 4.58 per cent. less on roadway and track; 28.69 per cent. less on rails, and 85.63 per cent. less on ballast. Maintenance of equipment cost $1,980,000 on the C. & E. I. in 1911, a decrease of 3.2 per cent., and $5,740,000 on the Frisco, or 3.40 per cent. less than in 1910. The saving on the C. & E. I. was largely in the cost of repairing freight train cars, and on the Frisco almost entirely from the smaller sum spent for repairs and renewals of locomotives.

As would be expected with such substantial increases in passenger business and with the increase in wages, transportation expenses were higher in 1911 than in 1910. For the two properties, transportation cost $20,280,000, or $1,480,000 more than in 1910. This shows, probably, actual economies in the operating department, and this surmise is strengthened by traffic statistics. For instance, while the number of passengers carried one mile on the Frisco totaled 506,000,000 in 1911, an increase of 6.1 per cent., passenger train miles totaled 10,590,000 in 1911, an increase of 4.7 per cent. Revenue ton mileage on the Frisco totaled 2,676,000,000, an increase of 154,000,000 over 1910. On the C. & E. I. the total number of tons of revenue freight carried one mile in 1911 was 1,950,000,000, a decrease of 42,800,000.

Naturally the trainload and kindred figures for the Frisco and the C. & E. I. show sharp contrasts. The C. &. E. I. has a freight traffic density of 2,020,000 tons, while the Frisco has a freight density of 520,000 tons, or only about a quarter as much. The average trainload of revenue freight on the Frisco is 221 tons, or about two tons less in 1911 than in 1910; on the C. & E. I. the average trainload was 561 tons in 1911, or about 11 tons less than the year before. An increase from 9.8 mills in the revenue per ton mile in 1910 to 10.5 mills in 1911 for the Frisco, and from 4.6 mills to 4.8 mills on the C. & E. I., suggests that the smaller train loading in 1911 as compared with the year before was due to a smaller proportion of low grade traffic. The striking difference between the average ton-mile rate for the two companies suggests the difference in character of traffic handled. On the C. & E. I., of the total 12,440,000 tons carried in 1911, 8,090,000, or 65.04 per cent., was products of mines, comparing with 7,780,000 tons, or 64.08 per cent. of the total tonnage, in 1910. On the other hand, of the total 17,130,000 tons carried on the Frisco in 1911, 38.57 per cent., or 6,610,000 tons, was products of mines, comparing with 7,200,000 tons, or 40.41 per cent. of the total tonnage, in 1910. On the C. & E. I., products of forests furnished only between 10 and 11 per cent. of the total tonnage, whereas on the Frisco these products furnished between 19 and 20 per cent.; and products of agriculture on the C. & E. I. furnished between 7 and 8 per cent., and on the Frisco between 15 and 16 per cent. In 1911 there was a notable increase in the tonnage of cotton carried by the Frisco, an increase which amounted to 31.26 per cent.; and while cotton even then only furnished 1.42 per cent. of the total tonnage, it is highly profitable traffic both of itself and because of the development of the territory which the increase in tonnage denotes. The fiscal year ended June 30, 1911, was not a good one from point of view of quantity of cotton raised, while the present crop, the movement of which began since the close of the fiscal year, is an extraordinarily large one.

The best basis for judgment as to what the future possibilities of the property are should be such indications as we get in studying the traffic and commodity figures, and what we know of the development of the territory that it serves. The Frisco is at present capitalized higher than its earning powers warrant, and the Frisco itself probably has a good deal of very lightly built railway. There are no figures showing the weight of rail in track on the St. Louis & San Francisco, although the C. & E. I. gives such figures for its own line; and on this property, at the end of 1911, 23.86 per cent. of main, second and third track was laid with 85-lb. rail, and 33.11 per cent. was laid with 80-lb. rail. There was still, however, in track 24 per cent. of 60-lb. rail. The Frisco, with its much smaller traffic density, would show a much larger proportion of light rail, we may be pretty sure.

The consolidated balance sheet of the Frisco and the C. & E. I. shows $5,890,000 cash on hand at the end of 1911, comparing with $4,790,000 on hand at the end of 1910. Total liabilities at the end of 1911 amounted to $18,145,000, of which only $1,600,000 was loans and bills payable, while at the end of 1910 total working liabilities amounted to $16,800,000, of which $6,510,000 was loans and bills payable. In working liabilities, in the year 1911 there are included $5,030,000 matured debt, against which there is deposited in the hands of trustees, in

addition to the cash which is held in the treasury, $5,030,000 cash.

The following table shows the principal figures of operation for the St. Louis & San Francisco and the Chicago & Eastern Illinois in 1911, compared with 1910. Offsetting accounts have been eliminated:

	1911.	1910.
Average mileage operated	6,154	6,037
Freight revenue	$37,493,290	$36,904,360
Passenger revenue	14,094,359	12,416,144
Total operating revenues	55,440,572	52,916,295
Maint. of way and structures	6,622,740	6,932,198
Maint. of equipment	7,715,323	7,983,687
Traffic	1,365,629	1,304,233
Transportation	20,275,267	18,794,766
Total operating expenses	37,664,863	36,630,826
Taxes	2,149,956	1,820,310
Operating income	15,625,752	14,465,159
Gross corporate income	17,619,914	16,558,084
Net corporate income	1,721,351	1,347,623
Dividends—		
(4 per cent. on St. L. & S. F. preferred)	199,742	199,742
(6 per cent. on C. & E. I. preferred paid to others than St. L. & S. F.)	157,140	157,140
Surplus	1,364,469	990,741

NATIONAL RAILWAYS OF MEXICO.

IT seems probable that the Mexican revolution did more temporary harm to the credit of the National Railways of Mexico than to either its earnings or its physical plant. The company earned in 1911 $30,515,000,* as against $30,740,000 in 1910. This is not quite as favorable a statement as would appear on its face, since $440,000 of the total earnings in 1911 was from "construction freight," against $110,000 from "construction freight" in 1910. Even taking this into consideration, however, the effects of the revolution on earnings were not serious. On the other hand, the company needs to finance permanently a rather large floating debt. The disquieting effect of a change in government in Mexico has made the market for National Railways of Mexico securities so unsatisfactory that the management found it more advisable to continue to borrow from bankers on short term notes rather than to try to sell securities.

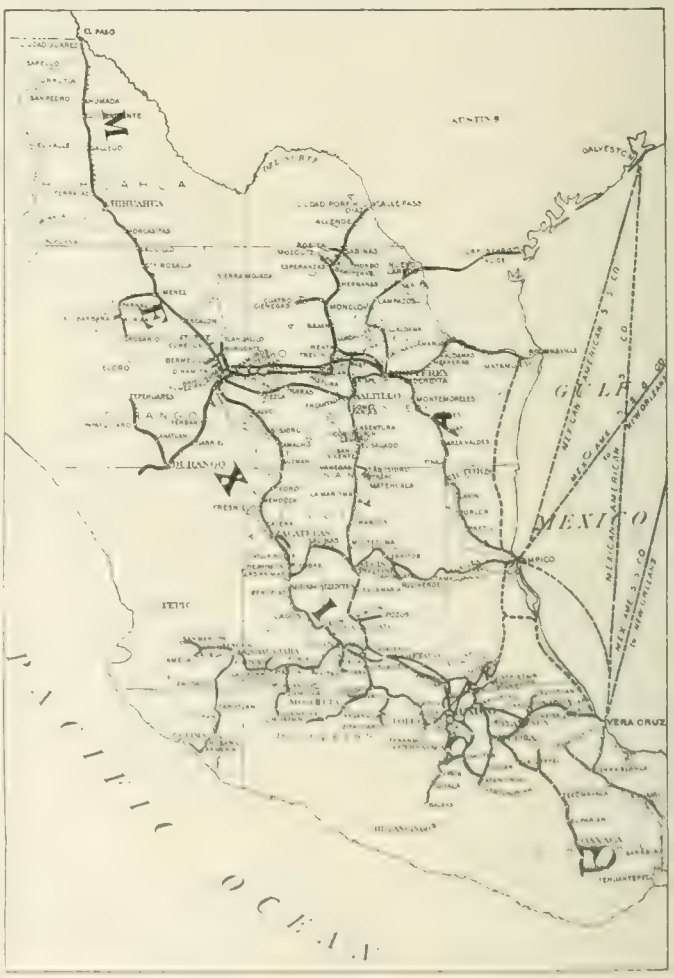
It is worth while hastily running over once again the history of the Ferrocarriles Nacionales de México (National Railways of Mexico). This was a consolidation in April, 1908, of the Mexican Central, the National Railroad of Mexico and certain other less important railway companies. Securities of the merged companies were deposited and exchanged for securities of the National Railways. The government of Mexico guaranteed the general mortgage 4 per cent. bonds, of which $50,735,000 are now outstanding, and acquired a controlling interest in the stock of the company. It will be seen, therefore, how closely connected the credit of the National Railways is with that of the Mexican government.

Insofar as the exchange of securities of the old companies is concerned, the merger plan seems to have been almost entirely successful. At the close of the fiscal year 1911, 97.50 per cent of the total issue of Mexican Central securities and 99.73 per cent. of the total issue of National Railroad of Mexico securities had been deposited under the plan. This left $5,480,000 Mexican Central securities outstanding and $170,000 National Railroad of Mexico. These are not much smaller amounts of securities undeposited than were outstanding at the beginning of the year; but on July 1, the outstanding $38,000 first mortgage bonds, $3,000,000 consolidated mortgage bonds and the $11,000 registered income bonds fell due, and all those that were presented were bought other outstanding securities when they could be secured report, which is dated October 4, 1911, there were only $2,030,000 obligations called for conversion and not yet deposited.

It is, of course, quite impossible to trace the economies and advantages arising from the merger of the companies without state of revolution and guerrilla warfare is surprisingly good. While the revolutionists, and probably at times the government

there was comparatively little wanton destruction of railway property, and the National Railways hopes to be reimbursed for some, at least, of the damage caused to its plant by military occupation.

The serious aspect of the revolution, from the point of view of the National Railways, was the temporary effect on its market for securities. There were rumors, of course, that when President Diaz left office the Mexican government in some way lost control of the company. These rumors were absolutely denied by the officers of the company and appear to be entirely unfounded. The company sold during the year $1,070,000 general mortgage 4 per cent. bonds to pay for additional rolling stock contracted for between July 1 and December 31, 1910, and $3,860,000 general mortgage 4 per cent. bonds for additions and betterments to pay for work done between January 1, 1910, and March 31, 1911, and for equipment contracted for between January 1, 1911, and March 31. There were also authorized to be



The National Railways of Mexico.

issued $4,380,000 general mortgage 4s and $6,950,000 prior lien 4½ per cent. bonds, which the directors were given the option of selling or of depositing as collateral. The company found it unprofitable to sell these bonds and therefore issued $10,000,000 2-year 4½ per cent. notes and also sold $5,000,000 notes to Lazard Brothers & Co., London, at a discount of 4½ per cent.

At the end of the fiscal year the company had $765,000 working cash and $7,005,000 cash deposited for payment of the Mexican Central bonds maturing July 1 and for the interest payment on National Railways bonds, which interest was due in July and September, etc. This is plainly too small a working capital for a company doing the volume of business that the National Railways does; and, as has been stated, the directors found that the most profitable way of strengthening their cash position was through borrowing from bankers until such times as securities

$16,405,000 notes payable, and in November final arrangements were made for the loan by bankers to the railway company of $13,000,000, of which $5,000,000 was used to pay off a loan falling due, and the remainder for additions and betterments and working capital. The greater part of the floating debt was created during the past year.

During this year $7,400,000 was spent for additions and betterments. The company tells us that their accounting system and rules for charging sums to capital expenditures are as near like those prescribed by the Interstate Commerce Commission as is expedient with the conditions under which the company carries on its business. Of this $7,400,000, $3,575,000 was for additional equipment; $1,005,000 for bridges, trestles and culverts; $685,000 for increased weight of rail and $865,000 for a change from narrow gage to standard gage on the line between Acambraco and Uruapam.

The average miles of line operated by the National Railways was 6,132 in 1911, as compared with 5,262 in 1910. Construction work now under way is mentioned in our construction news columns in this issue. It will be recalled that on June 30, 1910, the National Railways took over the operation of the Mexican International, and wherever, in its 1911 report, the company makes comparisons of traffic, earnings, etc., with 1910, it has included Mexican International operations for both years. Total earnings amounted to $30,965,000 last year, as against $30,740,000 the year before. Operating expenses totaled $19,640,000 last year and $18,365,000 the year before. In 1911, after the payment of fixed charges, there was a surplus of $1,280,000, and after the transfer of 5 per cent. of net profits to the reserve fund, provided for in the plan of organization and the payment of the full 4 per cent. on the first preferred stock, there was a surplus of $61,500 for the year. In 1910, profit, after the payment of fixed charges, amounted to $1,420,000, and after the transfer of 5 per cent. of net profits to the reserve fund, and the payment of 3 per cent. dividends on the preferred, there was $480,000 surplus. In 1911, however, an additional 1 per cent. calling for $290,000 was paid out of the 1910 surplus on the first preferred stock, so that the total 4 per cent. was paid for in both 1911 and 1910, and on this basis the 1910 surplus, after the payment of dividends, amounted to $190,000.

The increase in operating expenses is entirely accounted for by an increase in the expenses of maintenance, transportation taking a slightly smaller proportion of gross revenue in 1911 than in 1910. The operating ratio in 1910 was 59.74, and in 1911, 63.22; conducting transportation consumed 27.82 per cent. of gross in 1910 and 27.68 per cent. of gross in 1911, while maintenance of way and structures consumed 15.79 per cent. of gross in 1910 and 18.02 per cent. in 1911.

The total tonnage* of freight carried in 1911 was 6,760,000, as against 7,630,000 tons in 1910. Of this tonnage, 51 per cent. was mineral products in 1911, while 57 per cent. of the 1910 tonnage was mineral products. The important gains made last year were in the tonnage of products of forests and of products of agriculture. There were 870,000 tons of forest products carried in 1911, as against 820,000 tons in 1910; and 1,510,000 tons of products of agriculture, as against 1,480,000 tons the year before.

It seems strange indeed for a railway to receive as much per ton per mile as per passenger per mile, but the National Railways does actually charge only about the same per passenger per mile as per ton per mile. The average receipts per ton per mile in 1911 were 1.463 cents, an increase of 6.57 per cent. over 1910; and the receipts per passenger per mile were 1.456 cents, a decrease of 2.27 per cent.

During the year the company bought 33,160 tons of domestic 85-lb. rail and 33,560 tons of 75-lb. foreign rail. About 215 more miles of 85-lb. rail was in track at the end of 1911 than at the end of 1910. This is on the entire system, and some of this rail may have been in track of the Mexican International in 1910. There was also about 548 miles of additional 75-lb. rail at the end of 1911. There is still, of course, a great deal of light rail, some of it accounted for by the fact that the company operates 522 miles of narrow gage lines. Of the total 6,177 miles of main line and branch tracks, 1,665 miles are 56-lb. rail, something over 800 miles are of lighter rail, and the greater part of the rest of the track is 85, 75 and 70-lb. rail.

*Long ton of 1,000 kilograms = about 2,200 lbs.

The purchase of about half of the tonnage of new rail from Mexican mills is interesting because of the policy of the management, which tends to make the National Railways as far as is possible a Mexican institution. In 1911, for instance, there were 30,874 employees, and, of these, only 3.95 per cent. were foreigners. Of the total 26,106 employees in service at the end of 1910, 4.12 per cent. were foreigners.

The following table shows the principal figures for operation in 1911, compared with 1910:

	1911.	1910.
Average mileage operated	6,132	5,262
Commercial freight revenue	$22,160,383	$22,631,302
Construction freight revenue	438,491	107,639
Passenger revenue	6,328,555	6,115,004
Total operating revenue	30,967,211	30,741,574
Maint. of way and structures	5,580,966	4,852,150
Maint. of equipment	4,394,194	3,883,258
*Transportation	8,570,709	8,553,173
Total operating expenses	19,639,673	18,364,159
†Net operating revenues	11,327,538	10,484,368
Gross corporate income	11,799,985	11,078,636
Net corporate income	1,278,936	1,418,285
Reserve fund	63,947	70,914
Dividends	1,153,316	935,901
‡Surplus	61,673	482,384

*Includes the greater part of traffic expenses.

†These figures and all the figures below in this table are our own comparisons made between the 1910 and 1911 report. The figures above are comparisons made in the 1911 report by the company itself.

Taxes and rentals are not shown separately, so that we cannot give net corporate income after the deduction of taxes.

‡As explained in the text, an additional 1 per cent., calling for $288,329, was paid on the preferred stock in 1911 from the surplus carried over from 1910.

NEW BOOKS.

Progress and Prosperity. By William De Hertburn Washington. The National Educational Publishing Co., New York. Half morocco. 6½ x 9½. 887 pages. Price, $4.50.

The author has produced a unique book. It is devoted chiefly to the presentation of facts about, and the discussion of, railway matters, although it dips into many other affairs—such as banking, ocean and inland water transportation and the good roads question. Mr. Washington begins his history of transportation at a period long anterior to the invention of the railway. Indeed, he goes clear back to the time before man had even domesticated the peaceful ox, and had, therefore, to bear his burdens himself. He traces the development of the corporation, and the railway corporation in particular, and then enters upon a discussion of various railway questions which are now engaging attention, including methods of rate-making, capitalization, the cost of constructing railways, the profits railways earn and should be allowed to earn, etc.

He has developed some novel ways of making statistics regarding the costs of construction and the profits of railways intelligible. For example, he invented, we believe, the figure "profits per day on a mile of railway." He shows that the profits per mile per day of the New England lines in 1907, the most prosperous year in their history, were only $4.08, that for 1882-1886 they were only $2.69 per mile per day, and from 1882 to 1891 but $2.75 per mile per day. The best profits ever made by the railways of the Gulf and Mississippi valley states, he shows, were made in 1905, when they amounted to 94 cents per mile per day. They had a grand average of 39 cents as their return during the ten years from 1889 to 1898. No union carpenter, he says, would work an eight hour day at the wages per mile received by the railways of the New England states, while the profits per mile received by the Gulf and Mississippi valley lines would hardly have paid the tip that would be given to a waiter for serving a single family in a dining car.

One of Mr. Washington's interesting statements is "if our railways were valued at the average per mile at which German roads are capitalized, they would be capitalized for no less than

$25,000,000,000, or there would be $999 extra on each thousand of our present net capitalization; upon the French basis they would be valued at $32,536,000,000, or $2,437 for each thousand dollars of our present net capitalization; upon the Belgian basis, at $41,496,000,000, about $3,105 for each thousand of our net capitalization; upon the English basis, at $64,273,000,000, or practically $4,824 for each thousand dollars of our net capitalization."

The author has acquired rare skill in so presenting dry facts as to make them interesting, and many persons who may be at first repelled by the peculiar, and even grotesque, typography of the book will be surprised when they begin to read it to find how it attracts and holds them. Its peculiar typographical appearance is due to the fact that Mr. Washington has put into it over 1,200 illustrations, most of which are pertinent to the subject and help to add to the interest of the text, although many of them do not seem to have very much relation to the subject matter. It is unfortunate that a book which is well written, and is a veritable encyclopedia of information about railways both in the United States and abroad, should be sent out without any index.

The Modern Railroad. By Edward Hungerford. A. C. McClurg & Co., Chicago. Cloth, 8⅜ x 5⅝. 476 pages. Price, $1.75.

Mr. Hungerford has avoided discussion of the various issues in controversy between the railways, on the one hand, and shippers, travelers, employees and public authorities, on the other. He set out, apparently, to write a book that would reveal to the people in general what may be called the "human" side of the railway, and he has done it with fidelity and at the same time in chapters that are extremely interesting.

He starts off with some historical matter about the building and development of railways. Then he tells about bridges, about passenger stations, about freight terminals and yards, and locomotives and cars, giving a large amount of information in a form that makes it very readable. His chapter on "Rebuilding a Railroad," tells briefly why it has been necessary to reconstruct many of the old, cheaply built lines into the expensive railways of today, and narrates a good many anecdotes about this important work. The chapter on "The Railroad and Its President," will convey to a good many persons a better understanding about what railway presidents have to do and the kind of men who occupy their offices than would a good many chapters written more in the essay, and less in the anecdotal, style. From the president's office he goes to that of the general manager, and then to that of the superintendent. He turns from them to the general passenger agent and his office, and then in his chapter on "The Luxury of Modern Railroad Travel," has some things to say that will make every traveler who reads the book and then rides on the fine, fast trains of this country look about him and better observe and appreciate their elegance, comfort and speed, and the expense that it has been necessary to incur to provide these things.

He tells in an entertaining way how freight traffic and suburban traffic are built up and handled; and he even goes into the mechanical department to describe with what science its work is done. "There is," as he says, "no guess work about the modern railway, and many hundreds of thousands of dollars are spent each year in scientific tests of every sort and in salaries of men who devote their entire time to this work; and the railways reap the benefit and many hundreds of thousands of dollars in operating economies."

It would be a good thing for the railways, and a good thing for the public, if every man in the United States would read Mr. Hungerford's book. They would know very little more about rates, and valuation, and capitalization, when they got through than when they started, but they would know a good deal more about the efforts that thousands, yes, hundreds of thousands, of men have been, and are, making to give the public ever better and cheaper service, of the way that they have done it, and of the results that they are getting, and if the public understood these things as it should, legislation would be altered and improved.

Letters to the Editor.

COMMENT ON MR. FRITCH'S VIEWS ON FUEL ECONOMY.

Chicago, November 29, 1911.

To the Editor of the Railway Age Gazette:

In the valuable and suggestive article on "Opportunities for Economies on Railways," published in the *Railway Age Gazette* of November 24, page 1059, the author reaches the conclusion that not more than 40 per cent. of the actual heat value of fuel is utilized in locomotives in producing tractive power or effective work. Under "item 8" the statement is made that less than half the heat value of the fuel is utilized in effective work in the boiler, the rest being dissipated in losses due to various causes as outlined. These losses are given under item 2 as due to evaporating moisture in coal; under item 4, to unconsumed gases escaping through the stack; under item 5, to unconsumed fuel in cinders and sparks; under item 6, to unconsumed fuel in ashes dropping through the grate; and under item 7, to losses due to radiation and leakage.

There is evidently some confusion here, as it is my understanding that these are all boiler losses, and have been already charged out in figuring the boiler efficiency as low as 50 per cent. By a coincidence, on page 1058 of the same issue of the *Railway Age Gazette,* and directly opposite to the article by Mr. Fritch referred to, there are published the results of a very careful locomotive test which gives the boiler performance of Mallet and consolidation locomotives. The thermal efficiency of the boiler is in round figures 58 per cent. for the consolidation and 68 per cent. for the Mallet; say an average of 60 per cent., which compares closely with laboratory tests, and is based on the total dry coal fired. It is true that by figuring thermal efficiency on the basis of "dry coal fired" the item for loss due to moisture in coal is eliminated, as dry coal fired is obtained by deducting from the total coal fired an equivalent weight corresponding to the percentage of moisture in the coal, and this usually amounts to only 1 or 2 per cent. But the other items of loss due to unconsumed gases, unconsumed fuel in sparks, cinders and ashes, and the loss due to radiation are not measured and allowed for in getting the thermal efficiency of the boiler, so that it is more correct to state locomotive boiler efficiency, as only 50 or 60 per cent., including those losses. I must take exception also to the statement in the same article that "not more than 40 per cent. of the actual heat value of fuel is utilized in locomotives in producing effective work as tractive effort." This is a good definition of the "efficiency of the locomotive," including boiler and engine. If any fuel expert or scientific manager could tell us how to obtain a locomotive efficiency of 40 per cent., the coal bill of the railways would be only about one-tenth of what it now is; for locomotive efficiency does not average 4 per cent.

In the report of the test of the Pennsylvania consolidation at St. Louis in 1904 the efficiency of the locomotive is given as 3 per cent. at 160 revolutions per minute, and 4 per cent. at 80 revolutions per minute. The report of the consolidation and Mallet tests in the *Railway Age Gazette* of November 24, above referred to, gives it as 3.5 per cent. for the consolidation and 5.5 per cent. for the Mallets. Four per cent. may, therefore, be taken as a fair average figure to represent locomotive efficiency. This means that while $200,000,000 is paid for locomotive fuel per year, in the final analysis the heat equivalent of only $8,000,000 worth is utilized instead of $80,000,000 worth, as the article states. And $192,000,000 worth of coal produces no effective results in moving trains. But the $200,000,000 coal bill must be paid, and if 25 per cent. can be saved by the various economies Mr. Fritch enumerates, then there will be a saving of $50,000,000 a year, as claimed. In statements relating to fuel consumption or economy it is best to make a table showing all items which go to make up 100 per cent., and in setting down each item if care is taken the confusion and errors above referred to may be avoided.

MECHANICAL ENGINEER

CHICAGO, November 28, 1911.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

On page 1060 of the *Railway Age Gazette* of November 24, 1911, a tabular comparison is made by L. C. Fritch, in an article on "Opportunities for Economy on Railways," to show how careful locomotive firing might have saved upwards of half the coal used on the road making the experiment. He sets up the consumption on a single test run by a passenger train consisting of from 8 to 10 cars against the average on the entire railway for the whole year 1910 made by all sorts of trains, all sorts of engines, under all sorts of conditions.

How does such a comparison prove that in 1910 there was any waste of coal? Unlike things cannot be compared. If the performance of the test passenger train and the performance of all the other trains on the system for 1910 cannot be reduced to some common denominator, then it is worse than useless to try to make a comparison. I say, worse than useless, because there has been, from the highest officers down, altogether too much of this kind of harmful playing into the hands of our critics, too much admitting that the operation of our roads is not efficient.

T. J. NORTON,
General Attorney, Atchison, Topeka & Santa Fe.

December 5, 1911.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

I am much interested in the article by L. C. Fritch on page 1059 of your issue of November 4. Two very important subjects in connection with the locomotive are treated. The first is the necessity for scientific proportions to get the maximum use from the heat of burning coal coupled with correct proportions of the locomotive as a whole; the second is the importance of intelligent firing as indicated by the results of the Lehigh Valley tests.

These points are well taken, but it seems to me more important to insure that locomotives will fit the conditions of service. In my judgment the most hopeful sign in locomotive progress at the present time making for reduction in cost of operation is the tendency toward designing locomotives which embody all features of up-to-date improvements specially fitting them to suit specific road conditions in the districts where they are to be used. In my opinion this is the greatest progress which we are making in connection with the locomotive today. Scientific designing intelligently applied to operating conditions, coupled with intelligent handling of the locomotive, offers a means for greatly reducing the cost per ton-mile; a number of roads have already taken advantage of this possibility. OPERATION.

A FAIR COMMENT ON MINORITY STOCKHOLDERS' REPRESENTATION.

WASHINGTON, D. C., November 28, 1911.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

In your issue for November 24, 1911, Professor William Z. Ripley of Harvard University refers to the right of the owners of the preferred shares of the Wisconsin Central, now leased to the Minneapolis, St. Paul & Sault Ste. Marie, to elect a majority of the board of directors, and adds:

"This right is at all times vested in the relatively small amount of preferred shares of the Rock Island Company. The common shareholders have practically no voice in the management at all. The same thing is true of the New York, Ontario & Western."

The outstanding common stock of the Rock Island Company has a par value aggregating $90,874,200 (amount authorized, $96,000,000) and the outstanding preferred has a total par of $49,967,600 (amount authorized, $54,000,000) which may be a "relatively small amount," but the board of directors recently consisted of William H. Moore, D. G. Reid, F. L. Hine, George G. McMurtry, James Speyer, A. J. Miller, Ogden Mills, Roberts Walker, Benjamin Strong, Jr., James Douglas, James McLean, Arthur Curtis James, James H. Moore, E. S. Moore and H. U. Mudge. Admitting that the preferred stock was permitted to elect eight of these gentlemen, it would be most interesting to be informed whether the remaining seven actually "have practically no voice in the management at all." Professor Ripley would greatly increase interest in his article if he would supply the names of the seven members of this board who are so excluded from participation in the direction of the company's affairs.

The outstanding common stock of the New York Ontario & Western has a par value aggregating $58,113,982 and the preferred a total par of four thousand dollars. Many years ago there was $2,000,000 in preferred and although $1,996,000 of this was exchanged for first mortgage bonds it was temporarily held in a voting trust so as to exercise its right to elect eight out of thirteen directors. But this right lapsed with the payment of a dividend of three per cent. on the common stock in January, 1905, and for substantially seven years a share of preferred has had no more right to control than a share of common.

H. T. NEWCOMB.

ABOLISH THE PRESENT GIVING.

December 4, 1911.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

Nothing that I have read in your columns for years past has so exactly fitted my views on a subject as the article under the heading "Abolish the Present Giving," which appeared in your issue of December 1. The system referred to is pernicious, and this has been admitted by many of the prominent supply men, with whom I have discussed the subject on various occasions during the past few years. That the giving is not personal but official is evidenced in many ways. I was appointed purchasing agent about Christmas time, and although I knew scarcely half a dozen supply men (not having been connected with the purchasing department up to the time of my appointment), I was amazed at the number of Christmas gifts received from those whom I had never met. The expensive ones were returned, with a polite note to the effect that I thought the acceptance thereof would be open to misconstruction; the inexpensive ones were retained, not because there was not just as much impropriety in keeping them as the others, but from the moral cowardice, which is common to most of us, of being afraid of being thought either hypocritical or of claiming to be better than others.

Another reason to show that the gift is to influence purchases is the fact that even those who claim it is only intended as a courtesy have nothing to say when their attention is called to the fact, which is quite noticeable, that the gifts are always *to*, but never *from*, railway officials.

I have no doubt that many supply concerns are just as much opposed to the practice as myself, but, because their competitors make presents, they follow the practice for fear they may be losers if they fail to do so.

The men who are the most notorious for making gifts are those who bear the reputation, either justly or unjustly, of influencing purchases by improper means. To a reflecting purchasing agent, the receipt of an expensive gift naturally leads to the inference that the price is excessive, as the cost of the gift inevitably must be charged to the expense of doing business, and in the end the railway company pays for it.

The practice of giving is most common with those who have high priced specialties to sell, and this is natural, because, in buying articles like bars, plates, shapes, spikes, bolts, etc., it is easy to determine by testing machine whether or not it is to the interest of the company to purchase them, but in the case of a specialty it is largely a matter of individual opinion or whim, and naturally the personal equation enters into it more than with other articles. The United States Steel Corporation, the Jones & Laughlin Steel Company, the Cambria Steel Company, the Pennsylvania Steel Company, the Republic Iron & Steel Company and most of the larger iron and steel companies have never, in all my experience, followed this practice, which they would have done had there been any good business reason for so doing.

I thoroughly approve of your article and trust it may result in breaking up the practice almost entirely. It is in line with the recent action taken to discontinue the entertainment features in connection with the Master Car Builders' and Master Mechanics' conventions each year. PURCHASING AGENT.

THE TRUTH ABOUT RAILWAY ACCIDENTS.

BY THE EDITOR.

Many articles have been printed and speeches made within recent years in which the railways of the United States have been misrepresented; but probably no other utterance about them has quite equalled in this respect an article entitled "Speed," attacking their accident record, which was written by Charles Edward Russell, and published in the Hampton-Columbian magazine for October.

This magazine, which was widely circulated, has, since the appearance of the article mentioned, become financially embarassed and temporarily suspended publication. Some of those formerly connected prominently with its business management have been arrested, charged with misuse of the mails in the sale of stock in the company owning the magazine. A few months ago Hampton's published an article assailing the Standard Oil Company. While this corporation has never been thin-skinned, and is not unused to criticism, it sued Hampton's for libel, and made it publicly retract its statement.

These facts may indicate the character of the magazine that published "Speed." Was it owing to its recent experience with the Standard Oil Company that the article under review, while attacking the railways as a whole, and even specific roads, did not mention a single one by its true name, but used such fictitious designations as "The Lake and River Railroad" and the "East and West Trunk Line?" At any rate, Mr. Russell's statements of fact and his deductions from them are incorrect in almost every particular, and if allowed to pass unchallenged are adapted, by misleading public sentiment, to do injustice and injury to the railways of this country, and injustice and injury cannot be done to the railways without reactionary effects that will harm the public itself. It is for this reason that this reply to the article has been prepared.

First, then, as to certain statements made by Mr. Russell concerning the relative speeds at which passenger trains are run here and in the old world. He says it is often stated as an excuse for railway accidents in this country that our trains are operated at higher speeds than those of Europe. He declares that the belief that this is so is an hallucination, and asserts unqualifiedly that "in average speed of passenger trains Great Britain is first, France second, Germany third, and the United States fourth." Now, the fact is that there is no data in existance by which anyone can ascertain whether, on the average, the speed of passenger trains in any leading country is greater than in any other leading country. The author of "Speed" has made a gratuitous guess as to the average speeds in different countries and then set down his guess, the correctness of which he cannot prove, and the incorrectness of which no one else can prove, as if it were the demonstrable gospel truth. The only existing records on the subject relate to the running time of a limited number of specific trains, and a comparison of their schedules indicates that there are more fast trains in Great Britain and some other European countries, where passenger traffic is much heavier than in the United States, than there are fast trains in the world.

Mr. Russell goes on to say that this record is easily explained because, to quote his own language, "the American railroad is not physically equipped for safety," and that it is not so equipped because railway managers have issued watered capital and then, instead of spending a great part of earnings on maintenance, have paid out those earnings as dividends on the fictitious capitalization.

It is true that the number of accidents to passengers is greater here than in the various countries of Europe, but it is not true that the number of accidents to passengers per passenger carried per mile is greater here than in Europe. It is not true that the number of passengers killed per million carried is greater here than in Europe. It is not true that the number of passengers killed per million passenger miles is greater here than in Europe. It is not true that the number of passengers killed per million train miles is greater here than in Europe. It is not true that the number of passengers killed per million hours of train service is greater here than in Europe. It is not true that the number of passengers killed per million dollars of gross earnings is greater here than in Europe. It is not true that the number of passengers killed per million dollars of net earnings is greater here than in Europe. It is not true that the number of passengers killed per million dollars of dividends paid is greater here than in Europe. It is not true that the number of passengers killed per million dollars of capitalization is greater here than in Europe. It is not true that the number of passengers killed per million dollars of capitalization and debt is greater here than in Europe. It is not true that the number of passengers killed per million dollars of capitalization, debt and surplus is greater here than in Europe. It is not true that the number of passengers killed per million dollars of capitalization, debt, surplus and unearned increment is greater here than in Europe. It is not true that the number of passengers killed per million dollars of capitalization, debt, surplus, unearned increment and undivided profits is greater here than in Europe. It is not true that the number of passengers killed per million dollars of capitalization, debt, surplus, unearned increment, undivided profits and water is greater here than in Europe. It is not true that the number of passengers killed per million dollars of capitalization, debt, surplus, unearned increment, undivided profits, water and graft is greater here than in Europe. It is not true that the number of passengers killed per million dollars of capitalization, debt, surplus, unearned increment, undivided profits, water, graft and stock jobbing is greater here than in Europe. It is not true that the number of passengers killed per million dollars of capitalization, debt, surplus, unearned increment, undivided profits, water, graft, stock jobbing and wrecking is greater here than in Europe. It is not true that the number of passengers killed per million dollars of capitalization, debt, surplus, unearned increment, undivided profits, water, graft, stock jobbing, wrecking and looting is greater here than in Europe. It is not true that the number of passengers killed per million dollars of capitalization, debt, surplus, unearned increment, undivided profits, water, graft, stock jobbing, wrecking, looting and piracy is greater here than in Europe. It is not true that the number of passengers killed per million dollars of capitalization, debt, surplus, unearned increment, undivided profits, water, graft, stock jobbing, wrecking, looting, piracy and murder is greater here than in Europe. It is not true that the number of passengers killed per million dollars of capitalization, debt, surplus, unearned increment, undivided profits, water, graft, stock jobbing, wrecking, looting, piracy, murder and arson is greater here than in Europe. It is not true that the number of passengers killed per million dollars of capitalization, debt, surplus, unearned increment, undivided profits, water, graft, stock jobbing, wrecking, looting, piracy, murder, arson and robbery is greater here than in Europe. It is not true that the number of passengers killed per million dollars of capitalization, debt, surplus, unearned increment, undivided profits, water, graft, stock jobbing, wrecking, looting, piracy, murder, arson, robbery and blackmail is greater here than in Europe. It is not true that the number of passengers killed per million dollars of capitalization, debt, surplus, unearned increment, undivided profits, water, graft, stock jobbing, wrecking, looting, piracy, murder, arson, robbery, blackmail and forgery is greater here than in Europe. It is not true that the number of passengers killed per million dollars of capitalization, debt, surplus, unearned increment, undivided profits, water, graft, stock jobbing, wrecking, looting, piracy, murder, arson, robbery, blackmail, forgery and counterfeiting is greater here than in Europe. It is not true that the number of passengers killed per million dollars of capitalization, debt, surplus, unearned increment, undivided profits, water, graft, stock jobbing, wrecking, looting, piracy, murder, arson, robbery, blackmail, forgery, counterfeiting and perjury is greater here than in Europe. It is not true that the number of passengers killed per million dollars of capitalization, debt, surplus, unearned increment, undivided profits, water, graft, stock jobbing, wrecking, looting, piracy, murder, arson, robbery, blackmail, forgery, counterfeiting, perjury and subornation of perjury is greater here than in Europe. It is not true that the number of passengers killed per million dollars of capitalization, debt, surplus, unearned increment, undivided profits, water, graft, stock jobbing, wrecking, looting, piracy, murder, arson, robbery, blackmail, forgery, counterfeiting, perjury, subornation of perjury and conspiracy is greater here than in Europe. It is not true that the number of passengers killed per million dollars of capitalization, debt, surplus, unearned increment, undivided profits, water, graft, stock jobbing, wrecking, looting, piracy, murder, arson, robbery, blackmail, forgery, counterfeiting, perjury, subornation of perjury, conspiracy and criminal libel is greater here than in Europe. It is not true that the number of passengers killed per million dollars of capitalization, debt, surplus, unearned increment, undivided profits, water, graft, stock jobbing, wrecking, looting, piracy, murder, arson, robbery, blackmail, forgery, counterfeiting, perjury, subornation of perjury, conspiracy, criminal libel and contempt of court is greater here than in Europe. It is not true that the number of passengers killed per million dollars of capitalization, debt, surplus, unearned increment, undivided profits, water, graft, stock jobbing, wrecking, looting, piracy, murder, arson, robbery, blackmail, forgery, counterfeiting, perjury, subornation of perjury, conspiracy, criminal libel, contempt of court and obstruction of justice is greater here than in Europe. It is not true that the number of passengers killed per million dollars of capitalization, debt, surplus, unearned increment, undivided profits, water, graft, stock jobbing, wrecking, looting, piracy, murder, arson, robbery, blackmail, forgery, counterfeiting, perjury, subornation of perjury, conspiracy, criminal libel, contempt of court, obstruction of justice and bribery is greater here than in Europe. It is not true that the number of passengers killed per million dollars of capitalization, debt, surplus, unearned increment, undivided profits, water, graft, stock jobbing, wrecking, looting, piracy, murder, arson, robbery, blackmail, forgery, counterfeiting, perjury, subornation of perjury, conspiracy, criminal libel, contempt of court, obstruction of justice, bribery and corruption is greater here than in Europe. It is not true that the number of passengers killed per million dollars of capitalization, debt, surplus, unearned increment, undivided profits, water, graft, stock jobbing, wrecking, looting, piracy, murder, arson, robbery, blackmail, forgery, counterfeiting, perjury, subornation of perjury, conspiracy, criminal libel, contempt of court, obstruction of justice, bribery, corruption and treason is greater here than in Europe. It is not true that the number of passengers killed per million dollars of capitalization, debt, surplus, unearned increment, undivided profits, water, graft, stock jobbing, wrecking, looting, piracy, murder, arson, robbery, blackmail, forgery, counterfeiting, perjury, subornation of perjury, conspiracy, criminal libel, contempt of court, obstruction of justice, bribery, corruption, treason and lese majesty is greater here than in Europe. It is not true that the number of passengers killed per million dollars of capitalization, debt, surplus, unearned increment, undivided profits, water, graft, stock jobbing, wrecking, looting, piracy, murder, arson, robbery, blackmail, forgery, counterfeiting, perjury, subornation of perjury, conspiracy, criminal libel, contempt of court, obstruction of justice, bribery, corruption, treason, lese majesty and high crimes and misdemeanors is greater here than in Europe. It is not true that the number of passengers killed per million dollars of capitalization, debt, surplus, unearned increment, undivided profits, water, graft, stock jobbing, wrecking, looting, piracy, murder, arson, robbery, blackmail, forgery, counterfeiting, perjury, subornation of perjury, conspiracy, criminal libel, contempt of court, obstruction of justice, bribery, corruption, treason, lese majesty, high crimes and misdemeanors and petty larceny is greater here than in Europe.

Mr. Russell says that "comparisons for a term of years seem to indicate that with the increase of passengers carried we shall soon [illegible] as many as Great Britain per thousand times as better, not worse. It is true that it is worse than the accident records of the railways of Europe. But it is nowhere near as much worse as he represents. It is true that many of our accidents are due to defects of railway plants. But it is not true that most accidents are due to them. It is true that the shortcomings of the plants of some railways are due to overcapitalization. But it is not true that the shortcomings of the plants of our railways as a whole are due to overcapitalization; for as a whole they are not overcapitalized.

RAILWAY ACCIDENTS IN THE UNITED STATES AND EUROPE.

Mr. Russell's apparent intent to deceive is illustrated by his comparisons between accidents on the railways of the United States, on the one hand, and of France and Great Britain, on the other. He shows that the numbers of passengers and employees killed are greater here in proportion to the numbers carried and employed than in France and Great Britain, and assumes that this shows the relative hazards of railway travel and employment. This assumption as to passengers is unjustified. Other things equal, the number of accidents to them will increase not merely with the number carried, but also with the average distance they are carried. Now, the average distance each passenger is carried is two to four times as great in the United States as in the various countries of Europe. Therefore, if all other conditions were the same, each passenger here would, because of the longer average journey, be exposed to two to four times as much risk as each passenger in Europe. Mr. Russell refrains from mentioning these differences in the average journey, thus giving a wholely false impression. It is not possible, as Mr. Russell assumes, to make accurate comparisons between the statistics of railway accidents in different countries, because they are kept on different bases. The last year for which complete statistics of railway accidents in any considerable number of leading countries are available is 1908. Fully recognizing that, because of the different bases on which the statistics are compiled no satisfactory comparisons between them are possible, an attempt has been made in the following tables to make the least unsatisfactory comparisons practicable:

RAILWAY ACCIDENT STATISTICS, 1908

Accidents to Passengers.

	Killed.		Injured.	
	Number.	Number per 1,000,000 passenger miles.	Number.	Number per 1,000,000 passenger miles.
United States	381	.013	11,556	.40
[illegible]	[illegible]	[illegible]	[illegible]	.38
[illegible]	[illegible]	[illegible]	[illegible]	(b)
[illegible]	[illegible]	[illegible]	[illegible]	.05
[illegible]	[illegible]	[illegible]	518	.032
Prussia-Hesse	69	.0048	374	.03
Austria-Hungary	40	.0064	624	.10

(a) Group II [illegible] New Jersey, Delaware, Maryland, most of New York and Pennsylvania, and part of West Virginia.

(b) Not ascertainable.

Country.	Total railway employees.	Passengers killed per one million.	Number.	Passengers injured per one million.	Number.	Employees injured per one million.
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	17
[illegible] Group II (a)	352,722	945	373	22,815		15
[illegible] inner only	276,785	1,842	150	35,821		8
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1,140	(c)
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	70
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	81.2
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	47.2
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	87.2
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	17.2

(a) [illegible] New York and Pennsylvania, and part of West Virginia.

(b) [illegible]

(c) Track and train employees only. Train movements only.

Mr. Russell says that "comparisons for a term of years seem to indicate that with the [illegible] as many as Great Britain per thousand times as

many as France." The foregoing table shows that the number of passengers killed per one million passenger miles in the United Kingdom is not ascertainable and that in France only the deaths and injuries of passengers included in *train accidents* are reported. If we compare passengers killed only in train accidents in France and the United States—in other words, like with like—we find that there was killed in France in 1908 .0027 passenger for each million of passengers hauled one mile, while in the United States there was killed .0085 passenger for each million passengers hauled one mile. On this showing, instead of passenger travel being thirty times as dangerous in the United States as in France, as Mr. Russell implies, it is only three times as dangerous. Using the same method of comparison, we find that travel in the United States is about three times as dangerous as in Germany, and about twice as dangerous as in Austria-Hungary. This is a bad showing, but it is much better than that sought to be made by Mr. Russell. In proportion to their numbers from 2½ to 3½ times as many employees are killed in the United States as in France, Germany and Austria-Hungary.

THE CAUSES OF ACCIDENTS.

To convict our railways of having a worse accident record than the railways of other leading countries is often assumed to convict their managements of inefficiency and to show the need for stringent government regulation of their operation. Their accident record is sometimes used as an argument for government ownership. But it can be demonstrated that most of our accident record is due to conditions that railway managers do not and cannot control.

We can fix the responsibility and devise remedies for accidents only after we have traced them to their causes. As a step in that direction, let us study the following table giving the total railway accidents in the United States in the year ended June 30, 1911, as reported by the Interstate Commerce Commission:

TOTAL RAILWAY ACCIDENTS, YEAR ENDED JUNE 30, 1911.

Train accidents	Killed.	Injured.
Passengers	356	13,433
Trespassers	5,284	5,614
Employees	3,163	46,802
Other persons	1,154	5,073
	9,957	70,922
Industrial accidents to employees	439	79,237
Totals	10,396	150,159

These are large figures. No exaggeration is necessary to make them appalling. No misrepresentation is necessary to convince any man who reads them of the necessity for the adoption of all feasible means for their reduction.

The significant column in the table is that headed "killed." An "injury" may mean the loss of a leg or merely a bruised thumb. Whether it shall be reported at all may depend on the judgment of the person making the report as to what really is an injury. On the other hand, a fatality is a constant quantity and is sure to be reported. In our analysis we shall, therefore, confine ourselves to the statistics for persons who were killed.

It will be seen that 53 *per cent. of those killed in train accidents were reported by the Interstate Commerce Commission as "trespassers."* Mr. Russell refers to this class as "unfortunate persons killed along the line," without saying how they happened to be along the line, thereby giving the impression that the railways were responsible for their deaths. As the commission says, they were persons who were stealing rides on trains or walking on railway tracks in preference to keeping to the public highways. All of them, as the designation used by the commission shows, were unlawfully intruding on the property of the railways. On the average over 14 trespassers are killed on railway property every day in the year. In European countries such trespassers are promptly arrested and fined or imprisoned, both to protect the roads and in the interest of public safety. The casualties to this class of persons in the United States are entirely due to failure on the part of our lawmakers and public officials to make and enforce similar laws; they are chargeable to inefficient government, not to inefficient railway managements. Mr. Russell is a socialist. This may explain why he so hotly denounces that part of our accident record for which he thinks the railways can be held responsible, and refers so briefly and tenderly to that large majority of fatalities for which the governments and the public are responsible.

ACCIDENTS TO PASSENGERS BUT A SMALL PART OF TOTAL.

Next to the figure for trespassers killed, the most significant one in the table is that showing that only 356, or *but 3.4 per cent.*, of the total persons killed were passengers; and this includes 32 persons carried under contract, such as mail clerks and newsboys. The railways annually carry almost 1,000,000,000 passengers an average of about 33 miles. This is equivalent to hauling every inhabitant of the country about 350 miles. The popular impression—an impression Mr. Russell fosters—is that most persons killed in railway accidents are passengers; but passengers are but a very small part of the total. Taking the figures for 1909 as a basis, Julius Kruttschnitt showed that *on the average a passenger on the railways of the United States could travel* 4,000 *times around the earth without being killed. Stating the matter in another way, he could travel sixty miles an hour for* 220 *years without a fatal accident.*

Another popular misconception is that most passengers are killed in true train accidents—that is, collisions, derailments, etc. Mr. Russell seeks to foster this idea, also, and roundly denounces our railways because they have a relatively small amount of double track and block signals, which he evidently considers essential to prevent collisions. The total number of passengers killed in collisions and derailments in 1911 was only 142, or only 1.4 per cent. of the total number of persons killed in all accidents, and but 2.6 per cent. as many as the number of trespassers killed. One hundred and thirty-one passengers were killed while getting on or off trains, locomotives or cars, or by falling from them. Thirty were killed by being struck or run over by engines or cars at stations or yards. The deaths of the rest were due to miscellaneous causes. Only 142 of the total of 356 were killed in true train accidents. These figures show that a large majority of the deaths of passengers are not due, as Mr. Russell asserts, to the fact that the "American railroad is not physically equipped for safety." For example, what improvement in their physical equipment would keep people from jumping or falling off trains, or stepping in front of them at stations? Deaths from such causes are largely due to the folly or misfortune of those killed, and not usually to physical shortcomings of the railways.

HOW EMPLOYEES ARE KILLED.

About 30 per cent. of the fatalities are suffered by employees. A computation made by Mr. Kruttschintt based on the ratio between the number of employees in service and the number killed in 1909 showed that *on the average an employee can work* 637 *years before being killed.* The hazards of railway employment, while great, are less than is commonly supposed or than Mr. Russell represents.

Furthermore, most of the fatalities to employees, as well as to passengers, are not due, as is asserted, to defects of the physical equipment of railways; nor is a large proportion of them due to collisions and derailments. The total number of employees killed in 1911 was 3,602. Of these 209 were killed while coupling and uncoupling cars, in spite of the fact that 99.3 per cent. of the locomotives and cars in service have been at heavy expense equipped with automatic couplers. One thousand, four hundred and twenty-nine were killed by being struck or run over by engines or cars, which, of course, were being operated by their fellow employees. It is impossible to see how anybody can attribute these fatalities to defective equipment; the best car or locomotive can kill an employee who gets in its way quite as easily as the poorest. One hundred and ninety-seven were killed while getting on or off cars or engines. Three hundred and ninety-one were killed by falling from trains, locomotives or cars. Part of these deaths were due to de-

fective equipment, although probably most of them were not. Seventy-eight employees were killed by coming in contact, while riding on cars, with bridges, tunnels, signal apparatus or some other fixed structures above or at the side of the track. Most of these deaths were due to the fact that, owing to the increased size of equipment and to other causes, overhead and lateral clearances between cars and structures have become too small. This is a defect in railway plants for which the railway managements are responsible and which they alone can remedy. The deaths of 439 were due to "industrial accidents" resulting from handling of tools, machinery, supplies, etc., getting on or off locomotives or cars while at rest, and from other causes *not connected with the movement of trains,* and therefore no more chargeable to hazards of transportation than an accident happening on a farm or in a mill.

The foregoing figures account for over 70 per cent. of the fatalities to employees. The total number of deaths of employees from collisions and derailments, from trains, locomotives or cars breaking down, etc.—in other words, from true train accidents—was 633, or but 17 per cent. of the total. Even all of this 17 per cent. cannot be charged against defective equipment or rules of operation. Many of them were due to reckless violations of the regulations adopted by the companies to promote safety. Innumerable instances could be cited where, for example, collisions resulted from locomotive engineers disregarding signals that were set against them, or disobeying orders to run at low speed over track that had been made soft by heavy rains, or to wait at specified stations to meet other trains. One of the most famous trains in the country—a train running entirely on double track on every mile of which there are modern block signals—recently was wrecked with disastrous results because the engineer failed to obey written orders to proceed slowly over a piece of weak track that was being strengthened as rapidly as men and money could do it.

Even those who are thoroughly familiar with what takes place daily on our railways find it hard to believe the facts about the foolhardy conduct of employees that sometimes causes many accidents. A train recently was wrecked by striking a bull. The engineer's story was that he saw the animal beside the roadway; that it started to run off, and then, just as the engine got almost opposite to it, turned and dashed upon the track. Investigation disclosed that the engineer, who was nearing the end of his run, desiring to clean up before reaching his destination, had got down from his seat, leaving his engine to run wild, and was washing his face and hands in a bucket of water on the floor of the cab when the bull was struck! He never saw it until the engine and cars had rolled into the ditch and he was pulled from the debris. It might seem that employees would appreciate more than any other persons the need for implicitly obeying signals. Yet, even on roads having the most perfect automatic signals that the ingenuity of man has invented and money can purchase, it is necessary to make constant tests by setting false signals, and to administer discipline when they are disregarded, to insure that the indications are being, and will be, obeyed.

THE SPECIFIC CAUSE OF ACCIDENTS.

Herein is to be found the cause of most accidents on the railways of the United States. We get a sidelight on the true situation when we consider certain conditions in the United States for which the governments and the public itself are responsible. The primary duty of every government is to protect each citizen from the violence of his fellows. Statistics collected by the Chicago *Tribune* show that in the year 1910 no less than 8,975 people died by homicide in the United States. During the same year the total number of passengers and employees killed in railway accidents in that year, the number being but 3,804. Our record in this respect is the worst in the civilized world, except perhaps in Italy. This is because we have so many people who are willing to "take a chance" with the law and because we are not nearly so badly enforced. The great majority of railway accidents are due to similar causes. We have seen that 53 per cent. of those killed on railways are unlawful trespassers on their property, and that this wholesale trespassing and resulting slaughter continues because the governments will not enforce the laws. Similarly, the great majority of the remaining fatalities, and of injuries, take place because many employees manifest, by "taking chances," by violating the rules which the companies have adopted to make operation safe, the same tendencies so conspicuously displayed by many of their fellow citizens in other walks of life, and then strenuously, and often successfully, resist, with the backing of their unions, the administration of the discipline enforcement of which is the prime requisite to a substantial reduction of accidents.

As W. M. Acworth recently said:

> "It has to be borne in mind, moreover, that the American railways are operated by over fifteen hundred thousand employees—average men—and an average man is after all only an average man. And when it comes to dealing with these average men, discipline in this country is attended by difficulties that do not exist in England. In England or on the Continent the railway employee usually spends his entire working life in the service of one company, and to lose his job is a disaster. In the United States men work for various railway companies in succession. When they overstep the bounds the final recourse is to 'fire' them—and they cannot always be 'fired' because of the trades unions; and even when a man is dismissed he does not care a continental, because all he has to do is to go around the corner and get another job."

It is not meant to assert that all employees are reckless and disobedient any more than it is meant to assert that all the people of the United States are lawless. It is meant only to say that, as the large number of homicides in this country is due to the fact that we have many lawless people of whom the rest of the public are the victims, so there are many railway employees who are careless or reckless of whom the public and employees themselves are the victims.

The author of "Speed" shows he is aware many accidents are due to failure of employees to comply with the rules and regulations of the companies, but, seemingly anxious to put on the companies the entire onus, he tries to show these failures of the human element occur because the managements make requirements too rigorous for human nature always to meet. He implies that trainmen are constantly forced to get trains over the road so fast that they cannot also conform to the code of train rules and obey all signals. There are no doubt cases where this is true, but they are exceptional. If they had been common they long since would have been the subject of vigorous and persistent protests from the railway labor brotherhoods. Mr. Russell's general assertions on this subject can no more be substantiated than certain specific statements that he makes about it. For example, he says many accidents occur because employees are worked excessive hours, and adds that the "new and feeble hours of service law does no more than limit continuous employment to sixteen hours." When the hours of service act was under consideration by Congress, those who charged that the working of trainmen excessive hours caused numerous accidents repeatedly were challenged to produce specific instances and could cite hardly any. Nevertheless, the hours of service law was passed, and, contrary to Mr. Russell's statement, it not only limits the time trainmen may work to sixteen consecutive hours, but *limits that which telegraph operators and despatchers may work to nine consecutive hours.* That no one may think, because the law permits trainmen to be on duty sixteen hours, that they are commonly worked this long, it should be said that ten hours, or a run of 100 miles, is the trainmen's normal day; and that for all additional service the roads have to pay them for overtime. Therefore, every effort is made to keep their working day down to ten hours. Many trainmen work much fewer hours than this.

AUTOMATIC STOPS.

The author of "Speed" thinks that what is most needed to eliminate accidents is some means of bringing trains automatically to a stop when danger is present. But such a device would only prevent collisions, and, as I have shown, ac-

cidents due to collisions are a very small part of the total. He asserts that an "automatic safety device" long ago eliminated collisions in New Zealand, and that the same device is in use on the railways of England. This statement completely discloses his ignorance, for there are no automatic stops in use in England except on the underground railways of London. Automatic stops also are used in the subways in New York, but experience has not shown that these devices, which are used on electric roads, will stand the test of service on steam roads operating under exposure to varying and severe weather conditions. Cab signals are used on just two railways in England, the Northeastern and the Great Western, and these are the "automatic safety devices" to which Mr. Russell evidently was referring, but the character of which he entirely misunderstood. Cab signals are not "automatic safety devices," because they simply signal the engineer in the cab and do not bring the train to a stop.

Mr. Russell makes sweeping statements regarding the use of automatic stops in other countries, but in view of the fatal error regarding their use on English railways into which he fell it is evident that his statements are entirely untrustworthy. Experiments have been carried on for six years on the government-owned railways of Germany looking to the selection of the most practical and suitable device for preventing the overrunning of stop signals by enginemen, but the results gained have been no more satisfactory than those reached by similar experiments in England and the United States, and automatic stops have not been favored at all. The German Railroad Union, a quasi-official body, has voted that the desideratum is an indication in the cab to warn the engineman.

Since only a relatively small number of railway accidents would be prevented even by an automatic stop which worked with absolute perfection, it is evident that some other means for stopping railway accidents is much more needed. The views of the Block Signal and Train Control Board of the Interstate Commerce Commission, which has been investigating this subject for several years, were expressed in its annual report for 1910. It said that "outside the army and navy the American is not reared with that discipline which becomes a part of the man and governs his actions mechanically. . . . This conclusion is brought home all the more convincingly when one reflects that *nowhere in the world have appliances for safeguarding railway transportation been so highly developed as in this country,* notwithstanding which nowhere in the world is there a greater proportionate number of accidents of the kind which such advance in the art should prevent." It adds that *"what is most needed is automatic performance of one's duties rather than automatic mechanical devices."*

DEATHS AT GRADE CROSSINGS.

Mr. Russell dwells at great length on the number of deaths that result from people being struck by trains at highway crossings. The total number thus killed in 1911 was 992, of whom 124 are described by the Interstate Commerce Commission as trespassers. The author of "Speed" implies that deliberately faulty original construction of our railways and a diabolical preference on the part of railway managers for killing people rather than for spending the comparatively small sum which he implies would be necessary to eliminate grade crossings are entirely to blame for the numerous grade crossing fatalities. Now, it is unquestionably true that, in parts of the country where population, and the traffic on highways and on the railways crossing them, are considerable, crossings at grade are a great menace to safety and ought to be abolished just as fast as may be practicable, and the construction of new crossings at grade should ordinarily be prohibited. The city and state governments are justified in legislating to compel their elimination, provided they give due consideration to the fact that the railways must, directly or indirectly, get from earnings the wherewithal to pay their part of the cost of such improvements. But the implication that the railways have deliberately laid their tracks over all the streets and highways that they now cross and that, therefore, they are entirely to blame for grade crossing accidents, is false. In thousands of cases, both in cities and rural districts, the railways were built first and the highways and streets were opened across them. Mr. Russell especially refers to the numerous grade crossings in Chicago and to the municipal legislation to require their abolition. The situation in Chicago illustrates conditions in cities throughout the country, and shows the facts to be very different from what Mr. Russell seeks to make appear. In a great majority of cases the streets of Chicago were built across the railways, not the railways across the streets. The author of "Speed" asserts that, and expresses astonishment because, the cost of track elevation in Chicago "is shared between the municipality and the railway." The facts, as supplied to me by the track elevation department of the city of Chicago, are that up to the present time the railways have spent $66,000,000 on track elevation, while the total cost to the city—including all land damages it has had to pay, the salaries of its track elevation expert, and of the engineers employed to pass on the plans submitted by the railways, and all other expenses incurred by it—has been only $600,000, or less than 1 per cent. as much as the cost to the railways! These facts show just how reliable a chronicler Mr. Russell is. They also illustrate how enormously expensive track elevation is. Before the railways complete it in Chicago it will have cost them over $150,000,000.

Mr. Russell adds: "In the final analysis, of course, the difference (whether the railway or public pay for track elevation) is nothing, because the companies invariably make the public pay for all improvements, recouping the expenditures through increased charges or curtailed service." Now, the fact is that railway rates to and from Chicago are lower on the average and more and better service is now rendered than before track elevation was begun.

While the facts are not as Mr. Russell states them, probably they ought to be. Is it equitable to require the railways to bear all, or practically all, the expense of separating crossings at grade with highways, when most of the highways have been opened across the railways? In some states the cost is divided between the railways and the public; in one state, for example, the railway pays one-half, the state one-fourth, and the community immediately affected one-fourth. Will any one contend that railway stockholders should be required to spend money for this, or any other kind of improvements, that are of public benefit, and then should be denied any return on the expenditure—in other words, should be forced to turn philanthropists? Such a suggestion is preposterous. Everyone knows that the money for improvements could not be raised on such terms. But if any return is to be earned on improvements it must be derived from the rates charged; and what community may more justly be required to pay it through its rates than the community for whose benefit an improvement is made? Track elevation in Chicago, for example, has been partly of benefit to the railways, because it has tended to reduce their cost of operation, but of still more benefit to the people of Chicago; and since Chicago is making the roads pay for it, as a matter of equity to the railways and to the other communities they serve, why should its people not pay in the rates charged in and out of it for the benefits received by them?

The author of "Speed" implies that the highway crossing accident is peculiar to the United States. As a matter of fact, in Great Britain, where the mileage of railways is about one-tenth of what it is in the United States, the number of persons killed on grade crossings in 1910 was 75, which is more than one-thirteenth of the number killed on highway crossings in the United States in 1911.

Mr. Russell not only misrepresents the causes of accidents, but asserts the record of our railways in this respect is growing worse. Now, Mr. Kruttschnitt has shown that in 1889 the passengers killed per 100,000,000 passengers carried one mile

were 2.68; in 1899, 1.64; and in 1909, but 0.86. The number of fatalities to passengers was only a little more than one-half as great in proportion in 1909 as in 1899, and less than one-third as great in proportion as in 1889. The number of employees killed per 1,000 employed in 1889 was 2.80; in 1899, 2.38; and in 1909, 1.57, a decline of 34 per cent. in 1909 as compared with 1899, and of 44 per cent. as compared with 1889. *As Mr. Kruttschnitt has pointed out, at the rate at which employees were being killed in* 1889 *an employee could, on the average work* 357 *years without a fatal accident; in* 1899, 420 *years; and in* 1909, 637 *years.* If we compare period with period instead of year with year we get even more favorable results. The last accident bulletin of the Interstate Commerce Commission gives statistics for the eight years, 1904-1911, inclusive. During the four years ending with 1907 the number of passengers killed was 2,022, and during the four years ending with 1911 it was but 1,513, a reduction of 25 per cent. Similarly, in the former period the number of employees killed was 16,810, and in the latter period, it was but 13,875, a reduction of 18 per cent.

We have now seen that the accident record of the railways of the United States is nowhere near as bad, compared with that of the railways of other countries, as Mr. Russell sought to show; that most accidents are not due to the defective equipment of American railways, as he sought to show; and that, contrary to his assertion, accidents to passengers and employees are not increasing, but decreasing, both in proportion to the number employed and the traffic handled, and absolutely.

THE PHYSICAL CONDITION OF AMERICAN RAILWAYS.

No railway man or other person who knows the facts and wishes the public to know them would, however, deny the truth of Mr. Russell's charge that American railways are not in as good physical condition as they ought to be in the interest of the public welfare generally, and particularly in the interest of public safety, and that many accidents are due to their comparatively defective physical condition. It is true, as he says, that most European railways have double track, while most of the railways of the United States have only single track, and in many cases are handling on single track an amount of traffic which makes operation unsafe. His statement is incorrect that even where there are block signals they are mere makeshifts. The signal systems on numerous American railways, and particularly the automatic block signals in use on a mileage of about 20,000 miles of line, are among the best block signals in the world. It is true, on the other hand, that only 71,000 miles out of a total of about 240,000 miles were on January 1, 1910, equipped with signal systems and that safety requires the installation of many thousands of miles more signals if, indeed, it does not demand the signaling of our entire mileage. His assertion that, "We have dirt ballasted roadbeds where the ballast should be of stone; we have wooden bridges instead of steel; we have temporary culverts instead of culverts in solid masonry; we have cheap, narrow and inadequate cuttings, wooden trestles, dirt fillings, soft ties," is, in the sweeping terms in which it is made, wholly misleading. The better railways of the United States are the best railways in the world. It is true, on the other hand, that a large—in fact, the greater—part of our mileage is the skeleton of what it should be, to render as economical, efficient, and safe service as the public welfare demands.

In comparing the construction of our railways with that of European railways, however, Mr. Russell falls into some absurd errors. For example, his statement that British lines "use light rails for smooth running," is nonsense. Any engineer could have told him that, other things equal, trains run less smoothly on light than on heavy rails. The reason the British roads have light rails is that they have light equipment and the [illegible] axle is small. The use of the light British rails under the heavy American equipment would cause rail breakages, spreading of tracks and consequent wrecks.

Before the managements of American railways are condemned for not having constructed and equipped their lines to the highest standards, the conditions under which they have been built and developed should be considered. The railways of Europe were from the first constructed in countries that already were densely populated and in a high state of agricultural and industrial advancement. They were sure of a large traffic from the start. Most of the railways of the United States were built through territory having a sparse population and little agricultural and industrial development. They were constructed to attract population and build up industry and traffic, not to handle a large traffic already available. It was necessary to build them cheaply if they were to be built at all—just as it was necessary for the farmer to build his house and barn cheaply. How many miles would there have been built in Kansas in the days of sod houses if railways had been required at that time to construct with double track, 90-lb. rail, stone ballast, automatic signals and no grade crossings? Even as inexpensively as they were constructed, the traffic for them was so light that many were unable to earn a return on their comparatively small investment and became bankrupt. Even as yet their earnings are much smaller than those of the railways of Europe. The gross and net earnings per mile of the railways of certain European countries in 1908, and of the railways of the United States in 1909, were as follows: United Kingdom, gross, $25,163, net, $9,127; Germany, gross, $18,210, net, $4,816; France, gross, $13,033, net, $5,641; Switzerland, gross, $14,275, net, $4,672; United States, gross, $10,356, net, $3,505. Owing to the conditions under which they have been built and developed, it has not been possible to spend as much per mile on our railways as on those of Europe. The capitalization per mile of the railways of Switzerland, according to the latest available statistics, is $110,740; of France, $139,237; of Germany, $109,788; of the United Kingdom, $275,040; and of the United States, $59,259. The foregoing figures ought to be enough to explain why many of the railways of the United States are not as well equipped for safety as are many of the railways of Europe. It has not been possible to spend enough money on them to make them as safe as they ought to be, and it has not been possible to do so because it has not been possible to earn enough to make the needful improvements from earnings, or to pay a return on it even if it could have been raised by the sale of stock and bonds. And it might be added, parenthetically, that the prevalent policy of regulation, which aims narrowly to restrict the earnings of railways, is admirably adapted to continuing to render it impossible to raise the funds requisite to make them safe. When the people of the United States so furnish business to the railways and so regulate them as to enable them to increase their investment and earnings until they shall equal those of the railways of Europe there will be more justice in criticising them for not being as perfectly equipped as is desirable.

Mr. Russell gives a very different explanation of the failure to make the improvements needful for safety. He asserts that in other countries the railways are maintained out of their earnings, while in this country constantly increasing quantities of securities are being poured forth, ostensibly to make improvements, but really to serve as pawns in the game of Wall Street, "or as melons for the plain and unadorned purpose of making profits for the gentlemen on the inside." He says, "When, by the increase of capitalization, these interest and dividend charges threaten to become more than the earning capacity of the road will normally provide for, there must be either an increase in the earnings through increased rates or a decrease of expenses. . . . Now, this is exactly what is happening all over the United States to an extent we little dream of; to an extent that means in plain terms the physical [illegible] of the American railway system."

This certainly is as complete a misstatement of facts as ever was penned. W. M. Acworth is the greatest authority on railway affairs in England, and one of the greatest in the world. Regarding the source from which improvements have been made in the railways of the United Kingdom and the United States, he said in an article in the *North American Review* for March, 1910:

"The recognized American principle has been so far as possible to charge to capital *only such additions as increase the earning power of the property.* I should define the corresponding English principle as being to *charge to capital* all extra [illegible] regardless of the fact whether *they are income-earning or not."*

This is exactly the opposite to the assertion which was made by Mr. Russell.

ARE THE RAILWAYS RECKLESSLY FINANCED?

It is true that some of the railways of the United States have been, and are, excessively capitalized; but owing to the conservative policy that has prevailed on most roads for many years, of making extensive improvements from earnings, and to other causes, it may be said with more truth that the railways of the United States, as a whole, are under-capitalized than that they are over-capitalized. It is well known that within recent years large increases have taken place in the value of their real estate. It is also well known that many have made extensive reductions of grades and rectifications of curvature, have built expensive stations and terminals, ballasted and tie-plated their tracks, laid heavier rails and better ties, constructed stronger and more durable bridges, installed interlocking and signaling systems, replaced wooden structures by structures made of cement, masonry and steel, etc. Besides all this, during the ten years from 1899 to 1909 the number of freight cars per 1,000 miles increased 27.5 per cent., the number of passenger cars 12 per cent., and the number of locomotives 24 per cent. Furthermore, the equipment added, and that with which old equipment was replaced, was of much greater capacity and much more expensive than that superseded. Meantime the mileage of additional main tracks and sidings per 100 miles increased 36 per cent. The density of passenger traffic per mile increased 64 per cent., and the density of freight traffic increased 45 per cent. The assessors evinced their belief that there was a large increase in the value of railway property by advancing taxes per mile from $245 to $401, or 64 per cent. Yet between 1899 and 1909 the railway stocks and bonds outstanding in the hands of the public increased only from $47,438 to $59,259 per mile, or but 25 per cent. In the two states of Minnesota and Washington, where the most thorough recent valuations of railways have been made, the railway commissions found that the cost of reproduction of the physical properties of the roads would exceed the part of their capitalizations assignable to the mileage in those states; and Judge Sanborn held in his decision in the famous Minnesota rate case that the valuation made by the Minnesota commission was too low. As I have already shown, the capitalization per mile of our railways is less than that of the leading countries of Europe; and, indeed, it is less than the capitalization per mile of the railways of any first rate country on earth. There was a time when the railways of the United States as a whole probably were over-capitalized; but any person who takes the pains to examine the facts will be convinced that as a whole their financing for the past fifteen or twenty years has been conservative, the actual cash investment in the properties having largely exceeded the increase in the amount of stocks and bonds outstanding.

A PROBLEM [illegible]

It has not been meant to try by the foregoing to give the impression that the managements of the railways of the United States are not at all at fault, or are even only slightly at fault, for railway accidents. On the contrary, it is incontrovertible that many managements have not done all that the public could reasonably demand or expect of them to promote safety. A good deal of money has been spent by the railways in other ways which would better have been spent to strengthen track, buy better equipment and install block signals. They have not been entirely consistent in adopting rules for the promotion of safety, and they have often been wanting in courage and perseverance in enforcing good rules which have been adopted. While it is not true, as asserted by Mr. Russell, that the railways as a whole are overcapitalized, that they take earnings which should be applied to the maintenance of the properties and use them to pay dividends on watered stock, and that the resulting bad physical condition of the properties is the cause of accidents, it is true that some railways have been overcapitalized, that they have taken earnings which ought to have been used to maintain the properties and paid them out as dividends on watered securities, and that in consequence of the resulting physical defects of their properties they do have accidents. But the facts show that most railways apparently have done as well as or better than other concerns in this country in the management of their affairs; that many have done about as well as they could, considering the conditions, to keep down and reduce accidents; and that, even if they have not, such a great majority of accidents is due to causes not connected with the physical condition of railway plants at all, that the problem of reducing accidents is one the solution of which requires the earnest co-operation of railway managements, of railway employees, and of the people individually and through the state and national governments.

To say anything else is to misrepresent the facts regarding American railways, and those who misrepresent the facts regarding American railways prompt and stimulate unjust attacks on them by the public through railway commissions and legislatures—attacks which, in their immediate effects are harmful to the railways, but which, in the long run, are even more harmful to the public itself. The railway managers have been at fault in not promptly refuting the many misrepresentations regarding railway accidents and other matters that have been so generally made and widely disseminated. But certainly the blame that should be visited on their failure fully to present the truth regarding the railways to the public is less censurable than the malicious and mercenary activity that has been displayed by many persons and publications in getting before the public the opposite of the truth. The certain effect of misrepresenting the facts is to help postpone the solution of the various problems connected with railway operation and regulation in this country; and the man who helps do that is a public enemy.

The *Revue Générale des Chemins de Fer,* in an article on The Railways of Brazil, tells how the railways have emerged from the era of only building lines to connect two or more thickly populated localities. The new lines precede civilization and penetrate sparsely inhabited districts. The government requires colonization clauses with the purpose of making the country more productive and of hastening its development. Land is bought along the right of way, by the railway companies, which are required to start the cultivation. They must also supply the colonists with implements, give them work on the railways, where practicable, and sell them homes under certain specified conditions. One railway receives government subsidies as follows: For every inhabited house, $200; for every family which has been in residence for six months, $100; for every family which has been in residence for one year, $200; for every group of 50 lots which have been inhabited for two years and of which the inhabitants have obtained full ownership, $5,000. There must be 160 lots for every 100 miles of line, and at least one demonstration depot for every 180 miles. The Sao Paulo & Rio Grande has a colony at Campo, where it sells lots to colonists at the rate of $60 an acre, builds houses, furnishes live stock, seed and farming machines; all payable in 12 semi-annual instalments.

LARGE CAPACITY TANK CAR.

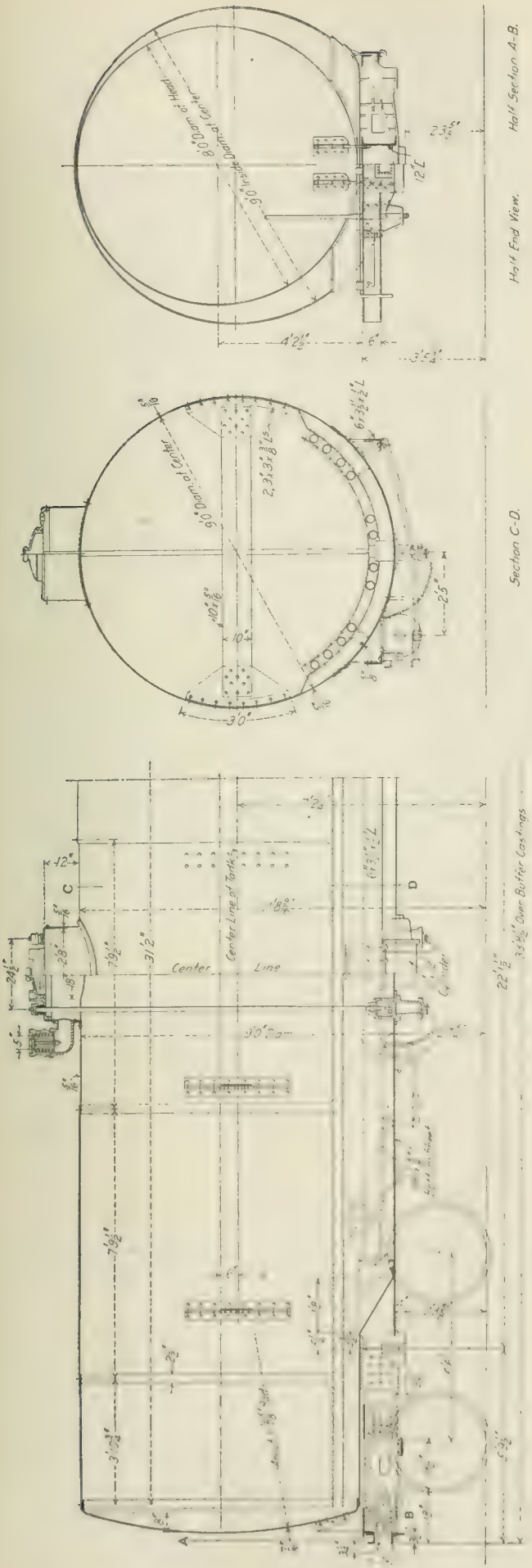
A new tank car 9 ft. in diameter and 33 ft. long, having a capacity of 14,650 gal., was recently exhibited at the Twelfth Street station, Chicago, of the Illinois Central, by the Chicago Steel Car Company, Chicago. It will be placed in service on all the lines of the Harriman system for test, inspection and criticism. The capacity for 113,550 lbs. of oil is 72 per cent. of the total weight (159,100 lbs.) of the car loaded to its full capacity. The largest car of this type built heretofore had a tank 8 ft. in diameter and 33 ft. long, with a capacity of 12,000 gal., while the ordinary standard tank car is 7 ft. in diameter with a capacity of 10,000 gal. Tank cars of this new design have reached the same limit as coal or ore cars, and the same advantages of the concentration of large volume in one unit may be expected from them.

The center of gravity of the car is 7 ft. from the top of the rail, which is lower than that of many of the old 8,000 gal. tank cars. This is accomplished by placing the bottom of the 9-ft. tank only 2 ft. 7⅝ in. from the top of the rail, with an offset in the bottom sheet at each end to allow the bolster draft sills and coupler to occupy the normal standard height. The bottom sheet is ⅝ in. thick, and is carried forward as a portion of the cylinder to its connection with the cast steel body bolster, to which it is secured with three rows of rivets. A ⅜ in. conical gusset sheet is connected to the 9 ft. cylinder back of the bolster and extends forward to the end of the tank, which is 8 ft. in diameter. The top line of the tank is horizontal. The gusset sheet forms a portion of the oil tank proper, but the connection of the ⅝ in. bottom sheet to the steel bolster is open and any working of the rivets at this point will not cause leakage.

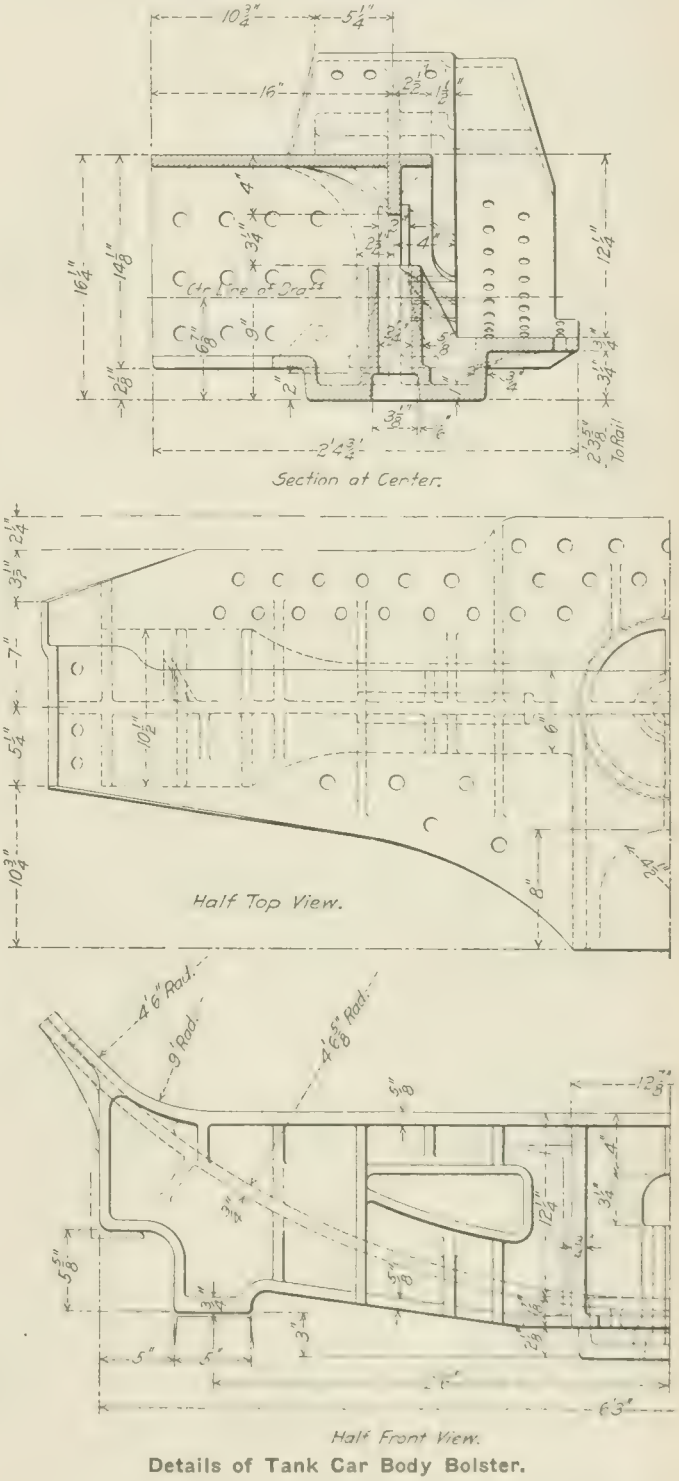
The tank has a bursting pressure of 240 lbs. per sq. in., and was tested to 60 lbs. per sq. in. Four splash plates, 10 in. x 5/16 in., are placed on the longitudinal center line of the car. These also act as lateral braces in holding the large tank in shape. The area of the bottom ⅝ in. plate in resisting buffing is 62½ sq. in. The draft sills are 12 in. steel channels heavily riveted to the body bolster; they are connected to the tank at the front by two large plate brackets. The friction draft gear is the Cardwell heavy type. The trucks were supplied by the American Steel Foundries Company, and have M. C. B. 50-ton axles and Griffin wheels weighing 825 lbs. each. The side sills are heavy angles, 6 in. x 3½ in. x ½ in., and the end sill is braced by diagonal angles 4 in. x 3 in. x ⅜ in. extending to the ends of the body bolster. A cast steel push pocket is riveted to the side sill at the body bolster and a jacking bracket is secured to the same sill at the rear of the truck. These two features are new in design and location.

Gusset Connection for Tank Car.

Experimental Tank Car of 14,650 Gal. Capacity.



The arrangement of the running boards and ladders is shown clearly in the illustration. The running board is a 2 in. x 12 in. plank, and is supported at the corners of the car by the angle iron ladders. The side boards are supported by bar iron brackets riveted to the tank. The hand-rail is also supported by steel



Details of Tank Car Body Bolster.

angles, and the whole structure provides for safe passage over the car and is unusually convenient and substantial. The car was designed by H. C. Priebe, and built by the Chicago Steel Car Company at Harvey, Ill.

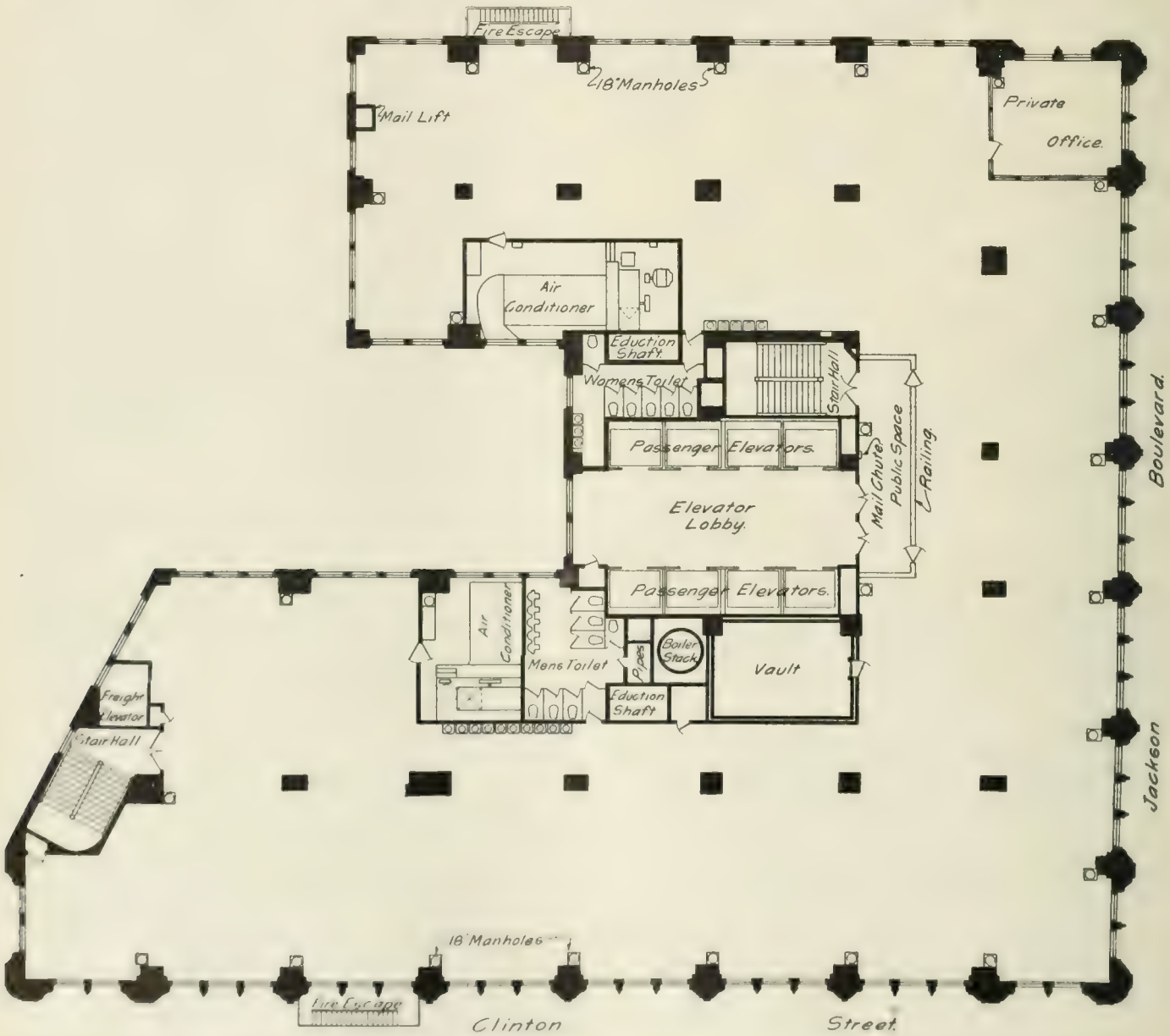
A report of the inspector general of the state railways of Chile shows that during the first quarter of 1911 there were 1,487 miles of railways in course of construction under the direction of the department of public works.

THE BURLINGTON'S NEW GENERAL OFFICE BUILDING.

Work is now well under way on the construction of the new general office building of the Chicago, Burlington & Quincy at Jackson boulevard and Clinton street, Chicago. This building will have a frontage of 150 ft. on Jackson boulevard and 175 ft. on Clinton street. It will be 15 stories in height, with provision for additional stories to be added later as required, and will probably be the largest building devoted exclusively to railway offices in the country. It will be of the latest type of construction and thoroughly modern in every respect. It will be entirely fireproof and special attention has been given to the subject of floor protection. Wooden floors will be omitted and cement and tile substituted, with a covering of linoleum where the use requires a resilient wearing surface.

The building is Gothic in design and is executed in glazed enameled terra cotta. It will be lighted on four sides and will vary from the current practice in that all four sides will show a finished exterior.

All the office space throughout the 15 floors and basement will be equipped with forced system ventilation. Fresh air washed and heated will be introduced through hollow floor systems and vertical ducts, while the hollow floor system will also carry the foul air from those floors through fans, discharging the air to the roof. This is the first time ventilation of this kind has been attempted in a building of this size. Eight passenger elevators and a freight elevator will be provided, while pneumatic tubes will connect the various floors. The accompanying floor plan shows the general arrangement of the floors, additions being made to suit the local requirements. The ticket offices and display of the industrial department will be located on the first floor, together with the offices of the real estate and industrial agent, tax agent and telegraph department. The offices of the treasurer, cashier, paymaster, secretary, special agent and relief department will be located on the second floor; the offices of the auditor of ticket accounts will be on the third floor, while the fourth floor is allotted for use of the car accountant. The auditor of expenditures will occupy the fifth floor and part of the sixth floor, while the rest of the sixth floor, together with the seventh and eighth floors, will be devoted to the use of the auditor of freight accounts and claims. The general auditor and the general passenger department will be located on the ninth floor, while the tenth floor will be given up to the use of the law department. The vice-president in charge of traffic and the general freight department will be located on the eleventh floor, while the offices of the chairman of the board and president and a general meeting room will be located on the twelfth floor. The vice-president in charge of operation, together with the general manager and the super-



Typical Floor Plan; Burlington Office Building.

intendent of transportation, will have offices on the thirteenth floor. The purchasing agent, general storekeeper and chief engineer will have offices on the fourteenth floor, while the telephone office will also be on the same floor. The superintendent of motive power will have offices on the fifteenth floor, while the balance of this floor will be divided between the engineering and motive power departments. It is expected that this building will be completed early next fall, and that it will be in service before the first of January, 1913. It was designed and is being erected under the supervision of Marshall & Fox, architects, Chicago.

New Burlington General Office Building, Chicago.

TESTS OF SUPERHEATER FREIGHT ENGINES ON THE CHICAGO & NORTH WESTERN.

The use of the Schmidt superheater on Chicago & North Western passenger engines has proved so satisfactory that it has been applied to freight engines and they are now being equipped at the rate of about 40 per month. Last March tests were made on consolidation locomotives with and without this type of superheater. They were made on the Iowa division between Belle Plaine, Ia., and Boone, a distance of about 85 miles. Four engines were tested on extra trains running at a speed of about 16 to 18 miles per hour. Three tests were made with each engine in each direction and the averages of these tests are shown in the accompanying table, together with the general averages for the two superheater and the two non-superheater engines. Both engines were of exactly the same class, being rated as class *Z* in the company's classification, the only differences being in the superheater. The general dimensions and chief differences are shown in the following table:

	Non-superheater	Superheater
Total weight of engine	235,000 lbs.	238,000 lbs.
Weight on drivers	207,000 lbs.	209,500 lbs.
Tractive effort	47,500 lbs.	47,500 lbs.
Boiler pressure	170 lbs.	170 lbs.
Cylinders	25 in. x 32 in.	25 in. x 32 in.
Diameter of driver	61 in.	61 in.
Grate area	53 sq. ft.	53 sq. ft.
Tubes, number and diameter	436—2 in.	261—2 in. 36—5⅜ in.
Tubes, length	15 ft. 2 in.	15 ft. 2 in.
Heating surface, tubes	3,443 sq. ft.	2,825 sq. ft.
Heating surface, arch tubes	28 sq. ft.	28 sq. ft.
Heating surface, firebox	186 sq. ft.	186 sq. ft.
Heating surface, total	3,657 sq. ft.	3,039 sq. ft.
Heating surface, superheating	.....	610 sq. ft.
Heating surface, total equivalent*	.....	3,954 sq. ft.

*Total equivalent heating surface equals total heating surface plus 1½ the superheating surface.

It will be noticed that the heating surface of the superheater is somewhat larger than that of the non-superheater engine when considering its total equivalent value, thus practically increasing the boiler capacity of the superheater engine. The profile of the division has a gradual rise from Belle Plaine to Boone for more than one-half of the distance and there are a few short grades of not more than .7 per cent. A dynamometer car was used in the tests and the coal and water were measured as carefully as possible. The dynamometer records were used in figuring the horse power. Thus only the measure of the useful work in hauling the train was considered, and the resistance of the engine as well as that of the head wind was neglected. The coal and water, on the other hand, include both the engine and train resistance; therefore the results given are somewhat higher than those where the cylinder power is considered.

Although the saving for the superheater in ton miles per lb. of coal is shown to be 31.92 per cent., an analysis of the results

TESTS OF SUPERHEATER AND NON-SUPERHEATER CONSOLIDATION LOCOMOTIVES ON THE CHICAGO & NORTH WESTERN.

	Boone to Belle Plaine.							Belle Plaine to Boone.						
	Superheater.			Non-Superheater.			Per Cent. Saving for Superheater.	Superheater.			Non-Superheater.			Per Cent. Saving for Superheater.
	Engine.			Engine.				Engine.			Engine.			
	1795.	1797.	Average.	1727.	1731.	Average.		1795.	1797.	Average.	1727.	1731.	Average.	
Time elapsed, hrs.	6.10	6.44	6.27	8.14	6.31	7.22	.....	6.49	6.72	6.60	7.16	7.11	7.13	.....
Time running, hrs.	4.63	4.76	4.70	5.41	5.11	5.26	.....	5.04	5.49	5.27	5.66	5.63	5.64	.....
Time stopped, hrs.	1.07	1.68	1.37	2.72	1.20	1.96	.....	1.45	1.23	1.34	1.50	1.49	1.49	.....
Av. temperature of atmosphere.	41.6	45.3	43.4	51.47	56.14	53.80	.....	41	49	44.5	51.6	62.6	57.1	.....
Number of cars in train	53	66	59	62-63	65	63-64	.....	78 42	71 45	74* 43†	78	80 50	79* 44†	.....
Tonnage	1,730.6	1,568.0	1,649.3	1,636.5	1,814.5	1,725.5	.....	2,953.3 1,629.7	3,024 1,652.6	2,988.7* 1,641.1†	2,839.1 1,533	2,901 1,660	2,870* 1,596†	....
Mileage	85.53	85.72	85.62	86.37	85.93	86.15	.....	15.77 69.75	15.73 69.59	15.75* 69.67†	15.36 69.61	15.63 69.90	15.49* 69.76†	.....
Coal used, tons	8.12	8.00	8.06	11.10	10.79	10.95	26.4	10.36	9.94	10.15	12.56	12.33	12.45	18.43
Coal used per hr., lbs.	3,448	3,334	3,391	4,052.9	4,228.7	4,140.8	.....	4,094	3,614	3,854	4,360	4,380	4,370	.....
Coal used per h.p. hr., lbs.	7.30	6.74	7.02	10.70	8.68	9.69	27.51	7.02	5.88	6.45	9.15	7.77	8.46	23.78
Water used, gals.	11,500	11,234	11,367	16,821	15,751	16,286	30.20	14,319	14,855	14,587	18,901	19,940	19,421	24.89
Water used per hr., lbs.	20,527	19,483	20,005	25,952	25,761	25,857	.....	23,600	22,450	23,025	27,573	29,355	28,464	.....
Coal used per h.p. hr., lbs.	44.00	39.65	41.82	68.77	52.77	60.77	31.19	40.35	36.49	38.42	58.22	52.04	55.12	30.30
Ton-miles per lb. coal	9.35	8.77	9.06	6.46	7.28	6.87	31.92	7.74	8.11	7.92	6.10	6.50	6.30	25.72
Ton-miles per gal. water	12.90	12.45	12.67	8.38	9.96	9.17	38.19	11.15	10.88	11.02	7.99	8.04	8.01	37.52
Average drawbar pull, lbs.	9,692	10,400	10,046	8,988	10,893	9,941	.....	13,000	14,870	13,935	12,160	14,000	13,080	.....
Maximum drawbar pull, lbs.	40,680	36,700	38,690	38,600	43,200	40,900	.....	40,440	44,970	42,700	33,800	40,950	37,375	.....
Work done, h.p. hr.	470.9	495.7	483.3	378.8	490.4	434.6	.....	586.8	615.0	600.9	477.6	564.8	521.2	.....

*Belle Plaine to Tama. †Tama to Boone.

shows this to be too high. It will be noticed that the time elapsed in making the runs with the superheater and the non-superheater engines from Boone to Belle Plaine was quite different; in the case of engine 1727 the time stopped was over one hour longer than in the case of either of the superheater engines. This delay of course means a waste of coal. Engines 1797 and 1731 give a fairer comparison in the trip from Boone to Belle Plaine, in that the total time for these runs is very nearly the same. Using these ton-mile figures the per cent. saving for the superheater is shown to be only 20.5 per cent. All the other data shown should be considered or analysized in the same way in order to get at the true amount of the saving. It will also be noticed in the trips from Belle Plaine to Boone that the number of cars in the train varied, the division point being at Tama.

The money value of the saving due to the superheater has been calculated according to the figures given in this table and it was shown that $6.17 in water and coal could be saved on eastbound trips, which would equal an average saving of $2,221 per year. The saving westbound was shown to be $4.98 for the coal and water per trip, or $1,792 per year. The sum of these two amounts when compared with the cost of applying the superheater to each locomotive shows that the superheater would be paid for in less than six months. These figures are, of course, somewhat larger than they should be, as noted above.

A NEW METHOD OF TESTING RAILS.

In a recent article in *Le Gemé Civil,* M. C. Fremont describes some experiments made with rails from which he drew the conclusion that mild steel of a good quality may be so exposed to detrimental treatment that, notwithstanding the fact that it might successfully pass the usual tensile tests as to strength and ductility, it may be so brittle or fragile that it will break under the effect of a single blow.

In order to determine whether a sample of mild steel has this dangerous characteristic, the well-known one-blow method of testing was used and the specimens were not nicked. The specimens used were 0.31 in. deep, 0.39 in. wide, and 1.18 in. long. They were placed on knife edges .82 in. apart, and struck one blow by a weight of 22 lbs. falling 13 ft. 1½ in., so that the striking energy was about 290 foot pounds. Tough steel, under this test, merely bends and shows little or no sign of a crack; brittle specimens do not bend, but crack all of the way across. A test piece is considered to be dangerously brittle if the energy absorbed in breaking it is less than 145 foot pounds.

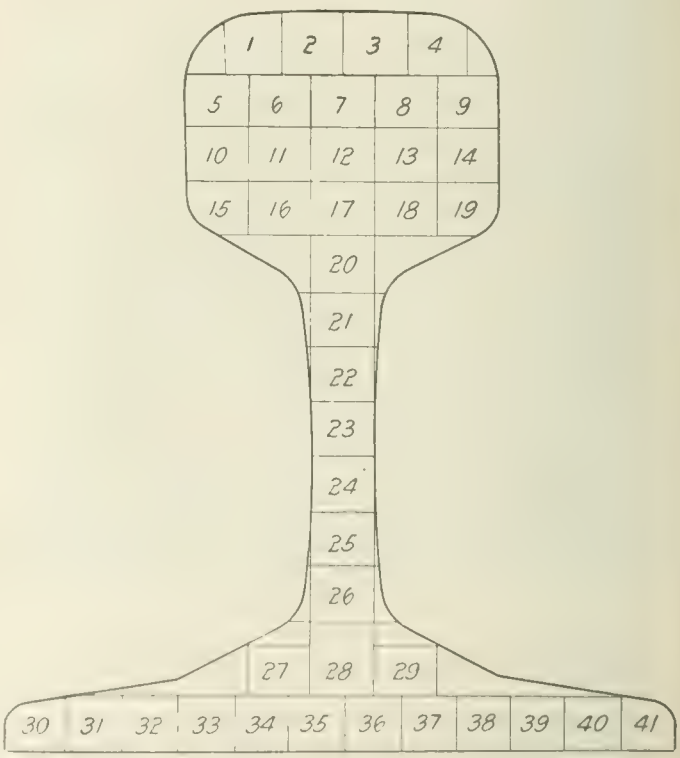
In applying this method of research, the rail sections under investigation were cut into 41 test pieces, as shown in the illustration. Broadly, the result of tests with a large number of rails of all descriptions shows that in brittle rails the test pieces in the interior of the head and those in the web—that is, specimens 6 to 18, and 20 to 26 of the illustration—have an impact figure less than 145 foot pounds, and the remaining test pieces, except in very inferior rails, give a good impact figure. It is obvious that the cost and delay of cutting up a rail section into so many small test pieces would be impracticable. Therefore Fremont has devised a simple impact test based on these results, and which can be carried out with a short length of rail of the full section after removing at the center of the length the top portion of the head; namely, test pieces 1 to 4. He uses a special apparatus for carrying out this test.

In recent years rail breakages in France have been as frequent as 1 in 2,000; in Germany they have averaged 1 in 1,150. Fremont says that in France, in cases of derailment, the rails have been bent and twisted out of shape without breaking, and yet those rails which have broken in service never show any deformation at the fracture.

Fremont discriminates between two kinds of brittleness. In the first case the material is originally tough and the brittleness does not become apparent until after several years of use, due, it would appear, to the hardening effect of the pressure caused by the wheels, producing minute cracks at right angles to the length of the rail. These cracks, being external, are easily detected and no serious danger should result from them. They are probably due to the material of the rail being originally too soft.

In the second case, the material of which the rail is made is initially brittle, and, according to the amount of this brittle material in the rail section, the rail will break, either after some service, or even during transportation or laying.

For example, vibration and shock will produce internal cracks which take their origin in the area of segregation, and gradually extend from one grain of impurity to another. Such internal cracks are extremely dangerous, as they cannot be seen and, therefore, no warning is given. It may be said that the author's investigations and the new test he proposes are principally addressed to detecting rails subject to this defect. The ordinary tup test in France generally prescribes that the foot of the rail shall be underneath, thus being put in tension on receiving the blow. It is obvious that a rail like that just described will, under these



Location of Test Pieces.

conditions, pass the test satisfactorily, owing to the tough material in the flange and at the outside portion of the head. If, however, a certain portion of the depth of the head be removed, the brittle portion is exposed, and if, further, in making the drop test, this brittle portion is placed underneath so as to be put into tension on receiving the blow it would be fractured with one, or at most two, blows if it were brittle internally.

This modification in the usual test constitutes Fremont's proposed new test, and it has the advantage that it can be carried out with short pieces of rail, say, 18 in. to 19 in. long. A series of trials was made to ascertain how much of the head of the rail should be removed, and it was found that the depth of the cut should not be less than 0.79 in.

As far as the tests are concerned, the new method appears to discriminate satisfactorily between sound and unsound rails. To establish this method as a standard method will require undoubtedly further independent research, but the work already done by Fremont is amply sufficient to show that present methods are—to put it mildly—not always reliable, and that the new method merits further close study with a view to its adoption.

FREIGHT CAR RECORDING ON THE CANADIAN PACIFIC.

The car record office of the Canadian Pacific, at Montreal, which uses the Betts system of reports and methods of work, now makes an average of 47,000 entries a day, and Mr. Altimus, the car accountant, says that as compared with ordinary methods the work of recording can be begun much earlier after the receipt of the conductor's reports; that the clerks make more entries a day, and that inquiries of all kinds can be more promptly replied to. He cites other important advantages. We give herewith a facsimile, reduced one half in height and width, of the heading and the first four lines of the conductor's train report, as used in the Betts system. This blank at once strikes the observer as remarkable by reason of its size, 12 in. wide by 18 in. in height. A sheet of these dimensions has room for entries of 38 cars, besides the caboose. This great length of sheet is necessary to carry out the fundamental principle of the system, which is to provide a separate *sheet* for each item, so that the original writing can be quickly carried to the desk where the item is to be recorded. This is accomplished by cutting the report into 38 parts.

The "engine record" at the right of the sheet occupies only a small space, at the top, the space below this being used for a tonnage record and for other statistical data. The main part of the report is that included in columns AA to AN inclusive, and the part which goes to the car recorders is only that containing columns AA to AF inclusive. This is the part that is cut up for the recorders. This, however, does not mean that the sheet is cut in two vertically at the right of column AF. It is not cut at all; there is a separate sheet, 5 in. wide, containing a duplicate of these columns, and this, by the use of carbon paper, is filled out by the conductor by the same writing as the principal report. Strips of this 5 in. sheet are cut apart horizontally to be distributed to the recording clerks. Sample strips are shown in Fig. 2. The holes punched at the left-hand side of the slips are ⅛ in. in diameter and are to enable the cutter to quickly put the slips on spindles for filing by the sorting clerks.

A similar form is used for the agents' daily interchange reports. This report also is made with carbons, white copies for the general office, a pink copy for the agent of the delivering road at the junction and a yellow copy for the agent of the receiving road.

When the conductors' and agents' reports are received at the recording office they are sorted so that those having only one item may be placed in one lot, those with two items in another and so on. The sheets are then made up into packages containing 200 to 300, with those showing the smallest number of cars on top. This being done, the cutter is able to throw away the blank slips as they come from the cutting machine and to give to the clerks only those slips which are to be recorded.

The amount of work done by the office or by each clerk is calculated by counting the slips; and these are counted by weight, the slips being weighed before being handed out to the sorting clerks. The weighing is done with a common apothecary's scale having a beam graduated to sixteenths of an ounce, 1-16 of an ounce being the weight of 17 slips.

Five clerks are employed to sort the slips. They put the numbers in proper numerical order to give each recording clerk those numbers which are to be entered in his book, and no others. The sorting is done by putting the slips, one by one, on brass spindles, 4¾ in. high, the sorter's desk having two rows of spindles 1 in. apart, the second row being 7 in. behind the first.

At regular periods during the day a sorting clerk carries to each recorder the slips belonging to him. When this system was introduced a thousand errors a day were made by the sorting clerks, but by education this has been reduced to 150 a day, or one-third of 1 per cent. of the slips handled; and these errors are mostly due to illegible writing on the part of the conductors.

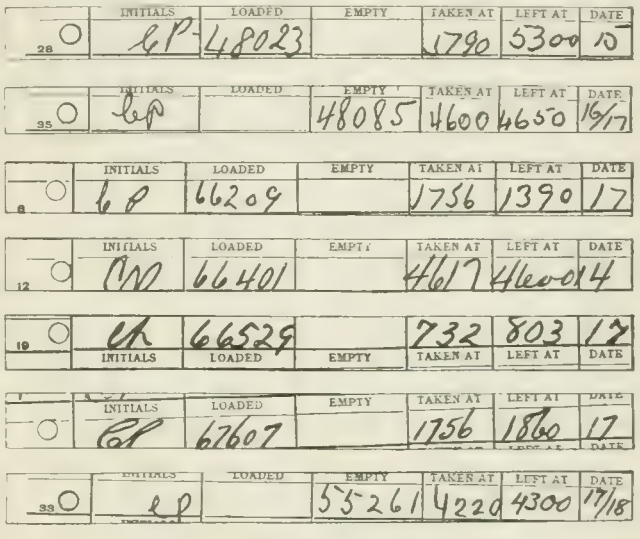


Fig. 2. Samples of Record Slips.
(Two-thirds actual length.)

The average recording clerk makes four to five entries a minute and they work at their books about six hours a day, spending the balance of their time in other kinds of work. At the end of the day the weighing clerk credits each clerk with the number of entries which he has made. In this way an absolute check can readily be kept on the work of all the clerks.

The interchange record slips for foreign cars can be sent to the owners of the cars, in lieu of junction cards; and this is being done with 80 roads already.

One of the new sleeping cars sent from England to the Malay States has now been placed in service between Singapore and Kuala Lumpur. The car contains eight separate sleeping rooms on either side of a central passage. The rooms are shut off from the passage by doors and are comfortably furnished. Each contains two berths, with spring mattresses, one above the other; a large half-length looking-glass, a shut-up washstand which can be converted into a writing table, and step ladder for the upper berth. The rooms are lighted by three small electric lamps and one large one, and well ventilated by two windows with wire-gauze screens and blinds, as well as by a ventilator over the large electric lamp in the roof. The sides of the rooms and corridor are paneled with English oak, while the bed rails are polished brass. In addition to the bedrooms, each car contains lavatories and a bathroom, with a shower bath.

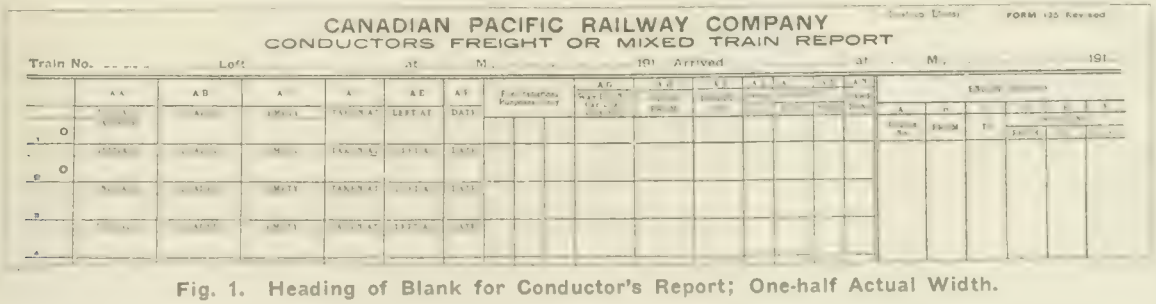

CANADIAN PACIFIC RAILWAY COMPANY
CONDUCTORS FREIGHT OR MIXED TRAIN REPORT
Train No. Left at M. 191 Arrived at M. 191

Fig. 1. Heading of Blank for Conductor's Report; One-half Actual Width.

THE RAILWAYS, THE BIG SHIPPERS, AND THE LITTLE SHIPPERS.*

BY L. E. JOHNSON,
President, Norfolk & Western.

The great mass of shippers are dealers upon a moderate scale in the products of a single, simple department of industrial activity and cannot be expected to take as broad a view of the needs and conditions growing out of relations to all forms of productive industry as the railway officer whose success is dependent upon his ability to adapt his course so as efficiently to serve the largest possible number of producers, producing points, and forms of production. On the other hand, it is asserted that most of those shippers who forward their traffic in large volume maintain a consistently sympathetic attitude toward the railway industry and are generous and considerate in their dealings. Their daily and intimate contact with the carriers, bringing with it a necessary recognition of inter-dependence and of reciprocal service, has supplied that understanding from which nothing less significant could have sprung than full acceptance of the truism that fair and even generous dealing is the expression of the most enlightened self-interest.

The carriers cannot escape a large share of responsibility for the failure of the smaller shipper to pay due regard to so essential an element in the relations between them. Engaged in the performance of a service of *quasi* public character, holding their rights to administer their own property, as they do, subject to the public right of supervision and subject to such modifications of their practices or methods as public opinion may justify, it is the fault of the carriers themselves if they have failed to induce a favorable public sentiment through the legitimate instrumentality of the fullest and most friendly understandings with their smaller as well as their larger patrons.

Admitting, however, for the purpose of the argument, the utmost dereliction in this respect that can be charged against them, the railways, having resolved no more to sin by these omissions, may rightfully demand the support and assistance of the larger shippers in bringing about a satisfactory understanding with all shippers. Authority for this position lies in the incontrovertible fact that the aloofness of the smaller shippers is the direct result of their fear or mistrust of their larger competitors. This finds frequent and emphatic expression in the repeated averments by smaller shippers that they are not so much concerned as to the actual charges upon their shipments provided they can be assured that no one else is permitted to ship at lower rates or upon more favorable terms. The abolition of rebates but partly solves the problem, though I cannot but regard that as the most notable accomplishment in traffic affairs during the past decade. And, in passing, let me say just here that, while not failing to give due and proper credit to Congress, the commission, and other governmental authorities for their part in bringing about this needed reform, yet we should not fail to remember that no small part of this result has been due to the initiative and co-operation of the railway managers and traffic officers of this country and to their cordial support in making the laws on this subject thoroughly effective.

[illegible] regular purchaser has not lost its attractiveness, nor has the ability to offer traffic in enormous quantities been deprived of its persuasive power. Miracles are as unlikely to result from regulative legislation as from any other sort of human effort. The larger shipper still possesses the advantages, in negotiations concerning rates or facilities, which grow out of the revenue pro- [illegible] resented by those unable to profit by them. Every railway traffic [illegible] this assertion and both recognize the necessity of resisting the [illegible]

shippers which would warrant resentment from any quarter. If railways were not prohibited from entering, among themselves, upon those arrangements which would make self-restraint effective and secure stable rates and the orderly maintenance of reasonable relations with all shippers, the remedy would be in their own hands and they could apply it with wisdom and finality. But their hands are tied by existing laws, and even the recently adduced "rule of reason" apparently does not relieve them from the burden of the uneconomic methods which those laws impose upon them. Therefore, it is necessary for them to invoke the co-operation of the larger shippers and to ask of the latter that they shall not, in the furtherance of narrow and selfish interest, press upon even the weakest carrier demands for lawful concessions which, if admitted, would become the subject of complaint and bring about a new period of controversy and unrest. The railways are fully warranted in making this request, for they can rest it confidently upon the truth that no mere advantage in rates or facilities which any carrier could lawfully grant would, in the end, compensate for the injuries which would come to all through a renewal of the controversies that have characterized the decade just ended.

Public sympathy is always with the poor as against the rich, with the weak as against the strong, with the small as against the great. The under-dog may have his jaws firmly gripped upon the throat of his rival, but while the noise of the contest continues the sympathy of the crowd is his. The smaller shipper may have immense advantages in production and even in the common market, but let him acquire a grievance against a railway over alleged favoritism to a larger competitor, and he has only to air it in public to convince many that duty requires them to agitate for his redress. This attitude of the public is neither unnatural nor to be condemned. Doubtless public prejudice in favor of the small shipper will yield to reason if it appears that he has complained without justification, but, even though explanation be practicable, the occasions requiring explanation should be reduced to a minimum. In short, if mutual understanding between the buyers and sellers of railway transportation is essential to the general well-being—and I have spoken in vain if I have not established that truth—the small shipper must not be disregarded. He too must be satisfied, for his prosperity and his contentment are the safeguards of the rights of the larger shippers, the guarantors of the prosperity of all.

FOREIGN RAILWAY NOTES.

The cash-on-delivery system in respect to parcels will be introduced by the railway department of New Zealand, making it possible for tradesmen to consign goods to clients, the department collecting the charges and paying the amount to the consignors.

A practical test of the Renard road trains will be made in New Zealand, and, if successful, similar trains will be put in service to provide a means of transport to the nearest railway station for settlers in sparcely populated districts. Increasing use is to be made of motor cars to connect with railways in towns not yet having railway facilities.

The Northern Central Railway, Spain, has received a concession for an extension to Logrono, in northern Spain, and is also seeking to obtain concessions for a branch to Estella and Pamplona. These extensions would penetrate a region rich in agriculture and mining products and would furnish the main line with a considerable increase in freight tonnage.

The annual statement presented to the New Zealand parliament by the minister of railways shows a net profit in 1910 of $5,795,564, the total earnings amounting to $17,004,437, the highest in the history of the railway department. A profit of 4.06 per cent. is shown on the invested capital. The minister of railways says that parliament will be asked to sanction an expenditure of $486,650 on grade-reduction work, one-fourth of which [illegible]

General News Section.

At London, Ky., nine railway contractors have been indicted on charges of peonage, many negroes being said to have been held in involuntary slavery.

The passenger station at White River Junction, Vt., was destroyed by fire November 28; loss $80,000. The building was owned jointly by the Boston & Maine and the Central Vermont.

The Erie and the Cleveland, Cincinnati, Chicago & St. Louis are arranging to use the single track line of the Erie and the single track line of the Big Four between Dayton, Ohio, and Durbin (near Springfield) jointly as a double track railway. It is expected that this arrangement will be put into effect about January 1.

The United States attorney general has brought suit against the New York Central & Hudson River in the United States district court at Boston to recover penalties of $500 each for 28 alleged violations of the hours-of-service law. It is claimed that the company required enginemen, firemen, conductors and brakemen on certain trains between Rensselaer, N. Y., and West Springfield, Mass., to work more than 16 consecutive hours, and also that telegraph operators at Springfield, Mass., were required to work more than nine consecutive hours.

The State Tax Board of Indiana, having taxed refrigerator and other cars which pass through the state, but which are owned by shippers in other states, has encountered the usual remonstrances from the owners; but in its statement sustaining its position it has produced an argument which is somewhat novel. Investigating the conditions of one Illinois concern, the Board finds that while the length of the railways owned by this car owner is only 7,850 ft., the cars owned by it aggregate a length of 15,750 ft.; incontrovertible evidence that the cars are not used at home!

The Chicago Anti-Smoke League, of which Mrs. C. H. Sergel is president, has addressed a petition to the Chicago City Council demanding that the application of the Central Terminal Railway for an ordinance giving it the right to cross streets and alleys for its new freight terminal be refused unless the railway agrees to use electric traction. The Central Terminal is a subsidiary of the Minneapolis, St. Paul & Sault Ste. Marie, which proposes to build an elevated freight terminal costing approximately $6,000,000, in the heart of the Ghetto district. (See *Railway Age Gazette*, December 1, page 1140.)

The Veteran Association of the Nickel Plate Railroad (New York, Chicago & St. Louis) has issued a pamphlet containing the proceedings of its fifth annual convention, which was held recently at Niagara Falls, Ont. This association now has over 300 members. The pamphlet contains portraits of a number of the veteran officers of the road. The president of the association for the ensuing year is E. A. Miller, superintendent of motive power. A veteran is one who has been in the service of the road 25 years. The oldest can have served only a little longer than that, as the road has been in operation only twenty-nine years.

Smoke Abatement and Electrification in Chicago.

The Chicago Association of Commerce committee of investigation on smoke abatement and electrification of railway terminals has prepared a sketch of the origin and progress of its investigation to the present time. It appears that considerable study has been put on the problem and that a very satisfactory start has been made toward the collection of data and necessary information. It is expected by the committee that within the next few months tangible results will be shown.

Smoke abatement in Chicago is naturally divided into three periods: the first beginning with the passing of the ordinance of 1881, when smoke abatement was made a branch of the city health department's activities; the second beginning with the ordinances of 1903 and 1905, when smoke abatement was included in the work of the steam boiler inspection department; and the third beginning with the ordinance of 1907, when smoke abatement was made an independent department. The first steps toward the appointment of the present committee were taken at a meeting of the Chicago Association of Commerce on March 18, 1911. Four members of the committee were appointed by the mayor and fourteen by the Association, the latter including a number of prominent railway officers and competent engineers. The expense of the investigation is being borne by the railway companies interested. Horace G. Burt was chosen chief engineer and has selected a corps of assistants who are specialists in various lines of engineering, as mentioned from time to time in the *Railway Age Gazette*. The scope of the investigation is, first, a determination as to the necessity of changing the motive power of steam railways to electric or other power; second, the mechanical or technical feasibility of such change; and, third, the financial practicability of the change. The committee has published 15 documents which include various statements of its proposed lines of work, a brief historical sketch of the movement for smoke abatement in Chicago, a memorandum of the maps prepared for the study of this problem, and an investigation of a report on the loss and damage caused by smoke in Cleveland. This report was found to be based on methods so speculative that the conclusion that a loss of five or six million dollars was resulting from smoke might as easily have been made as that the loss was one or two million dollars. Studies have been made on smokeless fuel for locomotives, on definitions and designations of smoke, smoke measurements with special reference to the Ringelmann chart and other papers on smoke measurement in this country and abroad.

Denatured Alcohol in Railway Service.

A paper on this subject, from which the following extracts are taken, was presented before the November meeting of the Western Railway Club by Michael Schwarz. For years the question of properly lighting railway stations, not only the country flag station, but the waiting rooms in good sized towns and small cities, has been a serious one. Of all the dark, dreary, shadowy, "spooky" places in the universe, the average waiting room of the country station at night stands pre-eminent. Electricity and gas are out of the question in the country districts and villages, and even in the towns and smaller cities the railway stations are frequently so far removed from the other sections of the town, that the lines do not reach them. So the only recourse was the kerosene lamp. Station agents do not take kindly to cleaning chimneys and trimming wicks and filling the lamps from a greasy oil can, and so they neglect the lamp.

A number of years ago the Germans discovered the advantages of denatured alcohol as a lighting fuel. A burner was patented which generates gas as the alcohol is fed into it from the lamp fount. The ordinary gas flame gives a light equal to ten candles, more or less. By using a mantle, the actual light is increased 4 or 5 times, and its quality, steadiness and color are greatly improved. Thus one alcohol lamp produces a light of 45.2 candle power, the equivalent to 4 or 5 gas jets, or 3 ordinary incandescent electric lights.

The greatest advantage of the alcohol lamp, particularly in a railway station, is that it takes care of itself. The station agent can neglect it, but it will keep on burning just as brightly as ever. All it asks is that the fount be kept filled, an operation requiring about a minute's work. True, the lamp has a wick, which feeds the fuel to the burner, but it never comes in contact with the flame, and therefore requires no trimming. Alcohol is absolutely smokeless and the lamp chimneys will continue clean week after week. Mantles used for 12 hours every night, frequently last for 6 months, so that the only attention the lamp requires in all that time is the refilling. The relative economy of denatured alcohol for illuminating purposes is clearly established by the official report of the Electrical Testing Laboratories of New York City. For lighting purposes, one gallon of alcohol at 60 cents a gallon, is as cheap as kerosene at 18 cents a gallon. One gallon of alcohol at 55 cents a gallon, is as cheap as kerosene at 16 cents a gallon. One gallon of alcohol at 50 cents a gallon, is as cheap as kerosene at 15 cents a gallon. One gallon of alcohol at 45 cents a gallon, is as cheap as kerosene at 13 cents a gallon.

The Pullman Company has recently adopted denatured alcohol stoves in its broiler and buffet cars, and is making quite a success of them. The writer has, on many occasions, investigated

the efficiency of these stoves and finds invariably that the alcohol stove is considered superior to the gas stoves.

Portable heaters using denatured alcohol are now on the market for heating refrigerator cars. They have been in tests and actual service, for more than a year. The heater is used as a gravity feed burner. Wicks and hand manipulated valves are entirely eliminated. They are regulated automatically, and will burn for a period of 10 days without attention. The burning of denatured alcohol does not require the admission of any free air into the car to support combustion, the air is not vitiated to any appreciable extent, and the products of combustion are used as a heating agent. It does produce antiseptic conditions. There is no smoke or soot, therefore it seems to be the ideal fuel to use in the cars for the protection of eatable products. The heater is made in two sizes, single and double burners, and can be applied to any car by setting it on the floor at the door, or by placing it in the ice box at the end of refrigerator cars.

Franklin Institute.

The Franklin Institute Alumni Association, organized by graduates of the school of mechanic arts of the Franklin Institute, Philadelphia, Pa., is desirous of obtaining the addresses of all graduates and former students in this country and elsewhere. The association was formed for the purpose of promoting closer relations among the graduates, and by co-operation to further, if possible, the professional interests of each member. The officers are anxious to get into communication with the graduates with a view to presenting to them the objects of the association and the advantages of membership. Former graduates, or those who may have any information relating to them, are requested to communicate with Charles E. Hubsch, secretary of the association, who can be addressed care of the Franklin Institute.

Indianapolis Transportation Club.

The November meeting of this club was held at the Board of Trade building, November 28, with a large attendance. Addresses were given by F. J. Woulfe, general freight agent of the Lehigh Valley; and E. J. Reynolds of Crawfordsville, Ind., formerly president of the National Grain Dealers' Association.

American Society of Civil Engineers.

At the meeting of the American Society of Civil Engineers, held on December 6, a paper on The St. Croix River Bridge, by C. A. P. Turner, M. Am. Soc. C. E., was presented for discussion. This paper was printed in the *Proceedings* for October, 1911.

Cleveland Engineering Society.

An open meeting of the Cleveland (Ohio) Engineering Society will be held on December 12. The next regular meeting of the society will be held on January 9, when a paper will be presented on Railway Signaling, by C. E. Denney, signal engineer, Lake Shore & Michigan Southern.

American Society of Mechanical Engineers.

Dr. Alex. C. Humphreys, president of the Stevens Institute, has been elected president of the American Society of Mechanical Engineers.

MEETINGS AND CONVENTIONS.

American Railway Bridge and Building Association.—C. A. Lichty, C. & N. W., Chicago. Next annual convention, third week in October, 1912, Baltimore, Md.

American Railway Engineering Association.—E. H. Fritch, Monadnock Block, Chicago; annual convention, March 19-21, 1912, Chicago.

American Railway Master Mechanics' Association.—J. W. Taylor, Old Colony building, Chicago. Annual convention, June 17-19, Atlantic City, N. J.

American Railway Tool Foremen's Association.—M. H. Bray, N. Y., N. H. & H., New Haven, Conn.

American Society for Testing Materials.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.

American Society of Civil Engineers.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

American Society of Engineering Contractors.—J. R. Wemlinger, 13 Park Row, New York; 2d Tuesday of each month, New York.

American Society of Mechanical Engineers.—Calvin W. Rice, 29 W. 39th St., New York.

Association of American Railway Accounting Officers.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.

Association of Railway Claim Agents.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 22, 1912, Los Angeles, Cal.

Association of Railway Electrical Engineers.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago.

Association of Railway Telegraph Superintendents.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.

Association of Transportation and Car Accounting Officers.—G. P. Conard, 75 Church St., New York; December 12-13, Louisville, Ky.

Canadian Railway Club.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.

Canadian Society of Civil Engineers.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

Car Foremen's Association of Chicago.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

Civil Engineers' Society of St. Paul.—D. F. Jurgensen, 116 Winter St., St. Paul, Minn.; 2d Monday, except June, July and Aug., St. Paul.

Engineers Society of Pennsylvania.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

Engineers' Society of Western Pennsylvania.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

Freight Claim Association.—Warren P. Taylor, Richmond, Va.; annual, May 15, Buffalo, N. Y.

General Superintendents' Association of Chicago.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

International Railway Congress.—Executive Committee, rue de Louvain, 11 Brussels; 1915, Berlin.

International Railway Fuel Association.—D. B. Sebastian, La Salle St. Station, Chicago.

International Railway General Foremen's Association.—L. H. Bryan, Brown Marx building, Birmingham, Ala.

International Railroad Master Blacksmiths' Association.—A. L. Woodworth, Lima, Ohio.

Iowa Railway Club.—W. B. Harrison, Union Station, Des Moines, Ia.; 2d Friday in month, except July and August, Des Moines.

Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York; annual convention, May 14-17, Pittsburgh, Pa.

Master Car Builders' Association.—J. W. Taylor, Old Colony buiuding, Chicago. Annual convention, June 12-14, Atlantic City, N. J.

Master Car and Locomotive Painters' Association, of United States and Canada.—A. P. Dane, B. & M., Reading, Mass.; next annual convention, second week in September, 1912.

New England Railroad Club.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

New York Railroad Club.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

Northern Railway Club.—C. L. Kennedy, C., M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.

Omaha Railway Club.—H. H. Maulick, Barker Block, Omaha, Neb.; second Wednesday.

Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

Railway Club of Pittsburgh.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

Railway Industrial Association.—G. L. Stewart, St. L. S. W. Ry., St. Louis, Mo.; annual, May 12, 1912, Kansas City, Mo.

Railway Signal Association.—C. C. Rosenberg, Bethlehem, Pa.

Railway Signal Engineering Associates.—J. P. Murphy, Box C, Collinwood, Ohio.

Railway Storekeepers' Association.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

Roadmasters' and Maintenance of Way Association.—L. C. Ryan, C. & N. W., Sterling; September, 1912, Buffalo, N. Y.

St. Louis Railway Club.—F. W. Brazier, Union Station, St. Louis, Mo.; 2d Friday, except June, July and Aug., St. Louis.

Southern and Southwestern Railway Club.—C. Nesbett, La Salle St. Station, Chicago.

Southern Association of Car Service Officers.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.

Southern Railway Club.—A. J. Merrill, Grant Bldg., Atlanta, Ga.; 2d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

Southern Railway and Locomotive Club.—J. C. Metcalfe, Worker Spice Co., Toledo, Ohio; [illegible].

Traffic Club of Chicago.—C. S. McCord, La Salle Hotel, Chicago; [illegible].

Traffic Club of New York.—C. A. Swope, 290 Broadway, New York; last [illegible] except June, July and August, New York.

Transportation Club of Pittsburgh.—D. L. Wells, Exc., Pittsburgh, Pa.; meetings [illegible].

Transportation Club of Buffalo.—L. F. Mueller, 7012 Stewart [illegible].

Transportation Club of Detroit.—[illegible], Detroit, first Saturday [illegible].

Transportation Club of Fort Wayne.—W. R. Hedley, L. S. & M. S., Detroit, [illegible].

Transportation Club of Utica.—W. O. Thompson, N. Y. C. & H. R., [illegible].

Transportation Club of Winnipeg.—W. H. Rosser, P. O. Box 130, Winnipeg, Man.; [illegible].

Western Railway Club.—W. [illegible], Harvard, Chicago, 3d [illegible].

Western Society of Engineers.—H. Wheeler, 1735 Monadnock Block, Chicago, 1st Monday, except July and August, Chicago.

Wheeling Railroad Club.—[illegible], B. & O., Baltimore, Md.; annual, January 16-18, Chicago.

Traffic News.

Reports of the Texas Demurrage & Storage Bureau for October show that 1,171 stations reported 132,710 cars, of which 94.09 per cent. were released before demurrage accrued.

At the December meeting of the St. Louis Association of General Passenger Agents, Frank B. Gildersleeve, assistant general passenger agent of the Baltimore & Ohio Southwestern, was elected president.

The Southern Illinois Millers' Association has filed a complaint with the Interstate Commerce Commission, attacking reshipping rates on grain products between St. Louis and East St. Louis and the Atlantic seaboard, and alleging discrimination as compared with the intermediate rates.

Incidental to the unprecedented movement of wheat from Western Canada to Eastern markets, the Canadian Pacific reports that in a single day of 24 hours the number of cars of freight moved eastward from Winnipeg was 1,003. Trains of 45 cars each were sent out at intervals of about one hour. The total number of cars moved to and from Winnipeg on all divisions during that day was 3,389.

The legislature of California, which at its last session made a radical revision of the laws of the state regulating railway operation, has now before it a bill making further and more detailed changes in its legislation. The bill has been drawn by Mr. Eshleman, the president of the State Railway Commission, in conjunction with a number of lawyers, and is intended apparently to cure defects which were left in the present statutes because of lack of time to thoroughly consider all questions.

The Railway Ticket Protective Bureau has issued a circular letter announcing the successful prosecution of a ticket scalper in California for using the United States mails to defraud. On complaint of the Atchison, Topeka & Santa Fe, Judge Wellborn on November 8 sentenced Charles Jordan of Los Angeles to 30 days in jail for writing letters offering to sell non-transferable tickets at less than tariff rates. Jordan had been carrying on his business under various aliases. Judge Wellborn said he made the sentence light because Jordan had already been in jail two months awaiting trial.

The federal grand jury at Chicago is said to be conducting an investigation of the alleged payment by Eastern railways of excessive advertising rates to theatrical publications as an inducement to influence the routing of passenger traffic controlled by theatrical agencies. Several passenger officers of lines between Chicago and New York and representatives of New York theatrical agencies have testified before the grand jury. It is understood that certain theatrical agencies in New York have made a business of soliciting advertising from the railways for theatrical publications of a limited circulation and have refused to patronize roads that do not pay their rates.

The Secretary of Agriculture, in his annual report just issued, recounts in some detail what the officers of his department have done during the past year toward the promotion of road building. The department finds that there are in this country 2,210,857 miles of wagon roads, of which only 8½ per cent. are improved; but in 1904 only 7.13 per cent. were improved, the increase in the five-year period, 1904-1909, being 34,379 miles. The Office of Public Roads, a bureau of the department, has during the past year built, at local expense, object-lesson roads in 52 places, for which the sum of $120,000 was expended. Expert advice on road-work has been given in 183 cases, scattered throughout thirty states. This work related not only to road building but to the economic and financial questions related to such work. The agents of the department who have traveled over the country to investigate road building have given also 723 lectures in 35 states. These lectures have been attended by 200,000 persons, mostly farmers. The department employs each year graduate engineers who are instructed during a period of one year and who thus gain experience which fits them for important positions all over the country. The department has made many tests of road materials, road binders and dust preventives; and finds that many worthless road preparations are being offered to the public and in many cases sold. The use of oil-mixed cement concrete for roads is looked upon as an important improvement.

Eastern Steamship Corporation.

This is the name of a corporation which has been organized at Boston to take over the vessels and the business of nearly all of the steamers doing business between Boston and ports east of there, including the Maine Steamship Company, which operates between New York and Portland. It is expected also to take in the Metropolitan Steamship Company, which runs freight boats between New York and Boston. The two last named companies have been controlled by the New York, New Haven & Hartford Railroad, and with the present transfer that road disposes of its interest in all maritime traffic east of New Bedford, Mass.

Illinois Central Suburban Fares in Chicago.

The Illinois Central on December 1 voluntarily established a new tariff of reduced commutation fares in Chicago applying between downtown stations and all stations as far up as Forty-seventh street. On 25-ride tickets the new rates give a five-cent fare between the city and points as far south as Forty-third street. The reductions were made in part to meet the increasing competition of the South Side Elevated and surface street car lines and are in pursuance of a policy of improving the suburban service generally. The old and the new rates for twenty-five and ten-ride tickets are as follows.

	25 Rides.		10 Rides.	
To or From -	Old.	New.	Old.	New.
Thirty-first street	$1.25	$1.25	$0.60	$0.50
Thirty-sixth street	1.50	1.25	.70	.60
Thirty-ninth street	1.50	1.25	.70	.60
Forty-third street	1.60	1.25	.80	.60
Forty-seventh street	1.80	1.60	.90	.60
Fiftieth street	2.00	1.90	.95	.80

On December 3 the suburban train service was improved by the addition of sufficient trains to give a four-minute service, instead of a five-minute service, during the rush hours on week days, and on Sundays a fifteen-minute service instead of thirty-minute.

Recommended to the Southern Governors Who Are Discussing the Low Price of Cotton.

President Finley, of the Southern Railway, in an address at the Black Soil Belt fair at Demopolis, Ala., said: "It is particularly desirable that the cotton farmer should have a steady source of income throughout the year. The local demand throughout the South for dairy products, poultry and eggs is such as to enable the farmer who produces a surplus of these commodities to have a weekly income throughout the year sufficient to meet his bills with the local merchants, and a regular income such as this, even though the amount received per week be small, will go far in assisting him to market his cotton when there is an economic demand for it."

Railway Associations in Chicago to be in One Building.

The principal railway traffic associations having headquarters in Chicago, now located in various office buildings scattered throughout the business district of the city, have decided to move early in the coming year into a joint headquarters for all of the associations in the new Heisen building, Dearborn and Harrison streets. This step has been decided on after a thorough investigation of the plan by a joint committee representing the associations; and a five-year lease with the privilege of renewal for another five-year period has been taken of the nineteenth, twentieth, twenty-first and twenty-second floors of the Heisen building, having a total of 50,000 square feet of floor space.

The associations which now have separate offices and meeting rooms and which will move into the new headquarters, are the Western Passenger Association, the Western Trunk Line Committee, the Transcontinental Freight Bureau and the Transcontinental Passenger Association, now in the Railway Exchange building; the Central Freight Association, in the Rookery building; the Central Passenger Association, in the Tribune building; the Western Railway Weighing Association and the Western Classification Committee, now in the Great Northern building, and the Uniform Classification Committee, in the Merchants Loan & Trust building. The General Managers' Association, with headquarters in the Western Union building, is considering joining the other associations.

About 9,000 square feet on the twenty-second floor will be devoted to meeting rooms. The offices of the Western Trunk Line Committee will also be on this floor. The distribution of the

offices of the other associations on the nineteenth, twentieth and twenty-first floors has not yet been determined. There will be one central telephone exchange and one mailing room for all these associations. On account of the necessity of making some changes in the building, it is expected that the offices will not be ready for occupancy until March or April.

The plan is believed to offer many important advantages. The total amount of space is considerably less than that occupied by the separate headquarters and is secured at a lower rate per square foot making a total saving of between $23,000 and $24,000 in rentals per year. The added convenience of a central headquarters is also an important consideration. Many railway officers are members of several associations that may be holding meetings simultaneously and it will be a great convenience to be able to go from one meeting into another, if necessary, resulting in a valuable saving of time.

Car Surpluses and Shortages.

Arthur Hale, chairman of the committee on relations between railways of the American Railway Association, in presenting herewith statistical bulletin No. 107-A, giving a summary of car shortages and surpluses by groups of states, from July 20, 1910, to November 22, 1911, says:

"Contrary to the corresponding periods in the preceding years, the surplus figures reported for the period ending November 22, 1911, show a decrease of 2,231 cars, bringing the total surplus down to 43,059 cars. The decrease is probably due to the stocking up of anthracite coal in the East. The coal car surplus in group 2 (New York, New Jersey, Delaware, Maryland, eastern Pennsylvania) shows a decrease of 3,789 cars, while the total car surplus shows a decrease of 4,052 cars. Box, flat and miscellaneous cars show increases of 1,024, of 643 and of 151 cars, respectively and partially offset the decrease in coal cars.

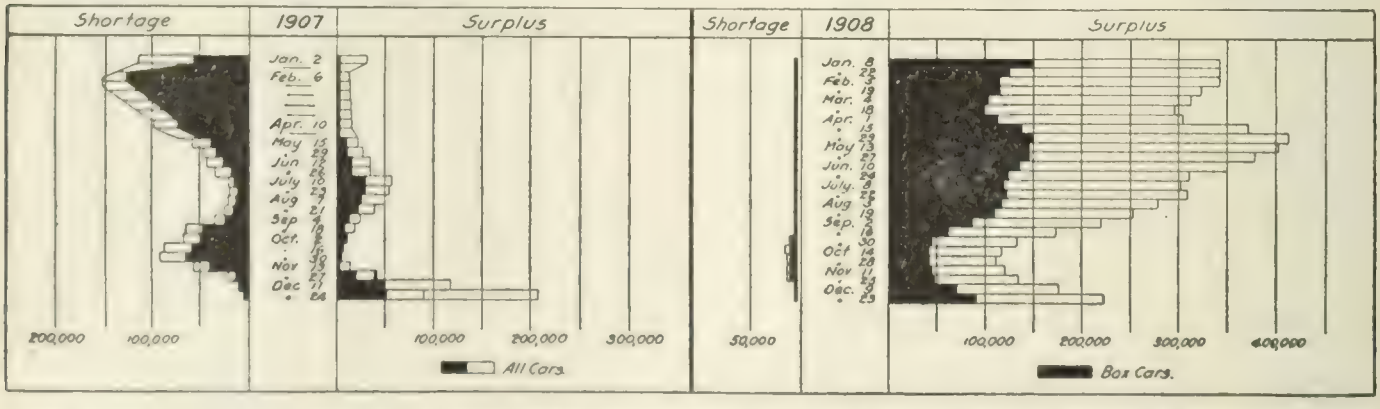
"There is an increase of 1,173 cars reported in the total car shortage. Coal and miscellaneous cars show increased shortages of 1,094 and 938 cars, respectively, while the box and flat car shortage decreased 612 and 247 cars, respectively."

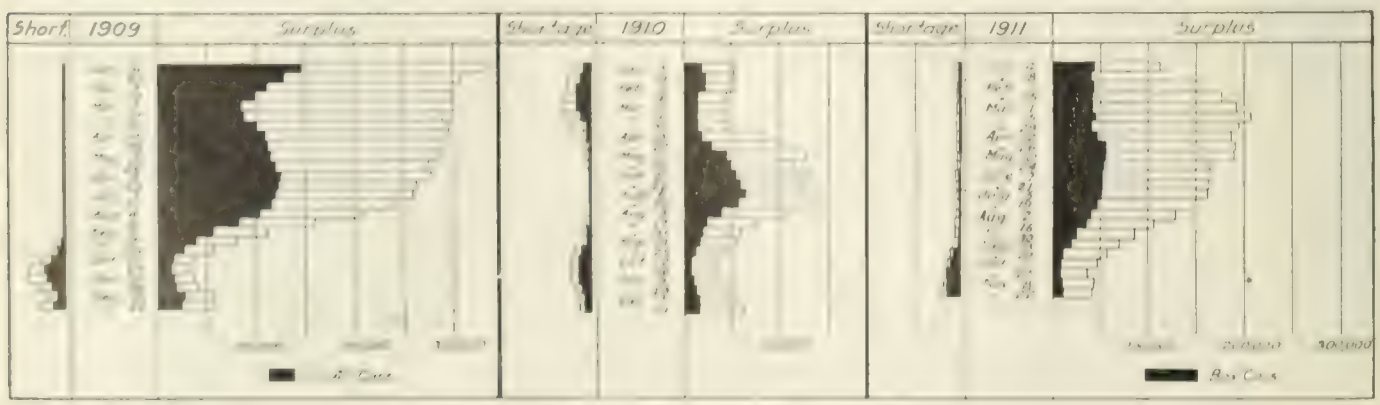
The accompanying table gives car surplus and shortage figures by groups for the last period covered in the report, and the diagrams show total bi-weekly surpluses and shortages in 1907 and 1911.

Car Surpluses and Shortages.

Date.	No. of roads.	Surpluses					Shortages				
		Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.	Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.
Group *1.—November 22, 1911	7	373	778	140	205	1,496	349	40	258	459	1,106
" 2. " 22, 1911	26	709	80	1,425	709	2,923	9	0	107	94	210
" 3.— " 22, 1911	26	578	810	5,879	1,559	8,826	1,459	0	405	1,357	3,221
" 4 " 22, 1911	11	247	7	624	596	1,474	848	130	2,455	16	3,449
" 5.— " 22, 1911	19	30	62	159	1,037	1,288	175	122	623	11	920
" 6 " 22, 1911	23	5,684	496	1,522	3,812	11,514	198	8	162	313	681
" 7.— " 22, 1911	3	0	11	11	752	774	137	0	0	0	137
" 8.— " 22, 1911	19	600	75	906	1,897	3,478	1,515	123	70	75	1,783
" 9 " 22, 1911	10	1,497	143	247	656	2,543	400	0	0	0	400
" 10.— " 22, 1911	20	813	971	1,433	4,964	8,181	1,301	0	0	20	1,321
" 11.— " 22, 1911	5	0	251	0	311	562	6,287	60	0	374	6,721
Total	169	10,531	3,684	12,346	16,498	43,059	12,678	483	4,080	2,708	19,949

*Group 1 is composed of New England lines; Group 2—New York, New Jersey, Delaware, Maryland, and Eastern Pennsylvania lines; Group 3—Ohio, Indiana, Michigan and Western Pennsylvania lines; Group 4—West Virginia, Virginia, North and South Carolina lines; Group 5—Kentucky, Tennessee, Mississippi, Alabama, Georgia and Florida lines; Group 6—Iowa, Illinois, Wisconsin, Minnesota and the Dakotas lines; Group 7—Montana, Wyoming and Nebraska lines; Group 8—Kansas, Colorado, Missouri, Arkansas and Oklahoma lines; Group 9—Texas, Louisiana and New Mexico lines; Group 10—Oregon, Idaho, California and Arizona lines; Group 11—Canadian lines.





Car Surpluses and Shortages in 1907 to 1911.

INTERSTATE COMMERCE COMMISSION.

The commission has suspended until April 11, tariffs filed by the Chicago & North Western and other lines west of Chicago, showing increases in rates for the transportation of cattle from the west to Chicago.

The commission has extended until February 1, the time within which the trunk lines must file joint passenger tariffs, revised according to the orders of the commission in connection with its rulings on the applicability of the amended long and short haul section.

Special Examiner Gerry of the Interstate Commerce Commission on December 1, at Indianapolis, Ind., began a rehearing of the rate case originated by the complaint of the Indianapolis Freight Bureau against the railways serving the city of Indianapolis, involving charges of discrimination in the rates from Indianapolis to the Missouri river, as compared with those from Illinois and Wisconsin points.

Reparation Awarded.

Gibson Fruit Co. v. Chicago & North Western et al. Opinion by the commission:

The case shows that the carload of apples in question was shipped from Sioux City, Iowa, to New Orleans, La., under a misrouting by the defendant. (21 I. C. C., 644.)

Rates on Pineapples and Citrus Fruits Prescribed.

Florida Fruit & Vegetable Shippers' Association v. Atlantic Coast Line et al. Opinion by Commissioner Prouty:

Carriers will be directed to establish new basing points, and they are ordered to make their rates on a distance tariff. (22 I. C. C., 11.)

Minimum Weights on Ties and Lumber.

G. S. Baxter & Co. v. Georgia, Florida & Southern. Opinion by the commisison:

The defendants maintain a minimum carload weight on lumber of 24,000 lbs., but on ties of 32,000 lbs. This the commission finds to be unreasonable. However, the rates on ties from southeastern Georgia to Jacksonville, Fla., are not found to be unreasonable. (21 I. C. C., 647.)

Equipment Must Be Furnished by Carrier.

Brook-Rauch Mill & Elevator Co. v. St. Louis, Iron Mountain & Southern et al. Opinion by the commission:

The complaint is in regard to a carload of corn shipped from Omaha, Neb., on a through tariff to Fordyce, Ark., which was stopped at Little Rock, Ark., for milling-in-transit. Little Rock, Ark., is on the lines of the inbound carrier—the St. Louis, Iron Mountain & Southern—but is not reached by the delivering carrier. The inbound carrier refused to furnish equipment for the shipment after it had been stopped for milling-in-transit, because the shipment was so soon to go from its own lines, and the outbound carrier refused to furnish equipment, because Little Rock was not on its lines. The commission holds that since a carrier cannot be compelled to furnish equipment until a shipment reaches its own lines, the duty rests on the inbound carrier. (21 I. C. C., 651.)

Rates on Live Stock to Tacoma Upheld.

Carstens Packing Co. v. Union Pacific et al. Opinion by Commissioner Lane:

The complainant, while not attacking the rates in themselves on live stock from eastern Oregon points to Tacoma, Wash., via the Northern Pacific through Wallula, Wash., claims that these rates are discriminatory because of a lower rate by way of Portland, Ore. The two routes by which stock may be shipped from eastern Oregon and Idaho points to Tacoma are over the Northern Pacific via Wallula, or over the Oregon-Washington R. & N. via Portland. This latter route is 43 miles longer, but the Wallula route involves crossing the Cascade mountains, and there is a difference in rates ranging from nothing to $15 per car, the longer route having the cheaper rates. The commission finds that the fact is that the complainant, through its negotiations with the Oregon-Washington line, brought about the discrepancy which now exists in the rates by way of these two routes. Higher rates were previously in force by the longer Portland route than by way of the Northern Pacific. The complainant, after having obtained lower rates on the longer route, now attempts to get the commission to make the Northern Pacific reduce its rates to a corresponding degree. (22 I. C. C., 8.)

Retroactive Application of Milling-in-Transit.

Young & Cutsinger v. Louisville & Nashville. Opinion by the commission:

Complainants ask that the present milling-in-transit privilege be made retroactive on shipments of lumber sent out 18 months after inbound shipments of the material. The present milling-in-transit privilege went into effect nine months after the inbound shipments had been made. The commission says that milling-in-transit is a privilege which may be granted or withheld by the carrier at its discretion, as long as there is no discrimination, and the extension of this privilege carries with it no obligation on the part of the carrier to make the privilege retroactive. Even if the time between the inbound and outbound shipments were not unreasonably long the complaint would be dismissed. (22 I. C. C., 1.)

Specific Tariff Cancellation Required.

Carlos Veitch v. Seaboard Air Line. Opinion by the commission:

A tariff supplement was filed by the defendant showing a rate of $3.40 per ton on cottonseed hulls C. L. from Lorinburg, N. C., to Birmingham, Ala. This supplement, however, did not specifically refer to that portion of the previous supplement which named a rate of $2.50 per ton for the same service. The previous supplement had not been cancelled in full. The complainants ask reparation for the difference between the $3.40 rate which was charged and the $2.50 rate, which they claim was still in effect. The rule of the commission has been that reissues or supplements must state where rates will hereafter be found, and must be filed at the same time and in connection with the tariffs which contain the new rates, and must specifically state the portion of such tariff which is thereby cancelled. The railway company claims that when a supplement conflicts with a part of its original tariff, that is, the tariff which it amends or supplements, or conflicts with a part of a previous supplement to such original tariff, as is the case here, the rule has no application. This is not in accord with the spirit and purpose of the rule. The commission finds that the rule does apply to the situation presented in this case. In view, however, of the fact that the original tariff was published prior to the promulgation of the rules invoked by the complainant, and that it was later reissued in conformity with the rules, the commission does not find that the case presents a proper basis for an award of reparation. (22 I. C. C., 4.)

STATE COMMISSIONS.

The California State Railroad Commission has ordered a reduction of 50 per cent. in the freight rates on nut shells and similar products, between San Francisco and Los Angeles. The present rate of $1.20 per 100 lbs. is reduced to 60 cents.

The California State Railroad Commission has affirmed its recent decision ordering the Southern Pacific to reduce its Los Angeles-San Pedro freight rates; and announces that such reduction becomes effective not later than December 7. The reductions vary from 10 to 50 per cent. on different commodities; the principal product, lumber, is lowered from $1.20 to 80 cents a ton.

The Indiana Railroad Commission has ordered the steam roads to haul and deliver coal from the mines to the Kokomo, Marion & Western Traction Company for 65 cents a ton the rate charged manufacturers. It was shown that the traction company produced and sold electric current to the other manufacturing plants which made it a manufacturer and entitled to manufacturer's rates. The difference in the rate is 10 cents a ton.

The Indiana State Railroad Commission has ordered the Cleveland, Cincinnati, Chicago & St. Louis to deliver coal in car load lots to the Indianapolis Union, to be switched to the Terre Haute, Indianapolis & Eastern interurban (electric) line to be transported to Plainfield, twelve miles. The ordinary charge of $2 per car is authorized. The ruling indicates the purpose of the commission to require exchange of freight between steam and electric lines where physical conditions will permit.

COURT NEWS.

In the county court at Hammond, Indiana, Judge Reiber has decided against the State Railway Commission in its suit against the Grand Trunk to enforce an order requiring the introduction of block signals. The judge holds the law invalid because it is not specific.

The Commerce Court has dismissed the petition of the Arkansas Fertilizer Company, asking to have set aside the order of the Interstate Commerce Commission barring claims for reparation unless presented to the commission within two years from the date of delivery of freight.

The United States Court of Claims at Washington has dismissed the suit of the Missouri, Kansas & Texas, asking for reimbursements for land adjacent to the line of the road in the Indian Territory, now a part of the state of Oklahoma. The value of the land claimed is given as $62,000,000.

The United States district court at Springfield, Ill., has issued a temporary injunction restraining the attorney-general of Illinois and various state's attorneys from enforcing the state two-cents-a-mile passenger fare law against the Wabash, Chester & Western Railway. The road contended that the law was confiscatory.

The Commerce Court has overruled the demurrer in the case of the Atlantic Coast Line v. the Interstate Commerce Commission in which the commission has prescribed rail and water rates on boots and shoes from New York and Boston to Atlanta, Ga. Motion to dismiss the case has been denied, and leave has been granted to amend the petition.

In the federal court in Indiana fines have been imposed on the Cleveland, Cincinnati, Chicago & St. Louis, for violations of the safety appliance act, $1,700; and on the Evansville & Terre Haute and the Grand Rapids & Indiana, smaller fines for similar violations. The Grand Rapids & Indiana and the Cleveland, Cincinnati, Chicago & St. Louis, were fined for violation of the hours of service law.

The Commerce Court has ordered counsel for the Atchison, Topeka & Santa Fe and the Interstate Commerce Commission to get together and agree on a form of final decree of injunction in the long and short haul case in which the Commerce Court has granted a temporary injunction restraining the I. C. C. from enforcing its orders. This agreement on the form of final decree is preparatory to an appeal by the United States and the I. C. C. to the Supreme Court.

At Washington, December 5, the Commerce Court sustained the order of the Interstate Commerce Commission, holding that in the allotment of cars to coal mines private cars must be counted; and dismissed, with costs, the petition of the Pennsylvania Railroad against the commission to set aside a certain order for distribution of coal cars. This order requires that privately owned cars shall be counted in with the cars of the [illegible] such an order.

The Supreme Court of Missouri has rendered a decision sustaining the right of the Missouri Pacific to own stock in coal [illegible] character that the inhibition of the constitution would prevent a railway from engaging in either.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

W. W. Strickland, assistant freight auditor of the Atchison, Topeka & Santa Fe, at Topeka, Kan., has been appointed freight auditor, with office at Topeka, succeeding A. A. Hayes, deceased.

The officers of the Manistee & Repton are now as follows: J. B. Barnett, president; L. J. Bugg, secretary and treasurer, and J. A. Kauffman, vice-president and general manager, all with offices at Monroe, Ala.

John S. Douglas, who was apopinted acting general claim agent of the Gulf, Colorado & Santa Fe, succeeding W. L. Alexander as was previously announced in these columns, has been appointed general claim agent, with office at Galveston.

C. M. Secrist, vice-president and general manager of the Pacific Fruit Express Company at Chicago, will have his office removed to San Francisco, Cal., effective January 1, when the general offices of the company will be transferred to the latter place.

E. A. Sunderlin, vice-president and general manager of the Grand Junction & Grand River Valley at Colorado Springs, Colo., has been elected president, with office at Colorado Springs, succeeding Thomas E. Curtin, deceased. Charles L. Tutt has been elected vice-president, succeeding Mr. Sunderlin.

R. E. Williams, assistant auditor of the International & Great Northern at Houston, Tex., has been appointed auditor of the Texas & Pacific, with office at Dallas, succeeding R. Fenby, appointed consulting auditor. W. J. Werner, chief clerk to the auditor of the International & Great Northern, has been appointed assistant auditor, succeeding Mr. Williams.

W. W. Walker has been elected vice-president and general manager of the Duluth, South Shore & Atlantic and the Mineral Range, with office at Duluth, Minn., his appointment as general manager of the former road having been announced in these columns last week. Mr. Walker was born June 3, 1868, at St. Cathcrines, Ont., and he received a high school education. He began railway work as an office boy with the Grand Trunk in 1883, and the following year went with the Queen & Crescent Route, where he was a clerk in the traffic department for three years. He was then for a year with the Chicago & North Western in the claim department, and from October, 1888, to February, 1890, was rate clerk and chief clerk in the general freight department of the Great Northern. He was appointed traveling freight agent of the Duluth, South Shore & Atlantic in Novem[illegible], 1890, [illegible] later was promoted to assistant general freight agent, and from July, 1901, until December 1, 1911, the date of his election as vice-president and general manager, he [illegible] freight agent at Duluth.

W. W. Walker

George V. Massey, general counsel of the Pennsylvania Railroad, will retire from that position on January 1. Mr. Massey was born on December 16, 1841, in West Whiteland township, Chester county, Pennsylvania, and was educated at Freeland [illegible] in Montgomery county, and at a school at Delaware [illegible]. He was admitted to the bar in 1865, and from 1876 to 1895 he was solicitor for the Philadelphia, Wilmington & Baltimore, now a part of the Philadelphia, Baltimore & Wash-

ington. He was appointed assistant general solicitor of the Pennsylvania Railroad in August, 1895, and from November 12 to November 26, 1902, was general solicitor. Mr. Massey has been general counsel of the same road since November, 1902.

Will George Van Vleck, whose election as vice-president and general manager of the Southern Pacific lines in Texas and Louisiana, with office at Houston, Tex., has been announced in these columns, was born March 5, 1857, at Elbridge, Onondaga county, N. Y. He received a common school education, and began railway work in August, 1873, as a telegraph operator with the Grand Rapids & Indiana, remaining with that company for two years. He went with the Galveston, Harrisburg & San Antonio in October, 1875, where he until 1885 was consecutively, for one year telegraph operator, four years despatcher, one year chief despatcher, one year trainmaster of the Mexican & Pacific extension, and two years division superintendent. For over two years from March, 1885, he was superintendent of the San Antonio division; he was then transferred to the Louisiana division of the Southern Pacific Company, and six months later was made general superintendent of the lines in Texas. From October, 1895, until the time of his recent promotion he was manager of the Galveston, Harrisburg & San Antonio, and the Texas & New Orleans, and for a number of years was also second vice-president of those lines.

W. G. Van Vleck

Operating Officers.

J. B. Paul has been appointed general superintendent of the Liberty White, with office at McComb, Miss.

C. E. Prugh has been appointed assistant trainmaster of the New Orleans Great Northern, with office at New Orleans, La.

J. E. Johnson has been appointed trainmaster of the Chicago, Burlington & Quincy, with office at McCook, Neb., succeeding F. R. Mullen, promoted.

J. C. Talmage has been appointed trainmaster of the 25th district (C. S. & M.), 27th and 28th districts of the Grand Trunk, with office at Durand, Mich., succeeding F. G. Bement.

W. D. Johnson, formerly general roadmaster of the Duluth, South Shore & Atlantic, has been appointed assistant superintendent, with office at Thomaston, Mich., succeeding A. M. Sutherland, resigned.

G. E. Reel, assistant trainmaster of the Cincinnati, Hamilton & Dayton at Lima, Ohio, has been appointed trainmaster of the Toledo division, with office at Dayton, Ohio, and William A. Carruthers succeeds Mr. Reel at Lima.

C. H. Hurdleston, trainmaster of the Missouri, Kansas & Texas of Texas, at Denison, Tex., has been appointed superintendent, with office at Smithville, Tex., succeeding F. A. Lattig, resigned. T. Johnson succeeds Mr. Hurdleston.

H. C. Landon, who recently resigned from the position of division engineer of the Erie Railroad, has been appointed general manager and chief engineer with office at Lenor, N. C., of the Watanga Railroad, a new line to be built in North Carolina and eastern Tennessee.

W. F. Schaff, assistant superintendent of the Eastern division of the Lake Shore & Michigan Southern at Buffalo, N. Y., has been appointed assistant superintendent of the Toledo division, with office at Cleveland, Ohio. As has been announced in these columns, E. V. Brogan succeeds Mr. Schaff.

C. C. Arnold, superintendent of the Sandusky division of the Lake Erie & Western at Lima, Ohio, has been appointed superintendent of the Peoria division, with office at Lafayette, Ind., succeeding E. R. Bissell, resigned to go to the Lake Shore & Michigan Southern. George Dyer succeeds Mr. Arnold.

J. F. Simms, superintendent of the St. Louis & San Francisco, at Memphis, Tenn., has been appointed superintendent, with office at Springfield, Mo., succeeding A. O'Hara, deceased. C. H. Baltzell, assistant superintendent at Thayer, Mo., succeeds Mr. Simms, B. F. Hunter, assistant superintendent at Enid, Okla., succeeds Mr. Baltzell, and W. Rudd, assistant superintendent at Amory, Miss., succeeds Mr. Hunter.

R. M. Johnson, trainmaster of the Pere Marquette at Saginaw, Mich., has been transferred to Detroit. W. W. Dyer has been appointed trainmaster with office at Grand Rapids. G. E. McLaughlin, trainmaster at Saginaw, has been appointed trainmaster of the Ludington and S. T. & H. divisions and branches. E. S. Stuart has been appointed trainmaster, and F. P. Little has been appointed chief train despatcher of the Buffalo division, with offices at Port Huron. S. H. Guddall has been appointed night chief train despatcher, with office at Grand Rapids. C. J. Bailey has been appointed chief train despatcher, with office at Traverse City, and G. F. Downing has been appointed chief train despatcher at Ionia.

G. Radetzki, general superintendent of the Houston & Texas Central, the Houston East & West Texas, and the Houston & Shreveport at Houston, Tex., has been appointed assistant general manager of those lines and the Galveston, Harrisburg & San Antonio and the Texas & New Orleans. D. K. Colburn, engineer of maintenance of way of the Galveston, Harrisburg & San Antonio and the Texas & New Orleans; I. A. Cottingham, engineer maintenance of way of the Houston & Texas Central, the Houston East & West Texas and the Houston & Shreveport; and J. T. Connor, superintendent motive power and machinery of the latter three roads, have been appointed assistant general managers, with jurisdiction over the five roads. Each officer continues charged with the responsibilities heretofore devolving on him, and assumes such other duties as may be assigned from time to time. The titles of general superintendent, superintendent motive power and engineer maintenance of way will be retained to such extent only as may be necessary for compliance with laws and existing contracts. H. J. Micksch, assistant superintendent of the Texas & New Orleans at Jacksonville, Tex., has been appointed assistant superintendent of that road and the Galveston, Harrisburg & San Antonio, with office at Houston, Tex., succeeding F. B. Irvine, promoted. A. L. Kuykendall, yardmaster at Beaumont, has been appointed assistant superintendent of the Texas & New Orleans and the Galveston division of the G., H. & S. A., at Jacksonville, succeeding Mr. Micksch.

Traffic Officers.

James Edward has been appointed commercial agent of the Grand Trunk, with office at Moncton, N. B.

R. G. Hanson, Jr., has been appointed traveling immigration agent of the Southern Railway, with office at St. Louis, Mo.

W. D. Clayton has been appointed assistant agricultural and industrial agent of the Cincinnati, New Orleans & Texas Pacific, with office at Chattanooga, Tenn.

C. G. Boyer has been appointed agent of the Interstate Despatch, with office at Memphis, Tenn., succeeding M. R. Singleton, resigned to accept service elsewhere.

C. G. Collins, contracting agent of the St. Louis, Iron Mountain & Southern at Dallas, Tex., has been transferred to Little Rock, Ark., and W. L. Cates succeeds Mr. Collins.

C. D. Dunann, general passenger agent of the Pacific Coast Steamship Company at San Francisco, Cal., has been appointed passenger traffic manager, with office at San Francisco.

J. I. Hazzard has been appointed general agent of the El Paso & Southwestern and the Morenci Southern, with office at St. Louis, Mo., succeeding Charles McD. Adams, resigned.

J. F. Deatrick has been appointed general agent of the Pacific Fruit Express Company, with office at Chicago, effective January 1. See item under Executive, Financial and Legal Officers.

B. B. Stowits has been appointed live stock agent of the Erie Railroad for the lines east of Buffalo, N. Y., and Salamanca, also of the New York, Susquehanna & Western and the New Jersey & New York, with office at Buffalo.

F. S. Fisher, contracting freight agent of the Missouri, Kansas & Texas at Fort Worth, Tex., has been appointed traveling freight and passenger agent of the Texas Central, with office at Waco, Tex., succeeding C. J. Hooker, resigned.

H. L. Armstrong, commercial agent of the Louisville, Henderson & St. Louis at Louisville, Ky., has been appointed general agent, with office at St. Louis, Mo., succeeding F. G. Cunningham, resigned. E. G. Jones succeeds Mr. Armstrong.

A. B. Collins, soliciting freight agent of the Queen & Crescent Despatch at New Orleans, La., has been appointed commercial agent, with office at New Orleans. A. C. Littlejohn has been appointed traveling freight agent, reporting to Mr. Collins.

J. C. Glenn, traveling freight agent of the Minneapolis & St. Louis and the Iowa Central at Minneapolis, Minn., has been appointed traveling freight agent, with office at Marshalltown, Iowa, succeeding H. R. Cammack, resigned to accept service with another company. J. A. Lucey succeeds Mr. Glenn.

Stewart R. Lewis, assistant general freight agent of the Duluth, South Shore & Atlantic at Duluth, Minn., has been appointed general freight agent, with office at Duluth, succeeding W. W. Walker, promoted to vice-president and general manager. See item under Executive, Financial and Legal Officers.

W. C. Dixon, freight solicitor of the Pennsylvania Railroad at New York, has been appointed agent, with office at Brooklyn, N. Y. Clayton Kent succeeds Mr. Dixon, and E. J. Karr and H. B. Arledge have been appointed freight solicitors, with offices at New York City.

Walter D. Burr, district freight and passenger agent of the Chicago, St. Paul, Minneapolis & Omaha at Duluth, Minn., has been appointed assistant general freight agent, with office at St. Paul, Minn. W. G. Brown has been appointed district freight agent, with office at Duluth, succeeding to part of the duties of Mr. Burr.

R. E. Tipton, general freight agent of the Wolvin Line, the Texas City Transportation Company and the Texas City Terminal Company at Texas City, Tex., has been appointed manager of the Houston branch of the J. H. W. Steele Company, in which capacity he will represent the Wolvin Line as general agent in charge of Texas territory. As has been announced in these columns, C. S. Bather succeeds Mr. Tipton as general freight agent of the Texas City Transportation Company and the Texas City Terminal Company.

Robert C. Fyfe, member of the Uniform Classification Committee, formerly assistant general freight and passenger agent of the St. Louis Southwestern of Texas, has been appointed chairman of the Western Classification Committee, with office at Chicago, succeeding F. O. Becker, deceased. A. S. Dodge, general agent of the St. Louis & San Francisco at St. Louis, Mo., formerly third vice-president, has been appointed superintendent of the Western Railway Weighing and Inspection Bureau, also succeeding Mr. Becker. F. F. Thompson, chief clerk to director of traffic of the Harriman Lines, has been appointed a member of the Uniform Classification Committee, succeeding Elmer H. Wood.

Engineering and Rolling Stock Officers.

M. C. M. Hall, [illegible] draftsman of the Boston & Maine, at Boston, Mass., has been appointed engineer of buildings of the New York, New Haven & Hartford and the Boston & Maine, with office at Boston.

Frank V. Marshall, assistant engineer of the Wabash at Decatur, Ill., has been appointed engineer of maintenance of way, with office at Decatur, succeeding Edward Ehrich, who has been promoted assistant engineer in place of Mr. Marshall, with office at Decatur.

J. E. Bender, master mechanic of the Baltimore & Ohio, at Garrett, Ind., has had his jurisdiction extended so that he now has charge of the Chicago division and the Southwest system, the latter including the Baltimore & Ohio Chicago Terminal. G. A. [illegible] has been superintendent of motive power of the lines west of the Ohio river, now has jurisdiction over the Wheeling system only. D. H. Watson, general foreman in the locomotive department at Garrett, Ind., has been placed in charge of the operation of the shops at Garrett.

C. R. Hogdon, who was recently appointed signal engineer of the western lines of the Canadian Pacific, with office at Winnipeg, Man., began railway work with the Great Northern in 1905 as a laborer. He was later made foreman of a signal crew, and was then consecutively signal repairman on the Terminal division in charge of the maintenance of automatic signals and power interlocking plants, signal draftsman and inspector of signals. At the time he left the Great Northern to become signal engineer of the Canadian Pacific as above he was inspector of signals in charge of manual and electrical signaling.

W. J. Long has been appointed engineer of the Grand Rapids division of the Pere Marquette, with office at Grand Rapids, Mich.; William Madden, division engineer at Detroit, has been appointed engineer of the Buffalo division, with office at Port Huron. J. P. Reynolds, division engineer at Grand Rapids has been appointed engineer of the Petoskey division, with office at Traverse City. V. E. Duncan has been appointed engineer of the Ionia division, with office at Ionia, and A. L. Grandy, division engineer at Saginaw, is now in charge of the Toledo, Ludington and S. T. & H. divisions and branches. C. F. Weir, supervisor of bridges, at St. Thomas, Ont., has been appointed foreman of bridges and buildings, and W. E. Shaffer has been appointed foreman of water service of the Buffalo division, both with offices at Port Huron, Mich. John Robinson, supervisor of bridges and buildings at Grand Rapids, has been transferred to Traverse City. A. Gustafson, roadmaster at Muskegon, has been transferred to Traverse City. A. McNab, supervisor of bridges and buildings at Holland has been transferred to Grand Rapids, and G. Y. Whitmee, foreman of water service, will have charge of water service on the entire Grand Rapids division, with office at Grand Rapids.

OBITUARY.

Thomas M. Fish, formerly general superintendent of the Detroit, Lansing & Northern, now part of the Pere Marquette, died on November 29. His funeral was held at Chicago.

James A. Millholland, formerly president and general manager of the Georges Creek & Cumberland Railroad until it was purchased by the Western Maryland, died in Cumberland, Md., on December 6. Mr. Millholland was born on December 8, 1842, at Baltimore, Md., and began his railway career in January, 1860.

Alden M. Young, a vice-president of the Albany Southern, died on December 3 at his home in New York City. Mr. Young was also a director in a large number of lighting and electric companies, and at one time was connected with the Connecticut Railway & Lighting Company, before it was taken over by New York, New Haven & Hartford.

Anrew O'Hara, division superintendent of the St. Louis & San Francisco, at Springfield, Mo., died on November 29. Mr. O'Hara was born in Ohio in 1857 and began railway work in 1872 as a telegraph operator. He was promoted to train despatcher and then to trainmaster of the Cleveland, Columbus, Cincinnati & Indianapolis, now a part of the Big Four. Since 1885 he has been in the service of the St. Louis & San Francisco Railway and its successor, the St. Louis & San Francisco Railroad, successively as train despatcher, trainmaster and division superintendent.

Frank M. Townsend, general agent of the Colorado Midland at Pittsburgh, Pa., died on November 25 at Bluefield, W. Va., at the [illegible] years. Death was due to typhoid pneumonia. Mr. Townsend began railway work at Indianapolis as agent of the Cleveland, Lorain & Wheeling, and was later yardmaster and then purchasing agent and superintendent of that road, now a division of the Baltimore & Ohio. Leaving this position, he became secretary and treasurer of La Colorado Gold Mining Company, Sonora, Mexico. Later he became identified with the Gulf Petroleum Company as traveling auditor, and for the past [illegible] Mr. Townsend had been general agent of the Colorado Midland.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The California Plumas, Quincy, Cal., is in the market for 3 mogul locomotives or 3 ten-wheel locomotives.

The Quanah, Acme & Pacific has ordered 1 six-wheel switching locomotive from the Baldwin Locomotive Works.

The Georgia Railroad has ordered 2 switching locomotives and 2 ten-wheel locomotives from the Baldwin Locomotive Works.

The Chesapeake & Ohio has ordered 1 mountain type passenger locomotive from the American Locomotive Company. The dimensions of the cylinders will be 29 in. x 28 in., the diameter of the driving wheels will be 62 in., and the total weight in working order will be 330,000 lbs.

The Lourenco Marques, Lourenco Marques, East Africa, has ordered 2 Mallet compound locomotives from the American Locomotive Company. The dimensions of the cylinders will be 17½ in., and 28 in. x 26 in., the diameter of the driving wheels will be 45½ in., and the total weight in working order will be 196,000 lbs.

CAR BUILDING.

The Pennsylvania Railroad is in the market for from 3,000 to 6,000 freight cars.

The Western Live Stock Express Company, Chicago, is in the market for 150 refrigerator cars.

The California Plumas, Quincy, Cal., is in the market for 30 flat cars, 10 box cars, 1 coach and 1 combination car.

The Minneapolis, St. Paul & Sault Ste. Marie has ordered 750 box cars from the American Car & Foundry Company.

The Live Poultry Transportation Company, Chicago, has ordered 150 poultry cars from the American Car & Foundry Company.

The Berwind-White Coal Mining Company, Philadelphia, Pa., has ordered 300 all-steel, 50-ton coal cars from the Cambria Steel Company.

The Kansas City Southern has ordered 8 chair cars, 5 baggage and express cars and 3 combination cars from the American Car & Foundry Company.

The Missouri Pacific has ordered 1,000 gondola cars, 500 box cars, 500 automobile cars, and 500 furniture cars from the American Car & Foundry Company, and 500 box cars from the Standard Steel Car Company.

The Algoma Central & Hudson Bay has ordered 6 passenger cars, 2 baggage cars and 30 steel underframe box cars from the Canadian Car & Foundry Company. This company has also ordered 4 second-class passenger cars from the Preston Car & Coach Company.

The Chicago & North Western has ordered 1,250 box cars from the Pullman Company; 1,250 box cars from the American Car & Foundry Company; 600 automobile cars from the Western Steel Car & Foundry Company, 500 flat cars from the Standard Steel Car Company, and is now in the market for 500 refrigerator cars.

IRON AND STEEL.

General Conditions in Steel.—The action of the Steel Corporation in increasing the price of steel bars, following the announcement of a similar advance by the Republic Iron & Steel Company has been of great encouragement to steel manufacturers, for the earnings last month, in spite of the high production, are said to have been remarkably low. Rail inquiries are exceptionally large now, and, if they develop into orders, it is estimated that about 1,000,000 tons will be placed during the next six weeks. If prices were increased generally the situation would be very satisfactory, for incoming business is heavy. It is believed by many that the period of low prices is at an end, for the strain has been great on many of the independent companies.

Supply Trade News.

The Wellman-Seaver-Morgan Company, Cleveland, Ohio, has received an order from the Canadian Pacific for a steel coal handling plant at Ft. William, Ont.

James Doyle, master car builder of the Pullman Company, Chicago, died in Detroit, Mich., on December 3, at the age of 57. He had been with the Pullman Company 36 years.

The Banks Electric & Manufacturing Company, New York, has made the North Western Construction Company, New York, its sole sales agent for the Banks track battery and the Banks signal battery.

Joseph F. Gettrust, for 16 years mechanical inspector of the Galena-Signal Oil Company, Franklin, Pa., has been made southern railway representative of the Ashton Valve Company, Boston, Mass., with office in Chicago.

The Biddle Hardware Company, Philadelphia, Pa., has opened a branch office at 150 Chambers street, New York. This office will be devoted to railway appliances, including the Burrows' ball-bearing jack. W. R. Burrows is manager.

The Vulcan Iron Works, Wilkesbarre, Pa., has received an order from Rodgers & Haggerty, Inc., New York, for three 20-ton, four-driver, saddle-tank locomotives. This company has also received an order from C. W. Blakeslee & Sons, New Haven, Conn., for one 30-ton, four-driver, saddle-tank locomotive with 13-in. x 18-in. cylinders; and an order from the Rockport Granite Company, Rockport, Mass., for one 35-ton four-driver, saddle tank, locomotive with 14-in. x 20-in. cylinders.

TRADE PUBLICATIONS.

Cattle Guards.—The National Surface Guards Company, Chicago, has issued a booklet giving illustrations and descriptions of the National surface stock guards.

Digging Machinery.—The Hayward Company, New York, has issued pamphlet No. 577, containing photographs of its clam shell, orange peel and drag scraper buckets in operation where the work is exceptionally heavy.

Expanders.—Gustav Wiedeke & Company, Dayton, Ohio, have published an illustrated booklet on their expanders for locomotive boilers. Each type of expander is illustrated and tables are given which show prices, sizes and code words for ordering.

Couplers.—The National Malleable Castings Company, Cleveland, Ohio, has published catalog No. 2 on Sharon, Tower, Climax, Latrobe and Chicago couplers and repair parts for freight, passenger, engine and tender service. Excellent diagrams are given of each type of couplers, and also of each repair part. Catalog numbers for ordering are included.

Valves.—The Nelson Valve Company, Philadelphia, Pa., has published a small folder on Nelson blow-off valves. These valves are made of iron for working pressure up to 300 lbs., and of steel for extreme service. They are described in detail and illustrations and diagrams are supplied to amplify the descriptions. Price lists and dimension tables are included.

Galvanized Sheets.—The Inland Steel Company, Chicago, has issued an illustrated booklet entitled The Story of an Inland Galvanized Sheet, giving a complete description of the various processes entering into the manufacture of an open hearth galvanized sheet, from the mining of the iron ore to the output of the finished product, with illustrations of the principal stages in its manufacture. This company has also published a small booklet describing Vismera sheets.

Fireproof Products.—The Dahlstrom Metallic Door Company, Jamestown, N. Y., has published in a small pamphlet the address of Edward F. Croker, ex-fire chief of the New York fire department, at the International Municipal Congress and Exposition, held in Chicago, September 29, 1911. This address was on the Reduction of Fire Waste, and made a strong appeal for fireproof construction in both public and private buildings. The pamphlet ends with a brief description of the fireproof qualities of Dahlstrom products.

Railway Construction.

New Incorporations, Surveys, Etc.

Atchison, Topeka & Santa Fe.—An officer of the Dodge City & Cimarron Valley writes that this company has been incorporated with $3,600,000 capital, to build 180 miles of railway. The plans call for a line from Dodge City, Kan., southwest to Colmor, N. M., and a branch may be built in a northerly direction to the west line of the state. Right of way has been secured and it is the intention to start work at once on the 58 miles from Dodge City to the southwest corner of Haskell county through Ford, Gray and Haskell counties. The surveys will be continued through Grant, Stevens and Morton counties, Kan.; and probably through the southwestern part of Colorado, thence into New Mexico to a connection with the main line at Colmor. On the completion of the track-laying the line will probably be operated as a part of a division of the Santa Fe. E. L. Copeland, secretary and treasurer, Topeka, Kan.

California Plumas Railway.—This company has been incorporated in California, with headquarters at Quincy, to build a 27-mile line from a point on the Western Pacific, near Twain via Greenville, to Nevis. It is estimated that it will cost about $650,000 to build the line. H. C. Flournoy, president; G. H. Stephan, vice-president; W. J. Miller, secretary; A. C. Berg, treasurer, and E. M. Camaron, chief engineer. J. E. Sexton of Quincy is interested in the project.

Canada & Gulf Terminal.—An officer writes that an extension is projected from Matane, Que., to Gaspe Basin, 189 miles. J. R. Cassidy, superintendent, Ste. Flavie.

Canadian Northern Quebec.—An officer writes that surveys are being made from St. Eustache, Que., to St. Jerome, 16 miles; also from St. Justin to St. Stanislas, 60 miles. H. K. Wicksteed, chief engineer, Toronto, Ont.

Canadian Pacific.—An officer writes that work is now under way on lines as follows: In Manitoba—Tilston boundary line, 3.2 miles; between Virden and McAuley, 23 miles; Lauder and Boissevain, 36 miles. In Saskatchewan—Between Estevan and Forward, 55 miles; Wilkie southeast, 35 miles; Kerrobert northeast, 25 miles; Weyburn west, 2.2 miles; Tilston west, 21 miles; Moose Jaw northwest, 8 miles. In Alberta—Coronation easterly, 39 miles; between Bassano and Irricana, 36 miles. In British Columbia—Port Moody spur, 3 miles; between Jukeson and Fort Steele, 15.8 miles; Fort Steele north, 21 miles; Golden south, 42 miles; between Three Forks and McGuigan, 3 miles. Total, 368.2 miles. J. G. Sullivan, chief engineer, Winnipeg, Man.

Cape Charles.—See New York, Philadelphia & Norfolk.

Carolina, Clinchfield & Ohio.—An officer writes that surveys have been made for an extension from Laurel Junction or Dante, Va., to Elkhorn City, Ky., 33 miles. M. J. Caples, vice-president and general manager, Johnson City, Tenn.

Central Idaho Railroad.—See Oregon Short Line.

Chehalis & Cowlitz River.—An officer writes that this company is building from Chehalis, Wash., to Cowlitz river, 20 miles, and has track laid on 7.25 miles from Chehalis southeasterly to Newaukum prairie. H. C. Coffman, president, Chehalis. (June 9, p. 1333.)

Chicago & Wisconsin Valley (Electric).—An officer writes [illegible] Merrill towards Janesville, 276 miles. The Western Indiana Construction Company, Madison, are the contractors. Surveys are under way from Portage to Merrill, 130 miles. (January 6, p. 62.)

[illegible] to build from Midland to Lattas Creek, 4.50 miles. A. S. Kent, [illegible]

[illegible] tracts have been given to the C. H. Sharp Contracting Company, Kansas City, Mo., to build from Malvern, Ark., to Camden, 58.85 miles, and to MacArthur Brothers Company, Chicago, Ill., to build from Carlisle, La., to Allerton, 64.76 miles. J. B. Berry, chief engineer, Chicago, Ill.

Cincinnati, New Orleans & Texas Pacific.—An officer writes that work is now under way by the Mason & Hanger Company, Richmond, Ky., between Oakdale, Tenn., and Lancing, 14 miles. C. Dougherty, chief engineer, Cincinnati, Ohio.

Copper River & Northwestern.—An officer writes that surveys are now being made from Strelna, Alaska, to Copper mountain, 18.8 miles; also from McCarthy to Mother Lode mine, 13 miles, and from McCarthy to Skolai Pass, 64 miles. E. C. Hawkins, chief engineer, Seattle, Wash.

Cullman Coal & Coke.—This company has projected an 18-mile extension from Ryan's Creek, Ala., to Julianna. J. W. Jones, chief engineer, Cullman.

Dodge City & Cimarron Valley.—See Atchison, Topeka & Santa Fe.

Detroit & Mackinac.—An officer writes that work is now under way building an extension from Calcite, Mich., to Rogers City, 3 miles. The company is carrying out the work with its own forces. J. D. Hawks, vice-president and general manager, Detroit.

Eastern Maine.—An officer writes that surveys are being made for an extension from Bangor, Me., to Houlton, 108 miles. F. O. Beal, treasurer, Bangor.

Florida East Coast.—An officer writes that work is now under way by the Kissimmee Valley Construction Company, Jacksonville, Fla., between Maytown and Tantie, on 125 miles. E. Ben Carter, superintendent maintenance of way, St. Augustine.

Fort Worth & Rio Grande.—See St. Louis & San Francisco.

Garden City, Gulf & Northern.—An officer of the Scott City Northern writes that an extension is projected from Winona, Kan., to St. Frances, 60 miles. C. F. W. Felt, chief engineer, Topeka.

Grand Trunk Pacific.—An officer of the National Transcontinental Railway writes that construction work is now under way between Moncton, N. B., and the New Brunswick-Quebec boundary on 6 miles, thence west of that point to the Quebec bridge on 63 miles; also from the Quebec bridge to the Quebec-Ontario boundary on 162 miles, and from the Quebec-Ontario boundary to the Ontario-Manitoba boundary on 259 miles; a total of 490 miles. The contractors are as follows: Grand Trunk Pacific Construction Company, Montreal, Que., Districts A-1, 3, 4, B-11, C-14 and D-14; J. W. McManus & Co., Ltd., Chipman, N. B., District A-2; W. Kitchen Company, Ltd., Grand Falls, N. B., District A-5; Lyons & White, Edmundston, N. B., District A-6; M. P. & J. T. Davis, Quebec, Que., Districts B-7, 8 (east), 9 (west), D-16, E-16 and 17; Macdonnell & O'Brien, Montreal, Que., Districts B-10, C-12 and 13; E. F. & G. E. Fauquier Brothers, Ottawa, Ont., Districts D-15 and E-18; O'Brien, Fowler & MacDougall Brothers, Dryden, Ont., Districts E-19, F-19 and 20; J. D. McArthur, Winnipeg, Man., District F-21. G. Grant, chief engineer, Ottawa, Ont.

Hawkinsville & Western.—An officer writes that work is now under way from Grovania, Ga., to Perry, 8 miles. E. M. Becham, Hawkinsville, and J. F. Lamb, Thomasville, are the contractors. J. J. Gaillard, chief engineer, Hawkinsville.

Idaho & Washington Northern.—An officer writes that surveys have been made to build a branch from Ione, Wash., west to Cronin, 17 miles. W. C. Smith, chief engineer, Spirit Lake, Idaho.

Kansas City, Mexico & Orient.—An officer writes that work [illegible] miles between Granada, Tex., and Alpine. W. W. Colpitts, chief engineer, Kansas City, Mo.

[illegible] has been finished by Gust Fredun, Norway, Mich., on a branch to the Negaunee mines at Negaunee, 2 miles. R. C. Young, chief engineer, Marquette.

Lehigh & New England.—An officer writes that work is [illegible] from Danielsville, Pa., to Tamaqua, 32.3 miles. F. W. Gilcreast, chief engineer, Mauch Chunk.

Louisiana & Arkansas.—An officer writes that work is now under way on an extension from Jena, La., to Jonesville, 22.5 miles. M. Tansey, Jena, general contractor. The Union Bridge & Construction Company, Kansas City, Mo., has the contract for the steel work. Surveys are being made for an extension from Jonesville, La., to Vidalia, 24.4 miles. W. H. Vance, engineer maintenance way, Stamps, Ark.

Maryland-Virginia.—Incorporated in Virginia with $1,000,000 capital to build through the counties of Alexandria, Fairfax and Prince William. Alexander Suter, president; S. L. Monroe, vice-president; G. M. Lewis, secretary and treasurer. N. Garner, G. L. Booth, J. R. Caton and R. B. Washington, all of Alexandria, are incorporators.

Memphis, Arkansas & Louisiana.—This company has filed articles of corporation in Louisiana with authorized capital stock of $25,000,000. The president of the company is B. L. Winchell, president of the St. Louis & San Francisco, and it is said that the new company has been formed with a view to building a Gulf coast connection for the Frisco. A proposed arrangement for such a connection over the Texas & Pacific, involving the making of important improvements on the T. & P., fell through about a month ago, because of disagreement as to details. The company now formed describes its line as running from Port Barre, La., on the New Orleans, Texas & Mexico northward 375 miles through Louisiana and Arkansas to a connection with the Frisco.

Memphis, Dallas & Gulf.—An officer writes that work is now under way by T. H. Sater & Bro., Murfreesboro, Ark.; Jack Thorne, Leard, and W. J. Murphy, Glenwood, on the following sections: Murfreesboro to Dunlap Junction, 18 miles; Brown to Shawmut, 12 miles; Rosboro Junction to Glenwood, 3 miles; Loewenberg to Hot Springs, 15 miles; and surveys are under way from Standing to Arkadelphia, 16 miles; also from Dalark to Pine Bluff, 61 miles. The company's plans call for an extension from Ashdown, Ark., southwest to Dallas, Tex., 170 miles. A. M. Van Auken, chief engineer, Nashville, Ark. (September 15, p. 544.)

Mexican Union.—An officer writes that work is now under way by the Railway Finance & Construction Company, 130 Dashwood House, London, E. C., England, on an extension from Santa Rosalia, Sonora, Mex., north to Ures, 32 miles. H. R. Wagner, vice-president, Mexico, Mex.

Missouri Pacific.—An officer writes that work is now under way from Marianna, Ark., to West Memphis on 45.87 miles. List & Gifford Construction Company and the Kansas City Bridge Company, both of Kansas City, Mo., are the contractors. E. F. Mitchell, chief engineer, St. Louis.

Mount Airy & Eastern.—An officer writes that a preliminary survey has been made from Mt. Airy, N. C., to Philpott, Va., 60 miles. J. T. Heare, superintendent, Mt. Airy.

National Railways of Mexico.—The report of this company for the year ended June 30, 1911, shows that the most important work under way during the year was on the two lines as follows: To connect the city of Durango with the station of Canitas on the main line of the old Mexican Central, in the states of Durango and Zacatecas, Mex., about 170 miles, with a branch about eight miles to Sombrerete, and the line from Penjamo on the Guadalajara division to Ajuno on the Uruapan branch, in the states of Guanajuato and Michoacan, about 85 miles. The change from narrow to standard gage on the line from Acambaro to Uruapan, about 145 miles, was carried out during the year and the line has been opened for operation. The work included the construction of thirty-nine miles of new line between Acambaro and Patzcuaro, to reduce the grades and curvature and shorten the distance. Work on the new line from Durango to Llano-Grande, was continued, and grading and masonary work is finished on about 90 per cent., it is expected that the first twelve miles will be opened for operation during 1911. A large amount of heavy rail was laid to replace lighter sections at various places, and much bridge renewal work was carried out during the year.

National Transcontinental Railway.—See Grand Trunk Pacific.

New Orleans Great Northern.—An officer writes that surveys are now being made between Nogan, Miss., and Jackson on 6.6 miles. C. R. Howard, chief engineer, Bogalusa, La.

New Orleans, Texas & Mexico.—See St. Louis & San Francisco.

New York, Philadelphia & Norfolk.—An officer writes that during 1911 this company built a short section of second track and put in some new sidings. The Cape Charles Railroad has under construction an extension of 3.39 miles, which will probably be finished by March, 1912. W. A. Patton, president, Philadelphia, Pa.

Northwestern Pacific.—An officer writes that work is now under way by the Utah Construction Company and Willett & Burr, both of San Francisco, Cal., on 31.7 miles, between Willits and Shively, and surveys have been completed on an additional 47 miles between these two places, also between Healdsburg and Christine, 62 miles. W. C. Edes, chief engineer, 1262 Flood building, San Francisco, Cal.

North Yakima & Valley.—An officer writes that surveys have been made for an extension to Tieton, Wash., in the Cowiche valley, 12 miles. Geo. Donald, general manager, North Yakima.

Ocean Shore.—An officer writes that grading work is partly finished between Tunitas, Cal., and Pescadora on 10 miles. L. H. Landis, general manager, San Francisco.

Ocilla Southern.—An officer writes that work is now under way by R. S. Talmadge, Nashville, Ga., and E. E. Bailey, Fitzgerald, building an extension from Abba to Rochelle, 15 miles. J. A. J. Henderson, president and general manager, Ocilla.

Omaha, Sioux City & Northern.—An officer writes that the line has been located and work is now under way by the Kansas Construction & Irrigation Company, Garden City, Kan., from Tekamah, Neb., to Decatur, 20 miles. E. A. Tennis, vice-president, Garden City, Kan.

Oregon Short Line.—An officer writes that work is now under way from Judkins, Idaho, to Driggs, 15.16 miles, and from Nyssa, Ore., to Homedale, Idaho, 25.26 miles. The Central Idaho is building an extension from Wood River, Idaho, to Taft, 38.90 miles, and the Salt Lake & Idaho is building from Burley, Idaho, to Strevell, 60.29 miles. The Utah Construction Company, Ogden, Utah, has contracts for all the work. W. H. Bancroft, vice-president and general manager, Salt Lake City.

Pittsburgh & Susquehanna.—An officer writes that work is now under way building an extension of 1.75 miles from East Moshanonton, Pa., to the car shops, and surveys are being made from Waltzvale to Heilners, 17 miles. J. W. Cleveland, chief engineer, Philipsburg, Pa.

Port Bolivar Iron Ore.—An officer writes that surveys are being made to build an extension from Ore City, Tex., to Clarksville, 70 miles. Lewis L. Featherstone, secretary, Longview.

Quebec & Saguenay.—An officer writes that a contract has been given to O'Brien & Doheny, Quebec, and work is now under way on a 73-mile line from a point 30 miles northeast of Quebec, Que., northeast along the north shore of the St. Lawrence river. An extension is projected from Mile-73 northeast. Arthur H. N. Bruce, chief engineer, 85 Dalhousie street, Quebec.

St. Louis & San Francisco.—The report of this company for the year ended June 30, 1911, shows that during the year the Marion-Hurlbut cut-off in Arkansas 5.49 miles was put in operation. The Fort Worth & Rio Grande was extended from Whiteland, Tex., to Menard, 27.56 miles, and is now in operation. During the year 48.18 miles of new industrial and side tracks were constructed. There was an increase of 38.35 miles in main track mileage on the New Orleans, Texas & Mexico, and an increase of 23.56 miles, side-track mileage.

See Memphis, Arkansas & Louisiana.

Salt Lake & Idaho.—See Oregon Short Line.

Scott City Northern.—See Garden City, Gulf & Northern.

Seattle & Eastern.—See Washington Roads

Seattle & Olympic Peninsula.—See Washington Roads

Sydney & Louisburg.—An officer writes that this company is making surveys to build from Summit, N. S., to Colliery No. 17 1.5 miles. M. J. Butler, vice-president and general manager, Sydney.

Tampa & Jacksonville.—An officer writes that this company will probably build an extension from Blichton, Fla., to Ocala during 1912. A. L. Glass, general manager, Gainesville, Fla.

Texas, Kansas & Oklahoma.—Incorporated in Texas with $100,000 capital to build about 100 miles of railway through Potter, Moore and Sherman counties, Texas, thence to Texahoma, in Oklahoma. The general offices of the company are at Amarillo, Tex. The incorporators include F. T. Burnhaw, Kansas City, Mo.; C. T. Herring, R. E. Underwood, M. C. Linmaster, Amarillo, Tex., and J. T. Williams, Texahoma, Okla.

The A. & A. Short Line (Electric).—An officer writes that grading work is now under way from Alliance, Ohio, to Akron. Marasco & Serianni are the general contractors. L. C. Marble, chief engineer, Cleveland, Ohio.

Thornton & Alexandria.—An officer writes that reconstruction work is now under way straightening the old line at Big Hill, Ark., on one mile; also at Rock Island Junction on 1.25 miles. J. H. Beland, general manager, Thornton.

Washington Roads.—Articles of incorporation of two railways, both on Puget Sound, have been filed in the state of Washington. The Seattle & Olympic Peninsula is to be built from Port Townsend or Port Ludlow, or both, to Port Angeles, and thence westerly to Lake Crescent. The Seattle & Eastern Railway Company is to build from "some convenient point on the east shore of Lake Washington to Issaquah, about 15 miles. The incorporators and trustees of the Seattle & Olympic Peninsula are Michael Earles, Seattle, and J. A. Kerr, both of Seattle, and Thomas T. Aldwell, Port Angeles. The principal office is at Seattle, and the capital stock is $5,000,000. The incorporators of the Seattle & Eastern are R. S. Terhune, G. F. Aust, A. Schramm, A. Schramm, Jr., W. K. Keene, O. H. Springer and C. D. Folger. The offices of the company will be at Seattle, and the capital stock is $1,500,000.

Watanga Railway.—This company's plans call for building a 91-mile line in North Carolina and eastern Tennesse, on which work is to be started at once. A. C. Landon is general manager and chief engineer, with headquarters at Lenoir, N. C.

RAILWAY STRUCTURES.

Cincinnati, Ohio.—An ordinance for the Cincinnati union depot was submitted to the city council on December 3 for final approval. According to the plans, the estimated cost of the improvements is $36,000,000. The work includes a large terminal office building, a new four-track entrance to the city, and an elevated approach reducing the mileage and grades.

East Hutchinson, Kansas.—The Atchison, Topeka & Santa Fe is contemplating building a twelve-stall roundhouse.

Jacksonville, Fla.—According to press reports the Seaboard Air Line will begin work soon on the terminal improvements at the foot of Hovan street, Jacksonville. It is understood that the work calls for the construction of two warehouses and some other structures. (June 23, p. 1675.)

Gary, Ind.—An officer of the New York Central lines writes, regarding the report that work is to be started soon on a large yard east of Gary, that land has been bought for a yard. It is likely that construction work will begin in the near future, but definite plans have not yet been decided upon.

Minot, N. Dak.—The Minneapolis, St. Paul & Sault Ste. Marie [illegible] passenger station 250 ft. x 56 ft. The main building will be [illegible] construction.

[illegible] the new Manhattan station of the Brooklyn bridge. This work [illegible] with the subway, the Brooklyn bridge, Municipal building and the [illegible] improvements will be $2,500,000.

[illegible] stories high

Railway Financial News.

Delaware, Lackawanna & Western.—At the annual meeting of the Syracuse, Binghamton & New York, it was voted to lease the road, formerly an independent line paying 10 per cent., to the Delaware, Lackawanna & Western for 12 per cent as rental. The Lackawanna owns about 80 per cent. of the stock.

International & Great Northern.—The temporary directors, who were W. H. Cope, of New Orleans; W. L. Maury, of Houston, Tex.; Milton L. Morris, of Houston; Horace Booth, of Houston; Frank R. Richardson, of New Orleans; D. J. Price, of Houston, and S. Dabney, of Houston, have retired, and the board of directors now consists of Frank J. Gould, George J. Gould, R. Lancaster Williams, Walter K. Morrow, F. W. Cook, J. H. Jones, Henry Martin, A. R. Howard and Thomas J. Freeman. Frank J. Gould is chairman of the board, and Frank J. Gould, George J. Gould and R. Lancaster Williams are the executive committee.

Iowa Central.—Directors of the Minneapolis & St. Louis and of the Iowa Central have approved the plan of the lease of the Iowa Central to the Minneapolis & St. Louis. J. S. Bache & Co., New York, have, it is understood, agreed to underwrite an issue of $2,500,000 5 per cent. bonds of the Minneapolis & St. Louis to provide for the retirement of securities of the Minneapolis, Dakota & Pacific, which is the name of the western extension of the Minneapolis & St. Louis. (November 10, p. 975.)

Jamestown, Chautauqua & Lake Erie.—George Bullock has been appointed receiver of this company, of the Jamestown & Chautauqua Railway and the Chautauqua Steamboat Company

Minneapolis & St. Louis.—See Iowa Central.

Missouri, Kansas & Texas.—See an item in Court News.

St. Louis & San Francisco.—Speyer & Co., New York, have bought from the railway company $2,553,000 general lien 15-20 year 5 per cent. bonds. The bankers are offering these bonds at 89, at which price they yield 6⅛ per cent.

Seaboard Company.—This company has sold to a syndicate headed by Blair & Co., and Ladenburg, Thalmann & Co., New York, $6,700,000 Seaboard Air Line Railway adjustment mortgage 5 per cent. bonds, and has sold to the bankers for their own account $85,900, the remainder of these bonds heretofore held by the Seaboard Company. The Seaboard Company's assets consist of Seaboard Air Line Railway Company common and preferred stock, the bonds mentioned above, and $900,000 Seaboard Air Line Railway demand notes. A special meeting of stockholders has been called for January 3 to vote on the question of dissolving the Seaboard Company and distributing the railway company's stock to holding company stockholders. The charter of the Seaboard Company provides for the distribution to its common stockholders of the common stock of the railway at the rate of about 1.03 shares of railway stock per share of Seaboard stock; the distribution of about 1.33 shares of railway preferred stock to each share of second preferred Seaboard stock, and all the other assets pro rata to Seaboard Company's first preferred stockholders. The cash received from the sale of the bonds mentioned above and to be received from the redemption of the demand notes will provide, it is estimated, par in cash for the first preferred stockholders.

Wabash.—See editorial pages for comments on the election of new directors.

See also Wheeling & Lake Erie.

Wheeling & Lake Erie.—A new minority stockholders' committee has been formed, consisting of Joseph Ramsey, Jr., Ralph E. Slavens, the firms of Werse & Dickman and J. & J. Taussig. In a circular sent to minority stockholders the new [illegible] call attention to the progress made by the Wheeling & Lake Erie under the receivership and says that, in their opinion, the Wheeling & Lake Erie is solvent and perfectly able to carry on its obligations. They claim that a proposed assessment of $25 per share is more than would be necessary to [illegible] the Wheeling & Lake Erie itself.

ANNUAL REPORTS

FIFTEENTH ANNUAL REPORT OF THE ST. LOUIS AND SAN FRANCISCO RAILROAD COMPANY.

To the Stockholders:

The Directors herewith submit their report of the operations and affairs of the St. Louis and San Francisco Railroad Company for the fiscal year ended June 30th, 1911.

The results of operation for the fiscal year were as follows:

Operating revenue (increase $1,993,288.32 or 4.8 per cent.)	$43,159,227.69	
Operating expenses (increase $643,557.81 or 2.2 per cent.)	29,320,400.00	
Net operating revenue (increase $1,349,730.51 or 10.8 per cent.)		$13,838,827.69
Taxes		1,811,827.15
		$12,027,000.54
Miscellaneous income		2,333,970.73
Total income		$14,360,971.27
Interest, rentals and other fixed charges		12,825,567.17
Net income after providing for all charges		$1,535,404.10
Dividends paid—four per cent. on first preferred stock		199,742.12
Surplus carried to profit and loss		$1,335,661.98

The increase in the average mileage operated during the year as compared with the preceding year was 116.14 miles, or 2.3%.

The main track mileage at June 30, 1911, was	5,227.37 miles
The main track mileage at June 30, 1910, was	5,071.54 miles
Showing an increase of	155.83 miles

This increase is explained as follows:

MILEAGE CONSTRUCTED.

Extension Whiteland, Texas, to Menard, Texas	27.56 miles
Marion-Hulbert Cut-off, Arkansas	5.49 miles

TRACKAGE UNDER CONTRACT.

Brady, Texas, to Whiteland, Texas	11.78 miles
Irving, Texas, to Dallas, Texas	10.50 miles
Dallas, Texas, to Paris, Texas	100.50 miles
Total increase	155.83 miles

On pages 76, 77 and 78 will be found details of the mileage of all the Lines operated, owned or controlled, by this Company.

CAPITAL STOCK.

There was no change during the year in the Company's Capital Stock issued or outstanding.

FUNDED DEBT AND EQUIPMENT BONDS AND NOTES.

The outstanding funded debt at June 30, 1911, was	$228,924,224.68	
The outstanding equipment trust bonds and notes were	14,498,491.59	
Total		$243,422,716.27
The outstanding funded debt at June 30, 1910, was	$221,966,174.11	
The outstanding equipment trust bonds and notes were	15,700,521.79	
Total		$237,666,695.90
The net increase for the year was		$5,756,020.37

Statements on pages 21 and 22 give in detail the changes in funded debt and equipment notes.

EQUIPMENT.

The following equipment was purchased during the year:

1. Under Trust Agreements:
   - 25 Consolidation Locomotives.
   - 5 Pacific Type Locomotives.
   - 10 Switching Locomotives.
   - 6 Ten-Wheel Locomotives.
   - 7 Mallet Locomotives.
   - 2 Observation Cafe Cars.
   - 3 Steel Underframe Combination Passenger and Mail Cars.
   - 2 Steel Underframe Baggage Cars.
   - 4 Steel Underframe Coaches.
   - 6 Gasoline-Electric Motor Cars.
   - 250 Steel Frame Automobile and Furniture Box Cars.
   - 25 Express Refrigerator Cars.
2. Under Lease and Purchase Agreement:
   - 500 Steel Frame Box Cars.
   - 300 Steel Frame Automobile and Furniture Box Cars.
   - 250 Steel Tank Cars.
   - 500 Steel Frame Stock Dump Cars.
3. Purchased for cash:
   - 2 Brown Hoists,
   - 1 Ballast Spreader,
   - 1 Boarding Car,
   - 4 Box Cars,
   - 1 Coal Car,
   - 1 Commissary Car,
   - 2 Flat Cars,
   - 2 Official Cars,
   - 1 Refrigerator Car,
   - 2 Scale Test Cars,
   - 6 Stock Cars,

   (Built at Company's Shops.)

All of this additional equipment was received at June 30, 1911, with the exception of the six Gasoline Electric Motor Cars and two Observation Cafe Cars.

On pages 40 and 41 of the report will be found statements showing the number of each class of equipment owned and leased.

CONSTRUCTION.

Reference was made in last year's report to the completion of the Marion-Hulbert Cut-off in that year, 5.49 miles, but the track was not put in operation until July 1st, 1911. The track is, by agreement, being operated jointly with the Chicago, Rock Island & Pacific Railway Company.

The Fort Worth & Rio Grande Railway was extended during the year from Whiteland, Tex., to Menard, Tex., 27.56 miles, and put in operation February 15th, 1911. This new track is laid with 60 pound steel rail and 3,000 cross ties to the mile. The maximum gradient is 0.75 per cent and the maximum curvature 3 degrees.

TRACKAGE.

Agreements were made during the year with the Gulf, Colorado & Santa Fe Railway Company for the joint use of 11.78 miles of track between Brady and Whiteland, Tex., and for joint use of 100.50 miles between Dallas and Paris, Tex.; also with the Chicago, Rock Island & Gulf Railway Company for the joint use of 10.50 miles of track between Irving and Dallas, Tex.

NEW ORLEANS, TEXAS & MEXICO RAILROAD COMPANY.

This property was operated, and its accounts kept, separately.

Its outstanding funded debt at June 30, 1911, was $26,000,000, and outstanding equipment trust notes, $1,176,596.54.

The gross operating revenue for the fiscal year was $3,737,716.32.

Political conditions in Mexico prevented the expected interchange of traffic via the Brownsville gateway, and unforeseen delays in the completion of necessary ballast and other construction work prevented through passenger train service from being undertaken until near the close of the fiscal year (June 18th). For these reasons this line could not be considered as in full operation until that time. In addition to interest on its indebtedness, the Company paid $254,148.37 in rentals, leaving a deficit for the year of $943,392.14, which for the reasons stated, has been included in the cost of the property.

The increase in its main track mileage for the year was 38.35 miles, and in side track mileage, 23.56 miles. See page 78 for details of mileage of this line.

(This line extends from New Orleans through Houston to Brownsville, Texas, on the Mexican border, and is now operating 976.72 miles, including 183.84 miles under trackage rights.

Its strength is demonstrated by the noticeable development of traffic since the close of the fiscal year, gross earnings for three months ended September 30th, 1911, showing an increase of $219,640, or 26 per cent. over the same period in 1910.

The acreage planted in cotton in 1911, tributary to the Brownsville Line, was considerably more than double that planted in 1910. Shipments of cotton from the Rio Grande Valley in July were 6,000 bales, against 700 bales last year.

Shipments of sugar will commence by December 1st, and the increased acreage planted indicates a large increase in the movement of this commodity. It is expected that Louisiana will have the largest sugar cane crop in its history, and the present high price for sugar should result in very favorable conditions for that State.

There has been a marked increase in population along the line during the year. The settlers are principally farmers of means from the older agricultural districts and foreign countries who adopt the most improved methods.

The property is well constructed and in good operating condition. It has a low grade, permitting of handling traffic promptly and economically. The terminal facilities are excellent, especially at New Orleans, Baton Rouge, Beaumont and Houston.

To take care of the increased traffic additional equipment has already been contracted).

GENERAL.

The property of your company has been well maintained during the year, expenditures for Maintenance of Way having been at the rate of $1,054.40 per mile operated; for repairs of locomotives, $2,671.69 per engine owned; for repairs of freight cars, $62.79 each and of passenger cars, $727.76 each.

The percentage of locomotives in shop or awaiting repairs decreased 1.5, and the percentage of bad order freight cars decreased 3.05, as compared with conditions at the close of the previous fiscal year.

Increased rates of pay caused increased costs per train mile and per traffic unit mile for engine, train, yard and station service.

While freight revenue increased 1.5 per cent., freight train miles decreased 4.7 per cent., and freight revenue per train mile increased 6.4 per cent.

Passenger train revenue increased 11.3 per cent., with an accompanying increase in passenger train miles of only 4.7 per cent.

The gross revenue per mile of road—$8,319.16—is the highest in the history of the Company.

Two hundred and seventy-six industrial plants, costing approximately $6,400,000 and employing over six thousand men were located on the company's tracks during the fiscal year. It is estimated by the Industrial department of the company that the tonnage producing capacity of these plants will exceed fifty-nine thousand carloads per annum.

Forty-eight and eighteen-hundredths miles of new industrial and side tracks were constructed during the year.

The usual consolidated statements showing the balance sheet, income and profit and loss accounts and statistical data including the figures of the Chicago & Eastern Illinois Railroad Company, will be found on pages 46 to 78. These statements are in forms prescribed by the Interstate Commerce Commission.

Thanks are due to officers and employes whose loyal service is heartily appreciated.

By order of the Board of Directors,

B. L. WINCHELL,
President.

October 2nd, 1911.

ST. LOUIS AND SAN FRANCISCO RAILROAD LINES.
GENERAL PROFIT AND LOSS ACCOUNT AND ADJUSTMENTS THEREIN,
JUNE 30TH, 1910, TO JUNE 30TH, 1911.

CREDIT.

Balance at credit, as per annual report June 30th, 1910	$4,394,606.23	
Surplus for the year ended June 30th, 1911	1,335,661.98	
Total Credit		$5,730,268.21

DEBIT.

Proportion for the year of discount on securities sold	$880,253.01	
Sundry adjustments affecting current year's income	24,805.32	
Total Debit		$897,058.33
Balance		4,833,209.88
		$5,730,268.21
By Balance at credit, June 30th, 1911		$4,833,209.88

ST. LOUIS AND SAN FRANCISCO RAILROAD LINES.
INCOME ACCOUNT.
FISCAL YEAR ENDED JUNE 30TH, 1911, COMPARED WITH PREVIOUS YEAR.

	1910-11.	1909-10.	Increase or Decrease. Amount.	Per Cent.
Average mileage operated...	5,187.93	5,071.79	116.14	2.3
Operating revenue—				
Freight	$28,671,781.86	$27,645,863.48	$425,918.38	1.5
Passenger	11,999,385.31	10,548,969.83	1,450,415.48	13.7
Mail	1,010,218.61	1,009,241.56	977.05	0.1
Express	1,120,194.06	1,134,904.37	—14,710.31	1.3
Miscellaneous	650,047.02	550,811.88	99,235.14	18.2
Total transportation revenue	$42,851,626.86	$40,889,791.12	$1,961,835.74	4.8
Revenue from operation other than transportation	307,600.83	276,148.25	31,452.58	11.4
Total operating revenue.	$43,159,227.69	$41,165,939.37	$1,993,288.32	4.8
Operating expenses—				
Maintenance of way and structures	$5,470,178.59	$5,778,268.15	—$308,089.56	5.3
Maintenance of equipment	5,738,290.32	5,940,310.37	—202,020.05	3.4
Traffic expenses	1,085,846.84	1,036,821.23	49,025.61	4.7
Transportation expenses...	15,737,164.89	14,698,094.38	1,039,070.51	7.1
General expenses	1,288,919.36	1,223,348.06	65,571.30	5.4
Total operating expenses.	$29,320,400.00	$28,676,842.19	$643,557.81	2.2
Net operating revenue.....	$13,838,827.69	$12,489,097.18	$1,349,730.51	10.8
Taxes	1,811,827.15	1,458,185.96	353,641.19	24.3
Operating income	$12,027,000.54	$11,030,911.22	$996,089.32	9.0
Miscellaneous income—				
Hire of equipment.....	*$323,013.85*	*$609,988.27*	$286,347.42	46.9
Other income	2,657,611.58	2,910,416.99	—252,805.41	8.7
Total miscellaneous income	$2,333,970.73	$2,300,428.72	$33,542.01	1.5
Total income	$14,360,971.27	$13,331,339.94	$1,029,631.33	7.7
Interest	$7,850,606.63	$7,447,805.63	$402,801.00	5.4
Rentals and sinking funds—				
Interest on guaranteed securities	2,604,038.36	2,594,390.91	9,647.45	0.4
Other rentals and sinking funds	836,040.18	627,302.23	208,737.95	33.3
Dividends on trust certificates, The Kansas City, Ft. Scott & Memphis Railway	540,400.00	540,400.00	.....	...
Dividends on trust certificates, Chicago & Eastern Illinois Railroad	994,482.00	999,482.00	—5,000.00	0.5
Total charges	$12,825,567.17	$12,209,380.77	$616,186.40	5.0
Available for dividends.	$1,535,404.10	$1,121,959.17	$413,444.93	36.9
Dividends—				
Four per cent. on first preferred stock	199,742.12	199,742.12	.....	...
Surplus carried to credit of profit and loss.....	$1,335,661.98	$922,217.05	$413,444.93	44.8

Figures in italics denote debit.

ST. LOUIS AND SAN FRANCISCO RAILROAD LINES.
CONDENSED GENERAL BALANCE SHEET, JUNE 30, 1911, AND COMPARISON WITH PREVIOUS YEAR.

ASSETS.	1911.	1910.	Increase or Decrease.
Capital Assets:			
Franchises and property....	$217,093,620.47	$214,003,890.94	$3,089,739.53
Stocks and bonds owned....	203,845.69	203,845.69	.....
Total franchises and property	$217,297,466.16	$214,207,736.63	$3,089,729.53
Leasehold estate (The Kansas City, Fort Scott and Memphis Railway)	58,964,291.92	58,642,263.69	322,028.23
Leasehold estate (Kansas City, [illegible]	9,536,637.80	9,257,609.78	279,028.02
Franchises and property, auxiliary companies	4,946,982.25	4,950,455,90	—3,473,65
Chicago and Eastern Illinois Railroad Company preferred stock (cost of).....	9,321,550.00	9,321,550.00	.....
Chicago and Eastern Illinois Railroad Company common [illegible]	18,[illegible]87.13	18,239,187.13	.....
Total	$318,306,115.26	$314,618,803.13	$3,687,312.13
[illegible]	1,413,934.17	1,568,910.29	—154,976.12
[illegible]	3,620,880.98	4,198,950.17	—578,069.19
[illegible]	[illegible]	6,348,000.00	-1,323,183.36
[illegible]	[illegible]	634,268.59	84,999.31
Due from railroad companies, account traffic	[illegible]	25,710.04	—36,222.68
[illegible]	[illegible]	2,375,852.23	518,934.23
[illegible]	2,288,061.72	672,204.71	1,615,857.01
[illegible]	103,367.77	[illegible]	19,032.43
[illegible]	[illegible]	9,269,958.32	[illegible]
[illegible]	[illegible]	3,873,795.63	[illegible]
[illegible] construction	867,060.01	[illegible]	—67,726.64
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	1,036,012.20	747,074.05	288,938.15
[illegible] and out	11,590,239.26	9,788,690.67	1,801,548.59
[illegible]	506,049.65	468,776 58	[illegible]
[illegible]	[illegible]	[illegible]	—31,452.64
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	$1,025,966.14

LIABILITIES.	1911.	1910.	Increase or Decrease.
Capital Liabilities:			
Capital Stock:			
First preferred	$5,000,000.00	$5,000,000.00	.....
Second preferred	16,000,000.00	16,000,000.00	.....
Common	29,000,000.00	29,000,000.00	.....
Total	$50,000,000.00	$50,000,000.00	.....
Funded debt	171,453,554.68(a)	165,128,204.11(a)	$6,325,350.57
Equipment bonds and notes	13,278,491.59	14,152,521.79	—874,030.20
Outstanding securities on leasehold estate (The K. C. F. S. & M. Ry.):			
Stock—			
Preferred certificates...	13,510,000.00(b)	13,510,000.00	.....
Funded debt	44,301,000.00	43,668,300.00(c)	632,700.00
Equipment bonds and notes	1,220,000.00	1,548,000.00	—328,000.00
Total	$59,031,000.00	$58,726,300.00	$304,700.00
Outstanding securities on leasehold estate (K. C. M. & B. R. R.):			
Funded debt	9,246,670.00	9,246,670.00	.....
Funded debt, auxiliary com[illegible]	3,923,000.00	3,923,000.00	.....
Preferred stock trust certificates (C. & E. I. R. R.).	9,317,550.00	9,317,550.00	.....
Common stock trust certificates (C. & E. I. R. R.).	18,044,500.00	18,044,500.00	.....
Total	$334,294,766.27	$328,538,745.90	$5,756,020.37
Current Liabilities:			
Audited vouchers and pay[illegible]	4,517,034.69	4,586,767.04	—69,732.35
[illegible] and [illegible] [illegible]	4,110,575.53	3,106,763.90	1,003,811.63
[illegible]	1,610,494.70	1,602,679.72	7,814.98
[illegible]	570,549.07	521,568.98	48,980.09
Land and real estate notes..	1,075,000.00	1,175,000.00	—100,000.00
[illegible]	[illegible]	4,833,070.00	—4,833,070.00
[illegible] redemption (see contra)..	5,024,816.64	6,348,000.00	—1,323,183.36
[illegible]	[illegible]	$22,173,849.64	—$5,265,379.01
Provisional Accounts:			
[illegible]	[illegible]	248,977.31	—5,952.64
[illegible]	[illegible]	278,945.35	103,389.67
Improvement fund (K. C. & M. Ry. & Br. Co.).....	6,759.37	[illegible]	715.90
[illegible]	$632,119.06	$535,397.93	$96,721.13
Grand total Liabilities..	$351,835,355.96	$351,247,993.47	$587,362.49
Profit and loss	4,833,209.88	4,394,606.23	438,603.65
[illegible]	[illegible]	[illegible]	$1,025,966.14

[illegible] the St. Louis and San Francisco

[illegible] included in "Funded debt"

[illegible] to other liabilities included in

[illegible] September 1, 1910, funds for

TWENTY-SECOND ANNUAL REPORT OF THE CHICAGO & EASTERN ILLINOIS RAILROAD COMPANY.

Fiscal Year ended June 30, 1911.

To the Stockholders:—

The Board of Directors herewith submit their report of the operations and affairs of the Chicago and Eastern Illinois Railroad Company for the fiscal year ended June 30, 1911.

The results of the operations for the fiscal year were as follows:

Total operating revenue (increase $530,988.68 or 4.5 per cent.	$12,281,344.27	
Operating expenses (increase $390,479.59 or 4.9 per cent.	8,344,463.43	
Net operating revenue (increase $140,509.09 or 3.7 per cent.		$3,936,880.84
Taxes		338,128.91
Operating income		$3,598,751.93
Miscellaneous income		718,583.32
Total income		$4,317,335.25
Interest and rentals		3,072,995.13
Net income after providing for all charges		$1,244,340.12
Dividends paid (6 per cent. on preferred and 9½ per cent. on common stock)		1,215,533.00
Surplus for the year		$28,807.12

For comparative income account in detail, see table on page 10.

The earnings, both gross and net, were the largest in the history of the Company.

There was no change in the capital stock of the Company during the year; the mortgage, bonded and secured debt was increased $729,942.24, as shown on page 15, and the working liabilities decreased $264,994.57.

Upward of 26 per cent. of the total increase in Operating Revenue was saved for the net, and the surplus available for dividends increased $68,549.96, or 5.8 per cent., being somewhat curtailed by a decrease in income from Hire of Equipment of $55,786.21 and an increase in Interest and Rentals of $71,915.53. Of the increase of $441,430.62 in Cost of Transportation, increases in rates of pay amounted to $203,000.00 and the increased cost per ton of engine fuel brought a further burden of $74,900.00.

The growth of your passenger traffic is gratifying, having more than doubled in ten years, and passenger train earnings for the fiscal year increased 11.76 cents per train mile, compared with the previous year.

Bituminous coal tonnage increased during the year 264,873, standing at 7,165,742 tons, or 57.59 per cent. of the total tons carried.

During the year, the Industrial Department located fifty new industries, the estimated cost of which was $1,558,300.00, employing 1,966 men with a yearly output of 10,496 cars.

New equipment was received and placed in service, all purchased for cash, reimbursed by 4 per cent. refunding and improvement bonds, under the mortgage of July 1, 1905, as follows:

5 Pacific type passenger locomotives Nos. 331 to 335, inclusive, and 5 switch locomotives, Nos. 61 to 65, inclusive	$175,879.60
2 Observation smoking cars Nos. 496 and 497	40,205.59
200 40 ton capacity steel underframe automobile cars Nos. 1801 to 2000, inclusive	217,707.46
Total	$433,792.65

With thanks to officers and employes for faithful service.

By order of the Board,

B. L. WINCHELL,
President.

OCTOBER 1, 1911.

CONDENSED GENERAL BALANCE SHEET, JUNE 30, 1911, AND COMPARISON WITH PREVIOUS YEAR.

ASSETS.	1911.	1910.	Increase or Decrease.
Property Investment:			
I. Road and equipment:			
Investment to June 30, 1907:			
Road	$34,654,422.67	$34,654,422.67	.....
Equipment	20,173,710.41	20,173,710.41	.....
	$54,828,133.08	$54,828,133.08	.....
Investment since June 30, 1907:			
Road	$1,040,365.75	$815,972.73	$224,393.02
Equipment	2,695,997.26	2,319,937.39	376,059.87
	$3,736,363.01	$3,135,910.12	$600,452.89
	$58,564,496.09	$57,964,043.20	$600,452.89
Reserve for accrued depreciation—Cr.	*104,691.80*	*144,953.57*	*40,261.77*
Total road and equipment	$58,369,804.29	$57,819,089.63	$550,714.66
II. Securities:			
Securities issued or assumed—Pledged:			
Funded debt		$2,000,000.00	—$2,000,000.00
Securities of proprietary, affiliated and controlled companies:			
Unpledged:			
Stocks	$373,231.76	373,231.76	.....
Total securities (page 20)	$373,231.76	$2,373,231.76	—$2,000,000.00
III. Other investments:			
Miscellaneous investments:			
Pledged	$215,743.35	$208,551.28	$7,192.07
Securities Unpledged	1.00	1.00	.....
Total other investments (page 20)	$215,744.35	$208,552.28	$7,192.07
Total property investments	$58,958,780.40	$59,129,873.67	—$171,093.27
Working Assets:			
Cash	$1,183,763.10	$1,006,946.93	$176,816.17
Securities issued or assumed—Held in Treasury:			
Funded debt (page 20)	2,000.00	423,000.00	—$421,000.00
Marketable securities:			
Stocks (page 20)	3,700.00	4,171.42	—471.42
Funded debt (page 20)	88,000.00	153,000.00	—65,000.00
Miscellaneous (page 20)	100,635.12	100,635.12	.....
Loans and bills receivable	545,075.83	437,077.38	107,998.45
Traffic and car service balance due from other companies	258,953.07	317,531.27	—58,578.20
Net balance due from agents and conductors	326,008.89	327,578.63	—1,569.74
Miscellaneous accounts receivable	653,216.74	607,865.29	45,351.45
Material and supplies	1,171,935.30	1,038,243.04	133,692.26
Other working assets	1,674.49	2,384.45	—709.96
Total working assets	$4,334,962.54	$4,418,433.53	—$83,470.99
Deferred Debit Items:			
Advances:			
Temporary advances to proprietary, affiliated and controlled companies	$40,099.30	$40,099.30	.....
Working funds	1,327.17	1,055.58	$271.59
Rents and insurance paid in advance	38,700.54	43,655.95	—4,955.41
Unextinguished discount on securities:			
Unextinguished discount on funded debt	1,772,894.35	1,164,186.22	608,708.13
Special deposits (page 20)	10,578,091.64	10,578,091.64	.....
Cash and securities in sinking and redemption funds	13,366.33	16,219.06	—2,852.73
Other deferred debit items	653.160.50	386,202.31	266,958.19
Total deferred debit items	$13,097,639.83	$12,229,510.06	$868,129.77
Total	$76,391,382.77	$75,777,817.26	$613,565.51

Figures in *italics* denote credits.

LIABILITIES.	1911.	1910.	Increase or Decrease.
Stock:			
Capital stock:			
*Common stock	$13,626,100.00	$13,626,100.00	.....
*Preferred stock	8,992,000.00	8,992,000.00	.....
Stock liability for conversion of outstanding securities of constituent companies	168.88	168.88	.....
Total stock	$22,618,268.88	$22,618,268.88	.....
Mortgage, Bonded and Secured Debt:			
Funded debt:			
In treasury:			
Mortgage bonds	$2,000.00	$1,152,000.00	—$1,150,000.00
Outstanding (not held in treasury):			
Mortgage bonds	43,549,000.00	40,408,000.00	3,141,000.00
Collateral trust bonds	27,000.00	27,000.00	.....
Equipment trust obligations	5,699,232.16	6,960,289.92	—1,261,057.76
Total mortgage, bonded and secured debt (page 10)	$49,277,232.16	$48,547,289.92	$729,942.24
Working Liabilities:			
Loans and bills payable	$528,249.00	†$515,250.00	$12,999.00
Traffic and car service balance due to other companies	244,635.27	250,421.31	—5,786.04
Audited vouchers and wages unpaid	1,159,469.94	1,241,027.12	—81,557.18
Miscellaneous accounts payable	124,416.71	313,741.91	—189,325.20
Matured interest, dividends and rents unpaid	56,896.00	55,995.00	901.00
Matured mortgage, bonded and secured debt unpaid	336.04	3,336.04	—3,000.00
Other working liabilities	49,427.55	†48,653.70	773.85
Total working liabilities	$2,163,430.51	$2,428,425.08	—$264,994.57
Unmatured interest, dividends and rents accrued	$757,582.09	$713,192.92	$44,389.17
Unmatured mortgage, bonded and secured debt accrued	229,865.56	221,345.53	8,520.03
Total accrued liabilities	$987,447.65	$934,538.45	$52,909.20
Insurance Reserve Fund	$200,262.12	$179,325.31	$20,936.81
Other deferred credit items	330,870.29	259,946.77	71,823.52
Total deferred credit	$531,132.41	$438,372.08	$92,760.33
Profit and loss			$2,948.31
Total	$76,391,382.77	$75,777,817.26	$613,565.51

† The Loans and Bills Payable and Other Deferred Assets $161,300.00 previously reported have been reclassified as Investments (page 20). Changes to conform with Interstate Commerce Commission Classification.

THIRD ANNUAL REPORT FERROCARRILES NACIONALES DE MEXICO.

(NATIONAL RAILWAYS OF MEXICO.)

Mexico Office:
Segunda Calle de Bolivar, No. 19.

New York Office:
No. 25 Broad Street.

To the Shareholders:

In compliance with the provisions of Article 48 of the By-Laws of the Company, I have the honor to present to the shareholders, in the name of the Board of Directors, the report of operations for the fiscal year July 1, 1910, to June 30, 1911.

EXCHANGE AND PAYMENT OF SECURITIES OF THE MEXICAN CENTRAL RAILWAY COMPANY LIMITED, AND OF THE NATIONAL RAILROAD COMPANY OF MEXICO.

In accordance with the terms of the Bankers' Agreement of February 29, 1908, and following the plan adopted, the deposit of securities of the old Mexican Central Railway Company Limited, and National Railroad Company of Mexico, which under said agreement were called for conversion, has continued, and there is at present a very small number of said securities which have not been exchanged for stock and bonds of the National Railways of Mexico, as shown in the following

STATEMENT OF THE SECURITIES DEPOSITED UP TO THE 30TH OF JUNE, 1911, IN ACCORDANCE WITH PLAN OF 6TH OF APRIL, 1908.

Securities of the Mexican Central Railway Company Limited.

	Total Issue.	Deposited.	Per Cent.	Out-standing.	Per Cent.
Five Per Cent. Notes	$500.00	.....	0.00	$500.00	100.00
Five Per Cent. Priority Bonds.	6,597,000.00	$5,198,000.00	78.79	1,399,000.00	21.21
First Mortgage Bonds	264,062.50	225,715.00	85.48	38,347.50	14.52
Consolidated Mortgage Bonds....	109,020,000.00	105,361,000.00	96.64	3,659,000.00	3.36
First Income Bonds	32,706,000.00	32,424,300.00	99.13	281,700.00	.87
Registered Income Bonds	325,200.00	314,000.00	96.55	11,200.00	3.45
Second Income Bonds	11,284,000.00	11,260,000.00	99.79	24,000.00	.21
Shares	59,127,100.00	59,058,800.00	99.89	68,300.00	.11
Total	$219,323,862.50	$213,841,815.00	97.50	$5,482,047.50	2.50

Securities of the National Railroad Company of Mexico.

	Total Issue.	Deposited.	Per Cent.	Out-standing.	Per Cent.
Preferred Stock..	$32,000,000.00	$31,998,100.00	99.99	$1,900.00	.01
Second Preferred Stock	22,043,600.00	22,002,600.00	99.81	41,000.00	.19
Common Stock...	284,600.00	154,300.00	54.22	130,300.00	45.78
Deferred Stock..	11,021,800.00	11,021,800.00	100.00	.....	.00
Total	$65,350,000.00	$65,176,800.00	99.73	$173,200.00	.27

Total Number of Securities of Both Companies.

	Issued	Deposited.	Per Cent.	Out-standing.	Per Cent.
Bonds and Shares.	$284,673,862.50	$279,018,615.00	98.01	$5,655,247.50	1.99

NOTE.—All of the above amounts are in U. S. Currency.

In view of the fact that the First Mortgage Bonds, the Registered Income Bonds and the Consolidated Mortgage Bonds of the Mexican Central Railway Company Limited which were outstanding and had not been [illegible] due July 1, 1911, and which that Company had to redeem, the Board of Directors resolved that as the [illegible] Mexican Central Railway Company Limited, that payment of the securities be made when they became due, and in this way they were nearly all redeemed, [illegible] readily be seen that the total amount shown in the above statement of securities outstanding should be considerably decreased, inasmuch as the [illegible] fiscal year under review.

Furthermore, in consideration of the small number of First and Second [illegible] Railway Company Limited which were outstanding, and in order to withdraw from the market the securities of that Company before they became [illegible] the Board of Directors resolved [illegible] of said bonds at [illegible] and authorized the purchase of [illegible]

[illegible]

SETTLEMENT OF DEBT OF THE VERA CRUZ TO ISTHMUS RAILROAD AND PAN-AMERICAN RAILROAD COMPANY

[illegible] stock [illegible] Board of Directors [illegible]

road should not cover said interest, the Federal Government would contribute for that purpose, up to the fiscal year of 1912-1913, the amounts of $450,000, $350,000 and $150,000 as maximum during the fiscal years of 1910-1911, 1911-1912, and 1912-1913, respectively, and it being provided that after June 30, 1913, the Mexican Government would participate in the net earnings which might result from the operation of the lines covered by said contract.

This Company has the direct management of the Vera Cruz to Isthmus Railroad by reason of the ownership of said stock, which lines are of great importance for the southern part of the Republic. The Vera Cruz to Isthmus Railroad is still a legally independent corporation, but as before said, it is controlled by the National Railways of Mexico through the possession of the stock purchased by the latter from the Federal Government.

In view of the importance of the lines of the Pan-American Railroad Company, which is the connecting link between the Tehuantepec National Railway and the Mexican frontier with Guatemala, and which will undoubtedly constitute the future route to Central America, the Board of Directors considered it desirable to acquire the control of the Pan-American Railroad Company, not only for the interests of the Company proper, but also in the interests of the service and development of the country adjacent to the railway in question. As a consequence the Board of Directors negotiated for the purchase of a majority of the stock of the Pan-American Railroad Company, as reported to the shareholders at the last regular annual meeting, and entered into a contract to that end with Mr. David E. Thompson, owner of said stock, whereby this Company acquired 96,000 shares and 570 General Mortgage Bonds of that Company, through the obligation assumed by the National Railways of Mexico to guarantee unconditionally the prompt payment of principal and interest of the First Mortgage Bonds and General Mortgage Bonds of Pan-American Railroad Company.

With the control of the lines of the Vera Cruz to Isthmus Railroad and Pan-American Railroad Company, the National Railways of Mexico has a transportation line extending from the frontier with the United States in the North to the southern boundary with Guatemala, with the excepion of some few kilometers covered by the Tehuantepec National Railway.

The shareholders will fully appreciate the advisability of acquiring control of the Vera Cruz to Isthmus and Pan-American lines, as also the advantage to be gained by including the railroads in question in the system of the Company.

On account of the poor physical condition of both the Vera Cruz to Isthmus and Pan-American Railroads, and as neither of these Companies was financially able to meet its fixed charges nor to pay expenses of improvements which it was desired to make on these properties, your Board of Directors approved various loans of money to said Companies, as is shown in the General Balance Sheet accompanying this report; said loans are to some extent offset by deficit in operation and by the amount receivable to cover interest payments under the terms of the contract above mentioned.

SUBSIDIARY COMPANIES.

The Company has continued to operate the various lines and properties pertaining to the different corporations shown in the statement accompanying the General Balance Sheet, of which the National Railways of Mexico owns the majority of the stock, and the contracts entered into with other transportation companies have been complied with. Special attention is drawn to the Compañia Mexicana de Express, S. A., in the organization of which the National Railways of Mexico took part on the lines reported at the regular annual meeting of shareholders of October 5, 1910, and it is gratifying to the Board of Directors to report to the shareholders that the results obtained from the various contracts entered into with said Company have been very satisfactory, the earnings derived by your Company from that source during the year being $2,066,544.67 for express service, and $50,000 as dividend on the Express Company's shares owned by the National Railways of Mexico.

With respect to the Brownsville and Matamoros Bridge Company, another subsidiary company which was organized by the National Railways of Mexico and The St. Louis, Brownsville and Mexico Railway Company, for the construction and operation of an international bridge between Brownsville and Matamoros, the concessions granted, one to the Brownsville and Gulf Railway Company by the United States Government to construct the bridge in question in so far as the northern half of the Rio Bravo is concerned, and the other granted by the Mexican Government to the National Railways of Mexico for the construction over the southern portion of said river, were transferred to the Brownsville and Matamoros Bridge Company in compliance with the respective contracts which are already known to the shareholders.

In compliance with the obligations assumed by the National Railways of Mexico at the time of organizing the Brownsville and Matamoros Bridge Company, to the effect that your Company as well as The St. Louis, Brownsville and Mexico Railway Company would guarantee the mortgage bonds [illegible] by the Bridge Company, under the Trust Agreement with the [illegible] Company, by virtue of which, bonds were to be issued to [illegible] and which were duly issued, the National Railways of [illegible] St. Louis, Brownsville and Mexico Railway Company [illegible] to said bonds, and as you will note on the at[illegible] have been included in the contingent liabilities; [illegible] the fact that while the guaranty is of a joint nature the [illegible] of Mexico might be held responsible for the entire [illegible] discharging the importance and responsibility of The [illegible] Railway Company, it can safely be [illegible] the National Railways of Mexico covers only [illegible]

[illegible] to Subsidiary Companies the Board de[illegible] that the total issue of Five Per Cent. [illegible] Mexican Central Railway Company Limited, have been [illegible] deposited thereagainst as collateral have [illegible]

[illegible] OF BONDS AND NOTES

[illegible] to the shareholders at their regular [illegible] to the Board of Directors, the latter [illegible] bonds to June 30, 1911 $1,072,- [illegible] Mortgage Four Per Cent. Bonds, in reimbursement for [illegible] and equipment acquired between July 1 [illegible] General Mortgage Four Per Cent. [illegible] made account additions, [illegible] between January 1, 1910, [illegible] additional rolling stock and [illegible] June 30, 1911, also $1,384,925 of

this class of bonds and $6,949,000 Prior Lien Four and One-half Per Cent. Bonds, in order that they might be sold or used as collateral, as the best interests of the Company might require.

Consideration was given the sale of certain of the bonds of the Company by your Board of Directors, it being thought advisable to dispose of approximately $10,000,000 of the bonds in the treasury, but due to the unfavorable financial conditions the Board decided to postpone the same; accordingly and in order to meet obligations and payments falling due in June and July, 1911, consisting mostly of obligations of the Mexican Central Railway Company Limited, assumed by your Company, the Board of Directors authorized the issue of Two-Year Four and One-Half Per Cent. Notes to the amount of $10,000,000, Gold, depositing as collateral thereagainst $6,000,000 in Prior Lien Bonds and $7,000,000 in General Mortgage Bonds. The corresponding Trust Agreement was duly executed, the collateral deposited and the amount of the notes received by the Company. With the same object in view and owing to similar reasons the Board of Directors negotiated the issue of notes to the amount of £1,000,000 sterling, with Messrs. Lazard Bros. & Company, of London, at a discount of 4½ per cent., pledging Prior Lien Bonds to the face amount of $6,150,000 as collateral thereagainst.

The Board expects to be able to pay off both of the above mentioned series of notes at or before maturity and as soon as it can dispose of certain of the bonds of the Company now in the treasury on favorable terms.

Mention is made of the return to the Company of the $1,800,000 Prior Lien Bonds and the $1,200,000 Guaranteed General Mortgage Bonds deposited for the purpose of guaranteeing the dividend of two per cent. per annum for the three years beginning January 1, 1908, on the Company's First Preferred Shares.

CONSTRUCTION AND OPERATION OF LINES.

Every effort has been made to improve the condition in general of the tracks and appurtenances, as well as of all equipment and rolling stock and to improve the service in all respects. The shareholders will be able to get a good idea of what has been done in this direction by referring to the technical report of the Company's Executive President, whose work deserves all praise. I desire to make special mention of the construction of two lines, the importance of which is self-evident, and which were authorized by the Board of Directors and work started on them by the Construction Department. These two lines are: the line that is to connect the City of Durango with Station of Cañitas on the main line of the old Mexican Central Railway, and the proposed line from the Station of Pénjamo on the Guadalajara Division to Ajuno on the Uruápan Branch.

BOARD OF DIRECTORS.

There is nothing special to be reported to the shareholders with respect to the work of the Board of Directors, such matters as pertain exclusively to the Directors resident in Mexico as also those connected with the New York Local Board, having proceeded with all regularity and the provisions of the Company's By-Laws having been properly observed in all acts and resolutions as well as in the relations between the two Boards, as is evident from the minutes of the meetings held in both places.

It is with much regret that the Board has to inform the shareholders of the loss sustained by the death of Mr. Emilio Pardo, which occurred the 9th of January, 1911. By designation of the Board Mr. Enrique C. Creel was elected to fill the vacancy.

During the year Directors Martín G. Ríbon, José A. Signoret, Pablo Macedo and Guillermo de Landa y Escandón requested leave of absence, which was granted in accordance with the Articles of Association and By-Laws of the Company, and Messrs. Ignacio L. de la Barra, Jorge Vera Estañól, Leandro Fernandez, and Jaime Gurza, respectively, were appointed to act in their stead during their absence.

On August 2, 1911, Mr. Joaquin D. Casasús resigned and Mr. J. N. Galbraith was appointed in his place. Although this did not occur during the period covered by the present report, the Board of Directors wishes to give the shareholders this information in order that they may be fully advised as to changes made.

At the meeting held by the Board of Directors on October 28, 1910, Messrs. José Yves Limantour and Pablo Macedo were appointed Chairman and Vice-Chairman, respectively, of the Board of Directors, and at the same meeting Mr. Limantour was granted leave of absence, and Mr. Macedo in his capacity of Vice-Chairman discharged the duties of the former until May 1, 1911, when he asked to be relieved from the duties of Vice-Chairman owing to his appointment to the position of Financial Agent of Mexico in London, which required his departure from Mexico City; the undersigned was appointed to substitute him during his absence.

The terms of office of all the Directors designated by the shareholders at the regular annual meeting of 1910, to serve during one year, expire today, as well as of the Directors composing the second group mentioned in Clause XIV. of the Articles of Association of the Company, and of the persons substituting either of these. The terms of office of the Commissaries and substitutes appointed by the shareholders at the regular annual meeting of 1910 also expire today.

RESULTS OF OPERATION AND DIVIDENDS.

As will be seen from the Balance Sheet to be presented shortly, the result of the operations of the Company for the fiscal year which terminated on the 30th of June, 1911, is very satisfactory, especially if due consideration is given to the abnormal conditions through which the country has passed during the second half of the year, and which have not seriously affected the net results for the year. This will surely serve as a solid basis on which to establish the credit of your Company and add confidence in the minds of the security holders.

As the shareholders will note by the Balance Sheet and Income Account attached to this report, which after examination made by Messrs. Price, Waterhouse & Company, Chartered Accountants, were duly approved by the Commissaries, as per report from the latter, and now submitted to the meeting, it is shown that during the fiscal year under review there was paid a dividend of four per cent in two instalments on the Company's First Preferred Shares, which is the maximum dividend allotted to said shares, and which was authorized by the Board of Directors under and in accordance with the respective provisions of the Company's Articles of Association and By-Laws, which authorize the Board to declare dividends in advance for account of earnings. The Board hopes that the shareholders will approve the payment of said four per cent made to the holders of First Preferred Shares.

From the foregoing facts and data the shareholders can form a good idea of the work performed by the Board of Directors, whose members trust that their actions will meet with the approval of the shareholders, for whose further information the book containing the minutes of meetings of the Board of Directors and Executive Committee, as well as documents pertaining thereto are at their disposal.

Mexico, October 4, 1911.

LUIS ELGUERO,
Vice-Chairman.

FERROCARRILES NACIONALES DE MEXICO.

(NATIONAL RAILWAYS OF MEXICO.)

MEXICO, D. F., September 18, 1911.

Sr. Lic. D. Luis Elguero,
Vice-Chairman of the Board,
Mexico.

MY DEAR SIR:

I beg to submit herewith to your Board of Directors the following report of the operations of the property for the fiscal year ended June 30, 1911.

In the statistical statements which follow, the figures of The Mexican International Railroad Company have been included with those of the Ferrocarriles Nacionales de México proper, both in statements of operations for the year under review and where comparison is made with the previous year:

RESULTS OF OPERATION.

The following condensed statement of the Income Account shows the results for the year:

		Mexican Currency.
The Gross Earnings from all sources were		$61,934,421.05
The total Expenses of Operation were		39,279,344.57
Leaving Net Receipts of		$22,655,076.48
To which add:		
Interest and Dividends on Securities owned		753,562.60
Other receipts		191,329.90
Making		$23,599,968.98
From which deduct:		
Taxes and Rentals	$483,590.82	
Operating Deficit of Subsidiary Companies (Texas-Mexican Ry. Co. and Pan-American Railroad Company)	464,421.13	
Sundry Adjustments of Operating Expenses:		
Material Adjustment Account	200,000.00	
Additions and Betterments Adjustment Account	300,000.00	
Reserves on Additions and Betterments in Suspense	100,000.00	
Provision for Expenses for Repair and Replacement of Equipment	1,300,000.00	
Reserve for Bad and Doubtful Debts	100,000.00	
Various Items in Suspense eliminated	147,816.84	
	$2,147,816.84	3,095,828.79
		$20,504,140.19
And:		
Interest on Funded Debt and Equipment and Collateral Trusts, etc.	$17,250,131.77	
Interest on Notes Payable	696,137.55	17,946,269.32
Leaving Balance carried to Profit and Loss Account		$2,557,870.87
And deducting:		
Five Per Cent. of Net Profits transferred to Reserve Fund	$127,893.54	
Dividend on First Preferred Shares, four per cent.	2,306,632.00	2,434,525.54
Leaving as Net Surplus for the year ended June 30, 1911		$123,345.33
To which add:		
Net Surplus at June 30, 1910	$1,015,237.00	
Less:		
Dividend of 1 Per Cent. on First Preferred Shares	576,658.00	438,579.00
Which gives a total Net Surplus at June 30, 1911, of		$561,924.33

MILEAGE.

Average Length of Line Operated

The average length of line operated during the year was 9,868.537 kilometers, or 6,132.061 miles.

GROSS EARNINGS.

The total Gross Earnings from all sources amounted to $61,934,421.05, Mexican Currency, for details of which, as well as comparison with last year, your attention is called to the following table:

1909-1910. Earnings.	Percentage		1910-1911. Earnings	Percentage.
$45,262,604.45	73.62	Commercial Freight	$44,320,766.34	71.56
215,277.03	.35	Construction Freight	876,981.93	1.41
[illegible]	[illegible]	Passenger	12,657,140.31	20.44
226,884.91	.37	Baggage	235,111.63	.38
[illegible]	[illegible]	Express	2,066,544.67	3.34
51,470.45	.08	Telegraph	55,705.93	.09
130,092.42	.21	Rentals	130,726.74	.21
8,186.34	.01	Floating Equipment	44,517.39	.07
1,400,091.47	2.28	Miscellaneous	1,546,956.10	2.50
$61,483,147.42	100.00		$61,934,421.05	100.00

The percentage of each class of commercial freight to the total handled during the year, and comparison with the previous year, is shown in the following table:

1909-1910. Percentage		1910-1911. Percentage.
10.71	Forest Products	12.88
[illegible]	Agricultural Products	22.33
[illegible]	Live Stock and Animal Products	3.15
[illegible]	Mineral Products	50.90
[illegible]	General Merchandise	10.74
100.00		100.00

The foregoing table shows a slight increase in the Gross Earnings for the year, and by reference to the General Auditor's Statement of Earnings

and Expenses by months, No. 6, submitted herewith, it will be seen that for the first seven months of the year the earnings show very satisfactory increases, but I am sorry to report a considerable falling off for the remaining five months on account of the political disturbances throughout the Republic.

OPERATING EXPENSES.

The maintenance of the property has received careful attention and at the close of the year the physical condition throughout the major portion of the system was much improved, particular attention being called to the large amount of new heavy rail purchased and laid, amount of stone ballast placed in track, and number of permanent steel bridges built and replaced as shown in detail in this report.

During the last six months of the year the expenses were increased by the political disturbances in the Republic. It is expected that the Government will reimburse your Company for such damages as can be properly substantiated by supporting evidence to claims. These are in process of being formally presented.

The cost of operating the property for the fiscal year was 63.42 per cent.

The comparative percentage of the Sub-Accounts for the years 1909-1910 and 1910-1911 are as follows:

1909-1910. Percentage.		1910-1911. Percentage.
26.42	Maintenance of Way and Structures	28.42
21.15	Maintenance of Equipment	22.37
[illegible]	Conducting Transportation	43.64
[illegible]	General Expenses	5.57
100.00		100.00

The comparative percentage to Gross Earnings for the years 1909-1910 and 1910-1911 being:

1909-1910. Percentage.		1910-1911. Percentage.
15.79	Maintenance of Way and Structures	18.02
12.63	Maintenance of Equipment	14.19
27.82	Conducting Transportation	27.68
[illegible]	General Expenses	5.53
59.74		63.42

STATEMENTS OF OPERATION.

The various statements of accounts as prepared by the General Auditor, and which accompany this report, give in detail the results for the year, and show the financial condition of the property.

The books and accounts have been audited by Messrs. Price, Waterhouse & Company, of London, New York and Mexico, and a copy of their certificate as to the correctness thereof accompanies this report.

The results of operation for the year are as follows:

1909-1910. Mexican Silver.		1910-1911. Mexican Silver.	Increase or Decrease.	Percentage of Increase or Decrease.
$61,483,147.42	Gross Earnings	$61,934,421.05		
36,728,318.36	Operating Expenses	39,279,344.57		
$24,754,829.06	Net Earnings	$22,655,076.48		
	Which, reduced to *gold* at the average price of the Mexican [illegible] for the year, viz., 50 [illegible]	$11,327,538.24		
59.74	Operating percentage	63.42	Inc.	3.68
19,903,910	Kilometers run by revenue trains.	19,833,846	Dec.	0.35
$3.0890	Gross Earnings per revenue train kilometer	$3.1227	Inc.	1.09
[illegible]	Operating Expenses per revenue [illegible]	1.9804	"	7.32
[illegible]	Net Earnings per revenue train [illegible]	1.1423	Dec.	8.15
[illegible]	Gross Earnings per kilometer of [illegible]	6,275.94	Inc.	1.35
3,698.96	Operating Expenses per kilometer [illegible]	3,980.26	"	7.60
[illegible]	[illegible]	2,295.68	Dec.	7.92
[illegible]	Average receipts per ton per kilo-	6.55209	Inc.	10.47
[illegible]	Average amount received from	.01818	"	6.57
[illegible]	[illegible]	1.80069	Dec.	2.91
[illegible]	[illegible]	[illegible]	"	[illegible]

Mexican Silver.		Percentage of Increase or Decrease.	
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

Mexico-Queretaro Division.

Bridge 0-152-A. New bridge of one 5.18 meter span "I" beams on masonry.

Bridge 0-87-A. New bridge of one 3.05 meter span "I" beams on masonry.

Bridge 0-87-B. Changed from rail to one 3.05 meter span "I" beams on masonry.

Bridge 0-88-A. New bridge of one 3.05 meter span "I" beams on masonry.

Bridge 0-77-A. Wing walls repaired and lengthened.

Bridge A-84-D. One 21.36 meter pin connected span replaced with a 21.33 meter plate girder.

Monclova Division:

Bridge 126-A. Two wooden trestle spans replaced with two 5.26 meter floor stringers on masonry.

Bridge 127-A. Five wooden trestle spans replaced with two 9.14 meter deck plate girders on masonry.

Bridge 145-A. Eight wooden trestle spans replaced with two 4 meter segmental arch culverts.

Bridge 156-A. Four wooden trestle spans replaced with two 3 meter segmental arches.

Bridge 157-A. Two wooden trestle spans replaced with one floor stringer of 5.26 meters.

Bridge 158-A. Two wooden trestle spans replaced with one 5.18 meter "I" beam span on masonry.

Bridge 163-A. Two wooden trestle spans replaced with one 3.05 meter rail girder span on masonry.

Four wooden trestle spans replaced with two 2-meter segmental arch culverts.

Bridge 171-A. Thirty-three wooden trestle spans, 130 meters long, replaced with three 24.38 meter through plate girder spans on masonry.

Bridge 193-A. Four wooden trestle spans replaced with three 5.18 meter "I" beam spans on masonry.

Bridges 194-A and 194-B. Four wooden trestle spans replaced with two 5.18 meter "I" beam spans.

Bridge 195-A. Four wooden trestle spans replaced with two 9.14 meter deck plate girders on masonry.

Bridges 197-A and 198-A, respectively. Eight wooden trestle spans replaced with two 5.18 meter deck plate girders and two 5.18 meter "I" beam spans on masonry.

Bridge 247-C. Seven wooden trestle spans replaced with two 3 meter circular arches.

Bridge 251-D. Seven wooden trestle spans replaced with three 5.18 meter "I" beam spans on masonry.

Bridge 252-A. Seven wooden trestle spans replaced with a 5 meter semi-circular arch culvert.

Monterrey and Gulf Division:

Bridges 165-C, 171-B, 177 and 179. Victoria District, which were all wooden structures, were replaced with five 7.01 meter "I" spans on masonry.

Bridge 410. Linares District, consisting of one 3 meter arch, changed to a double 3 meter arch structure.

Northern Division:

Bridge 1116-B. Six span frame trestle replaced with 13.41 meter deck plate girder.

Bridge 1014-B. One 19.8 meter deck girder replaced with a 30.48 meter through truss.

Bridge 958-B. Two 38.10 meter through spans to replace two spans of same length, which were too light.

Bridge 993-B. Ten span frame trestle replaced with six 7.01 meter "I" beam spans.

Bridges 956-E and 959-A. One span frame trestle replaced with 5.18 meter "I" span, and one 4 meter arch culvert replaced with one 5.18 meter "I" beam span.

Bridges 954-C, 960-B, 964-E, 966-B, 966-D, 971-A and 972-A. Fourteen 7.01 meter "I" beams put in to replace frame trestle.

Bridges 955-D, 964-D, 967-A, 967-D and 968-A. Five 5.18 meter "I" structures replacing frame trestles.

Bridges 954-D, 956-D and 960-A. One 3 meter arch replacing frame trestle, and one new arch culvert of one meter and one 4 meter arch culvert replacing small masonry box.

Bridge 961-C. One new "I" span of 7.01 meters.

Bridges 928-F, 986-A and 988-D. Three 5.18 meter "I" spans replacing spans of same length which were too light.

Bridges 969-C and 984-C. One 9.75 meter girder and one 7.01 meter "I" beam span replacing those of same length which were too light.

Bridges 954-E, 955-A, 955-C, 956-B, 962-A, 964-A and 993-C. Seven 2 meter arch culverts replacing frame trestles.

Bridges 954-B, 966-B and 966-E. Three 5.18 meter "I" beam spans replacing frame trestles.

Bridge 1117-A. Two 18.28 meter through girders replacing ten span frame trestles.

Bridges 961-A and 994-A. Two 7.01 meter "I" beam span replacing frame trestles.

Bridge 994-B. One 4 meter arch culvert replacing frame trestle.

San Luis Division:

Bridges 353-C, 355-A, 355-D, 355-E, 356-A and B, 359-D, 360-A and C, 367-C, 368-A and C, 370-B, 371-C, 372-B, 375-A, 472-B, 329-B and C, 330-A and B, 332-A, 335-D, 347-D and 348-B. Twenty-five 3.05 meter rail girder bridges to replace wooden stringers.

Bridge 372-F. One 3.96 meter "I" span to replace wooden stringers on masonry.

Bridge 425-B. One double 5.18 meter "I" structure on standard abutment, to replace a light half through 9.75 meter bridge with wooden floor.

Bridges 472-A, 472-D, 344-A and 344-B. Three double 2 meter segmental arches, to replace wooden trestles.

Bridge 487-B. Four 2 meter segmental arches, to replace wooden trestles.

Bridge 479-B. One double 5.18 meter "I" beam bridge on masonry, to replace old [illegible]

Bridge 480-C. [illegible] meter deck plate girders on masonry abutments and piers.

Bridge 331-A. One [illegible] meter "I" span on masonry, to replace wooden stringers.

Bridge 566-B. Two new 5.18 meter "I" beam spans—one in main line and one in siding—to replace old beams of lighter weight.

Bridge 645-A. [illegible] meter "I" beam spans on abutments and piers, to replace wooden trestle.

Bridge 910-F. One 53.34 meter through pin connected span, to replace a riveted span of same length.

Texas Lines.

Bridge 631-A, 631-C, 631-D and 631-A. Four 5.18 meter "I" spans on masonry, replacing former wooden and rail structures.

Bridges 631-D, 631-E, 632-A and B, 633-A and 634-A. Twelve 1 meter simi-circular arch culverts, replacing rail and timber trestles.

Bridges 633-B and 638-E. Two 3 meter semi-circular arch culverts, replacing former timber trestles.

Bridge 635-B. Five 5.18 meter deck girder spans on masonry, replacing timber trestle structure.

RELAYING WITH HEAVIER RAIL.

The following sections of track were laid with heavier rail during the year, viz.:

Aguascalientes Division:

From kilometer 475.150 to kilometer 486.030, difference 10.880 kilometers, and from kilometer 735.838 to kilometer 745.030, difference 9.192 kilometers, a total of 20.072 kilometers of 32.739 kilogram (66-lb.) rail replaced with 37.204 kilogram (75-lb.) rail.

San Juan del Rio Yard. From kilometer 190.144 to kilometer 190.798, a total of 645. track meters of 27.779 kilogram (56-lb.) rail replaced with 37,204 kilogram (75-lb.) rail.

Cardenas Division:

From kilometer 322.070 to kilometer 382.809, or 60.739 kilometers, and from kilometer 618.759 to kilometer 651.000, or 32.241 kilometers, a total of 92.980 kilometers, of which 79.936 kilometers was 27.779 kilogram (56-lb.) rail and 11.165 kilometers of 32.739 kilogram (66-lb.) rail and 1.879 kilometers of 41.172 kilogram (83-lb.) rail replaced with 42.390 kilogram (85-lb. A. R. A.) rail.

From kilometer 291.963 to kilometer 295.330, or 3.367 kilometers of 32.739 kilogram (66-lb.) rail replaced with 42.164 kilogram (85-lb. A. S. C. E.) rail.

From kilometer 453.624 to kilometer 453.774, or 150 track meters of 41.172 kilogram (83-lb.) rail replaced with 42.164 kilogram (85-lb. A. S. C. E.) rail.

From kilometer 514.920 to kilometer 520.632, or 5.712 kilometers of 32,739 kilogram (66-lb.) rail replaced with 42.164 kilogram (85-lb. A. S. C. E.) rail.

Chihuahua Division:

From kilometer 1734.422 to kilometer 1829.000, or 94.578 kilometers; from kilometer 1320.318 to kilometer 1321.196, or 878 meters; also several turnouts on this Division were changed to the extent of 734 meters, making a total of 96.191 kilometers of 27.779 kilogram (56-lb.) rail replaced with 37.204 kilogram (75-lb.) rail.

Guadalajara Division:

From kilometer 0.860 to kilometer 251.160, or 250.300 kilometers of 27.779 kilogram (56-lb.) rail replaced with 34.723 kilogram (70-lb.) rail.

Manzanillo Line. Between Tuxpan and Zapotiltic 1.378 kilometers of 27.779 kilogram (56-lb.) rail replaced with 37.204 kilogram (75-lb.) rail.

Mexico-Queretaro Division:

From kilometer 0-5.014 to kilometer 0-7.614, or 2.597 kilometers of 32.739 kilogram (66-lb.) rail was laid in place of 37,204 kilogram (75-lb.) rail.

From kilometer 0-237.648 to kilometer 0-237.967, or 319 meters; from kilometer 0-251.209 to kilometer 0-266.960, or 15.751 kilometers, a total of 16.070 kilometers of 27.779 kilogram (56-lb.) rail replaced with 32.739 kilogram (66-lb.) rail.

From kilometer A-52.780 to kilometer A-62.180, or 9.400 kilometers; from kilometer A-71.220 to kilometer A-169.060, or 97.840 kilometers, a total of 107.240 kilometers of 32.739 kilogram (66-lb.) rail replaced with 37.204 kilogram (75-lb.) rail.

At Hercules, Queretaro, Jocóqui, Manuel and Gonzalez switches were changed, and Main Line between switches to the extent of 7.209 kilometers from 37.204 kilogram (75-lb.) rail to 42.164 kilogram (85-lb. A. S. C. E.) rail.

Monclova Division:

From kilometer 113.721 to kilometer 115.943, or 2.222 kilometers of 27.779 kilogram (56-lb.) rail replaced with 30.507 kilogram (61½-lb.) rail.

Monterrey Division:

From kilometer 21.000 to kilometer 26.273, or 5.273 kilometers; from kilometer 96.796 to kilometer 97.509, or 713 meters; from kilometer 233.919 to kilometer 234.769, or 850 meters; from kilometer 371.022 to kilometer 371.760, or 738 meters, a total of 7.574 kilometers of 27.779 kilogram (56-lb.) rail replaced with 34.723 kilogram (70-lb.) rail.

From kilometer 50.100 to kilometer 75.000, or 24.900 kilometers, and from kilometer 593.520 to kilometer 594.500, or 980 meters, a total of 25.880 kilometers of 27.779 kilogram (56-lb.) rail replaced with 37.204 kilogram (75-lb.) rail.

From kilometer 478.890 to kilometer 479.162, or 272 meters of 27.779 kilogram (56-lb.) rail replaced with 32.739 kilogram (66-lb.) rail.

From kilometer 580.631 to kilometer 581.000, or 369 meters, and from kilometer 644.000 to kilometer 644.600, or 600 meters, a total of 969 meters of 27.779 kilogram (56-lb.) rail replaced with 30.507 kilogram (61½-lb.) rail.

Northern Division:

Matamoros Branch. The following rail was taken up and laid, viz.:

Kilometer		Taken Up.		Laid.		
		19.842 K.	[illegible] K.	27.779 K.	32.739 K.	[illegible] K.
From.	To.	(40-lb.)	(45-lb.)	(56-lb.)	(66-lb.)	(75-lb.)
86.440	88.500	[illegible]	2.060	1.971	[illegible]	.080
92.500	107.300	[illegible]	14.800	14.711	[illegible]	.089
107.900	112.000	[illegible]	4.100	[illegible]	[illegible]	.089
112.600	125.000	[illegible]	12.400	12.355	[illegible]	.045
125.000	128.900	[illegible]	[illegible]	3.900	[illegible]	[illegible]
129.350	131.700	2.350	[illegible]	2.350	[illegible]	[illegible]
132.020	137.000	4.980	[illegible]	4.624	[illegible]	.356
137.000	180.000	43.000	[illegible]	[illegible]	42.599	.401
[illegible]	190.044	.044	[illegible]	[illegible]	[illegible]	.044
198.830	[illegible]	.044	[illegible]	[illegible]	[illegible]	.044
199.250	[illegible]	.045	[illegible]	[illegible]	[illegible]	.045
207.495	207.540	.045	[illegible]	[illegible]	[illegible]	.045
207.960	208.005	[illegible]	[illegible]	[illegible]	[illegible]	.045
[illegible]	235.650	[illegible]	[illegible]	[illegible]	19.383	.267
235.650	275.700	40.050	[illegible]	39.694	[illegible]	.356
[illegible]	307.150	27.550	[illegible]	27.283	[illegible]	.267
328.000	329.754	1.754	[illegible]	1.754	[illegible]	[illegible]
[illegible]	[illegible]	143.457	33.360	112.653	[illegible]	2.182
Totals.		176.817		176.817		

Pacific Division:

From kilometer 5.745 to kilometer 36.388, or 30.643 kilometers; from kilometer 49.622 to kilometer 49.888, or 266 meters, and from kilometer 63.510 to kilometer 72.902, or 9.392 kilometers, a total of 40.301 kilometers of 22.322 kilogram (45 lb.) rail replaced with 27.779 kilogram (56-lb.) rail.

San Luis Division:

On the Morales Branch to the San Luis Smelter 11 kilometers of 19.842 kilogram (40-lb.) rail replaced with 27.779 kilogram (56-lb.) rail.

From kilometer 313. to kilometer 364., or 51 kilometers of 34.723 kilogram (70-lb.) rail replaced with 26.742 kilometers of 42.164 kilogram (85-lb. A. S. C. E.) rail, and 24.258 kilometers of 42.390 kilogram (85-lb. A. R. A.) rail.

From kilometer 364. to kilometer 505., or 141 kilometers of 34.723 kilogram (70-lb.) rail replaced with 42.664 kilogram (85.45-lb. A. R. A.) rail.

From kilometer 505. to kilometer 523.750, or 18.750 kilometers; from kilometer 527.585 to kilometer 530.765, or 3.180 kilometers, a total of 21.930 kilometers of 34.723 kilogram (70-lb.) rail replaced with 42.664 kilogram (85.45-lb. A. R. A.) rail.

From kilometer 530.765 to kilometer 562., or 31.235 kilometers of 34.723 kilogram (70-lb.) rail replaced with 42.164 kilogram (85-lb. A. S. C. E.) rail.

Torreon Division:

From kilometer 700. to kilometer 870., or 170 kilometers of 26.787 kilogram (54-lb.) rail replaced with 37.204 kilogram (75-lb.) rail.

NEW SIDE AND PASSING TRACKS.

During the year new side tracks, passing tracks, cross-overs and extensions to existing side-tracks were built to the extent of 46.947 kilometers. The following statements give details of weight of rail used in these new tracks, viz

	Kilometers.
Forty pound rail (19.842 kilograms)	.494
Forty-five pound rail (22.322 kilograms)	8.519
Fifty-six pound rail (27.779 kilograms)	31.816
Seventy pound rail (34.723 kilograms)	4.959
Seventy-five pound rail (37.204 kilograms)	.622
Eighty-five pound rail (42.390 kilograms)	.537
Total	46.947

From which deduct:—

Tracks taken up:

Forty pound rail (19.842 kilograms)	1.467	
Forty-five pound rail (22.322 kilograms)	0.177	
Fifty-six pound rail (27.779 kilograms)	11.206	
Sixty-six pound rail (32.739 kilograms)	0.015	
Seventy pound rail (34.723 kilograms)	0.312	
Seventy-five pound rail (37.204 kilograms)	0.128	
		13.305
Net increase		33.642

IN GENERAL.

Employees:

The number of employees in the service of the Company at the close of the fiscal year was 30,874. Of the total number 1,219, or 3.95 per cent., were [illegible]

Statement of Equipment:

Your attention is invited to the accompanying statement showing various classes of locomotives and cars on hand at June 30, 1911.

New Equipment:

The new equipment referred to in the last annual report has all been received, the greater part of it having been delivered to us during the year under review, and in addition thereto orders were placed, with the approval of the Board of Directors, for 200 tank cars and 200 flat cars, the latter for replacement of cars destroyed, etc., and the former to take care of the increased business principally in the movement of oil

Express Service:

The results from the operation of this service under the contract with the Compañia Mexicana de Expresos S. A., for the year have been satisfactory.

Tree Planting:

[illegible] commenced [illegible] in the matter of planting trees [illegible] and there are now [illegible] a large number of young trees [illegible] the Company's property [illegible] La Boca to Monterey [illegible] the Saltillo Division [illegible] the Company [illegible] to continue [illegible]

Insurance:

[illegible] insurance [illegible] deposited at various points [illegible] the provisions of the mortgage [illegible] the water service.

Fuel Oil:

[illegible] 2,000 barrels of fuel oil [illegible] Mexican Railway Company of Mexico, and it is expected that [illegible] equipped and facilities made for using this [illegible] the first of the present calendar year.

Land Matters:

[illegible] lands [illegible] and abutting [illegible] Mexico City [illegible] during the [illegible] June 30, 1911.

Change of Gauge:

The change from narrow to standard gauge of the line from Acambaro to Uruápan, a distance of 230 kilometers, was carried out during the fiscal year and the work completed and standard gauge trains operated over the line on the 20th of July, 1911. The work involved the construction of 63 kilometers of new line at various points between Acambaro and Patzcuaro to reduce grades, avoid unnecessary curvature, and shortened the distance by some 7,260 kilometers.

Tunnel at "La Mariposa":

This tunnel, at Kilometer 959 Northern Division, was enlarged and lined throughout and line changed at both ends of tunnel. Retaining walls and a 4 meter culvert were also constructed at the south end of this tunnel.

Anhelo-Paredon Cut-off:

This cut-off line was put into operation on September 15, 1910, all work having been completed by that time with the exception of the placing of two pairs of 25.15 meter deck girders at Rio Patos and one pair of 22.13 meter deck girders at kilometer 6.250, the masonry, however, being all ready.

Isasi Change of Line—Monterrey and Gulf Division:

Due to the washouts in the year 1909, the line between kilometers 154.963 to 157.615 was revised, line changed to reduce curvature and grade raised above the high water level.

At kilometer 151 work similar to the above was done for the same reason, and the bridge there was raised 2.1 meters and an additional bridge of 45.72 meters, single track through riveted trusses, was constructed.

Linares Bridge and Change of Line:

The original bridge which consisted of two 51.82 meter spans was replaced with a new bridge of five 53.34 meters, through pin connected span, and reinforced concrete abutments and piers. The grade was raised on each side of the bridge to clear the high water level.

Montemorelos Bridge and Change of Line:

This work, which includes new passenger and freight stations, a new bridge composed of five 48.46 meter steel spans, as well as a 4.069 kilometer change of line, was carried out during the year with a view of avoiding further trouble from high water.

San Juan Bridge and Change of Line:

A new bridge, consisting of eight 53.34 meter spans on reinforced concrete abutments and concrete piers, was constructed over the San Juan River, and also 1.600 kilometers of change of line on the south end and 200 meters of grade on the north end raised 1.5 meters.

These changes were made on account of damages done during the floods in August, 1909, and were completed in December, 1910.

New Line from Durango to Llano Grande:

Reference to this line was made in the report for the year ended June 30, 1910. During the fiscal year under review work has been proceeded with and at the close of the year the total percentage of grading and masonry completed to that date was 89.37 per cent. It is estimated that the first twenty kilometers of this line will be completed and ready for operation by the end of September, 1911.

New Line from Durango to Cañitas:

This line from Durango to Cañitas, in the States of Durango and Zacatecas, covers a distance of approximately 267 kilometers and passes in the vicinity of Nombre de Dios, Chalchihuites and Rio Grande to a junction with the Aguascalientes Division at kilometer 813.261 from Mexico. A branch line of about 12 kilometers in length is to be built to Sombrerete. The line is covered by concessions from the State Governments of Durango and Zacatecas as well as from the Federal Government. Contract for the grading and masonry on the first 160 kilometers out of Durango was let on March 30, 1911.

New Line from Penjamo to Ajuno:

This line in the States of Guanajuato and Michoacan, of approximately 135 kilometers in length from Pénjamo on the Guadalajara Division to Ajuno on the Pacific Division, is being built under a concession from the Federal Government. Contract was let for the work in October, 1910, and work commenced out of Pénjamo during the early part of November, 1910.

Purchase of New Rail:

During the year under review your Company received and paid for some 33,160 tons of domestic 85-lb. rail and 33,560 tons of 75-lb. foreign rail. These quantities of new rail were furnished under contracts dating back [illegible] and which were duly approved and authorized by the Board of Directors.

Statements of Income:

Attached hereto you will please find letter from the General Auditor, dated [illegible] 1911, together with the [illegible] statements of accounts as [illegible]

Accompanying this report will be found a list of directors and officers of the Company as at June 30, 1911.

It is with [illegible] regret that I record the death of an old time official of the Company in the person of the late Mr. J. M. Frazer, who at the time of his death in October, 1910, was General Treasurer of your Company.

Respectfully submitted,

E. N. BROWN,
President

Railway Age Gazette

Including the Railroad Gazette and the Railway Age

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E. A. SIMMONS, *President.*

L. B. SHERMAN, *Vice-President.* HENRY LEE, *Sec'y & Treas.*

The address of the company is the address of the officers.

EDITORS:

SAMUEL O. DUNN, *Editor.*
BRADFORD BOARDMAN, *Managing Editor.*
ROY V. WRIGHT
B. B. ADAMS
E. T. HOWSON
G. L. FOWLER
WILLIAM FORSYTH
W. E. HOOPER
H. H. SIMMONS
R. E. THAYER
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E. S. FAUST
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CLARENCE DEMING

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THE editorial in the *Railway Age Gazette* of December 1, condemning the giving of presents by railway supply men to railway men concerned with purchases, evidently expressed what was in the minds of many persons, both supply men and railway men. We publish this week some letters on the subject, including a clear-cut expression from President Markham of the Illinois Central. The *New York Times* grew facetious editorially regarding our comments on this matter. It considers the giving and acceptance of presents by the sellers and buyers of supplies as so obviously immoral as to call for no explanation of why it is so, but merely for stern reprobation because it is so. We took the pains to point out wherein the abuse lies because it was impossible for us to believe that numerous business men have been deliberately doing what they have clearly recognized as both unbusinesslike and unethical. We felt, on the contrary, that many who have participated in this evil practice have done so without seriously considering what it involves. However, there is no question that, as the *New York Times* says, the practice is one which calls for the severest and most unreserved condemnation. If it is not actually grafting it is the vestibule to it; and, indeed, it is so like grafting that the two things are practically indistinguishable. As Mr. Markham says, there is none of the spirit of Christmas in it. It is simply an attempt to sugar-coat one form of the giving and taking of bribes—an attempt to commercialize, to prostitute and cash in, the Christmas spirit—and those who continue it after attention has been called to its real nature will put themselves in an absolutely indefensible position.

A DECISION of the Commerce Court in October in the cases of the Goodrich Transit Company and the White Star Line against the Interstate Commerce Commission has attracted little attention or comment, doubtless because of what appeared to be the narrow scope of the question at issue. Yet it may conceivably have far-reaching consequences. The petitioners, lake lines of steamers, protested against being required to reply to special inquiries of the commission issued under the authority of Section 20, and against the order that they should keep their books in accordance with accounting classifications prescribed by the commission. They conceded jurisdiction over that portion of their business which was performed under joint arrangement with rail lines, but denied the jurisdiction of the commission as to that part of it which was either port-to-port or intrastate in its charter. Judge Hunt sustained the contention of the water carriers, and his decision is doubtless good law. At the same time it serves to emphasize the absurdity of rate regulating statutes which exempt from jurisdiction so important a class of transportation agencies. But the main interest of the decision lies in its implications. The commission had maintained that "while no distinction has been made between petitioners' income and expenses in connection with its interstate business and intrastate business, such distinction was not made because while the income from the different kinds of business stated in the petition can with reasonable accuracy be ascertained, yet it is impossible to determine with any substantial degree of accuracy the expenses incurred in either of said kinds of business as separate and distinct from the others, and because it is essential that the commission know the total income derived by the petitioner from all its investments and sources, in order that the commission may determine what are reasonable and just rates to be charged by petitioner in its joint rail and water business, and to determine whether it is complying with the provisions regulating interstate commerce." But the court held that "the scope of the right to call for the report is conferred by the nature of the business to be set forth within the report when made." It makes no difference if state and interstate operations are commingled; that is the fault of the law. The court concedes that it may be "somewhat tedious work" to furnish information and follow a system of accounting along the

lines laid down by this decision, but ventures the statement, "Nor does it seem logical to say that, if the business is so far separable as to furnish a basis for a common arrangement as to part of it, that report and systematic account of such part cannot be had without report of the whole." Now, it may be beautifully logical to separate accounts as suggested, but it will be most sad and unlovely accounting, particularly if the doctrine should be—as it might properly be—applied to the intrastate and interstate business of the railways. With the present attitude of the railways toward the constant annoyances due to state interference in matters of accounts as well as operation, it is hardly likely that any one of them in the immediate future will carry any such proposition to the Commerce Court, but the mere contemplation of the effect of such a decision when applied to the accounts of rail carriers transports one into a realm of most interesting speculation.

THERE seems to be a general misunderstanding as to the action that was taken by the joint executive committee of the Master Car Builders' Association, the Master Mechanics' Association and the Railway Supply Manufacturers' Association regarding the entertainment features in connection with the conventions of the mechanical associations at Atlantic City next June. As reported in the *Railway Age Gazette* of October 27, it was decided, at the suggestion of the railway men, to make certain changes in the entertainment features and the manner of handling them. No specific action was taken except that it was decided to eliminate the formal features. The question of exactly what should be done was left in the hands of a committee consisting of the presidents of the three associations. It is quite probable that the formal receptions and balls will be replaced by informal dancing, either at the Marlborough-Blenheim or on the Steel Pier, and that something of this sort will be arranged for each evening during the conventions. The expenses of the social affairs will be divided between the three associations in such proportions that there can be no criticism that the railway men are entertained at the expense of the supplymen. This is a splendid move in the right direction. It is doubtful whether the cutting out of the formal features will be seriously regretted by very many, if any, of either the railway men or the supplymen, and the substitution of the less formal entertainments will undoubtedly add much to the enjoyment of the occasion. If some arrangement could be made to keep the exhibits open for inspection during the evening and early in the morning it would be appreciated by the railway men. Many of them cannot stay throughout the conventions and do not have nearly as much time to examine the exhibits as they would like. The value of the conventions and the standing of the mechanical department officers generally will be raised to the high plane on which they should rest by placing the conventions on a strictly businesslike and dignified basis. The entire programme, including all social affairs should be strictly under the direction of the railway men.

W[illegible] "tale-bearer." An officer of the Lackawanna, addressing employees at one of the meetings held in that road recently to give the "safety committee" a send-off had little difficulty in defining this term. Calling attention to the [illegible] percentage of the deaths and injuries among railway employees who are at work on and around [illegible] careless or thoughtless in some of the features of their work, he commended the duty of reporting the misconduct of such men and yet said this officer, "I don't want anyone to tell a tale [illegible]." He wanted reports, but not tales. He recognized and respected the very common feeling, existing among all [illegible] to tell the superintendent anything about a fellow employee which will bring that employee [illegible] to get one of his fellows into trouble, and it would have been a good thing if that officer had offered a little further explanation of the ethics of the situation. The manager of the Lackawanna was asking for information which is necessary for the proper and decent conduct of the road's business. Suppose Tim Sullivan is in the habit of jumping on the front foot board of a moving locomotive coming towards him; he endangers his own life and sets a bad example to young yardmen. The superintendent ought to be informed. If you go to him because you like to make trouble for Tim you are a "tale-bearer." If you tell of the bad practice because you want to save Tim's life and promote the safety of the whole force you are doing a worthy service. It comes down, therefore, to a question of motive; and the only way to make sure that your motives shall be accepted as honorable is to have a reputation for honor in all things. Thus we have a clear and simple demonstration that in the railway service the humblest positions require the highest moral character. A reputation for honor cannot be acquired except by consistent uprightness, maintained for months or years. Secretiveness does not promote this object; frankness with fellow workers is a duty. Why should not the trainmaster foster this right spirit by encouraging men to tell him both the good and the bad that they see? To tell of good conduct will stimulate right courses of thought; as for bad conduct, it is the duty of the trainmaster to discover it, even to the extent of catechising the men. Why not? Why wait until you have to investigate a smash-up before inquiring about bad practices?

THE New York State Public Service Commission, first district has ordered the Interborough Rapid Transit Company to post notices, giving suitable information to the public, whenever a blockade occurs on the subway lines, these notices to be displayed at the ticket office of every station affected within ten minutes after the blockade occurs. This is one more instance in which a railway officer is ordered by the public authorities to do a thing which he ought to have done without being told. We sympathize warmly with the railway superintendent who is hampered by the unbusinesslike requirements of state commissions; but not all of their requirements can be thus classed, and we also sympathize with the passenger who is annoyed by the slowness of the railway superintendent. To most of our readers an order to publish train delays within 10 minutes would, perhaps, be an unreasonable requirement, but in the case of the Interborough, carrying sometimes a million passengers a day, and sometimes a *thousand* on a single train, the public oftentimes has a right to know of a train detention in 5 minutes if it be possible to convey the information in that time. Some of the station platforms will become intolerably crowded in that time, and in less than 10 minutes dangerously packed. That is to say, the commission's 10-minute limit is at best only a rough estimate. The railway is bound, as before, to advise all passengers as quickly as possible. And the notice ought to be posted at the entrances to the station (at the head of the subway stairs) as well as at the ticket office. Fortunately, the telephone has at last crowded out the slower Morse telegraph completely enough to do away with all excuses for delay in transmission. Only by the slowness of the conductor in reporting or of the superintendent in circulating the report can passengers be deprived of such knowledge as they ought to have. The mileage of the New [illegible] is only about a hundredth of one per cent. of that of the railways to which we are addressing this little homily; but we do this because the lesson is applicable not alone in New York, but throughout our 240,000 miles of railway. With the telephone in use on innumerable railways, large and small; with despatching circuits on which conversation is easier over distances of a hundred miles than over the average city telephone line for [illegible] with portable telephones and "fish pole" connections [illegible] as is now the case on some roads, what is to hinder the adoption by all railways of the high standard which has been prescribed for the Interborough? One of the New York papers says that the employees of the Interborough "are trained never to know anything about the condition of the line." The

same slur has often been cast at steam roads. Assuming that there may be some justification for the closed-mouth rule, the simple way to obviate all trouble about it is for the superintendent himself to open his mouth very promptly, when necessary, and to have his words quickly spread by telephone. Why is it that the Erie is the only road that can boast of a conductor who was able to inform the despatcher's office within four minutes, when his train broke down two miles from a telegraph office?

FEDERAL WORKMEN'S COMPENSATION LEGISLATION.

WHEN, a few years ago, President Roosevelt made speeches advocating the enactment of a federal workmen's compensation law applicable to railways, probably most railway managers were opposed to the plan. The change that has taken place in their attitude toward public regulation is illustrated by the fact that a good many, if not most, of them are not now opposed to such legislation, provided it be fairly and wisely drafted. A federal Employers' Liability and Workmen's Compensation Commission has been studying this subject, and must by January 1, 1912, report to Congress what, if any, legislation it considers desirable. The commission is composed of Senator George Sutherland of Utah, chairman, Senator George E. Chamberlain of Washington, Representative William G. Brantley of Georgia, Representative Reuben O. Moon of Pennsylvania, W. C. Brown, president of the New York Central, and D. L. Cease, editor of the *Railroad Trainman*. Launcelot Packer is secretary. The commission a few weeks ago sent out a statement, in which it said that it had tentatively agreed to recommend legislation along the following lines:

(1) The law to provide for payment of compensation by interstate carriers engaged in interstate transportation to employees sustaining injury by accident while engaged in such transportation, except in cases of willful misconduct to be hereafter specified. (2) The compensation to be paid by the employer directly, and not out of a general fund created by any form of taxation. (3) That the law shall be in form compulsory, and not subject to election by either employer or employee. (4) The remedy provided by such law to be exclusive of any common law or other statutory remedy. (5) To apply to all accidents resulting to the employee while in the course of his employment, except those where the disability continues for a period of two weeks or less, the employer, however, to furnish medical and surgical assistance to an amount not exceeding $200. (6) Payments of compensation to be made under the law shall be made periodically, and not in lump sums, with, however, appropriate provision for commutation at any time after the lapse of six months on the application of either party. (7) The amount of payments to be limited to a minimum and maximum sum, and not to continue beyond a specified term of years, to be hereafter fixed. The question as to whether or not this limitation shall apply to permanent total disability is left open. (8) The amount of all payments to be based upon a percentage of the wages received by the injured employee at the time of his injury to be hereafter fixed. (9) All claims arising under the law shall be nonassignable and exempt from levy. (10) In case of death, payments to be made to dependents, including alien dependents. (11) All claims under the law to be made preferred lien. (12) Whenever any railway company and its employees have agreed or shall hereafter agree upon a plan of compensation which is as favorable to the employees as the provisions of this law, such plan may be substituted for the law, provided that wherever in any such plan the employees contribute to the compensation fund, the plan shall contain beneficial provisions in addition to the schedule of payments, equivalent to such contribution.

It is understood that the commission will soon report in completed form the bill it favors, and that it will stipulate what proportion the amounts paid in case of injury or death shall bear to the employee's wages.

There are two principal points involved in the question of workmen's compensation, that of expediency and that of constitutionality. As a broad proposition the *Railway Age Gazette* believes that legislation of this character is, under modern conditions, economically and socially just and desirable. The theories on which the old "fellow servant" and "assumption of risk" defenses are based is not consonant with modern industrial conditions. To say, for example, that a locomotive engineer, who has been injured in an accident because some despatcher whom he never saw has made a mistake in a train order sent from miles away, should not be compensated by his employer for his injury because the despatcher is a fellow employee and the engineer assumed the risk of working with such a negligent fellow, is nonsense. The fellow servant and assumption of risk defenses grew up under conditions of small industry. This is the day of large industry, and the laws ought to be made to fit the changed conditions.

Legislation which determines in advance how much the employer shall pay an employee, or his heirs if the employee be injured or killed, probably will not tend to increase accidents. Few men, indeed, will deliberately incur the risk of injury or death because they know in advance what the accident will cost their employer or be worth in money to them. When an employee is injured or killed the economic cost of the accident has to be borne either by the unfortunate man and his family, or by the employer, or by society. If the man's employment, even under the most favorable conditions and to the most careful employee, is an extra-hazardous one, as employment in some branches of railway service is, this is due to conditions which the individual employee did not create, and cannot control, and therefore, it is not equitable that he should not only suffer the accident, but that he or his family should also have to bear the entire economic cost of it. If the employer is to bear the economic cost, an arrangement under which the amount is fixed in advance that he shall, in any given circumstances, be obliged to pay, may be better for him than one under which he may have to defend himself by litigation against excessive claims, under which he may often have to pay such claims, and under which, in any event, he never can estimate with reasonable accuracy how much he will have to pay.

If, finally, the economic cost of accidents is ultimately to be met by society, it is better that it should be made a charge against the operating expenses of the particular concern or industry in connection with which the accident occurs, and then paid by society in the prices or the rates of the commodities or the services that society buys from that industry or concern, than that the injured person, or his family, or both, shall be cared for by public or private charity. Those who, in the performance of honest labor, are injured and become dependent through no serious fault of their own, but as a result of shortcomings of our industrial methods, are not fairly dealt with if allowed to become objects of charity; and furthermore, they can be cared for at less economic cost through the administration of proper workmen's compensation laws than by either public or private charity, whose administration is almost universally very expensive.

As between the employer and society—in this specific case as between the railway and society—while the compensation should come directly from the treasury of the employer, indirectly and ultimately it should come from the prices or rates charged for the commodities or services of the industry. How large an immediate burden the proposed legislation would put on the railways nobody, of course, can tell, even approximately, until a complete bill is drafted; and nobody can tell then more than approximately, for while elaborate statistics regarding the cost of past litigation and damages resulting from accidents to employees are being compiled, only experience with the proposed law will disclose how it will work. Furthermore, past experience is no guide to what future experience in the absence of workmen's compensation legislation would be; for the states are passing laws abolishing the "fellow servant," "assumption of risk" and "contributory negligence" defenses; and even where such laws have not been passed juries are showing a tendency to ignore the defenses mentioned and bring in increasingly large judgments against railways in damage suits brought because of injuries to employees. If the measure proposed seems reasonable it should not be opposed by the railways even though it may seem certain to cause even a very substantial increase in operating expenses.

The question as to just what kind of law ought to be passed is inextricably involved with the question of what sort of measure constitutionally can be passed. The differences of opinion

between the many able lawyers who appeared before the commission are so various and great that it would seem the wisest course to pass the best kind of measure which any considerable number of these lawyers believe will be upheld. The measure which would best answer this description would be one which would provide a reasonable scale of compensation, would abolish all the common law rights of action and defenses, and would be compulsory as to all interstate railway employers and employees, except such as may agree on some plan of compensation which, in the words of the commission's tentative draft, shall be "as favorable to the employees as the provisions of this law."

THE TRANSFER OF THE ONTARIO & WESTERN.

ASSUMING that the New York Public Service Commission assents, the transfer now of the Ontario & Western to the New York Central, after seven years of New Haven control, has in it some elements of mystery.

In November, 1904, following the failure of an attempt to secure a southward outlet and inlet for the Poughkeepsie Bridge system, the New York, New Haven & Hartford bought a little more than a majority of the stock of the New York, Ontario & Western. The last annual report of the New Haven shows that the control, omitting 22 preferred shares, was represented by 291,600 shares of common stock, which had cost the company $13,105,185, or about $45 a share. The purchase seven years ago was regarded as a hostile act by the New York Central, which began a survey across northwestern Connecticut for a shorter connection of its own with the Boston & Albany; but an appeal to the Connecticut legislature by the New Haven and an amendment of the general railway law of the state thwarted the scheme. The control of the Ontario & Western was welcomed in Boston and southern New England as a valuable acquisition; it was to give New England cheaper all-rail coal; it was to open northern Pennsylvania and western New York to New England factory products; and it was hoped that it forecast a larger western business beyond the Niagara frontier. Tested by earning power, the returns indicate that some of these hopes have been realized. Gross earnings of $7,090,888 in 1904-5 rose to $9,295,702 in 1910-11 and net from $1,281,276 in 1904-5 to $1,312,797 in 1909-10, though they fell to $1,142,936 last year, owing to increase of wages and loss of a western differential. But the purchase has paid continuously $2 a share to the controlling corporation, on a return of 4.44 per cent., and even last year the Ontario & Western lacked but $19,400 of earning its dividend, though revenue has considerably fallen since. In his last annual report, published in October, President Mellen emphasized strongly the future value of the line to the New Haven's New York, Westchester & Boston, with its Bronx terminal and "a more direct all-rail delivery of coal and general merchandise to all points reached." Yet now the control of the potentially important feeder is allowed to pass, and with it the direction of the coal traffic to New England; nor can any traffic agreements quite equal the value of positive and permanent control. On their face, the advantages seem very positively with the New York Central. It obtains control and traffic routings on a system comprising a total single trackage of 846 miles; some valuable coal properties; a new entrance into the anthracite field, whence the system last year carried 5.4 per cent. of the total anthracite output; a very important milk business, which last year brought in gross receipts of $742,104, and, what is of far larger importance, a new cross-country line from Oneida junction, in northwestern New York, to Weehawken. The New York Central's power of throwing much freight business, especially in times of intensive traffic, on the Ontario & Western is manifest and, in that aspect, while the acquired property cannot exactly be called a new trunk line with a terminal at New York City, the situation suggests it. Then, again, it is something for the purchaser to have secured the property against future transfer to rival interests.

The New Haven, which paid by 4 per cent. bonds for the Ontario & Western stock at about $45 a share, gains about $50,000 a year guaranteed under the transfer. But that net sum seems so trivial compared with the advantage acquired by the New York Central that one must look elsewhere for the New Haven's other offsets. One of them is to be found, undoubtedly, in the New Haven's purchase from the New York Central of the full control of the Rutland. This, with the Montreal connection annexed, presumably forms part of the New Haven's general campaign against the southern New England invasion by the Grand Trunk. It is also asserted that the Rutland reaches the great lakes by a route more efficient and economical than the Ontario & Western. And it appears certain that the New Haven will at least make an energetic attempt to develop, via the Rutland, new business both to Canada directly and to and from western points over the lakes.

The Ontario & Western sale, therefore, must be taken not separately, but as part of a more extensive and complex deal. The two-sided transaction as a whole has one other striking feature. It registers another step in that closer physical and financial New York Central-New Haven relation, which during the last few years has been so marked a feature in the relations of the two systems, and of which the joint Boston & Albany lease was a very recent sign. Is that movement to stop now or go on to more impressive results?

WHAT ARE THE RAILWAYS GOING TO DO ABOUT RAILS?

RAILWAY men continue to complain that they are not getting good rails. Some say that the rails they are receiving now are a little, although not much, better than those they were receiving a few years ago. Others positively declare that the steel now being put in track is not as good as that bought a few years ago. The consensus of expert opinion unquestionably is that if there has been any improvement since the agitation and negotiations about the rail question four years ago it has been very much less than it ought to be, and that most of the rails being made now fall far short of being such as safe operation requires.

If most of the mills are not turning out poor rails the detailed facts that will refute the numerous charges that they are ought, in justice to them, to be made public. If they are making poor rails the detailed facts ought to be made public in justice to the railways and the public. The individual railways possess the data necessary, if they would but give it out, to disclose the truth. They do, through the reports of the American Railway Engineering Association and other channels, give out some of the facts They do not give out all that it is necessary to know in order to draw correct inferences either as to the general character of the rails now being made, or, if it is bad, as to the reasons for this. As the safety of travel depends largely on the kind of rails made and laid, railway men and the public have a moral right to know all of the facts as to the results the different roads are getting and the reasons for them.

Why have the railway managers thus far failed and refused to tell all of the facts? One very important reason is that the makers of steel rails are large shippers and that each railway has feared that if it took the initiative in effectively agitating the subject it would be punished by the withdrawal of traffic. Another is that a good many of the same men are influential, as directors, large stockholders or bankers, in both the steel companies and the railways, and while they may never have directly interfered in the rail situation their connection with both buyers and sellers is almost beyond question having a decided influence in the wrong direction.

The trouble with rails is due to one of three causes. Either the railways' specifications are faulty, or the specifications are not being enforced by the railways and lived up to by the makers, or, while the specifications are adequate, the methods of manufacture are defective. Whatever is the trouble, the railway man-

agers have the means of remedying it—providing there is no interference from those higher in authority than the managers. They can begin by making public the results that they get from the steel bought from the different mills, mentioning the mills not by numbers, by which only a few persons can identify them, but by name, so that all persons may know which are making good, and which poor, rails. Then, as another step, they can quit giving orders to mills whose product is poor and concentrate them on those whose product is satisfactory. The tariff on rails was halved by the Payne-Aldrich law, and those unfamiliar with all the pertinent conditions might inquire why the roads do not try the effect of placing some orders abroad. There seem to be two reasons. One is, that the management of each road fears that if it ordered rails abroad the steel companies might tell it to go abroad to get its traffic. The other reason, unless our information is entirely incorrect, is that there is an understanding between the rail makers of the United States and those of foreign countries, in consequence of which the foreign makers refuse to sell rails to the railways of this country. They may not do so in express terms, but they ask prices, or impose conditions, which come to the same thing.

One of the main points that has been in controversy between the railways and the manufacturers has been as to the price that ought to be paid for improved rails. The makers have said that they must get more money for better rails, and many of the railways have said that they could not afford to pay more. One good way to settle whether better rails can be made for present prices would be to have a committee of experts, appointed by both parties and given unreserved access to all pertinent information, investigate and report on the subject. While the question of what price shall be paid is one for determination by negotiation between the makers and the railways, the question of safety involved is one with which the public and the railways are primarily concerned. The public interest requires that the roads shall get safe rails, if they be obtainable, whether they get them at present, at lower or at higher prices, and if the railway managements would show a little more of the courage, a little more of the backbone, a little more of the spirit of co-operation among themselves, that their duty to the roads and the public demands, the problem would in due course be solved. If the makers can wield a big stick in the form of tonnage, the public can also wield one in the form of more drastic regulation; and if some day the public should get the idea into its head that one of the main difficulties in the way of the solution of the rail problem is that the same men are very influential in some steel companies and many railways, it might so wield its big stick as to cause serious results for both the makers and the roads.

THE USEFULNESS OF A PHYSICAL VALUATION.

THE Hadley commission recommends that the Interstate Commerce Commission be given authority and the necessary appropriation to make a physical valuation of railways whenever, in the opinion of the Interstate Commerce Commission, this will help it to pass on any of the questions brought before it. Physical valuation—in other words, the estimated cost of reproducing a railway's physical property—is the main factor in determining the fair value of railways, and its fair value is the main factor to be considered in the determination of the reasonableness of an entire system of rates. If the railways are to base their opposition to reductions of rates on the constitutional ground that they must be allowed a fair return on the fair value of their property, the Interstate Commerce Commission, in order to ascertain if a proposed reduction would deprive them of such a return, unquestionably should have the authority and the means of finding out what the value of the property is. The opposition to a physical valuation by railway officers, and the demand for it by shippers and many public men who consider it necessary for the protection of the public, have been based very largely on a misapprehension as to the use that could and would be made of the results of such a valuation.

The *Railway Age Gazette* has taken the position that as a means merely of satisfying curiosity as to whether or not, at any particular time, the outstanding par value of railway securities approximated the cost of reproducing the property, a physical valuation could do no harm to railways that in all probability it would show that the property value was higher than the par value of outstanding securities. If the public is willing to pay the cost of gratifying its curiosity it surely is entitled to do so.

The Securities Commission's report, however, goes to the root of the whole matter in showing the absurdity of trying to discover any rigid relation between the par value of securities issued against the property and its value at any given time. A readjustment of the par value of securities outstanding to the present value of railway property "would become archaic almost from the outset because an adjustment of securities based on the values of today might be totally erroneous tomorrow."

The Interstate Commerce Commission's comments on physical valuation seem to indicate that it thinks a physical valuation would be of some use in determining whether railway rates and profits in general are too high and might be made a new starting point from which, by the employment of a theoretically perfect system of accounting, it could determine at any future time what the value of a railway's property was, and whether its profits were insufficient, fair or excessive. The Securities Commission's report cannot prevent the Interstate Commerce Commission from using a valuation in this way, but it shows that, in its own opinion, such use of it would be injudicious. Throughout the report the principle is held that the profits of wise and far-sighted investment and management should accrue to investors, and that likewise the losses due to unwise investment and management should fall on investors. "No attempt," says the Securities Commission, "should be made by statute to limit railway profits to a fixed percentage, or to treat a high cash dividend as necessarily indicating extortion. Railway charges must be reasonable; but to try to control rates by arbitrarily limiting profits is to put the manager who makes his profits by efficiency and economy on the same level as the one who tries to accomplish the same result through extortionate charges."

Let us say that today two properties are each found to be worth $10,000,000. Under the accounting rules of the Interstate Commerce Commission, each road spends $1,000,000 a year for the next three years for additions and betterments. One road's management applies its money on grade reduction, the other on heavier motive power. At the end of three years the road that has cut down its grades is able to conduct its business at an operating ratio of 55, as compared with an operating ratio three years previously of 65. On the other hand, the road which has bought heavier motive power finds that it has made a mistake; that the character of its traffic and of its roadbed is such that the heavier motive power cannot be used to anywhere near its full capacity, while it is far more expensive to maintain. This second road's operating ratio has risen from 65 to 70 per cent. The second road asks to raise its rates on certain non-competitive traffic. Is the commission to say that the value on which it now has a right under the constitution to earn a fair return is $13,000,000? The values of the first road and of the second road are not the same at the end of three years. The par value of outstanding securities may be exactly the same. The same amount of money may have been spent on the property, but the heirs of a business man who would pay the same price for the two properties if they were to be offered to him free of all incumbrances could properly apply for a guardian to keep him from throwing away his money.

If the question of raising rates on the second road comes up at the end of the three year period, or of lowering rates on the first road, the Securities Commission recommends that the Interstate Commerce Commission be given the right to make a valuation of the two properties, and such a valuation, if properly made, would show that the second road could not, under the constitution, claim as high a rate of return on its outstanding securities as the first road, and that the first road could not be

restricted to as low a return as the second road, simply because the securities of the second road do not at the end of the three year period represent as valuable a property as do those of the first road.

The Securities Commission believes that the giving to the Interstate Commerce Commission of the power to make a valuation may be found sufficient to protect the public without the passing of a law that should require approval by it in advance of the amount and the purpose of stock and bond issues.

THE SECURITIES COMMISSION REPORT.

AUNANIMOUS report on an important question of public economic policy, heavily concurred in by President Taft, and made by a commission of five men, including a great economist, a member of a great private banking firm, an interstate commerce commissioner, a member of the President's cabinet and an able lawyer who is the author of a book on interstate commerce that has established his reputation as an authority on that subject, is worthy of the most careful study and consideration by those connected with the industry directly concerned, by Congress and by the public. If the report of the Hadley commission on the regulation of railway securities has not settled the question of the advisability of a physical valuation of railways, and does not show what can and what cannot be done to prevent the evils resulting from overcapitalization, it is because there is something behind these questions which the experience and the best thought of the host of successful men who gave their opinions freely to the commission and of the commissioners themselves, could not suggest.

The fundamental principle on which the entire report was founded is suggested by the sentence, "It is far easier to pass a radical measure which is going to be evaded than to secure obedience to a conservative one."

The commission comes to the conclusion that it is the degree of publicity given to the facts regarding security issues, rather than the stringency of the law regulating them, which will give the public the most and best real protection. "A stringent law inadequately enforced and secretly evaded is the worst thing that can possibly be offered the public, because it gives color to claims which have no foundation in fact." The extraordinarily exhaustive fund of information and opinion which the commission had at its disposal makes almost conclusive its opinions as to the *possibility* of remedying the real and imaginary grievances which have led to the criticism of railway financing and rate-making. The commission finds that the extent to which a law regarding security issues, however well drawn, can protect either the investor or the shipper is quite limited. "One man expects that a good law on stocks and bonds will be great service in enabling courts and commissions to protect shippers against overcharge; a second believes that both investors and shippers can be benefited by an abolition of the profits of the promoter; a third, that [illegible] so that the investors will be sure of getting the return which is promised them; a fourth demands that the [illegible] be restored that the community may get the railway capital it requires. The attainment of these [illegible] the passage of an act of Congress. The chief thing that such an act can do is to remove obstacles which bad laws and worse practices have placed in our way."

If the suggestions and spirit of the commission's report can be so placed before the people that they will understand the true principals involved, it will in itself go far towards satisfactorily solving a great number of problems that have confronted the investor, the railway manager and the public in its relations with railways.

As to the specific recommendations in regard to publicity, we do not believe that they are either definite enough or go far enough. The commission says: "We are told that if it was possible to standardize food by a pure food law, it ought to be possible to standardize railway securities by a securities law. It is possible—to the same extent and no more. The pure food law enables a man to know what he is buying; it does not certify that the thing he buys is good for him." The pure food law goes further than to *enable* a man to know what he is buying; it comes as near as now seems practicable to *force* the information on him. The maker of a patent medicine is not required to file with the board of health a formula showing that his product contains 60 per cent. of alcohol and some morphine. He has to put these facts on the bottle itself in letters of a certain size. It's all very well to say that if a man is so stupid as not to be able to take care of himself the law ought not to do more than enable him to protect himself. But, regardless of the ultimate economic right or wrong of the principle, what the people now want is to be protected against their own mistakes, and a railway company which is simply required to file with the Interstate Commerce Commission a statement of the purpose of a stock or bond issue and the other information which the Securities Commission believes the public has a right to possess protects only the investor and that part of the public who are wise enough to protect themselves. It seems as if the commission, having gone so far in its analysis of conditions, could have capped and rounded out its work by recommending a specific law which would require the publication in some manner, on the date of the sale to bankers of a railway's securities, of a full prospectus showing the use to which the proceeds of the sale are to be put, the interest of the directors in any financial operations effected by such sale, the price which the company was compelled to pay for its money, and the other facts recommended to be filed with the Interstate Commerce Commission. Then not only would the public be enabled to find out the facts, but the facts would be thrust before them. For the accuracy of these facts the directors should be held civilly and criminally liable.

THICK AND THIN FIRING OF LOCOMOTIVES.

A FUEL test with a passenger train of 10 cars weighing 560 tons was recently made on the Lehigh Valley from Buffalo, N. Y., to Jersey City, N. J., 446.6 miles, by running one locomotive through without change. The time on the road was 12 hours, the amount of bituminous coal burned 15 tons, and the average steam pressure 195 lbs. The interesting feature of the performance was not so much the endurance of the machinery without adjustment or repair, as the small amount of coal burned and the manner in which the fire was handled. The amount of coal usually burned on the same run when several engines are used is 25 tons. The report of the tests states that the fire was not cleaned or raked, and the grates were shaked slightly and only six times. It is this manner of handling the fire to which we call particular attention, as it is a radical change from the ordinary practice; one which results in marked economy in fuel and is growing in favor on some of the largest railway systems.

The method of firing locomotives with little disturbance of the coal bed on the grate, either by shaking or slicing, or by the use of the paker or rake, has been used on some railways in the South for a number of years, and it first came into prominence at the first convention of the International Railway Fuel Association at Chicago in June, 1909. A paper was then read by [illegible] superintendent of motive power of the

St. Louis Southwestern, on How to Successfully Burn Locomotive Fuel, in which he said: "The clinkering of coal is due to the manner in which it is handled and not to the quality of the coal. If a proper depth of coal is established on the grate when the fire is new it will not clinker, and to prevent clinkering on the run the grate should not be shaked when the fire is light. After a long run, when ashes accumulate, it may be shaked down to a depth of 8 or 10 in., the ash pan cleaned and the engine continued in service. The condition of the fire will then be better than if it had all been dumped and a new fire made." Mr. Adams regards it fundamental in the art of firing locomotives that when the steam pressure drops, the coal is not distributed properly over the grate, or the bed is too shallow for large steam production. The method here advocated may be termed "thick firing," where a bed of ashes is allowed to accumulate on the grate, as distinguished from "thin firing," where the grate is shaked to keep the fire free from ash and bright live coals cover the grate surface. It is claimed that the shaking of the grates and the use of the slice bar are the most potent causes of clinker and of burned grates and warped ash pans, as the intense heat next the grate surface fuses the ash and envelops a portion of the coal in the form of clinker. This is shaked into the ash pan and, with live coal dropped by the further shaking of a thin fire, a bank of live coal is formed in the pan which heats it red hot in spots and causes it to warp.

It is even claimed by the most radical of the thick fire advocates that the clinkering of coal is due to the manner of handling rather than to the quality of the coal, and this has done much to discredit a method of firing which undoubtedly has much merit. Clinker is caused by the fusion of the ash and other foreign substances like iron pyrites; the degree of clinkering is dependent on the temperature of the fire. There is, however, a greater variation in the fusibility of ash and other foreign matter associated with coal than there is in the temperature of the fire. For this reason the formation of clinker is dependent on the character of the ash as well as the method of firing, and, therefore, to some extent, on the quality of the coal. Most locomotive coals are comparatively free from sulphur; they produce a light ash and can easily be burned with little shaking of the grates. With this grade of fuel there is large opportunity for reform in the matter of firing and for substantial economy in the amount burned. There are other coals which will clinker in spite of the most careful and intelligent firing, and it should not be claimed that thick firing will prevent clinker with all coals. The avoidance of clinker on locomotive grates has much to do with successful firing, for clinker is the principal reason for the shaking of grates and the cleaning of fires, and it is the direct cause of a large loss of good fuel which is carried down to the ash pan with the clinker and the violent disturbance of the fire bed.

In discussing efficiency in locomotive coal consumption at the second convention of the Fuel Association, a traveling engineer of large experience said: "There are more grates burned out, more coal wasted on account of green coal passing to the ash pan, and more ash pans burned and warped from excessive shaking of grates than from any other cause. The practice should be restricted and the rule adopted to shake grates as little as possible, consistent with the maintenance of regular boiler pressure and steam making capacity. It is understood that as the ashes accumulate on the grate the depth of the fire increases and there is an advantage in having this layer of ash on the grate, as it prevents the leakage of good coal, warms to some extent the air passing through it, and perhaps helps to distribute it more evenly. It also prevents the excessive passage of air into the firebox where there are holes in the fire and the coal bed is too thin. The excess air cools the furnace and rapidly reduces the rate of steam production. The strong blast of the exhaust is for the time sufficient to supply the proper amount of air for combustion, and it causes sufficient stirring of the fire to allow the lighter portion of the ash to pass out through the tubes and up the stack. In this way a fire may be maintained for a long run without shaking the grates or causing such a deep accumulation of coarser ash as would prevent the admission of sufficient air to the fire.

In his book on Locomotive Performance, Professor Goss gives the following conclusions as to the effect of thick firing on boiler performance: "It is probably true that an experienced fireman can judge with accuracy when his fire is in condition to make the boiler do its best, but the man must be one of exceptional ability and skill. A fire may be maintained so thick as to greatly impair the efficiency of the boiler on account of insufficient air supply. Between the limits of a very thin and a very thick fire there is for every condition of draft a corresponding thickness of fire which will give maximum efficiency. Variations in boiler performance under conditions which are identical emphasize the importance of the fireman's judgment and skill as factors affecting the efficiency of a locomotive boiler."

It is difficult to say how thick a fire should be, as it depends on the quality of the coal, the grate area and the intensity of the blast, but when the engine is working hard the draft is strong enough to force air through a bed of coal more than a foot deep. In a paper on Bank vs. Level Firing, by E. D. Nelson, in the Master Mechanics' Proceedings, 1909, page 103, the level fire is shown to be 8 in. deep, while the wide bank at the back half of the box is 20 in. deep. With this thick banked fire the capacity of the boiler and the rate of evaporation were as high as with the level fire, so that the steam-making qualities were not affected until the bank was made 28 in. deep, and even then the boiler horsepower developed was 1,032, compared with 1,081 obtained with the level fire. In this paper Mr. Nelson calls attention to the effect of the fireman's work on boiler performance and fuel economy. In one test with a banked fire the evaporation was 6.89 lbs., while on the next test with the same fireman an evaporation of 7.99 lbs. was obtained, resulting in a saving of 960 lbs. of coal on a 2-hour run, which is equivalent to a saving of 2,800 lbs. over a 100-mile division.

The principal objection usually made to a thick fire is that it prevents the admission of sufficient air for complete combustion, but the best action of the furnace is indicated by the free production of steam, and so long as sufficient steam is made, the limit of thickness of the fire has not been reached. The reports in the proceedings of the Fuel Association, showing runs of 150 to 200 miles without cleaning the fire or ash pan and with very little shaking of grates, are doubled by many because they imagine that most of the ash must remain on the grate or in the ash pan, but a simple calculation will help to explain. Suppose ten tons of coal are burned which contain 10 per cent. ash. The amount of sparks and cinder thrown from the stack may easily be 10 per cent., or 2,000 lbs., and half of this, or 1,000 lbs., may be one-half ash and non-combustible matter and one-half good coal. Another 10 per cent., or 2,000 lbs., of a mixture of ash and carbon may become dead on the grate and ordinarily be shaked through into the ash pan. If it is only partially shaked and, say, 1,000 lbs. remains on the grate and 1,000 lbs. goes into the ash pan, there will not be sufficient dead ash on a fair-sized grate to obstruct the proper admission of air. If the grate is not shaked, or only slightly, a large part of the 1,000 lbs. of fine, light ash, which is usually thought to accumulate on its surface, will be drawn through the tubes and out the stack by the strong blast; only the coarser and heavier portion will remain on the grate, and this will not clog the fire so as to prevent free combustion.

Thick firing obtained by restricted grate shaking thus results in less clinker, less loss of green coal through the grate, less cooling of the furnace due to excess air through thin fires, less burning of grates and less warping of ash pans, with equivalent or better boiler capacity and economy. While many regard the principle as doubtful or unsound, the fact remains that the practice of thick firing has extended to a number of Northern railways, and it is now well established on one of the largest lines in the Northwest, where ordinary Illinois and Iowa coal is used.

Letters to the Editor.

"ABOLISH THE PRESENT GIVING."

Chicago, December 6, 1911.

To the Editor of the Railway Age Gazette:

I desire to compliment the *Railway Age Gazette* on the editorial in its issue of December 1 relative to the holiday gift-making practice.

My connection with the Illinois Central only dates from January 12 last, and I have no personal knowledge as to the extent to which the practice obtains, but I think it should be plain to every one that there is none of the spirit of Christmas-giving attached to the gift from a representative of a selling concern to an employee of the buyer, and that the acceptance of presents from those to whom no legitimate service has been rendered creates an obligation on the part of the recipient to which he should not permit himself to be subjected.

It is unquestionably to the interests of both the seller and the purchaser that the practice of making gifts for the purpose of controlling business should be discontinued, and I am very strongly of the opinion that the publicity given to it by the *Railway Age Gazette* will be of benefit to all concerned.

C. H. MARKHAM,
President, Illinois Central.

December 11, 1911.

To the Editor of the Railway Age Gazette:

I write you to commend the sentiments in your editorial on the giving of presents to railway men. I am sure many other supply manufacturers heartily concur in these sentiments, and feel sure that this timely article will go a long way towards abolishing the practice. SUPPLY MANUFACTURER.

Chicago, December 7, 1911.

To the Editor of the Railway Age Gazette:

The writer of the editorial on present giving in your issue of December 1 has made one mistake; he should have presented this earlier, so that the resultant good effects would have been more numerous. This is a question of some moment and its treatment is an illustration of courageously protesting against a custom that is all wrong. A multitude of criticisms will be the share of the one who has started the protest. There are already expressions from those of opposite views, because there are men who like to make presents to railway officers and thus become "good fellows"; there are officers who like to receive presents.

We all do. We are human enough for that; but at the same time it must be evident that the only value of the gift is intrinsic. There is nothing sentimental in it, nor does it carry any other remembrances than those of paint, oil, freight cars, iron and steel, or other bulky commodities not usually associated with grandfather clocks, haviland China and oil paintings. We are all in the game for the most there is in it, but this most should come only through the employing company.

Every human being thinks that what he does is right, or near right. It is ridiculous to assume that no influence has been felt by any of the numerous railway men to whom presents have been given. One supply representative sends an expensive present. A competitor does not. In our own case we always feel, being charitable to ourselves, that nothing would change our former [illegible] But how about the men who are influenced? Does the supply man's present the expectations grow until, perchance, some transactions have taken place which mean ultimate entanglements.

It is a safe bet that every railway head has read this article, and [illegible] it to a considerable extent. It [illegible] [illegible] [illegible]

Why is it that when a certain specialty is found to be an expensive outlay, its continuance is sanctioned? Why is it that flagrant and barefaced "pull" is allowed to take the justly due dividend from the stockholder? How can some, under meager salaries, who have the "say," retire, under fire, rich?. The above questions may be answered thus: The little toad in the puddle follows the lead of the larger ones. If he gets too inquisitive the larger one simply swallows up the little one, and the unthinking stockholder and easy public pay the bills.

The handwriting of publicity is already on the wall. The wrecks are already strewn along the shore, and through the columns of your excellent journal, the lime light of investigation will throw consternation among the gang, and after the storm has blown over, the little fellow can sell his products in competition with the larger, and the "pull" will not be an eyesore to the honest business man. Repair costs will be brought down to a minimum and the stockholder will receive his justly due dividends. The salesman will not besmirch his reputation, high, important positions will not be used for petty gain, and expense accounts will not be padded to cover gifts because we happen to love our dear brother who has the "say."

RAILWAY SUPPLY MAN.

Chicago, December 9, 1911.

To the Editor of the Railway Age Gazette:

The editorial in your issue of December 1 regarding the wholesale distribution of Christmas gifts by representatives of railway supply houses is most timely. The practice has grown to proportions where it has become an abuse. There is no good and valid excuse for its existence, and its abolition should be earnestly desired by all right-thinking men.

The spirit of the Christmas festival, which forms the excuse for this promiscuous giving by those who sell to those who buy, is commercialized and cheapened by the practice. No thought of the fundamental idea underlying the observance of the Christmas holiday enters into the transaction. The finer character of both the men who give and those who receive is lowered, and the keenness of their moral perceptions is dulled and blunted in the process. If the expression of a kindly thought or a grateful remembrance was the underlying motive, a simple Christmas card would serve better to convey it than the most elaborate and costly gift, with its burden of unearned obligation.

The situation of the recipient is in most cases more difficult than that of the donor. No one likes to be accused of "leaning over backwards" in his uprightness, or of ostentatiously attempting to occupy a higher moral plane than his neighbor; nor does any man wish to be considered discourteous to his fellows, and the refusal or return of a proffered gift is often regarded as the height of discourtesy.

The arguments advanced when any disinclination is shown on the part of the recipient to be a party to the transaction are always insidious and frequently end by his scruples, if he has any, being overcome, and his conscience quieted by a plausible presentation of alleged counter-obligation. This usually takes the form of recognition of courtesy extended to the giver through the past year; as if ordinary business courtesy were so scarce as to require special recognition, or be made the subject of barter.

The enormous extent to which the practice has grown would lead to the inference that railway officials of high or low degree were the most courteous set of men on earth, a fact which would hardly be borne out could some of the private conversations among supply men be introduced in evidence. Altogether, the practice as a whole is debasing, if not immoral, and its prevalence is greatly to be deplored. I express my earnest conviction when I say that it should be abolished, not only for the good of the railways, but of the individuals, and in the interest of a higher business morality, and I hope that the fearless attitude of the *Railway Age Gazette* in bringing this question so forcibly and openly to the attention of all those immediately concerned will correct the evil which has been so vividly pointed out.

EX-PURCHASING AGENT.

THE SANTA FE TRAIN DE LUXE.

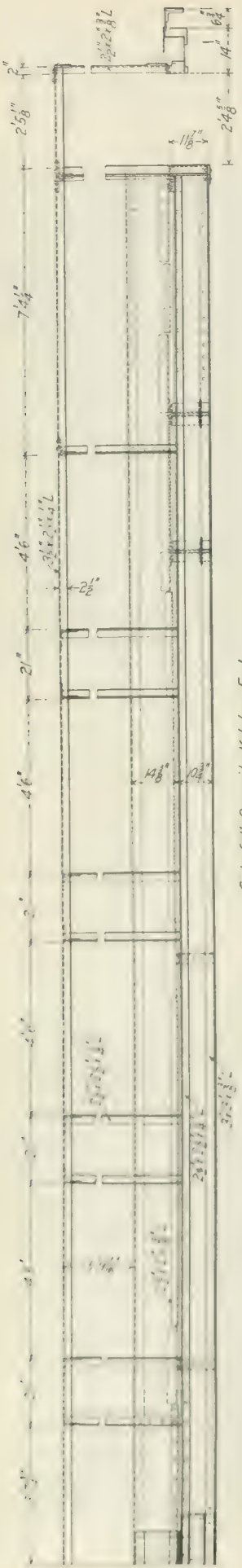
The Santa Fe was the first railway to place in service a limited train from Chicago to southern California, and after 16 years of successful operation of such trains it has determined to inaugurate an extra-fare service once a week, taking only 63 hours between Chicago and Los Angeles. This train, which is named

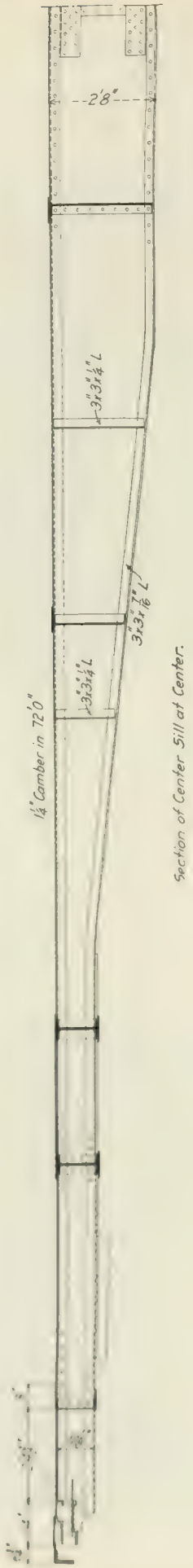
Buffet Car; Santa Fe Train de Luxe.

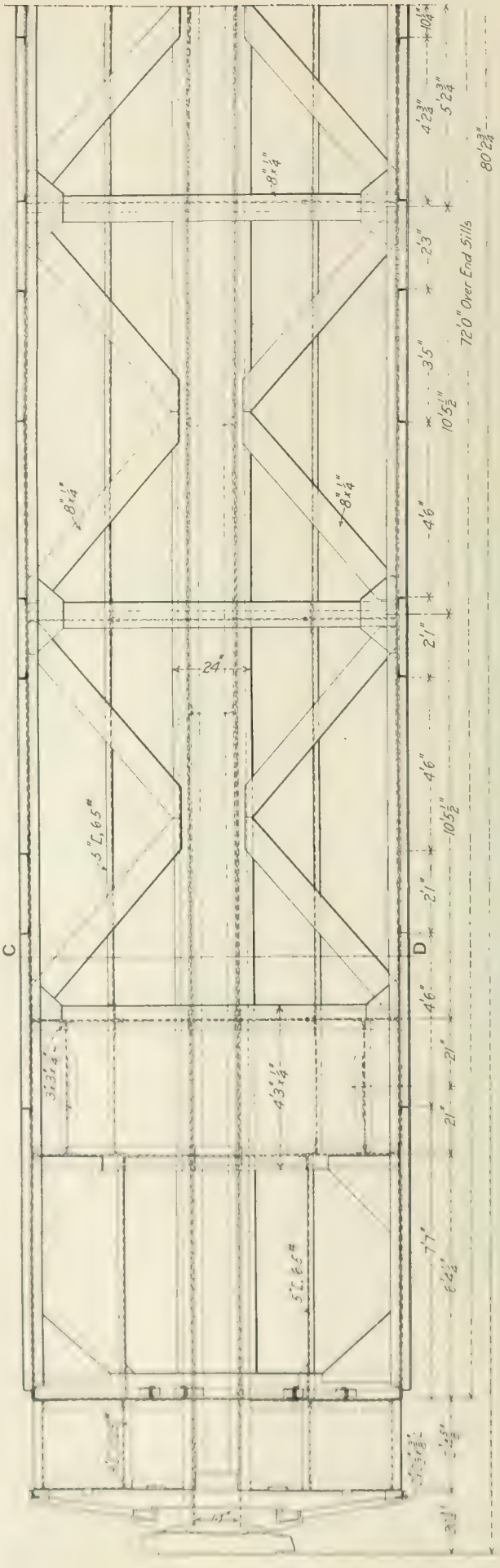
the "Santa Fe de Luxe," commenced its first run on December 12, 1911, being scheduled to leave Chicago at 8 p. m. Tuesday, Kansas City at 8 a. m. Wednesday, and to arrive at Los Angeles at 9 a. m. Friday. On the return trip it leaves Los Angeles at 6 p. m. Tuesday and arrives in Chicago at 11:10 a. m. Friday. This is faster by 5½ hrs. westbound, and by 8 hrs. eastbound, than the next fastest train on any line between these points. The distance by the way of the Santa Fe is 2,267 miles.

The "Santa Fe de Luxe" is limited to six through cars, one observation Pullman, one compartment Pullman, two all-drawing-room Pullmans, one club car and one dining car. In addition to the cost of regular first-class railway and sleeper tickets, an extra

Dining Car; Santa Fe Train de Luxe.







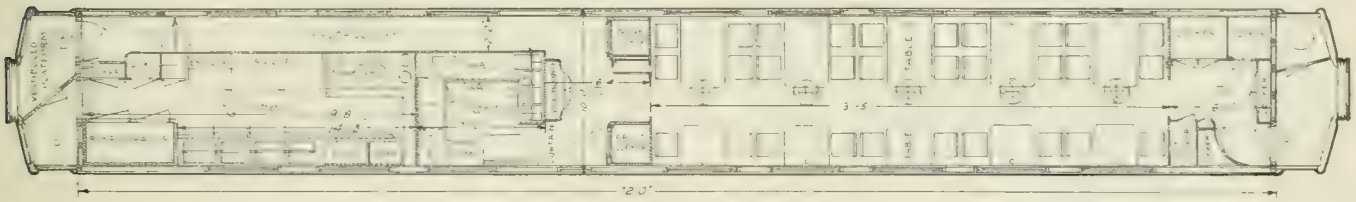
Steel Underframe of Dining Car; Santa Fe Train de Luxe.

Barber's Room in the Buffet and Baggage Car.

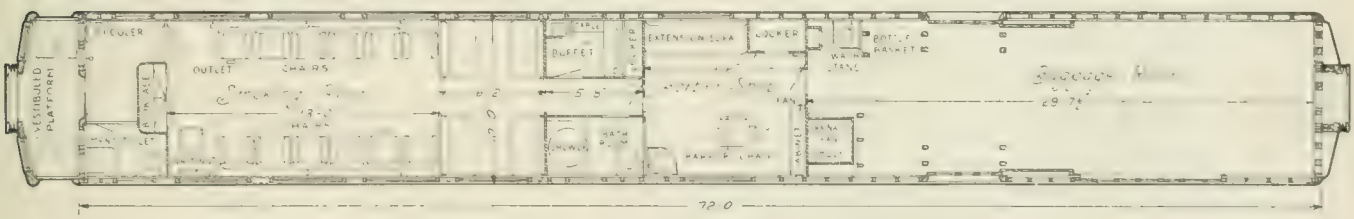
seven rooms, which have two double berths and a sofa berth. Individual annex lavatories and toilets are provided as well as electric berth lights. Six of the drawing-rooms may be occupied en suite. These cars are built from the recent Pullman designs using its type of steel underframe and cellular steel siding; the inside finish is mahogany.

The club car has a commodious smoking and reading room for men, with a fully stocked buffet. Bulletins by wire, giving the day's stock market report and important news items are received here. There are also the usual conveniences of the club car, including a writing desk, magazines, barber shop and tub bath room with shower. The front part of this car for a length of 29 ft. is used for baggage.

The dining car is built from special plans, which include a recently invented air-cooling and air-washing device that perfectly ventilates the car. The indirect system of electric lighting is used for general illumination, and the center lamps are enclosed in handsome metal pendants which contain the reflectors. The table lamps have ornamental shades and are below the level of the eye. The interior finish is vermilion mahogany. The dining car underframe and superstructure was designed by the engineer of car construction of the Santa Fe and the inside finish by the Pullman Company. It is 72 ft long over the end sills and weighs 144,000 lbs. The cross section and longitudinal plan of the steel underframe are illustrated. The center sills are of the fish belly

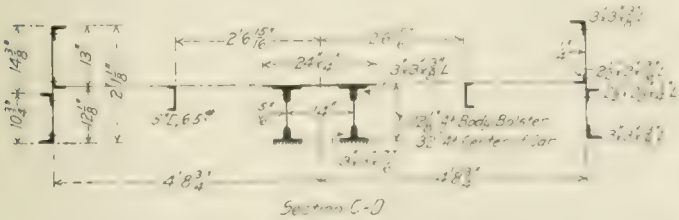


Arrangement of Dining Car.



Buffet and Baggage Car of the Santa Fe Train de Luxe.

fare of $25 is charged in each direction between Chicago and Los Angeles. The observation Pullman contains ten sections forward and an observation parlor with a large protected rear platform. Each section has two double berths with electric sidelights. The rear half is a spacious observation parlor sumptuously furnished. It contains easy chairs, a writing desk, stationery, a library of the latest fiction, newspapers, illustrated weeklies and magazines, a mail box, etc.

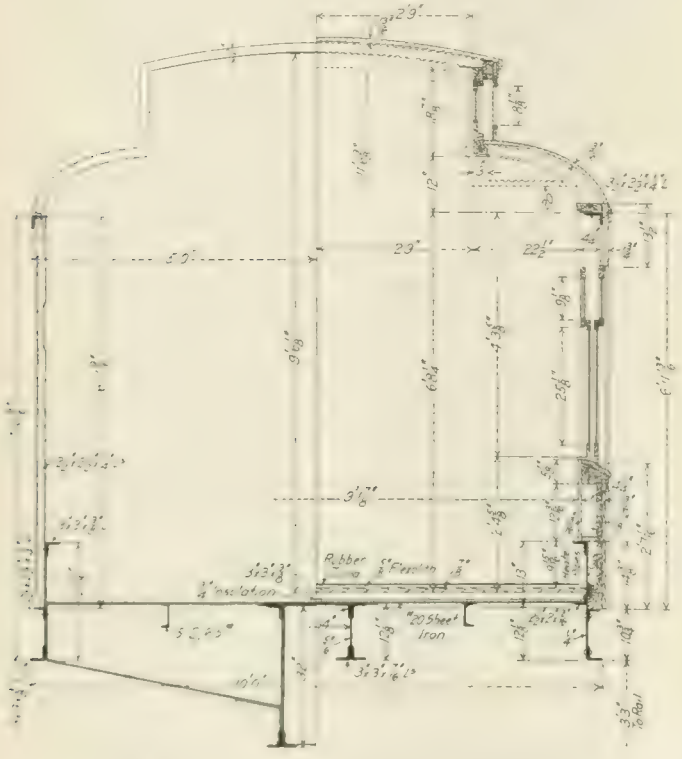


Section Through Steel Underframe of Dining Car Near the Bolster.

The compartment Pullmans contain seven compartments and two drawing-rooms, each compartment having two wide double berths, individual lavatory and toilet. Baggage racks, electric lights and electric curling iron heaters are among the conveniences. Doors lead to adjacent rooms, which rooms may be occupied en suite if desired. The drawing room Pullmans each have

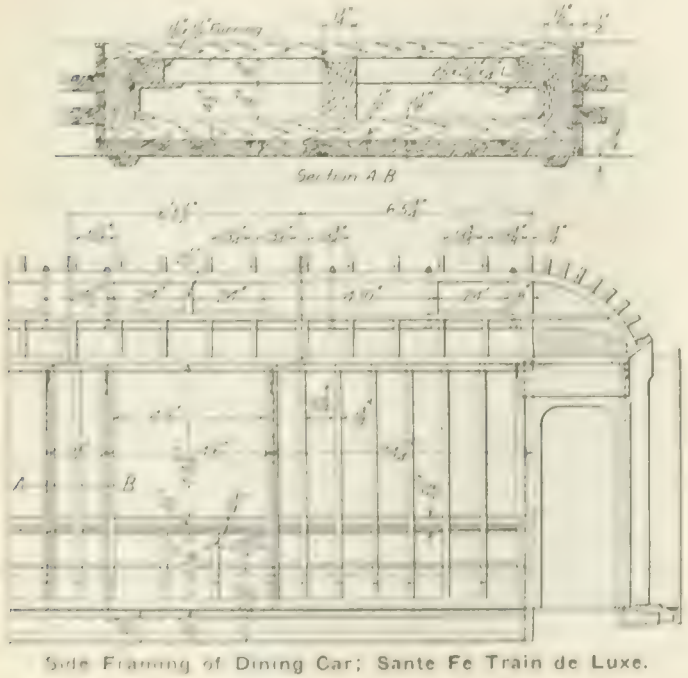
Buffet Car; Santa Fe Train de Luxe.

type with webs 5/16 in. thick. and 32 in. deep at center and 12⅛ deep at the body bolster. The top cover plate is ¼ in. x 24 in. The side sills have webs ¼ in. thick and are 25⅛ in. deep; 10¾ in. of this extends below the siding, and is stiffened with angles on the outside as shown in the cross section of the car. The longitudinal floor bearers are 5 in., 6.5 in., channels. The floor is covered with No. 20 sheet iron; on top of this is ¾ in. of insulation, ⅞ in. flooring boards, ⅝ in. flexolith, and a wearing sur-



Cross Section of Steel Underframe Dining Car.

face of rubber tiling. In the woden superstructure 2½ in. x 2½ in. x ¼ in. special angles are placed next the window posts, and these are riveted to the side sills and to the 2½ in. x 3½ in. x ¼ in. angle iron plate. In the end construction 4 in. steel channels are bolted to each wooden post; the corner posts are reinforced with angle irons, and the whole outside end surface is covered with steel plate ⅛ in. thick.



Side Framing of Dining Car; Sante Fe Train de Luxe.

REPORT OF THE HADLEY SECURITIES COMMISSION.

The securities commission appointed by President Taft to investigate the question of Federal regulation of the issuance of securities by railway companies, has made its report to the president, who has submitted it to Congress with his approval.

The specific recommendations for positive action that the commission makes are as follows:

That a railway doing interstate business should be required to furnish the Interstate Commerce Commission, at the time of the issue of bonds or stock, with a full statement of details of the issue, the amount of the proceeds, to whom they go, and later to furnish a full accounting of such proceeds.

That every company be required to send the Interstate Commerce Commission at certain specified times a full statement including the names of the parties concerned, of all financial transactions that have taken place during the periods covered by the report, whether in cash, in securities or in other valuable considerations. This statement is also to include the disposition of surplus.

That whenever a railway buys new property, every means should be placed at the disposal of the Interstate Commerce Commission to ascertain the value of the property as accurately as possible, a fundamental, though not necessarily controlling element in value being cost of reproduction.

That the Interstate Commerce Commission be given broad powers and adequate means for the valuation of the physical property of railways are as one element in determining fair value.

That if stock has a par value, it must represent that amount actually paid in, but that if it purports only to be a participation certificate giving a proportionate interest in any profits that may be earned, it must be understood that this is its essential character, and that if it claim any further rights than this, it must prove them by specific evidence.

That the intercorporate holding of railway stocks and the issue of collateral trust bonds against stocks should be discouraged but not forbidden.

That the two ways by which federal and state regulation may be prevented from interfering with each other are a full interchange of views between the Interstate Commerce Commission and the commissions of the several states as a means of securing harmony, or, second, of a federal incorporation act which shall permit railways to exchange their state charts for federal ones, and that such an act could be drawn in such a way as to offer advantages in the conduct of interstate traffic without unduly conflicting with local interests; that whichever alternative of these two is adopted, any disturbance but a voluntary of the existing amounts or status of bonds or stocks validly issued is clearly inadmissible, and in general there should be as little disturbance as possible in the relations today existing between different classes of security holders.

That no restrictions excepting those of publicity should be placed on the powers of the directors to issue new stock pro rata to their stockholders at or above par, even though the price received be less than the existing market value of the old stock.

That if a document says $100 has been paid, $100 ought to be paid. The most that can properly be done is to allow companies which cannot sell stock at par to arrange for the "amortization" or gradual cancellation of any net discount by appropriating part of future income or surplus which may accrue subsequent to the issue of such stock, an annual sum having precedence over dividend payment to be applied on capital account as to wipe the deficiency good in a period of no very great length.

That the retention of the $100 mark, or any other dollar mark, on the face of the share of stock is not essentially important, and that companies should be encouraged to incorporate with stock having no par value, and that existing companies be encouraged to exchange their stock into shares without a par value.

That as between the two alternatives of permitting the issue of stock below par, or authorizing the creation of shares without par value, the latter seems to the commission the preferable one.

That in the case of reorganizations, the advantages of shares without par value are obvious. In such cases the public interest would be subserved and the speedy rehabilitation of the roads promoted by requiring the conversion of common stock and encouraging the conversion of preferred stock into shares without par value, the certificates simply indicating the proportion or preferential claims of the holders on assets and on such profits as might from time to time be earned.

That in general no limitation should be placed on the price at which bonds can be sold, but that any discount should be canceled or amortized during the life of the bonds by appropriation each year out of income or accumulated surplus.

That no attempt should be made by statute to limit railway profits to a fixed percentage, or to treat a high cash dividend as necessarily indicating extortion.

That script bond and stock dividends should be prohibited. The prohibition of script dividends should of itself encourage the creation of proper reserve funds. Freedom from arbitrary restriction of profits, prohibition of script dividends and creation of proper reserve funds hang closely together. Any one by itself may be of doubtful value; taken together they should produce a result advantageous to all.

That an unqualified prohibition of the ownership of stock of one road by another involves too much disturbance of existing relations to warrant advocating it.

That any company or group of companies that has bought a majority of the stock of any existing road may properly be required to buy the minority stock at the same price as that paid for the majority stock where the price has been uniform. If the price has not been uniform the purchase should be either at the average price paid for such holdings, or at a price to be fixed by an appraiser at the option of the minority stockholders.

That if a company has acquired control of the common stock of another, but not of its preferred, it should be required either to buy the preferred stock or to make the preference cumulative.

That after such an offer, as indicated by the two preceding paragraphs, has been fairly made by the majority, a three-fourths vote of the stockholders should be sufficient to dissolve the corporation.

That the purchase of less than a majority of the stock of one line by another, except as one of the group of railways jointly holding the stock of some connecting company, should be discountenanced, and as far as possible prohibited.

The commission sums up the points to be emphasized as follows:

1. The questions presented for its consideration do not include or involve a comparison of the policy of governmental ownership of railways, with the policy of private ownership in any of its forms. The act of congress under which the commission was appointed provides that its duty shall be "to investigate questions pertaining to the issuance of stocks and bonds by railway corporations, subject to the provisions of the act to regulate commerce and the power of congress to regulate or affect the same. The commission has, therefore, concerned itself exclusively with questions which arise under a system of governmental regulation of privately owned railways.

2. It has not seemed to the commission profitable to consider at length what the government might have done in times past, nor to enter upon a historical recital of incidents arising out of the unregulated issue of securities. Railway development has gone so far and such a vast volume of securities has already been issued, that the only questions of real importance today are whether, under the conditions which now exist, it is desirable for the federal government to regulate the issue of future securities, and if so, to what extent and in what manner. In other words, the large volume and complex relationships of the outstanding securities, the issue of which has not been regulated at all by the federal government and has not been effectively regulated by the state governments, make it impossible to treat the question of present or future regulation as it might have been treated if these securities were not already in existence.

3. It would have been equally unprofitable for the commission to enter upon an elaborate discussion of the power of congress to regulate or affect railway securities, at a time when important cases are pending which will go far to determine the scope and extent of federal authority in this and other closely related subjects. Such a discussion could only state the opinion of the members of the commission regarding the constitutional power of congress. The issues themselves will remain undecided until the Supreme Court decides them. Whatever may be the ultimate outcome, the present fact which faces us is that constitutional questions of far-reaching consequence are today unsettled and must remain so for a considerable time. Uider these circumstances, any attempt by congress to adopt the policy of federal regulation to the exclusion of state regulation would be premature. On the other hand, to superimpose federal regulation upon state regulation would add to conflicts and complexities which, in the public interest, should be diminished rather than increased. Your commission believes that for the present an earnest effort should be made on the part of state authorities to harmonize existing requirements, both of law and procedure, and that for the future careful consideration should be given by congress to the preparation of a permissive federal incorporation act for railways engaged in interstate commerce.

4. Many, if not most, of the abuses connected with railway securities arise out of an almost universal failure to recognize the distinctions which exist and should exist between bonds and stocks. A bond is an obligation to pay a fixed sum of money at a stated time. A stock certificate is merely the evidence of ownership of a share in the property, profits, and risks of a corporation. Most of the evils of which investors and the public complain have grown out of the attempt to give to stock a face value in terms of money. Even if the state laws prohibiting the issue of stocks for less than par were literally enforced, all that the recitals on the face of a fully paid share of stock as to its par or money value would signify is that at the time of the issuance of the share there had been paid into the corporation an amount of money (or other valuable consideration) equal to the par value of the share. They do not even purport to indicate that at any time after the original issue of the stock the corporation was possessed either of the money or the money's worth. The real value of the stock certificate depends upon the manner in which the money has been invested. The commission is, therefore, of the opinion that it is far more important to ascertain just what are the facts connected with the issue of securities and what is actually done with whatever money has in fact been realized from the stock which is issued, than merely to make sure that the par value of the stock was paid in at the time of issue.

5. If we were compelled to assume that rates are to be materially influenced either in their making by the railways or in their regulation by the government by the amount and face value of the stocks and bonds outstanding, it seems to your commission impossible to escape the conclusion that these securities should be issued only under governmental regulation. Your commission, however, believes that the amount and face value of outstanding securities has only an indirect effect upon the actual making of rates and that it should have little if any weight in their regulation.

In so far as the value of the property is an element in rate regulation the outstanding securities are of so little evidentiary weight that it would probably be of distinct advantage if courts and commissions would disregard them entirely, except as a part of the financial history of the property, and would insist upon direct evidence of the actual money invested and of the present value of the properties. For this and other reasons discussed in the body of the report, your commission recommends that the Interstate Commerce Commission should have authority and adequate funds to make a valuation of the physical property of railways wherever the question of the present value of these roads is, in the judgment of that commission, of sufficient im-

portance. It is hardly necessary to add that your commission does not believe that the cost of reproduction of the physical properties, however carefully computed, is the sole element to be considered in determining the present value of a railway, or that the outstanding securities could or should be made to conform to any such arbitrary standard.

If railway securities were to be issued only after express authorization of each particular issue by the Interstate Commerce Commission or other governmental agency, it is difficult to see how the government can thereafter escape the moral, if not the legal, obligation to recognize these securities in the regulation of railway rates. In view of the vast extent of the railway systems of this country and the magnitude of the financial interests involved, both on the part of the railways and of those who pay the rates, your commission believes that the possible consequences of such a system of regulation are too serious to warrant its adoption at the present time.

6. Upon the whole, your commission believes that accurate knowledge of the facts concerning the issue of securities and the expenditure of their proceeds is the matter of most importance. It is the one thing on which the federal government can effectively insist today; it is the fundamental thing which must serve as a basis for whatever additional regulation may be desirable in the future.

SUGGESTIONS RELATING TO PUBLICITY, INDICATING POINTS UPON WHICH AMENDMENTS TO THE ACT TO REGULATE COMMERCE MIGHT BE BASED.

[*This commission has not considered it proper to present a formal draft of a statute.*]

Every railway corporation subject to the provisions of the act shall file with the Interstate Commerce Commission on or prior to the date of issuance of any stocks, bonds, notes or other evidences of indebtedness payable at periods of more than twelve months after the date thereof, and now or hereafter to be authorized, a certificate of notification in such form as the commission may from time to time determine and prescribe which shall show:

First (*a*) The total amount thereof authorized.

(*b*) The number and amount thereof outstanding prior to the date of such certificate; the amount thereof theretofore retired; the amount therefore then undisposed of, and whether such amount is held in the treasury of the corporation as a free asset, or pledged, and if pledged, the terms and conditions of such pledge.

(*c*) The number and amount thereof then to be issued and whether to be sold, pledged or held in the treasury of the corporation as a free asset; if such securities are to be sold, the terms of sale if a contract for such sale has been made, and if any part of the consideration to be received therefor is other than money, an accurate and detailed description; thereof; if such securities are to be pledged, the terms and conditions of such pledge.

(*d*) The number and amount thereof remaining unissued.

[illegible] shares of stock, the certificate shall also show the par value thereof, or if the issue is of shares of stock without par value, the number of such shares, and the number of then outstanding shares previously issued.

[illegible] interest of any such bonds, notes or other evidences of indebtedness, and any conversion rights granted to the holders thereof, and the price, if any, at which such shares or bonds may be [illegible].

Whenever any securities set forth and described in any cer[illegible] are required by subdivision (*c*) of the foregoing first paragraph.

The provisions in regard to certificates of notification shall apply to notes or evidences of indebtedness running for periods of twelve months or less, and to the pledging or repledging of stocks, bonds or other evidences of indebtedness to secure such notes or evidences of indebtedness running for periods of twelve months or less, except that such certificates may be filed within ten days after the issue thereof instead of on or prior to the date of such issue.

Every such railway corporation shall furnish to the commission, at such time or times as the commission may require, in addition to its income account, a balanced statement of its receipts and expenditures on capital account, and of the surplus of the income account accruing during the period covered by such statement, as well as of all other financial transactions that have taken place during such period, with whom had, whether in cash, in securities, or in other valuable consideration.

The commission may also require the carrier to furnish any further statements of fact or evidence that it may deem necessary or appropriate.

The certificates of notification, and any other written statement furnished to the commission under the act, shall be signed and verified by the auditor, comptroller, or other acting fiscal head of the carrier.

It shall be the duty of the commission to enforce these provisions, and to make public by appropriate means the information received, as, in its discretion, it may deem proper; and such certificates of notification shall at all times be deemed public records and open to inspection.

The commission may also require the carrier to compile for the information of its shareholders such facts in regard to the financial transactions of the carrier for its fiscal year in such form as the commission may direct. The carrier may be required by order of the commission to disclose every interest of the directors of such carrier in any transaction under investigation. The commission shall have the power to investigate all such transactions and to inquire into the good faith thereof, to examine the books and papers of carriers, construction or other companies or of firms or individuals with which the carrier shall have had financial transactions, for the purpose of enabling it to verify any statements furnished, and to examine into the actual cost and value of property acquired by, or services rendered to, such carrier.

Appropriate penalties, including fine and imprisonment, should be provided for violation of these provisions.

FOREIGN RAILWAY NOTES.

The government of Brazil has accepted the project to construct a branch of the Central Railroad of Brazil from Cascadura to Ilha, this branch to be completed within two years.

The Swedish part of the railway which carries the iron ore of Gellinara to the Norwegian port Narvik (near the Arctic circle) earned a profit of 10.65 per cent. on its cost last year, though it has been open but a few years. This line, which is a narrow gage road and belongs to the state, is being electrified.

Far greater care is now exercised in granting railway concessions in Argentina than formerly. Not many years ago valuable concessions could be obtained with a stipulation to the effect [illegible] could not be allowed within a certain radius. Under these conditions existing railways found that they could not branch out into certain territories unless they bought out the person holding the original concession, who, as a rule, had no intention of constructing. Often the purchase of the concession could not be effected, and this resulted in serious damage to the territory supposed to be protected. It is now largely prevented by the necessity of a permit from the individual or company owning the concession.

A TERMINAL CAR RECORD.*

BY W. E. BEECHAM,
Car Accountant, Chicago, Milwaukee & St. Paul.

The large terminal where thousands and tens of thousands of cars are to be found at all times is a good place to look for the introduction of economy in the use of cars and engines, and anything which makes that possible is worth looking into. The large terminal is the key to the situation, and, if the ground can be effectively and economically covered by some method that will reveal at a glance to the eye of the superintendent the imperfections of existing methods, there should be a way of correcting them, but the trouble is imperfections are not brought to the attention of those having the power to remedy them in regular methodical and continuous progression.

When failures occur in the service an investigation is set on foot, and, if defects are unearthed in the line-up for handling traffic in any special case, remedies are applied. In other words, when a hole is found it is plugged up, but sporadic efforts do not cure the disease, so very little good results.

In this connection we should remember that whenever men like ourselves, possibly but little better, probably not in the least worse, continually fail to give us the results we have a right to expect from their efforts, we may just as well make up our minds that the fault lies, not in their personalities, but in the conditions under which they work, and profit comes not from denouncing them, but from seeing that the conditions are changed.

Nothing is more discouraging to the average man than working under conditions which preclude the possibility of rendering efficient service, and, in addition thereto, if he is unjustly criticized for failures he cannot avoid, he soon settles down to a condition of indifference, if not hopelessness, from which it is hard to rouse him.

A railway is a thing of great magnitude requiring a high order of intelligence in all its branches, and an organization like unto a regular army minus the red tape.

All departments must be directed with unerring certainty if the best results are to be obtained. It is seldom that we can let the privates fight it out, as General Grant did on more than one occasion when the situation got beyond him. In this business we must cut the work out for the privates, and see that they do it as planned for them, and, if the conditions are unfavorable for the results required, we should change the conditions, but before we can do that we must be able to gather full and complete information daily of the minutest details of operation, and by careful analysis deduce therefrom the comforting assurance that everything is moving with clockwork regularity under a line-up as near perfection as we can hope to get it, and that all we have to do is keep it so, or, if the reports indicate weak spots in the line-up, they must be strengthened, until conditions are made as nearly favorable for the results desired as is possible.

I am proceeding upon the theory that the magnitude of the operations in such terminals as Chicago, St. Louis, Buffalo and others in that class under normal conditions precludes the possibility of keeping close enough in touch with the details of operation every hour of the twenty-four to enable the superintendents to detect instantly and immediately remedy defective work with the present system for gathering information, because the expense is prohibitive, but it is safe to assume that without a complete and nearly perfect system for gathering information scientific supervision cannot be maintained.

It is the knowledge of everything going on that places in the hands of the superintendent the power to rectify his line-up by changing methods here and altering plans there, so as to promptly meet the exacting conditions of commercial requirements, but the information must come to him in comprehensive form and must not be too voluminous, otherwise it cannot be made available for practicable use.

In a large terminal where 5,000 cars or more are to be found at all times, the difficulty of keeping in real close touch with every detail of operation is better known to those who have had actual experience in running such a terminal than it is to me, and I will not dwell long on that, but the reason that remedial measures have not been inaugurated in many cases is because, the operations being an a scale of such magnitude, and covering an area of such great extent, the mind cannot grasp it at all, and the means for getting the details are inadequate.

No one will take issue with the statement I think that loaded and empty cars make many false and unnecessary moves in large terminals, involving loss of time, waste of labor and useless expense, but they are obscured by difficulties it seems harder to overcome than it probably is because their real nature is concealed in doubt owing to a lack of means for gathering information promptly and of a reliable nature.

We also know that serious delays occur to cars under load in switching and through service which are not altogether justified by conditions and that empty cars are not moved as promptly as they should be, and that the power is not always used to the best advantage, and that it is not always fully employed. But this knowledge is general rather than specific, and on that account is not of as much value as it would otherwise be.

In order to overcome this uncertainty or lack of positive information, we decided to try out a new scheme for recording the movements of cars within and through one of our largest terminals where the traffic passing in transit is very heavy and the traffic originated is larger than it is at any other point on the line. In this scheme we use no books, pens or pencils, and in that respect it is a radical departure from old methods.

In the place of these articles we use a board marked off into squares of about 1¼ in. Each space has a hole in which an aluminum pin is inserted. This pin is about 4 in. long and has a washer near one end which prevents it from going through the board. The boards are divided into sections, each section provides for about 500 cars.

The process of making these records is as follows:

Incoming trains leave way-bills and wheel reports and a carbon copy of the wheel report at the yard office, the yard clerk sends the wheel report and carbon copy to the record room. The record clerk forwards the original wheel report to the car accountant, Chicago, and keeps the carbon copy from which a record of cars arriving is made. Outbound trains make list of their cars before departing and call at the yard office for the bills. Bills are checked with the list and the list is forwarded to the record clerk, and from these lists the record of cars departing is made.

Track lists of the entire terminal, except live tracks, are taken every morning except Sunday, and these lists are transferred with the reports of cars arriving and departing.

Card lists are made by all switch engine foremen of cars moved from yard to yard. These lists are not transcribed, but are held in file and used in analyzing the movement of traffic in and through the terminal so that intraterminal movements of the cars are available for the purpose of investigation.

It is proper to emphasize here the fact that the record shows the time of the arrival of trains in the terminal, the time they are switched and all the subsequent movements the cars make thereafter, so that the time in hours and minutes from the time a car arrives until it departs can be shown if desired for any purpose, and its whereabouts every day during the time it is in the terminal accounted for.

In making the records we use a visible typewriter for transcribing the initials and numbers of the cars, numbers of trains and dates or numbers of tracks where located to a tag about an inch square. This tag has a hole punched at one end and is perforated at the other. The tags come in rolls of tape, 2,000 in a roll, and the perforation is for convenience of separating them.

As fast as the reports are transcribed the tags are sorted in numerical order and placed on the pins where they belong, and are then ready for reference.

*A paper read before the St. Louis Railway Club.

As long as a car remains in the terminal the tag showing its arrival stays on the pin where it was first placed; after it departs it is placed on another and longer pin for permanent record. By this process only cars actually in the terminal show on the record.

This completes the recording of cars, and given a car number the record clerk should be able to furnish the following information:

When and by what train it arrived.

When train was switched up.

When and by what engine it was moved from yard to yard.

When and by what engine it was placed for unloading.

When and by what engine it was taken from a side track, and every subsequent move it makes until it leaves the terminal, and when and in what train it departs.

It may be said that this information would be too voluminous for practical use, but it must be remembered it is not necessary to use it all. The movements of 100 cars will as clearly indicate to the mind competent to analyze them the condition of efficiency in the terminal just as satisfactorily, just as fully and completely as a thousand times that number could or would, but, in order to be able to extricate from a mass of details sufficient information for analytical purposes, a record of all the transactions must be kept.

If the movements of cars over the entire system could be regulated from a common center with such unerring prescience that every shipment (carload or less than carload) would inevitably reach its destination and be delivered to the consignees with reasonable despatch, there would be an end to local supervision, but that is impossible, the area to be covered is too extended, and the facilities for keeping in touch with the situation every hour in the day are too limited to make that possible. We must depend on intelligent scientific local supervision for the results we are looking for, and that, backed by an organization for keeping in touch with the operations so closely that no failure, no matter how unimportant it may seem to be, will escape the vigilance of those who ought to know about it, will, I think, most nearly meet the situation.

Traffic which moves with regularity and reasonable despatch, and [illegible] that per cent. of it which does not must be looked after. Our efforts to get this per cent., however small it may be, to an irreducible minimum must be unceasing and never flagging, because therein lies the secret of success in the transportation business.

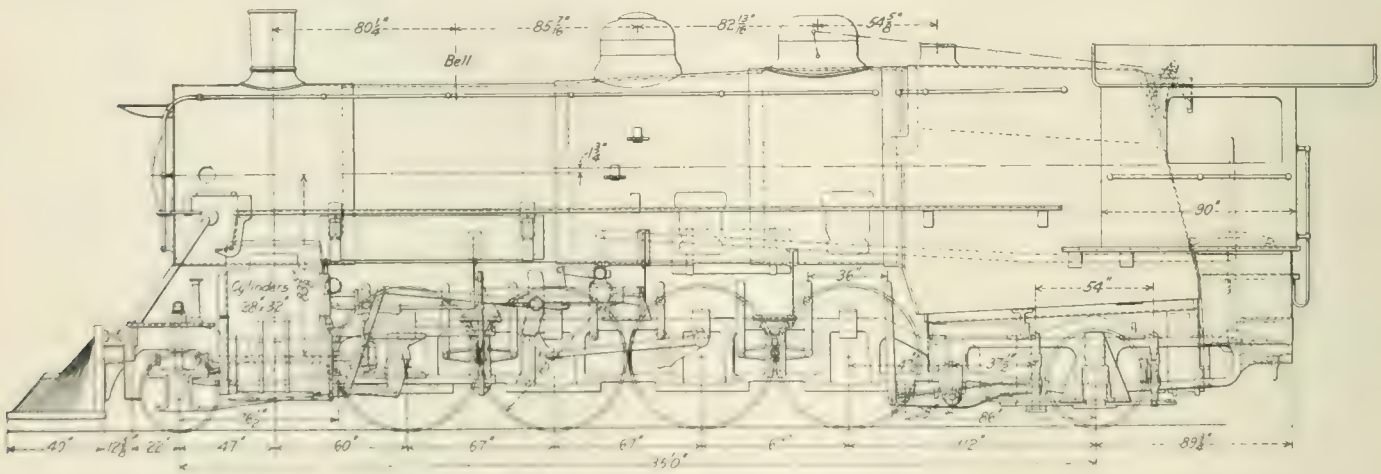
The terminal record referred to affords us the facilities for correcting abuses or failures. I should, perhaps, correctly say, by revealing them. It only remains for those in charge to make [illegible]

Besides that, it provides the means for taking a daily inventory of the number of cars on hand empty, and to unload, by classes, and the numbers of cars loaded during the past 24 hours, very essential information for distribution purposes and the making of reports to the general office.

My experience with this new plan leads me to think that every large terminal should have a man in charge of the card records, distribution, making of reports and everything pertaining thereto, if the best results are to be obtained, and that he should report direct to the superintendent of terminals, or the highest officer in charge located there.

MIKADO LOCOMOTIVES FOR THE GREAT NORTHERN.

The Great Northern has recently received 20 Mikado locomotives from the Baldwin Locomotive Works. Each locomotive has a total weight of 287,000 lbs., with approximately 55,000 lbs. on each pair of drivers. They are similar to the locomotives of the same type recently delivered to the Illinois Central, which were described in the *Railway Age Gazette*, September 29, page 585, in that they are only 3,000 lbs. heavier and have superheaters with very nearly the same amount of superheating surface. They differ, however, in that the cylinders are larger, being 28 in. x 32 in., as compared to 27 in. x 30 in. for the Illinois Central, and the boiler pressure is 5 lbs. less, or 170 lbs. This gives the Great Northern locomotives a tractive effort of



Elevation of Mikado Locomotive; Great Northern.

57,500 lbs., which is about 5,800 lbs. greater than that of the Illinois Central engines.

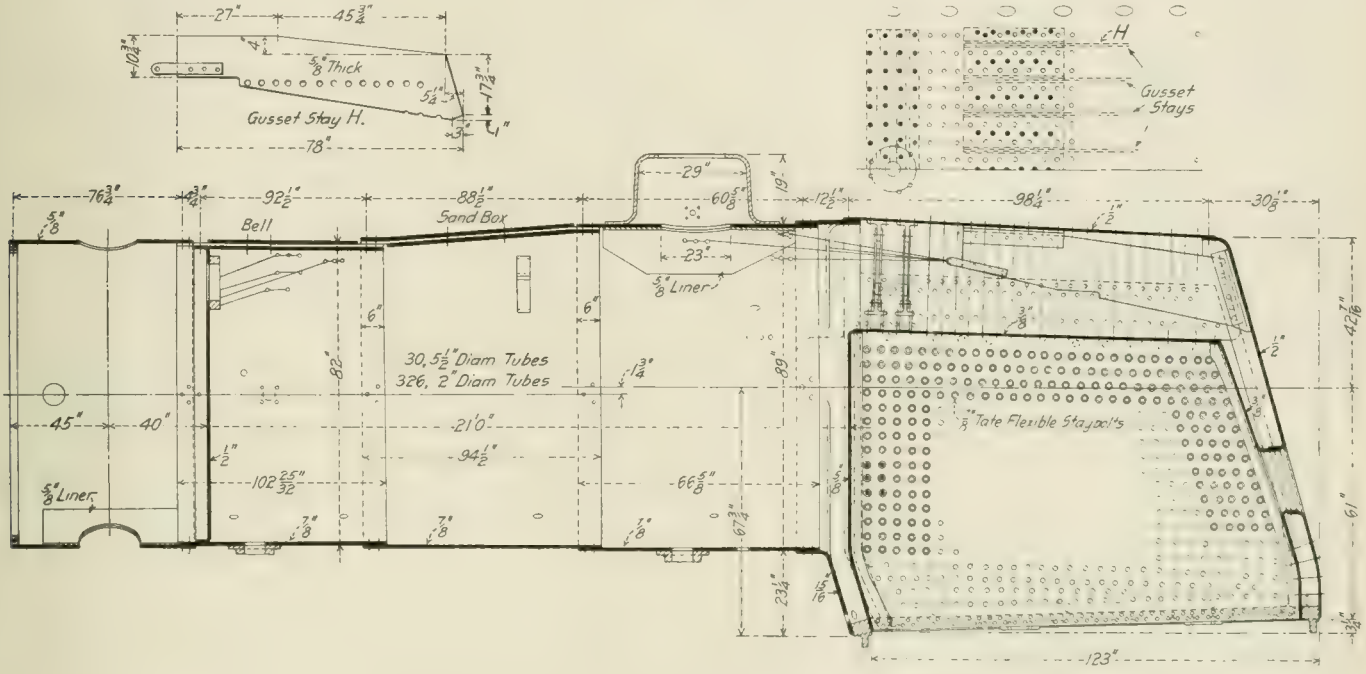
The present tendency in freight locomotive design is to increase the relative boiler capacity, thus enabling the engine to maintain better speed over the road, and to handle its full rating with less liability of steam failures. With the 2-8-2 wheel arrangement, a boiler of the required dimensions may be applied, while the use of superheated steam materially increases the efficiency of the locomotive as a whole. The Great Northern locomotives show a high relative boiler capacity and in comparing their ratios with those of the Illinois Central Mikado it is found that although their steaming capacity, the proportion of heating surface to grate area, and of heating surface to cylinder volume, is nearly the same in both engines, there is a gain of 8.5 per cent. in the ratio of the total weight to the total equivalent heating surface, or, as it is sometimes called, the factor of efficiency. This, together with the increase in tractive effort, shows an improvement in this design of single expansion freight locomotives.

[illegible] and are similar to those of the 2-6-6-2 Mallet locomotives used on the same road. The shell is 82 in. in diameter at the front end and increases to 89 in. at the dome ring. The dome is of pressed steel and is made in one piece. The firebox crown and the outside roof sheets are both slightly arched, the crown stays passing through radially.

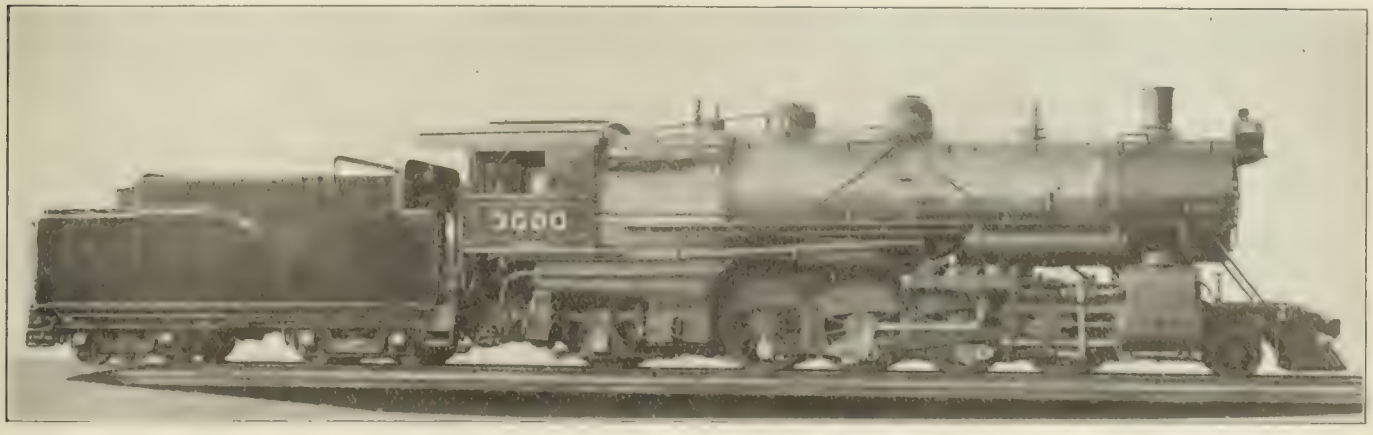
The back head is stayed by eight gusset stays. The water spaces are 5 in. wide all around at the bottom, increasing to 6½ in. at the crown on the sides and 8¼ in. on the back. The Emerson type of superheater is used which, with 326 2-in. tubes, gives a total equivalent heating surface of 6,310 sq. ft.; even though the superheating surface is 33 sq. ft. less than on the Illinois Central engines the total equivalent heating surface is 400 sq. ft. greater, both boilers having the same nominal diameter and only 6 in. difference in the length of tubes. The Illinois Central engines have an American Superheater Company's type *A* superheater.

The superheater is similar to those previously built for this road except that the saturated and superheated steam headers are cast separate from one another, and are bolted together at the top and bottom. The bolt holes are drilled of sufficient size to allow for expansion and contraction. There is a further advantage in this arrangement since an air space is provided between the header sections, thus minimizing the loss of heat by conduction through the header walls. The grate is composed of table bars, and rocks in four sections, having drop-plates at the rear. The ash-pan is built with six hoppers which have drop bottoms. These hoppers are placed outside the rail line, and are readily accessible so that the pan may be kept clean with little trouble. The cylinders, apart from their size, present no unusual features of construction. The barrel walls are thick enough to enable them to be subsequently bored to a diameter of 29 in., if desired. The live steam passages in the cylinder saddle are cross connected by an equalizing pipe, allowing each cylinder to draw on both the superheater sections for its steam supply. Built up piston valves, 13 in. in diameter, control the steam distribution. The valves are set with a maximum travel of 6 in. and a lead of 3-16 in. The steam lap is 1⅛ in. and the exhaust lap is zero. The by-pass valves are of the flat plate type, placed immediately above the steam chests.

Each main frame is cast in one piece with a single front rail which is 5 in. wide and 11 in. deep. The cylinder castings are keyed to the frames at the front only and are secured on each side by 7 horizontal and 4 vertical 1½ in. bolts. The rear frames are separate from the main sections and are arranged to accommodate the Hodges type of trailer truck. The mud ring is supported on the rear frames by expansion plates at the front and back. The throttle valve is operated from a horizontal shaft, which passes through a stuffing box in the right-hand side of the dome and has an external connection with the throttle lever. The latter is mounted in a vertical position on the back head of the boiler. The driving-wheel centers and boxes are of cast steel; the wheels have no hub liners, but the boxes are faced with babbitt. Castellated nuts are used on the connecting rods, valve motion work, crank pins, side rod knuckle pins and crosshead pins. The side rods are rectangular in cross section and



Belpaire Boiler for Great Northern Mikado Locomotive.

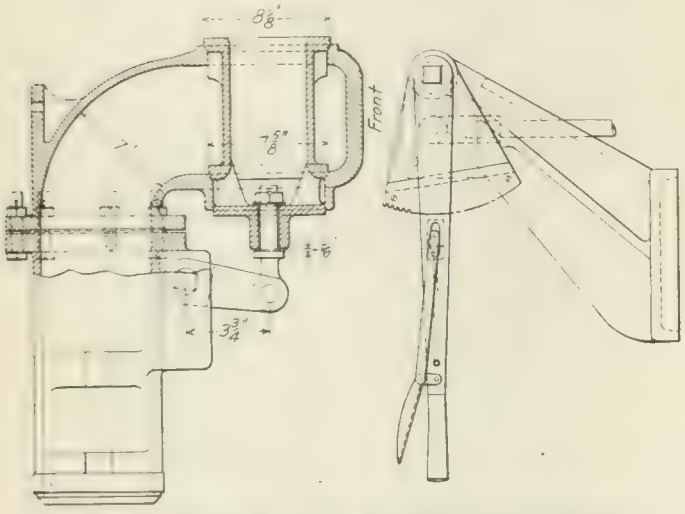


Mikado Locomotive for the Great Northern.

have solid and stubs except on the main pin where a strap stub is used with 3 bolts and a wedge adjustment. The back end of the main rod is forked with a wedge in front of the brass and two 2-in. bolts passing through the filling block in the back. The tender is designed in accordance with Great Northern standards. It has equalized pedestal trucks, and a steel channel frame placed as low as possible. The tank is of the water bottom type and is equipped with a coal pusher. The following are the principle ratios and dimensions for these engines:

General Data.

Type	2-8-2
Service	Freight
Fuel	Soft coal
Tractive effort	57,500 lbs.
Weight in working order	287,000 lbs.
Weight on drivers	220,000 lbs.
Weight of engine and tender in working order	435,000 lbs.
Wheel base, driving	16 ft. 9 in.
Wheel base, total	35 ft.
Wheel base, engine and tender	68 ft. 2 in.



Throttle Valve and Lever for Mikado Locomotive.

Ratios.

Weight on drivers ÷ tractive effort	3.84
Tractive effort × diam. drivers ÷ heating surface	767.
*Total equivalent heating surface ÷ grate area	80.7
Firebox heating surface ÷ total heating surface, per cent.	5.27
*Firebox heating surface ÷ total equivalent heating surface, per cent.	3.94
Weight on drivers — total equivalent heating surface	34.85
Total weight ÷ total equivalent heating surface	45.4

Cylinders.

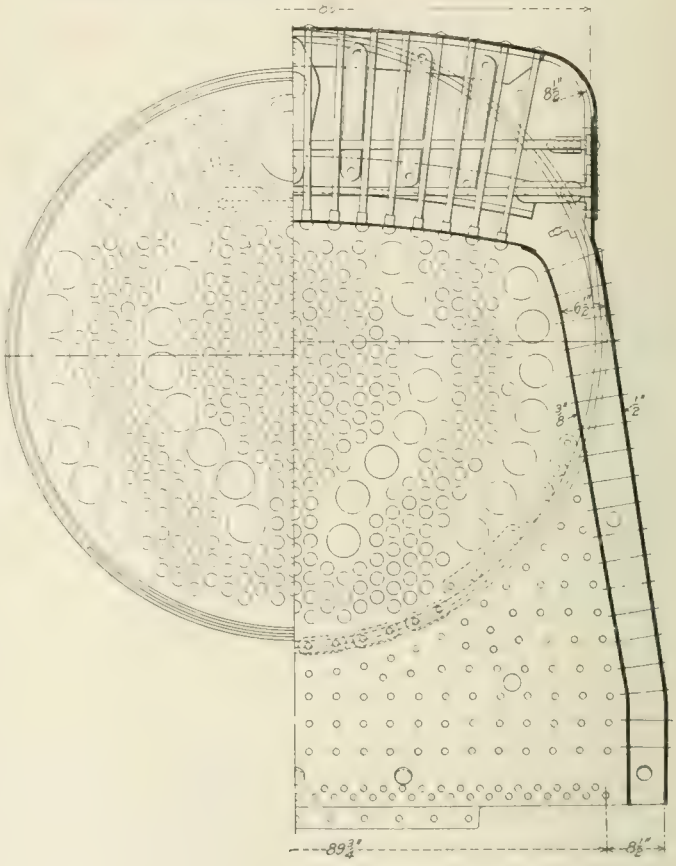
Kind	Simple
Diameter	28 in.

Valves.

Kind	Bal. piston
Diameter	13 in.
Travel	6 in.
Steam lap	1⅝ in.
Lead	3 16 in.

Wheels.

Driving, diameter over tire	63 in.
Driving, thickness of tire	3½ in.
Driving, journals, main, diameter	11 in. x 12 in.
Driving, journals, others, diameter	10 in. x 12 in.
Engine truck, diameter	33 in.
Engine truck, journals	6 in. x 12 in.
Trailing truck, diameter	42½ in.



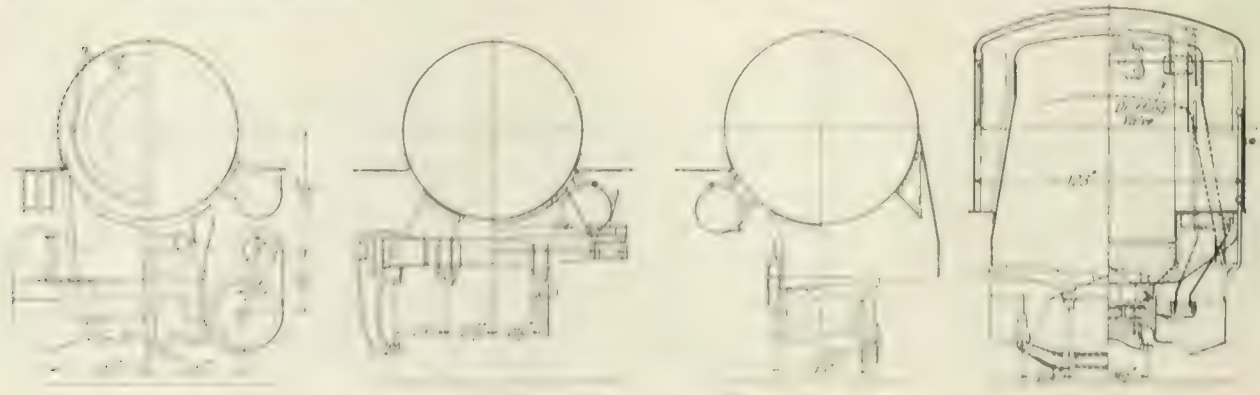
Partial Cross-Sections of Belpaire Boiler.

Boiler.

Style	Belpaire
Working pressure	170 lbs.
Outside diameter of first ring	82 in.
Firebox, width and length	96 in. x 117 in.
Tubes, number and diameter	326 2 in., 30—5½ in.
Tubes, length	21 ft.
Heating surface, tubes	4,471 sq. ft.
Heating surface, firebox	249 sq. ft.
Heating surface, total	4,720 sq. ft.
Heating surface, superheating	1,060 sq. ft.
Heating surface, total equivalent	6,310 sq. ft.
Grate area	78.2 sq. ft.

Tender.

Water capacity	8,000 gal.
Coal capacity	13 tons.



Sections of Mikado Locomotive; Great Northern.

SAFETY COMMITTEES ON THE LACKAWANNA.

As was recently announced in these columns, the president and the general superintendent of the Delaware, Lackawanna & Western have appointed, on each of the divisions of the road, a committee to promote safety, following the plan which was brought to public notice a year ago by the action of the Chicago & North Western. Meetings of Lackawanna employees attended by four or five hundred have been held at the headquarters of several divisions already, and other meetings are to follow. At these meetings addresses were made by President W. H. Truesdale, General Superintendent T. E. Clarke, and by a number of division officers. Prominent in the utterances of the general officers was the declaration that not only were the employees expected henceforth to do their best to abolish, as far as possible, everything that endangers the lives or limbs of employees, but that the company itself, so far as lies in its power, would take action in the same direction. In some things the employee can do what the company cannot. As one of the officers put it, the division officers are expected to inspect the work and the premises with sufficient frequency to detect and remove all causes of danger; but this purpose cannot be completely carried out, and therefore there is a duty on employees to report to their superiors every incident, coming under their observation, which indicates that remedial measures ought to be taken.

Another point to which strong emphasis was given was that some employees—a class forming, perhaps, a very small percentage, but yet one which is always with us—indulge habitually in dangerous practices. "We are all more or less dependent upon one another, and it is especially so in the railway business. How often it is that the efficient and most careful man, the man who has the cleanest record, will lose his life or limb through the carelessness or lack of foresight of some fellow employee, often a man who is habitually careless and whose record shows he has been so addicted for years. It matters not how careful a man may be, his safety depends on the judgment and action of the individual with whom he works; and if that individual fails he may lose his life, and his widow and children suffer by reason thereof."

The officer who summarizes the accident statistics and who has to settle the bills for damages often proves to be the most accurate observer and the most thorough student of the causes of deaths and injuries among trainmen; and therefore it is not surprising to find that Claims-Attorney W. C. Wilson made one of the best addresses to the assembled Lackawanna employees. Mr. Wilson called attention to the report of the Chicago & North Western that for a recent period of four months not a single engineman or trainman was killed on the 8,000 miles of that road. Observing that the record of the Lackawanna was not so good as this, Mr. Wilson went on:

"Railway operation is a dangerous business and requires both skill and courage. This movement for safety is not to develop timidity; is not to make cowards; is not to make a man flinch when his duty calls him to do what may be dangerous. There is a great deal of difference between courage and recklessness. Courage is commendable at all times, but the great percentage of danger lies in the taking of unnecessary chances and risks. . . . These statistics which we have considered are of little value to us unless we can draw a lesson from them. The question is to what extent these casualties can be avoided. We have had no great accidents; no great calamities which have shocked the public and filled the newspapers with scare headlines. We have been going along day by day in the usual and orderly operation of a railway. But these men are dropping by the wayside through the silent but powerful grind of the little things. We do not have to wait for some great calamity to come upon us to produce this record. It is the result of the neglect of little things.

"The company can do much to promote the safety of its men by improving the general physical conditions. It has spent a great deal of money in bringing the equipment up to the highest standards, and it stands ready to join with you in still further removing any dangerous conditions, found to be existing, when practicable. But, after all, most of our accidents involve the personal element—a certain man at a certain time and place did a certain thing, or neglected to do a certain thing, which resulted in injury either to himself or to some one else. Therefore, the greatest element of safety lies in the individual. The truth of this statement is shown by our records. Here are a few cases in point: Man steps off caboose right in front of approaching train on adjoining track and is killed; another tries to kick coupler open with his foot and loses leg when cars come together; another loses arm while trying to operate lever from opposite side of car; another passes around end of car so close that when it is unexpectedly moved, he is run over; another swings off car and lands on drawhead left too close to track by someone who should have moved it to a safe distance; another steps in hot water hole carelessly left open. . . . I am not preaching the gospel of perfection. We are not dreaming of ideal conditions which could never be realized; but this is a movement of men for the greater safety of life and limb; for the protection of the home. It should appeal to the best there is in every man and secure his hearty co-operation. It is not a flash in the pan; it will not be permitted to die out. With your support and earnest co-operation it is bound to succeed."

FOREIGN RAILWAY NOTES.

The traffic of the Shantung Railway, China, continues to grow, and the gross earnings per mile in 1910 were $6,881, and as the operating expenses were only 26¾ per cent., there remained net $5,037 per mile. A large part of the net went to improvements and betterments, but even then a profit of $3.811 per mile is shown. There was an average of little more than 4 trains each way daily. The passenger traffic is light, but the freight traffic comparatively heavy, and consists largely of coal.

The Hungarian minister of finance, in submitting his estimates for the coming year to the parliament, declared that the financial condition of the state railways was unsatisfactory. The proportion of expenses to earnings was greater than in almost any other European country. When the zone tariff was introduced in 1889 the operating ratio was 54.7 per cent., but it increased until 1908, when it reached 80 per cent. Little economies would not be sufficient to remedy this frightful condition. The cost of materials and labor have increased greatly, and the rates should be advanced accordingly. The zone tariff has greatly increased travel, but it does not pay. Moreover the zone tariff worked so unequally that no less than 2,000 special rates had to be made, and the minister added: "A system which to be workable, requires 2,000 exceptions, condemns itself."

The Antung-Mukden Railway, which the Japanese have been building in Manchuria, was to have been formally opened November 3, the emperor's birthday. It takes the place of a military line which was built and used during the war. By means of it Japan has rail connection with Europe, save for the straits of Simonoseki, which separates Corea from Japan; Mukden being on the line which connects the Siberian Railway with Port Arthur. Antung is the Manchurian town opposite the Corean town of Wiju, the northern terminus of the line through Corea. The road has been constructed of standard gage, like the other lines in South Manchuria, and it is in connection with them, rather than with the Siberian Railway, that is important. Better time can be made from Europe to Japan by going through to the Russian port of Vladivostok and thence by sea, than by using the new line, and as the Russians operate the line to Vladivostok, they are not likely to favor any arrangement which will divert traffic from it. The new road is said to have cost $12,000,000.

Maintenance of Way Section.

SIX papers were entered in the contest on Construction Kinks, which closed on November 25. The collection of kinks describing the reconstruction of a narrow gage road by E. R. Lewis, division engineer of the Michigan Central, Bay City, Mich., was awarded first prize, and the collection relating to rock ballasting by W. H. Cleveland, roadmaster Atchison, Topeka & Santa Fe, Wellington, Kan., was awarded second prize by the judges, who were: D. J. Brumley, engineer of construction, Illinois Central; J. S. Robinson, division engineer, Chicago & North Western, and C. G. Delo, engineer of maintenance of way, Chicago Great Western. Other papers were submitted by G. R. Barry, assistant engineer, Pennsylvania Lines West, Cambridge City, Ind.; C. L. Van Auken, Chicago; J. W. Shikles, assistant engineer, Chicago, Burlington & Quincy, Chicago; and George Mattis, resident engineer, Oregon-Washington Railway & Navigation, Portland, Ore. These papers are all valuable and describe practical methods for the handling of different kinds of track and construction work. The contest was more than usually productive of those kinks which can be applied to the every day work of the ordinary road.

ASSUMING that the safety of operating on rails of a special composition or alloy is the same as on the common Bessemer rail, the premium a railway is justified in paying for a special kind of rail depends mainly on the extent to which its life exceeds that of the ordinary rail. While the use of special rails is still in an experimental stage, the demand is growing for a rail that will have a greater life on sharp curves in congested territory and at other points subject to heavy wear, these being points where the life of the ordinary rail is but a few months and where the cost of renewal is very expensive. A number of experiments have been made, especially by the eastern roads, and several others are now being carried on. The results secured so far do not appear to indicate that satisfactory material has been found. In most cases the increased life secured is not proportionate to the heavy increased initial cost. To get the most economical results it would be advisable to have three, or perhaps four, different kinds of rail varying in resistance to wear and in cost, to place under corresponding degrees of service so that the ultimate costs of the rails at the different locations would be approximately equal. Whenever it becomes possible to manufacture rails possessing these different degrees of resistance to wear at proportionate ratios of cost, an interesting study of economical rail distribution will be possible. For this reason the paper by Mr. Luty in this issue is especially interesting.

THE condition in which the roadbed goes into the winter this year gives the track supervisor a good opportunity to study the condition of the sub-drainage of his track, because of the fact that the heavy rains of the past two months have saturated the roadbed with water. Where the drainage is poor a large amount of this water still remains in the subgrade, and the freezing of this water will result in more than the usual amount of heaving. The present conditions are very similar to those existing two years ago when heaving was very prevalent and slow orders were necessary in many places until the track could be properly shimmed. While it is probably impossible entirely to avoid heaving of track, there is no question that a large part of the trouble resulting from this cause is unnecessary. There is no longer any doubt about the economy of drainage, but many [illegible] affecting the condition of the track both in winter and summer. [illegible] increases the danger of spreading track, owing to the decreased penetration of the spike into the tie. For this reason heavy shimming of track requires careful bracing of the rails, especially on curves, as well as more careful inspection. While nothing can be done now except to put in shims as the track heaves, this heaving will indicate very prominently where remedial work is necessary. Careful note of all such places made by marking the rail or keeping other records will prove valuable next spring when proper measures can be applied to eliminate future trouble.

THE discussion of different methods of protecting timber bridges against fire, appearing on another page, is, it is believed, of timely value to master carpenters and bridge supervisors. The interest taken in this subject is illustrated by the fact that a committee report on it was presented at the recent annual convention of the American Railway Bridge and Building Association, while another report on this same subject will be presented at the annual meeting of the American Railway Engineering Association. The Association of Operating Officers of the Chicago & North Western considered this subject at its last spring meeting, while a similar association of the Missouri, Kansas & Texas considered it very recently. While a few roads have provided some form of protection against fire for their timber bridges for a number of years, the attention given to this subject has received a great impetus since the passage of the recent federal regulations regarding the dumping of locomotive ash pans. While these regulations may have decreased the number of accidents to firemen, they have very materially increased the danger of fire losses, and thereby rendered necessary increased supervision on the part of the master carpenter or bridge supervisor. Although the rapid increase in the use of concrete within the past few years has resulted in the replacing of many timber structures with those of permanent construction, there are many bridges which will not be rebuilt in permanent form for many years. The difference in the ultimate costs of small timber and concrete or steel bridges is not as greatly in favor of the permanent construction as is generally supposed, and in many cases a permanent structure is only justified when other considerations than economy enter into the decision. Since these timber bridges will remain in service for many years it is necessary to effectively safeguard them against fire in order to maintain continuous operation.

PROBABLY in no recent year has as much attention been given to efficiency in maintenance work as in that now closing. Increased operating expenses have made necessary strict economy in all departments and the track and bridge departments have been required to do their share in this work. It was fortunate that the amount of work to be done by maintenance forces was smaller this year than in the years immediately preceding, for this gave opportunity for closer attention to the handling of the work under way. There is a great field for improvement in the organization of floating gangs, and several roads have made marked changes in this line with very beneficial results. Another field for improvement is in the use of new tools or equipment to aid in different classes of work. Rail-laying cars, which have been first used to any extent this season, are an example of this sort. Methods of creating rivalry among those engaged in maintenance work, and thereby increasing their interest, illustrates another field to which more attention has been paid. The contracting of work, which has been referred to in these columns, has been more widely adopted on certain roads. The above are examples of the many different lines in which beneficial results have been secured from improvements made this year. We are

particularly desirous of drawing out a large number of descriptions of improvements which may indicate that progress is being made in maintenance work. It is not necessary that a plan be original, but if it was first used there this year and good results were secured, a statement of these facts may be of assistance to others. A prize of $25 will be paid for the best article describing such improvement, while $15 will be paid for the second best article. We will pay our regular space rates for all other contributions accepted for publication. All papers should be in the hands of the civil engineering editor of the *Railway Age Gazette,* 417 South Dearborn Street, Chicago, not later than December 25.

THE contest on Track Kinks, which was conducted by us last June, was so successful and brought out a number of devices of such practical value, that several have asked that we conduct another contest on the same lines. We are glad, therefore, to announce a contest on Track Kinks to close on January 25. As there has appeared to be a question on the part of some regarding what a track kink is, we repeat a definition of a kink which has been given elsewhere, viz., that it is a new or novel method, device, or means, by which a saving of time, labor or material can be effected. In the consideration of whether a kink is new, the position of the majority of the track men is borne in mind. Even if a device has been used locally for a number of years, it is still a kink if it is new to most experienced men. Contributions will be welcomed describing any kink used in general track work, while those dealing with the winter problems, such as the handling of snow and ice in terminals and at switches, will be especially timely. If our readers realized the value that the kinks they are commonly using may have to other men they would promptly send them in. One kink brought out in the last track kink contest resulted in a saving of two men in each of the several floating gangs for the entire season on one division of a certain railway. These kinks exist in large numbers, as we find in traveling throughout the country, and if anyone engaged in track work will give this subject a little thought he will probably find several short cuts in use on his own work which come within this classification. These kinks, perhaps contrary to general opinion, are to be found on unimportant branches as well as on the more important main lines; in fact, many times the lack of facilities gives rise to valuable devices which might never have been thought of had plenty of money and equipment been available. Contributors are urged to send in collections of several kinks, and while the judges will award the prizes on the best individual kinks, all others suitable will be published and paid for. Prizes of $25 and $15 will be awarded the two best contributions, and we will pay our regular space rates, with a minimum rate of $3 for a collection, for all others accepted for publication. All contributions must be in the hands of the civil engineering editor of the *Railway Age Gazette,* 417 South Dearborn street, Chicago, not later than January 25.

THE TURNOUT

THE article on the Turnout, by Mr. Stevens, in this issue, is an instructive and valuable discussion of this important problem of track construction. The writer treats the subject from both the theoretical and the practical standpoints, and points out wherein theoretical have had to compromise with practical considerations in the problems of manufacture and operation. While the turnout as a whole is an old device possible of little radical change, the various details of construction of the constituent parts are continually undergoing readjustment to meet the increasing requirements placed upon it. Because of these readjustments there are several comparatively minor differences in the practices of various prominent roads, in many cases depending largely upon the personal ideas and experiences of those in charge of maintenance standards. Mr. Stevens has assumed a well advanced, but at the same time conservative, in other words, a conservatively progressive, position in line with the best practice, and the paper is especially valuable for this reason.

The turnout has undergone considerable development within the past few years. With the increase in multiple main tracks and the necessity for diverting trains from one track to another under relatively high speed, the service demanded of main line turnouts has changed. While the general tendency has been to increase their length in yards and other places where speed is not a consideration, in order to keep pace with the increase in the rigid wheel bass of the locomotive, the increase here has not been in proportion to the increase in the length of main line turnouts where high speed has been the important consideration. The conclusion reached by Mr. Stevens—that any frog of less angle than a No. 15 is unnecessary, inasmuch as it does not appear practicable at the present time to reduce the switch angle much below 1 deg.—brings up a question of very live interest. Here the practice on railways differs. Many engineers will agree with the writer in his conclusion. On the other hand, the fact that many roads use No. 20 turnouts for main line movements is a strong indication that they regard them more favorably than No. 15 turnouts. With the type of construction of both frogs and switchpoints now in use, the angle at the switchpoint is to a large extent the governing feature in determining the riding qualities of a turnout, and it would seem that any considerable decrease in the curvature below that through the switchpoint would be unnecessary. However, this comparatively sharp curvature at the point extends but a few feet and the flatter frog is at least on the side of easy riding track. The practice on the Pennsylvania Railroad is to use No. 20 frogs, with 30-ft. switchpoints at such cross-overs. Another large road is considering seriously the preparation of new standards adding to the length of all yard and main line turnouts. With the increasing attention being given to this subject, and the continually growing demand for high speed passenger movements, the time should not be far distant when the process of manufacture will enable the switch angle to be reduced and the degree of curvature to be correspondingly decreased.

Another point discussed by Mr. Stevens, about which there is some difference of opinion, is that of bolting the heel blocks through both the switch and the stock rails. As the writer says, the advantages to be gained by the use of heel blocks are generally recognized, but their use is not so widespread as might reasonably be expected. Recently several roads have ceased bolting these blocks through the main rail and have simply passed the bolts through the heel block and switch rails, this being due to the stresses developed in these bolts and the tendency of the main line rails to buckle as a result of creeping. The photograph shown in the *Railway Age Gazette* of July 21, page 126, in the discussion on rail anchors, clearly illustrates this difficulty.

PROPER LENGTH OF SUPERVISOR'S TERRITORY.

IN common with most departments of railway operation, a great many men consider that the track department is over-manned, and that its being over-manned is chiefly because it is under-officered. It is a question whether the proper amount of track to be placed under the supervision of one roadmaster or supervisor is being given as careful consideration as it deserves by operating men. On many roads little or no change has been made in the territory of supervisors for many years, although the amount of track, including multiple main tracks, as well as yard and sidetracks, has greatly increased, and the burden of traffic on these tracks has increased in an even greater ratio, requiring the standards of maintenance to be greatly raised. Many lines which were comparatively unimportant branches years ago are now carrying heavy traffic, and not a few have been double-tracked without any corresponding decrease in the territory of the supervisor. In addition to the increase in the regular section forces which must keep pace with the development of traffic, the number of extra, or floating, gangs in the summer is greatly increased, to handle rail and ballast renewal, ditching and sim-

ilar work. A track which as a branch line very seldom required a special gang now has to be almost completely renewed every few years by forces other than section men who are busy with their routine duties. While it is true that a more frequent train movement allows a supervisor to get over his territory more easily, this advantage practically ceases to increase after the train service exceeds four or five trains each way.

The efficiency of the track forces depends to a large extent upon the personal supervision and instruction which the roadmaster or supervisor is able to give them. The task put on the foremen now is greater than it was a decade ago, owing, for one reason, to the very large percentage of laborers in the gangs who are ignorant both of the language and of the work, while the foremen themselves, as a class, are not of the same high standard as those of a few years ago. The number of men employed on a single supervisor's territory today frequently exceeds by several times the number employed on the entire division a few years ago. As an example, the average expenditure for maintenance on one division of 700 miles of an eastern railway exceeds four and a half million dollars annually. It is impossible for a roadmaster properly to supervise the work of from 30 to 40 extra gangs scattered over 150 to 175 miles of line, in addition to perhaps 40 section gangs. To get the best results he should be able to spend enough time with each foreman to know that he is handling his gang to the best advantage and securing maximum results. The salaries of the roadmasters bear such a small ratio to the total cost of the track labor under their supervision that a material increase in their number would hardly appreciably affect the total expense of track work; and the better results secured by closer supervision should offset many times over the additional salaries.

The Pennsylvania Railroad has gone into the subject of maintenance of way organization thoroughly, and its conclusions should be instructive. On the busy four-track main lines the territory of a supervisor frequently does not exceed 25 miles of line, while the average for the entire system east of Pittsburgh is about 58 miles of line, or about 92 miles of main track. In addition, each supervisor is provided with an assistant who relieves his superior of a large amount of detailed work, and at the same time is developing into material for a supervisor himself. On the other hand, the average practice on the western roads is to assign to each roadmaster from 150 to 200 miles of main line, and even more on light traffic branch lines, without allowing him an assistant.

In the study of the proper amount of territory to be given to the roadmaster, it should be borne in mind that he should be provided with sufficient clerical help. While any increase in clerical forces is generally opposed, there is no economy in requiring a roadmaster to spend his time writing letters in longhand or attending to the many details of the office which could be handled equally well by a competent clerk. The office work requiring his personal attention should be reduced to a minimum, and he should not be required to work at his desk late at night on routine matters. When he has a daily pay roll of several hundred dollars under his supervision he should be expected to spend his time with the gang in order to see that proper results are secured from this large expenditure.

Very little has been said about the traffic through the Simplon tunnel since it was opened, but the report of the Italian state railways gives the quantity of freight which enters and leaves the country at each border station, and from this it appears that in the year ending with June, 1910, 56,335 tons of freight entered this and 2,764 left it by that route, an average per day of 154 and 7[illegible] tons respectively, or [illegible] the building of a tunnel 12½ miles long. The average number of freight cars daily [illegible] The exports by the Mount Cenis route were nearly six times, and by the Gotthard 13 times as great; the imports by the Mount Cenis route were [illegible] and by the Gotthard the [illegible] great.

Letters to the Editor.

"ROLLING LOADS ON BRIDGES."

Chicago, November 23, 1911.

To the Editor of the Railway Age Gazette:

I cannot agree with the conclusions Mr. Greiner has drawn in his article on "Rolling Loads on Bridges," reprinted from Bulletin 139 of the American Railway Engineering Association, and appearing in the *Railway Age Gazette* of November 17, in which he seems to have assumed that the Cooper's E-50 loading ought to be sufficient to meet any possible further requirements and has then endeavored to demonstrate the same. In the accompanying table are given the center moments and end shears for spans up to 400 ft., for our double Santa Fe Mallet engines, our heavy grade loading, Cooper's E-60 loading, and our 1,800 class engine, these latter being the balanced compound Prairie type. This table shows that the moments and shears given by the E-60 loading are not very much in excess of those shown by our double Santa Fe Mallet engines. For the longer spans, if a train loading of 5,000 or 6,000 lbs. per foot is used, the difference between the moments in the two cases would be still less. If we compare the moments and shears produced by our Santa Fe Mallet engine with the E-50 loading, we will find a very slight excess, if any, in the latter loading.

It does not seem to me that this excess is sufficient to allow for any further probable increase in the weight of these special engines. A train of short heavy ore cars will show an equivalent uniform loading of from 5,000 to nearly 7,000 lbs. per running foot of track, so we must adhere to a sufficiently heavy uniform loading. I consider that Cooper's E-60 loading is a good deal nearer the possible maximum requirements than the E-50, and do not feel altogether certain that even this is sufficient.

A. F. Robinson,
Bridge Engineer, Santa Fe System.

Center Moments and End Shears.

	S. F. Mallet 3.000.		Heavy Grade Load		E-60.		1,800 Class.	
Span.	Moment.	Shear.	Moment.	Shear.	Moment.	Shear.	Moment.	Shear.
10.	71	38	99	54	84	45	73	39
15.	156	49	223	73	191	60	134	48
20.	256	61	371	88	310	75	239	58
25.	401	74	535	99	458	85	348	65
30.	553	82	716	107	616	95	458	72
35.	704	90	898	115	785	104	575	77
40.	867	99	1,090	123	983	113	733	84
45.	1,043	109	1,304	131	1,201	123	889	90
50.	1,265	120	1,532	139	1,426	131	1,044	96
60...	1,872	141	2,058	154	1,949	147	1,395	110
70.	2,445	158	2,651	175	2,560	166	1,848	122
80.	3,100	174	3,320	196	3,241	186	2,358	134
100.	4,633	206	4,803	237	4,830	225	3,595	103
150.	9,318	267	10,117	309	10,575	313	7,687	230
175.	12,004	304	13,103	344	14,040	381	10,011	261
200...	14,956	333	16,341	378	17,775	393	13,391	291
250.	22,064	388	24,467	437				
300...	30,452	441	33,586	449	36,617	547	27,404	354
350.	39,170	495	38,598	545	49,908	625	36,432	421
400...	*46,388	547	53,906	581	63,204	703	45,459	488
	One engine and 4,000 lb. per foot.		2 engines and 4,800 lb. per foot.		2 engines and 6,000 lb. per foot.		2 engines and 4,000 lb. per foot.	

*52,4[illegible] and 4,800 lb. per foot.

Chicago, November 23, 1911.

To the Editor of the Railway Age Gazette:

Like all productions of Mr. Greiner's pen, his discussion on "Rolling Loads on Bridges," appearing in the issue of the *Railway Age Gazette* of November 17, is of much interest and merits close study. In general I agree with Mr. Greiner's conclusions but the method of computation adopted by the Harriman Lines differs somewhat from the specifications of the American Railway Engineering Association, so that the tabulated relative stresses would differ in a comparison based on our specifications.

Our specifications require all counter systems to be so designed as to take care of a 50 per cent increase of live loads, and, in view of the low unit stresses used throughout, an increase of 80 per cent, without speed restrictions, would not be beyond safe practice on other roads. As our present loads are

equivalent to Cooper's E-55 loading, an increase of 80 per cent. would be equivalent to practically E-100. We do not, therefore, think we will be justified at present in increasing the live loads for which our bridges are now designed At a recent conference of the engineers of the Harriman Lines this matter was fully discussed and this conclusion approved. We agree with Mr. Greiner that a 50 per cent. increase in rolling load, without speed restriction, would be safe practice on bridges designed under American Railway Engineering Association specifications, but this percentage of increase could safely be exceeded on bridges under ours.

With regard to using live load E-50 on low grade lines and E-60 on high grade lines, considering the difference in speeds, the necessity of frequently operating the heaviest rolling stock over both high and low grade lines and the advantages in cost and delivery of minimizing the number of common standards, I believe that all bridges on any given line, whether high or low grade, should be designed for the same live loads.

JOHN D. ISAACS,
Consulting Engineer, Harriman Lines.

ABSTRACT OF ENGINEERING ARTICLES SINCE NOVEMBER 17.

The following articles of special interest to engineers and maintenance of way men, and to which readers of this section may wish to refer, have appeared in the issues of the *Railway Age Gazette* since November 17:

A division superintendent who has had several years' experience as locating and construction engineer writes a very interesting comment on the division organization which should be maintained to take care of the construction of second track, terminals and similar work. November 24, page 1043.

IMPROVING RAILWAY TERMINALS AT SEATTLE.—The Municipal Plans Commission of Seattle has prepared a very elaborate report, recommending certain steps necessary to improve the city, including the building of a new union passenger station and extensive track elevation and realinement. An abstract of that part of the commission's report referring to railway improvements was given in the issue of November 24, page 1044, being written by a correspondent who has been over the ground and is thoroughly familiar with the situation.

SOO LINE CUT-OFF FROM NEW RICHMOND TO WITHROW.—The cut-off which the Soo has built to improve its Chicago division entrance to St. Paul and Minneapolis and the steel arch bridge over the St. Croix river, on this cut-off, were described December 1 on page 1091. The bridge is unique in design, combining the merits of two-hinge and three-hinge arches by the use of a special sliding joint in the top chord. This and several other novel features of design were described and illustrated.

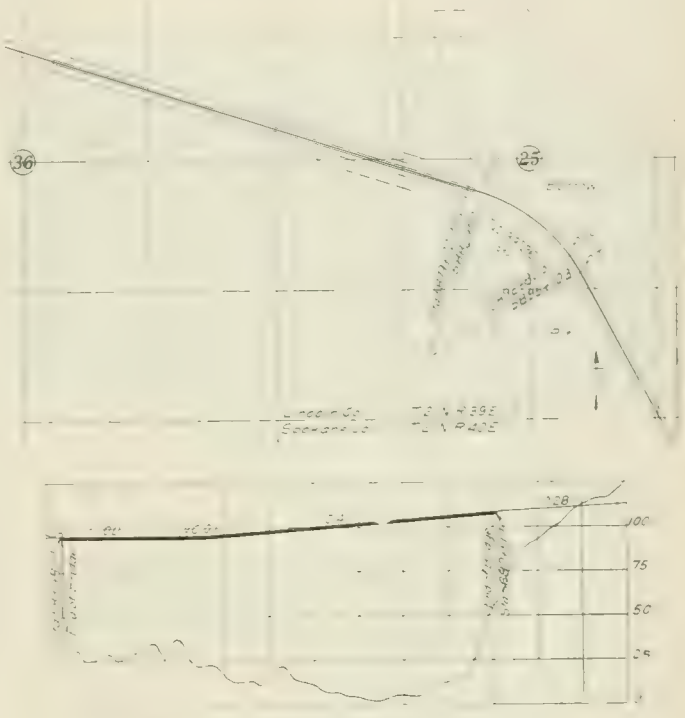
BURLINGTON'S NEW GENERAL OFFICE BUILDING.—A description of the plans for the general office building which the Burlington is now building at Jackson boulevard and Clinton street, Chicago, was given in the issue of December 8, page 1174.

A NEW METHOD OF TESTING RAILS.—An abstract of a recent article by M. C. Fremont in *Le Gemé Civil*, descriptive of a method of securing samples from rails which will give accurate tests of the quality of the rail, appeared in the issue of December 8, page 1176.

Construction work on the Jullunder-Doab Railway, India, is actively progressing. The headquarters of the company are Jollunder. The chief engineer, Mr. Bagley, has made a good economical design for the Sutlej bridge, and it is anticipated that the opening of the line to traffic will take place at an early date. The track is being laid on cast iron pot ties. During the past, these ties have proven very unsatisfactory and totally unsuited to Indian traffic conditions. It has been a common sight to see miles of track being pulled up from these ties, wherever they have been laid in India, to be relaid on wooden ties.

FILLING THE SPRAGUE GULCH TRESTLE ON THE SPOKANE, PORTLAND & SEATTLE.

An unusually large and interesting undertaking in bridge filling is now under way at Sprague Gulch, near Lamont, Wash., about 40 miles south of Spokane, on the Spokane, Portland & Seattle. Sprague Gulch is a large ravine or waterway nearly a mile wide and extending southwest across Lincoln county. Although large quantities of water must have passed through the channel in past ages, there is no flow above the surface now, except following heavy storms. There is, however, a considerable sub-surface flow through the gravel in the bottom of the gulch at all times, coming from several lakes in the southeastern



Plan and Profile of Sprague Gulch Fill.

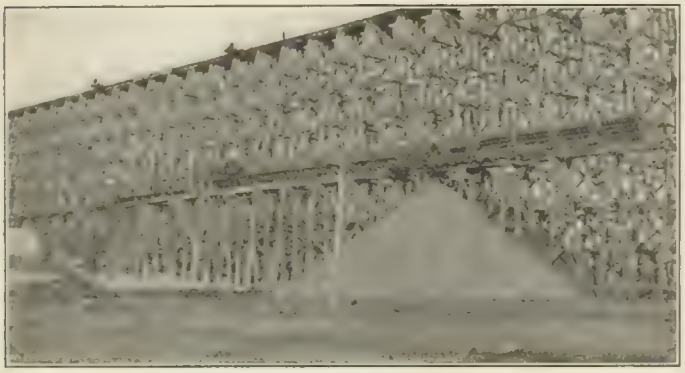
part of the country. These lakes only overflow in the spring, saturating the gravel at that time so that the flow is maintained throughout the year. The Northern Pacific secures water for locomotive use from this underflow at Sprague station, some distance down stream from this crossing while the contractor on this work secured his water from the same source.

At the point where the Spokane, Portland & Seattle, or "North Bank Road," crosses Sprague Gulch, the west bank is nearly vertical, as is commonly the case in the dry country, while the east bank has a more moderate slope. When the road was built in 1907 this gulch was crossed on a framed trestle in order to expedite work, as it would have required several months to have handled the immense quantities of earth required to complete this fill. This trestle is 4,869 ft. long, with a maximum

West End of Embankment.

height from base of rail to surface of water of 101 ft., and an average height of over 75 ft. It is composed of 317 6-post bents, 56 of which rest on piles, while five more have piles under the south side. Because of its great length and height, and the fact that it is located at the foot of a long 0.4 per cent. grade rising to the east, which grade is the maximum for this line, a slow order for 20 miles per hour has been maintained across the structure since it was put in service. The track is on tangent across the bridge and for some distance west, but a 3-deg. curve starts at the east end of the structure, the easement extending 135 ft. on to the bridge.

Because of the fire risk, the necessity of maintaining a slow order and the element of danger always present when operating over a structure of this size, and also because of the fact that the renewal of certain portions of the bridge would be necessary



Dumping Four-Yard Cars on First Lift.

within a few years, it was decided to replace the timber trestle with permanent construction.

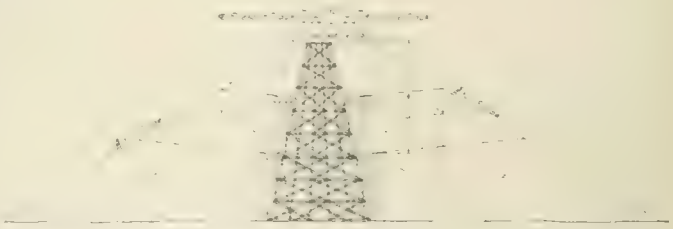
On account of the advantageous location of the borrow pit containing excellent material for steam shovel operation, it was found that the bridge could be filled at no greater cost than to build a steel viaduct, and it was, therefore, decided to fill the bridge.

There were three private crossings and one highway crossing under the timber trestle. These were all eliminated by a relocation of about 3,000 ft. of the highway and combining the private crossings with it, making one crossing under the track about half a mile west of the west end of the bridge. The relocation of the highway was simplified by the fact that the abandoned and the relocated highway crossings were both a school section, the title to which is still in the state of Wash-

First Lift, from East End.

bottom of the gulch as a waterway opening to provide for the storm water flow as well as for some of the underflow, which will probably be partially shut off by the compression of the gravel subsoil, resulting from the heavy load of the fill above.

In planning for this work advantage was taken of the sloping bank on the east side of the gulch, and it was decided to open borrow pits on each side of the track at the levels of the vari-



Cross Section Showing Method of Building Embankment.

ous lifts, thus eliminating crossing back and forth under the trestle and avoiding all uphill haul of material. Borrow pits totaling 180 acres in area were purchased and 24 test pits dug at various points in the pit to show the material to be handled. In this way the very common uncertainty regarding the class of material to be encountered was eliminated. The material uncovered in the pit was a glacial drift and gravel with a small percentage of boulders, few of which exceeded one-half cubic yard in volume. Contractors were asked to submit bids on a flat price basis, with no allowance for overhaul or classification. Because of the very favorable natural location of the work, the certainty regarding the material to be handled, and the fact that there were very few delays from the weather in this arid locality, there was close bidding on the work and a very low price was secured.

The contractor provided two complete outfits, consisting of two 70-ton Bucyrus shovels, with eight dinkey engines and 116

Borrow Pit on East Side of Track; Sprague Gulch Fill.

4-yd. cars, to handle the work, and to comply with the specifications which required that the fills on each side of the main trestle be brought up together to avoid unequal pressures tending to force the structure out of line, it was decided to build the fill in three lifts, as shown in the accompanying drawing, the first one approximately 35 ft. high and the other two 30 ft. each. It was planned to carry these lifts across the entire length of the fill, making the first lift across the bottom of the gulch about 1,800 ft. long. However, the contractor found such good material in uncovering his first cut, that he raised his grade gradually as he extended the fill across the gulch and made a first lift entirely across the bottom. The railway company offered no objection to this change in specification, as it left more material in the upper levels of the pit which will be available for filling other bridges in the vicinity in the future.

The specifications also required that the contractor build his construction trestles as close to the main trestle as practicable,

and fill out from these so that if there should be any tendency for the ground to rise beyond the slope, it would not interfere with the alinement of the high trestle. The wisdom of this provision became evident when such a movement appeared at one point without any damage to the trestle. At this point the ground raised 5 ft. for a strip about 140 ft. long by 50 ft. wide, about two months after the work started. Since that time no further movement has been noted.

From the section shown it will be noted that different layers are sloped in slightly towards the center, so that should there be any tendency for the material in the bank to slide it will move towards the center and compact. As fast as the fill is completed as far as it can be reached from the trestle, the tracks are thrown on to the fill and banks widened out to the slope stakes before a second lift is started. When the first lift was entirely completed the shovels were moved up the slope of the borrow pit to the level of the second lift, this change causing an interruption to the work of but five hours. No trestle will be erected for the third lift, but the contractor will change to standard gage equipment and unload from the main line, working under the control of the regular railway train despatcher.

The construction of the highway under-crossing and the culvert were included in the grading contract and were sublet by the contractor to another firm. The railway company furnished all material for their construction. Specifications required that concrete in the culvert be allowed to set 30 days before being covered, and at the end of that time it was required that the culvert be covered with a 4-ft. cushion of earth before any dumping was allowed directly on it.

Up to the present time very little trouble has been experienced from the settling of the main track trestle, and none is anticipated from now on, as the larger part of the trestle is buried in the fill. The outside batter posts settled somewhat while the first lift was being built, but the openings were closed by wedges inserted on the tops of the lower batter posts. A small bridge gang has been maintained on the bridge by the railway company since the work started in order to keep the trestle in line and surface and to be on hand should any serious trouble develop. It was necessary to avoid interruption of main line traffic, as the S. P. & S. is the direct main line of the Hill system between Portland and Spokane, and it is therefore, an important passenger line. In addition to S. P. & S. trains, most of the Northern Pacific freight trains are handled over the S. P. & S. between Pasco and Spokane, on which section of the road the Sprague Gulch fill is located.

The contractors started work on March 15, and completed the first lift on August 23. Both shovels have worked day shifts only, except during the last part of September when the shovel on the east side was worked night shifts for one week in order to bring the east side filling up even with the west side, the filling on the east side having gotten behind, as the embankment is being made wide enough for a second main track on that side. The output has been maintained at a remarkably high figure since the beginning of work. Ten-hour shifts were worked until May 1, when they were lengthened to 11 hours. On June 14, 12-hour shifts were started and another shovel crew put on so that each crew works but 8 hours. On October 1 shifts were changed from 12 to 10 hours, with two shovel crews. Up to October 31, 1,116,505 cu. yds. of material had been moved. This is at the rate of 251 yds. for every hour of work, including all delays due to breakdowns and moving for both day and night shifts. It amounts to 65,200 cu. yds. every month per shovel, working single 10-hour shift, or 78,300 yds. per month per shovel when one 12-hour shift was worked. This output has been maintained for seven and one-half months, and is still being continued. The best month's output to date was 174,000 yds. moved in August with two shovels, and the best daily record was made on June 23, when 7,470 yds. were moved with both shovels in 12 hours. The contractor's force employed averages about 150 men. The total estimated amount of earth to be handled is 2,350,000 cu. yds., of which about 55 per cent. is now in place.

This work is being done under the direction of R. Budd, chief engineer of the Spokane, Portland & Seattle, and W. C. Mock, resident engineer on the work. A. D. McDougall & Sons, of Portland, Ore., are contractors on the work, with Bates & Rogers, of Spokane, Wash., sub-contractors for the concrete work.

MATHEMATICAL RELATIONS BETWEEN INCREASES IN COST AND INCREASES IN DURABILITY IN STEEL RAILS.

BY B. E. V. LUTY.

It may be granted at the outset that it is anticipating a little to figure out the mathematical relations between cost and durability of steel rails, for of course the precise relative durability of different kinds of rails is not ascertained. However, special rails have been coming rapidly to the front, and if they are bought and paid for, the economies promised or expected should be the subject of careful thought. If we regard the open-hearth as a special rail it is to be observed that last year 47 per cent. of the total production was of this description, but passing that by it is to be observed that of rails purified by titanium—commonly called "titanium rails"—there was produced last year 195,408 tons, which probably means that of all the rails used by steam roads for replacement purposes last year, more than 10 per cent. were of this description.

It is obvious that the harder the service required of the rail the better it pays to use a good one, for with hard service upon any kind of rail the depreciation charge is large in proportion to the interest charge, while with light service the reverse is the case. For instance, if the service is such that an ordinary rail will wear for 20 years, one cannot afford to pay much premium for a rail calculated to last 30 years, because the additional interest on the premium runs through all the years, whereas the annual replacement fund to be set aside to replace the higher priced rail in 30 years, as against the ordinary rail in 20 years, may not be reduced at all, and may even be increased. If, on the other hand, the service is such that the ordinary rail will last only two years, it may well pay to buy a somewhat higher priced rail which promises to last three years.

In no case can the increase in the cost of the rail be allowed to be as great as the increase in durability. Theoretically that would be permissible if the rails had no life at all, for then there would be no interest charge, just as it is theoretically as well, in buying power, to pay twice as much per cu. ft. for water under 100 lbs. pressure as for water under 50 lbs. pressure.

As the duty upon the rail decreases, making for longer life for any description of rail, it is less and less economical to buy the more durable rail, on account of the interest charge figuring more and more largely. However, the increase of freight movement in the country has been steadily decreasing the life of rails. The time was that the first cost of the rail was the prime factor, the time of ultimate wearing out being so remote that it was not seriously considered, but the density of traffic has so increased that now on thousands of miles of track rails are wearing out very fast. Using the Interstate Commerce Commission's statistics, we compute the number of ton-miles of freight per mile of railway for the entire country as follows:

1890	487,425	1905	861,396
1895	429,190	1910	1,085,745
1900	735,382		

Thus in periods of twenty years the density of traffic has easily doubled. The above comparison is necessarily inexact, because, as it is per mile of line instead of per mile of main line track, it does not take account of the increase in speeds and weight upon wheels or the condensation upon certain trunk lines of enormous volumes of traffic. Consideration of all these factors would show that upon the most used track the duty upon the rails has

been increasing much more rapidly than doubling every twenty years, and making the question of durability, in proportion to first cost, more and more important as regards a large mileage of track.

A mathematical basis for comparing the values of different rails under different conditions of traffic and consequent wear can easily be reached. The feature of safety cannot of course be considered. The duty placed upon the rail may be expressed by the number of years which an ordinary rail would last in the circumstances, and the serviceability of a special rail may then be expressed by a ratio made by dividing its life in the circumstances by the life of an ordinary rail. The cost of rails may be taken as the cost of the rail actually laid, minus the salvage on the rail replaced. It is unnecessary to set up sinking funds, the assumption that a proportion of the rails must be replaced each year being the most correct and at the same time the simplest. Then let

P = cost of ordinary rail
L = life of ordinary rail in years
p = the ratio of increased cost of any special rail
l = the ratio of increased life of such special rail
Interest rate, 6 per cent.

The annual cost of maintaining the ordinary rail will be—

$$.06\ P + \frac{P}{L}$$

The annual cost of maintaining the special rail will be—

$$.06\ P_p + \frac{P_p}{Ll}$$

Equating these to each other, to find the common basis on which the rails meet, and dividing through by P we have—

$$.06 + \frac{1}{L} = .06\ p + \frac{p}{Ll}$$

$$p = \frac{.06L + 1}{.06\ Ll + 1} = \frac{Ll}{L} \cdot \frac{.06L + 1}{.06\ Ll + 1} = \frac{l\ (1 + .06L)}{1 + .06\ Ll}$$

The last expression is in such form that one can conveniently assign any suitable value to l and then solve the equation for successive values of L, obtaining the corresponding values of p. Thus let $l = 1.25$, meaning that the special rail under consideration will last 25 per cent. longer than the ordinary rail. Then if $L = 10$, i. e., an ordinary rail in the conditions of service would last 10 years, the special rail would last 12½ years, and the equation shows that p is 1.14, i. e., the special rail can cost 14 per cent. more than an ordinary rail and give the same economic result in track. This does not mean, of course, that the rail can cost 14 per cent. more per ton at mill, for there is freight and cost of laying to be added, and there is also the value of the old rail to be deducted, perhaps the same for the special as the ordinary rail, perhaps more. A moment's reflection will show that this is as it should be. The freight and cost of laying the same [illegible] of rail, and if the salvage is also the same then these items have nothing to do with the rail, any more than if they were items involved in another part of the track. The 14 per cent. is merely to be applied to the cost of the ordinary rail, after freight and cost of laying has been added and salvage has been deducted, unless the salvage should be expected to [illegible] be greater in the case of the special rail. As old rails must be sold for what they will bring, an increase [illegible] will perhaps be claimed from the presence of a large percentage of nickel, could only be expected when the scrap market is educated up to the point of paying it.

Proceeding in this manner, the following table has been computed. The first column shows the values of p for various conditions of service, assuming that the special rail will last 25 per cent. longer than the ordinary rail. If the service is heavy and the ordinary rail would last only two years, then the net cost of a rail promising to last 25 per cent. longer, or 2½ years, may be 22 per cent. greater than the net cost of the ordinary rail; for conditions of traffic permitting the ordinary rail to last 20 years the special rail can have a net cost only 10 per cent. greater than that of the ordinary rail. In the next column a similar series of values of p is worked out on the assumption that the special rail will last 50 per cent. longer than the ordinary rail, the next column giving values for an increase of 75 per cent. in the life, while the last column gives values in case the special rail has twice the durability of the ordinary rail.

Permissible Ratio of Increased Cost Corresponding to Various Ratios of Increased Durability.

Life of Ordinary Rail, Years.	Ratios of Increased Life.			
	1.25	1.50	1.75	2.00
2	1.22	1.42	1.62	1.81
4	1.19	1.36	1.53	1.67
6	1.17	1.32	1.46	1.58
8	1.16	1.29	1.41	1.51
10	1.14	1.26	1.37	1.45
12	1.13	1.24	1.33	1.41
14	1.12	1.22	1.30	1.37
16	1.11	1.20	1.28	1.34
18	1.11	1.19	1.26	1.32
20	1.10	1.18	1.25	1.30

It will be observed that in all cases the permissible increase in net cost decreases rapidly as the life is increased. In each column the series really starts at zero years, the successive decrements for each two years growing smaller and smaller, so that if the rails did not last at all the net increase in cost could equal the increase in service, while on the other hand if the ordinary rail lasted an indefinitely long time, it would not be economical to pay any more for the more durable rail, no matter how much more durable it might be, for in an indefinitely long series of years all the values of p would decrease to unity.

A glance at the values will show that for any condition of service whereby the ordinary rail would last, let us say, about 10 years, there is little economy in using the more durable rail. Assume the net cost of the ordinary rail, plus freight and cost of laying and less salvage, to be $20, which is not very far from the average, than if the ordinary rail lasts 10 years the net cost of the special rail, if promising double the life, or 20 years, can only be 45 per cent. greater, or $9 more, say $37 per ton at mill instead of $28. If on the other hand the conditions of service are such that the ordinary rail would wear out in four years, it would be feasible to pay 67 per cent. more on the net cost, or $13.40, making the cost per ton at mill $41.40 against $28.

In the same manner a special rail promising 50 per cent. longer life can cost a premium per ton of $7.20 if for service wearing out an ordinary rail in four years, $5.80 in the case of eight years, $4.80 in the case of 12 years, $4 in the case of 16 years, and $3.60 in the case of 20 years.

ECONOMY IN THE USE OF LARGE DUMP CARS.

That there is material economy in the use of large dump cars over small ones can be shown by the following comparison between 6-yd. and 12-yd. cars. The average working load of the 6-yd. car is 5 cu. yds. The average working load of the 12-yd. dump car is 12 cu. yds. A train of 20 6-yd. cars will haul 100 cu. yds. A train of 10 12-yd. cars will haul 120 cu. yds. However, a locomotive that can haul 10 12-yd. cars out of the pit cannot haul more than 15 6-yd. cars, on account of the high train resistance and the limiting load on the draft rigging of the smaller cars. A train of 6-yd. cars hauled by one engine, therefore, will take out only 75 cu. yds., while the same engine with 12-yd. cars will take out 120 cu. yds., or a gain of 60 per cent. It should not require more men more time to dump and right a train of 12-yd. cars than a train of 12 of 6-yd. cars, effecting a saving of probably 40 per cent. in time and labor at the dump.

FIRST PRIZE—A COLLECTION OF CONSTRUCTION KINKS.

BY E. R. LEWIS.

Division Engineer, Michigan Central, Bay City, Mich.

The more extensive undertakings in railway construction do not always demand the greatest ingenuity from the engineer in charge. More often the smaller project, presenting a wide range of obstacles to be surmounted with the least expenditure for labor and no expenditure for special equipment, more severely taxes his ability.

Such was the viewpoint of the writer when put in charge of standardizing the gage and extending a narrow gage mining railway to meet the necessities of a fast developing country. The track, which was of 3-ft. gage, was built on a roadbed 12 ft. in width, and extended from a mine, located at a considerable altitude, nine miles to a smelter on the shore of an inland lake, which in turn was connected with the Great Lakes by a ship canal constructed and maintained by the mine owners.

This narrow gage track was to be removed and the roadbed widened to accommodate a standard gage road. The road was also to be extended from the mine to a city 30 miles distant, where connections were to be made with two foreign railway lines. Difficulties in obtaining these connections compelled the promoters to force an entrance into the city by constructing the extension from the lake to the city limits instead of building from the city's railway terminals to the mine.

It was necessary, therefore, to send the rails, fastenings, ties and switch materials, as well as a light locomotive and a number of flat cars, by water to the terminus of the line on the shore of the lake.

ORGANIZATION.

When these materials had been landed, with some difficulty, and the writer had finished the railway location toward the city he was required to fit out an expedition to carry a construction gang by water, a distance of some sixty miles to the lake terminus. On this vessel the camp outfit, tools and materials not already on the ground, sufficient for three months' work of the gang of 75 men, were also to be carried. A blacksmith was to be engaged and outfitted, and two train crews were to be taken along, in addition to a competent foreman, an assistant foreman, a carpenter, a cook and an assistant cook.

Any engineer who has had experience in outfitting a survey party without more assistance than the storekeeper's clerk will give him will readily appreciate the situation. Any purchase overlooked means much inconvenience and probable expense. Tools, provisions and materials must be properly selected as to quantity and quality and properly packed, labelled and stored. Laborers must be hired and put aboard at the right time to assure keeping them.

The flotilla was towed over a choppy sea, in sleety weather, on an inky black night in April, to the scene of operations. The first three snowy days were spent in erecting camps, equipping the blacksmith shop and in rigging an old narrow gage locomotive to supply power to a winch with which to land materials and supplies from the boats. Laborers were divided into gangs of 15 each, with a large tent and a chosen leader, who served as boss of the sleeping quarters and as a grievance committee reporting to the foreman. There was no "officers' mess" and no separate table for foremen or artisans. The officers, foremen, artisans and trainment were distributed among the laborers at the table, all eating the same food, with the best disciplinary results.

Efforts were made to keep every man busy on rainy days. The money spent in wages for rainy day work was considered well spent if only to keep the men from idleness.

USE OF SNOW PLOW TO WIDEN BANKS.

The first construction problems were the removal of the narrow gage track and the widening of the roadbed. A large part of the roadbed was on embankment, while the few cuts had been made into virtual embankments by the removal of material for borrow and for ballast. It was decided, therefore, to combine the work of taking up the track and that of widening banks into one of operation. An old snow plow was fitted with stop flanges and extension wings. A wire cable, 200 ft. long, was attached to the plow, which was loaded on the front flat car of the narrow gage train and pushed up the grade to the mine. The plow was there unloaded on the grade facing the train. After six or seven rail lengths of track had been taken up and loaded, the cable was attached by means of a knotted rope to the drawbar of the front flat car. The locomotive was then backed down the grade, pulling the plow over the sandy banks, lowering them a foot and thereby widening them 3 ft. With the plow properly weighted, the work was quickly done. When some obstacle was struck the rope broke, without damage to plow or train. This kink worked remarkably well.

TRACK LAYING MACHINE.

The narrow gage track rails were loaded on flat cars supplied with steel rollers fitted in rows in the floors on each side of each car. These floors were later transferred to standard gage trucks and formed part of a home made track laying machine to lay the standard gage track. A narrow gage push car track was also laid over the whole standard gage train, terminating at the end of the pioneer car in an incline with upturned rail ends to catch and hold the car while its load of ties was dumped. This load of ties, sufficient for two rail lengths of track, was dumped and spaced ahead of the pioneer car, while two pairs of rails, spliced together, were passed forward over the rollers to the iron gang, which laid and quarter-spiked them.

CENTER DUMP BALLAST CARS.

Ballasting was a more serious problem, for, on account of the narrow embankments, the ballast had to be distributed between the rails. The ballast was trapped from the largest of three gravel cuts by building substantial bridges of poles and crossing planks, the only material available, from points on the cut slopes on each side of the cut, 8 ft. above the rail to a point which nicely cleared the cars. These bridges were connected by a platform over the track which contained the trap. This platform was hinged and was counterbalanced by weights and pulleys so that it could be lifted to let the locomotive through.

In order to distribute the ballast between the rails the floor of each flat car was sawed out between the center sills for about 3½ ft. in two places between the center of the car and each truck. Over these holes were placed bottomless boxes 4 ft. high, with projecting handles. When the cars had been loaded and hauled to place the boxes were lifted and the ballast distributed through the holes in the car floors. Although the loads hauled were small and the work tedious, as compared with that possible with convertible ballast cars of today, the ballast was put in at a low cost and without any waste over the sides of embankments. All of these schemes were made necessary, of course, by lack of equipment. The mechanical work was done wholly by unskilled labor, with the exception of the blacksmith and a ship's carpenter.

PRELIMINARY DRAINAGE.

A considerable portion of the 30-mile extension was through very wet cedar swamps. The contracts were first let for clearing, grubbing and ditching only. Ditching meant the excavation of a waterway, 2 ft. wide on the bottom, with 1 to 1 slopes and an average depth of 2 ft., within 10 ft. of each right-of-way boundary and parallel to the center line of the road.

Outlets were excavated, when necessary, at right angles to the line of road for final disposal of the drainage into streams or lakes. The grading contracts for each mile were let only after the clearing, grubbing and ditching were completed. Evaporation, together with this adequate and permanent drainage, dried the swamps by the time grading was started, so that the usual difficulties were almost entirely eliminated, while the labor of maintenance was minimized for all time.

SECOND PRIZE—KINKS IN ROCK BALLAST WORK.

BY W. H. CLEVELAND,

Roadmaster, Atchison, Topeka & Santa Fe, Wellington, Kan.

We have recently completed ballasting 50 miles of main track between Wellington, Kan., and Waynoka, Okla., with crushed rock. We began ballasting at the east end of the 50-mile stretch and worked west. As the train passes over the finished track it reaches the finishing gang first, then the gangs making the first raise, and then the gang that is skeletoning the track ready for ballast. The conductor of the ballast train is instructed to stop at each gang as he reaches it and let the foreman unload what ballast he needs for the day. This gives the finishing gangs the ballast they want first, and the gangs making the first lift what they want next. The train then passes on to the front and the gang skeletoning finishes unloading the remainder of the train. This arrangement allows the ballast train a straight run even in unloading, and permits a quick return trip.

Center dump cars and a Rodgers ballast plow are used. The ballast plow is always kept next to the way car when unloading. We begin unloading by opening the head car and moving the train head, opening each car in succession as is necessary. By beginning to unload from the head end of the train, we avoid pulling empty cars through the unloaded ballast and avoid the liability of derailing empty cars on account of ballast on the rail.

After the train is unloaded, the ballast plow is left at the first siding east of the uncompleted work, to be picked up by the next ballast train and taken to the front. The average cost of unloading ballast in this manner, for the time actually consumed in unloading, is six cents per car, or 1½ mills per cubic yard.

BANK WIDENING.

We are using a steam shovel and Western air dump cars in widening embankments on heavy fills, and an American ditcher with a Lidgerwood unloader and flat cars for light fills. The dirt is secured from widening small cuts, close to the fills, because of the short haul and also because the widening of cuts is a betterment to the roadbed. We are using a Mann McCann spreader to spread the dirt, and to shape up the embankments and cuts ready to receive ballast.

DITCHING WITH A SPREADER.

In cuts where the bottom of the ditch is below grade next to the track and the back of the ditch is high because of an accumulation of dirt which has washed or fallen in from a crumbling embankment, we use the spreader to shape the ditch bottom. We lower the point of the spreader wings to the proper depth and angle, and carry the wings high at the ends of the ties. The spreader is backed through the cut, which moves the dirt from the back of the ditch and leaves it at the ends of the ties. After passing through the cut in this manner, the wings are dropped down at the ends of the ties and adjusted to the required slope for the ditch bottom. The spreader is then moved forward through the cut, and the dirt is spread evenly from the ends of the ties over the entire bottom of the ditch to the slope desired. Any surplus dirt is left in a straight pile, at the back line of the ditch, divided from the ditch line in such a manner that it can be readily picked up with shovels without disturbing the ditch. This does away with the flat spots and holes in ditch bottoms, so noticeable in ditches that are made by laborers with shovels, and

[illegible]

We use extra gangs of 50 working men each, with one fore- [illegible] The skeletoning gang in the front skeletons the track, renews the shoulders of fills, prepares the cuts to receive ballast, renews ties and unloads the ballast for the first lift. This gang digs out the dirt from between the ties, sloping it gently from the center of the track to the ends of the ties, and casting the dirt on the shoulder of the fill at the [illegible] If there are any [illegible] in the shoulder of fills, they are put [illegible] When a good stretch of track is prepared in this manner the work engine runs the spreader over it with the wings adjusted to a slope of 1 in. in 8 in. This leaves the shoulder an open slope from the bottom of the ties to the outer edge of the shoulder of the fill and puts all the surplus dirt over the shoulder on the outer slope. Thirty minutes of actual working time, with a work train and spreader, will put one mile of embankment in perfect condition.

This skeletoning gang also renews the decayed ties after the track is skeletoned and before the ballast is unloaded, doing the work very cheaply at this time as the ties can be easily inspected and renewed without the necessity of digging out or shifting material. This gang also unloads the ballast for the first lift at an expense of four cents per car, or 1 mill per cubic yard.

FIRST RAISE ON BALLAST.

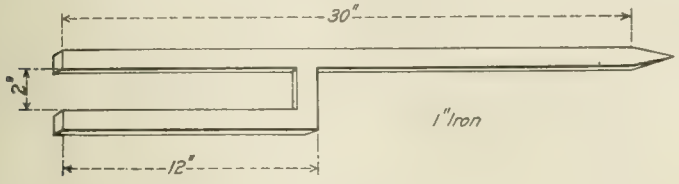
As we are putting in from 10 to 12 in. of ballast we are making two lifts of it. The gangs making the first lift follow the skeletoning gangs as closely as possible and do shovel tamping only. They raise the track up to within 1½ in. of grade, and shovel tamp the ends of the ties, and well under the rail from the outside, but do no tamping inside the rail. They space the ties to standard and renew any bad ties that may have been overlooked by the gang ahead. They line out the swings, leaving the track in fair line. When the ballast train reaches them, they open the center dump cars and fill the center under the ties and as much above the ties as the train will pass over. The pressure of the ballast plow will compress the ballast enough to insure that the centers are well filled and sufficiently tamped for the first lift, and will leave enough ballast between and on top of the ties for tamping the final lift. In this way the tamping of centers on the first lift, and also the labor of casting the ballast from the outside shoulder into the center, are done away with. All ballast has been handled by center dump cars and ballast plow, and it has not been necessary to handle any by hand. This track is left in service in this condition under heavy traffic for a few days, before the finishing lifting gangs reach it, and becomes solid under the ties by the compression of the traffic. When the finishing gangs reach it, it has settled enough so that the final lift can be permanently maintained.

FINAL LIFT.

The final lift gangs do all pick tamping and finish and dress the track complete. By the time the finishing gangs reach the work it is then about 3½ in. below grade, having compressed about 2 in. from service. The finishing gangs lift the track ½ in., making approximately a 4-in. raise, which will consume about what ballast was left in track by the high ballast plow in the last drop made by the first lift gangs. They will pick tamp the ends of the ties, and well under the rail, but will not do any center tamping between the rails, except to tamp the joint ties inside of the rail for a distance of about 18 in. They will let the traffic pass over the work with only the ends tamped, which will in a measure overcome the cause of center bound track, and will also show up any low spots that result from uneven pick tamping. Then, before tamping the centers of the ties, a small spotting gang is run ahead of the center tampers to pick up low joints that may have shown up, and retamp the ends of the ties of such spots before the centers are tamped. The center tampers follow up and pick tamp the centers. The finishing gangs will not unload any ballast until the track is in perfect surface and line ready to finish the shoulder dressing, but will then stop the ballast train and unload what is needed to complete the dressing. In this way all ballast is unloaded, handled and tamped without it being necessary to cast it with forks or shovels either to fill in centers or to relieve the track of ballast, except what the ballast plow leaves on top of the ties at the last, which necessarily [illegible] to clean the ballast from the top of the ties. This system also insures a good settled bed of new lift of ballast, which will maintain the surface and alinement of track when finished and will eliminate in a great measure the [illegible] track.

TOOLS.

Our surfacing gangs are equipped with the necessary standard tools for surfacing track and with other devices that will systemize and save labor and time. For spacing ties, we furnish gangs with wooden mauls made of hard wood timber, 6 in. in diameter and 10 in. long with an iron band ring on each end set back from the face of maul. Ties can be given as many blows as desired with these mauls without bruising the timber



Spot Board Bracket.

in the least. Gangs are also furnished spot boards and blocks and two bracket stakes, a device made for holding the spot boards in position while working. These bracket stakes are made of 1 in. square iron, 30 in. long, with a bracket 12 in. deep at the top and with a space for receiving the spot board, as shown in the accompanying sketch.

One of these stakes is used on each side of the track driven down to the proper depth to retain the spot board to the desired grade position, conforming to the engineer's stakes. The spot board resting in these bracket stakes can be lifted from the brackets at any time for the passage of trains without disturbing the position of the bracket stakes, and can be replaced to the same position in the bracket stakes immediately after the passage of the train. In using the bracket stakes it is necessary for engineers to set grade stakes only on one side, for the first lift work, as stakes on one side of track are sufficient, by using the bracket stake for supporting the spot board on the opposite side of the track.

ORGANIZATION OF GANGS AND SYSTEMIZING OF WORK.

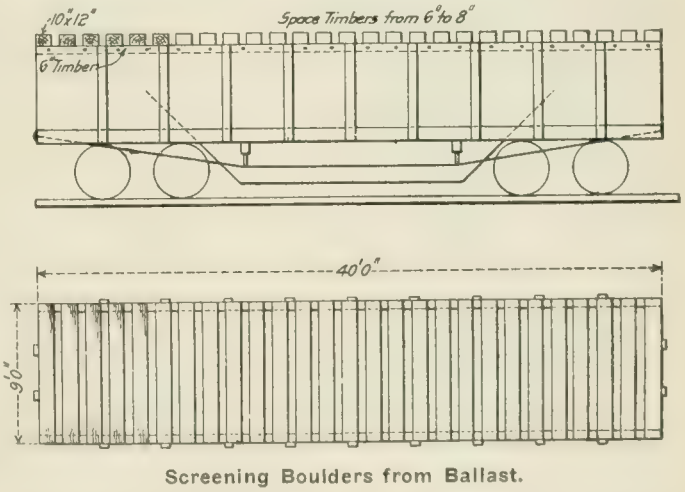
When the average foreman is handling 50 or more men, there is much confusion and loss of time because of lack of organization for lifting and tamping track and spacing and renewing ties. Each day there is the same succession of blunders, with men standing waiting for something to do and others wandering about not knowing where to begin or what to do. I have noticed some foremen making heavy lifts and raising track with from two to four jacks. This is wrong. No foreman can get 50 men busy quickly and keep them properly scattered out to secure true surface for track when using two or four jacks. In making heavy lifts of 10 or 12 in. with the ties buried in the ballast, one jack must be kept in the swing ahead of the face jack, about half the way up to face, to relieve the jack that is in full lift of the weight ahead, or the open loose track behind. The face jack will spring up from the excessive weight ahead and ruin the true surface of the track. Our gangs are organized and the work systemized in this manner, which I find gives the most satisfactory results. Each gang is furnished with six No. 6 Barrett track jacks, which will lift the track to the required face at one lift without resetting the jacks. The holes for the jack seats are opened out at the joints and centers for one day's work ahead, ready to receive the jack. Six jacks are used, three on each side of the track, with four sets of jack men, two sets working on each side of the track. When the work is started all the jacks are set in for a lift and are run part way up to face and the two front jacks are left in the swing at half lift to relieve the face jacks from the weight ahead. The gang is divided up, half on each side, and started tamping, following the jacks. When the first jack men have tamped the joint or jack tie solidly, they release their jack, take it ahead and place it in the seat ahead of the swing jack, and run it up to half lift. They leave it in the swing, step back to the former swing jack and run it up to full face lift, and tamp up the jack ties as before. The second jack men in their turn set their jacks in the seat ahead of the swing jack, and continue in this system. This will string out the gang quickly and will keep the track continually coming up to face in a systematic manner and with all men working in a well defined system without confusion. The tampers should all work on end tamping only, except to brace the joint ties, inside of the rail, and the foreman will have only one class of work to watch. When first starting to work, as soon as the first jacks are raised to face, four men step in with the wooden mauls and space the ties; and they should continue spacing until far enough ahead that two men can do the spacing, when two men fall back to tamping. In tamping first lift work with shovels, let the men work two together on the same tie, one on each side of the tie, and turn the shovels over, using the shovel blade reverse side up. The men should deliver a pushing blow at the same time and directly opposite each other, so that the force of their blows meet. This will carry the ballast under the tie and will fill under the tie quickly and solidly. Finishing gangs work under the same system when surfacing, except that they do all pick tamping work and finish completely.

SCREENING LARGE BOULDERS FROM BALLAST.

BY GEO. MATTIS,
Resident Engineer, O.-W. R. & N., Portland, Ore.

Very often during new railway construction where ballast is taken from adjacent gravel pits, considerable difficulty is experienced in getting rid of the large rock and boulders found mixed with the gravel.

A very satisfactory method was adopted on one of the roads in the West. Some 8 in. x 10 in. timbers, or heavier, were bolted across the top of the ballast cars from 6 to 8 in. apart. As the steam shovel dumped the material on these timbers, the ballast dropped between the timbers into the car and the large rock and boulders were rolled off on the opposite side of the car. If there were not too many of them, they would be left on top of timbers until the ballast train was pulled out on some fill and there rolled off. In this way the gravel pit would not be encumbered with



Screening Boulders from Ballast.

them. This method avoids the long delays and work necessary when it is attempted to pass these large rock and boulders through the cars and out of the bottom dumps, as they will usually lodge between the bottom of hoppers and the ties and break something.

The accompanying sketch shows the method of placing the timbers. A 6-in. stick is bolted to the top of the car on two sides and the timbers are then bolted to it. It will, of course, only be practical to use this method where the ballast is dumped from the bottom of the car, for as will be seen, a plow could not be pulled through cars equipped in this manner. It is only necessary to have the timbers extend to the ends of the hoppers, if these do not extend to the ends of the ballast car.

TURNOUT KINKS.

BY G. R. BARRY,
Assistant Engineer, Pennsylvania Lines West, Cambridge City, Ind.

MOVING A TURNOUT ENDWISE.

In the re-building or extension of side tracks, and especially in the re-arrangement of yards, it is often necessary to move an old turnout a short distance to put it in the proper location. A quick and economical way to do this is to drag the entire turnout endwise with a locomotive. The ballast is dug out and leveled down to the bottom of the ties, the tracks are disconnected at the first joints beyond the turnout ties at each end and the track taken up between the old and new locations of the turnout. The turnout is then dragged to place by chains attached to a locomotive, the hitch being made around the first tie in the turnout and passing around each rail. A strip of plank is nailed to the top of the turnout ties at each end to preserve the tie spacing. If the road bed is soft the turnout can be jacked up and rails slipped under the ends of the ties and extended ahead to the new location as skids, but usually this is not necessary. In this manner a turnout can be moved endwise any distance up to 200 or 300 ft. with very little damage, and at a very small cost compared with the cost of taking up and rebuilding the turnout, and with very little delay to traffic. The writer recently had a No. 15, 85-lb. turnout in main track moved a distance of about 250 ft. in this manner, and the work was completed and both tracks ready for use within one hour after it was started. An entire yard ladder has been relocated in this manner, moving one turnout after the other.

RENEWAL OF SLIP CROSSING.

A good way to renew a slip crossing in a busy terminal, where the track cannot be obstructed for any length of time, and where a steam wrecking crane is available, is to build the new crossing complete, including the ties, on flat cars and set it off the flat cars and in place with the wrecking crane, first lifting out and setting on cars the old crossing.

SHIFTING TURNOUTS LENGTHWISE.

BY J. W. S.

The usual practice of track foremen is to tear out and relay turnouts when they are to be moved within the limits of their lengths and where there is but little if any lateral throw, instead of shifting them endwise as units.

In moving turnouts where the ties are in good condition, especially on construction like track elevation or yard work where many temporary turnout connections have to be provided, these turnouts can frequently be shifted short distances lengthwise into new temporary or permanent location very economically and generally with the least interference to traffic.

The shorter turnouts up to a No. 9 should be worked along [illegible] after the ties are dug out, by the use of lining bars with the aid of from two to four track jacks set at the forward end at an angle with the line of throw. These jacks lessen the [illegible] and as they are pushed over forward with the jacks handles as levers and the throw of the lining bars, they shove the turnout ahead.

On longer turnouts, an easy way to shift them endwise is to jack and throw them along with lining bars on two lines of [illegible] After the ties are dug out, [illegible] with the bars on the ground under the outside rail about 2 ft. from the ends of the ties on each side of the turnout.

[illegible] a turnout or an intermediate crossover connection to a [illegible] a distance of 30 ft. in order to strike the [illegible] at the crossover. The [illegible] 140 ft. long, and had the [illegible] The ties used by the [illegible] on the actual shift of the [illegible] The turnout could not have been moved [illegible] to traffic.

This method of moving turnouts short distances lengthwise not only makes a minimum delay to traffic, and a saving in track labor, but also a saving in spikes and bolts, and saves the switch ties from the extra spike holes.

COLLECTION OF TRACK KINKS.

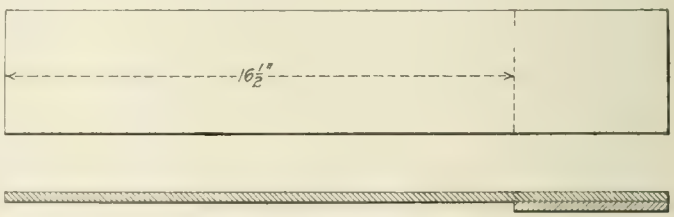
BY CLAUDE L. VAN AUKEN,
Chicago, Ill.

FIDDLE FOR MARKING TIES.

The "tie fiddle" consists of a board with a cleat nailed across one end, as shown in the illustration. The distance from the end of the board to the edge of the cleat is made the standard distance from base of rail to the end of tie for the road on which it is used.

This device can be used to advantage in laying new tracks or switches. The fiddle is laid on the upper face of the tie with the inside of the cleat resting snugly against the tie end. A mark made on the line side of the tie along the end of the fiddle then shows the proper line that the outside of the rail base should occupy after being spiked.

The use of a tie fiddle saves time because it does away with the spikers measuring and remeasuring with the handle of the spike maul in order to get the tie in the proper position under the rail, the outside spike being simply driven on the chalk line. Better line is thus secured, as there is liable to be a variation in the marks on several maul handles. The rails, when set up, can be placed on the line and little work is necessary in moving ties when spiking; in addition, the completed track will be nearly to



Fiddle for Marking Ties.

line, provided the ties were placed in proper position on the grade. The work of supervision is made much easier and a more perfect line on the ties is assured, for a foreman can see at a glance if the spikes are not in proper position. A tie fiddle can easily be made in a few minutes with a board, nail and a saw.

PUTTING IN SLIP SWITCHES UNDER HEAVY TRAFFIC.

One of the difficult kinks in track work is encountered in connection with the installation of slip switches in tracks handling heavy traffic. This problem was met with sometime ago in connection with the construction of new tracks in a congested suburban district to form a four-track system. At the junction of these tracks a network of double slip switches and cross-overs had to be installed under traffic, and strict orders were issued that there was to be no interference with passenger trains. There were over 200 scheduled movements over the main lines between 6:45 a. m. and 6:15 p. m., in addition to a large number of unscheduled movements consisting of extra passenger and freight trains and switching movements. In such work, while the track on which work was being done might be clear for a few minutes, trains were moving in both directions on the other tracks so that when [illegible] or heavy material the work was handicapped by the movements on these adjacent tracks. The foreman in charge had to study the time card closely to determine when each part of the work could be done to best advantage with safety not only for the traffic but also for his men.

In the case in hand, all material was unloaded as near as possible to the place where it was to be used, there being room beyond the outside tracks at this point for storage. The single switch work was comparatively easy for a foreman familiar with the [illegible] requirements, but after the ties were in fifteen minutes was sufficient time for him to cut the track and put in the frog and main line equipment. The guard rail was installed before

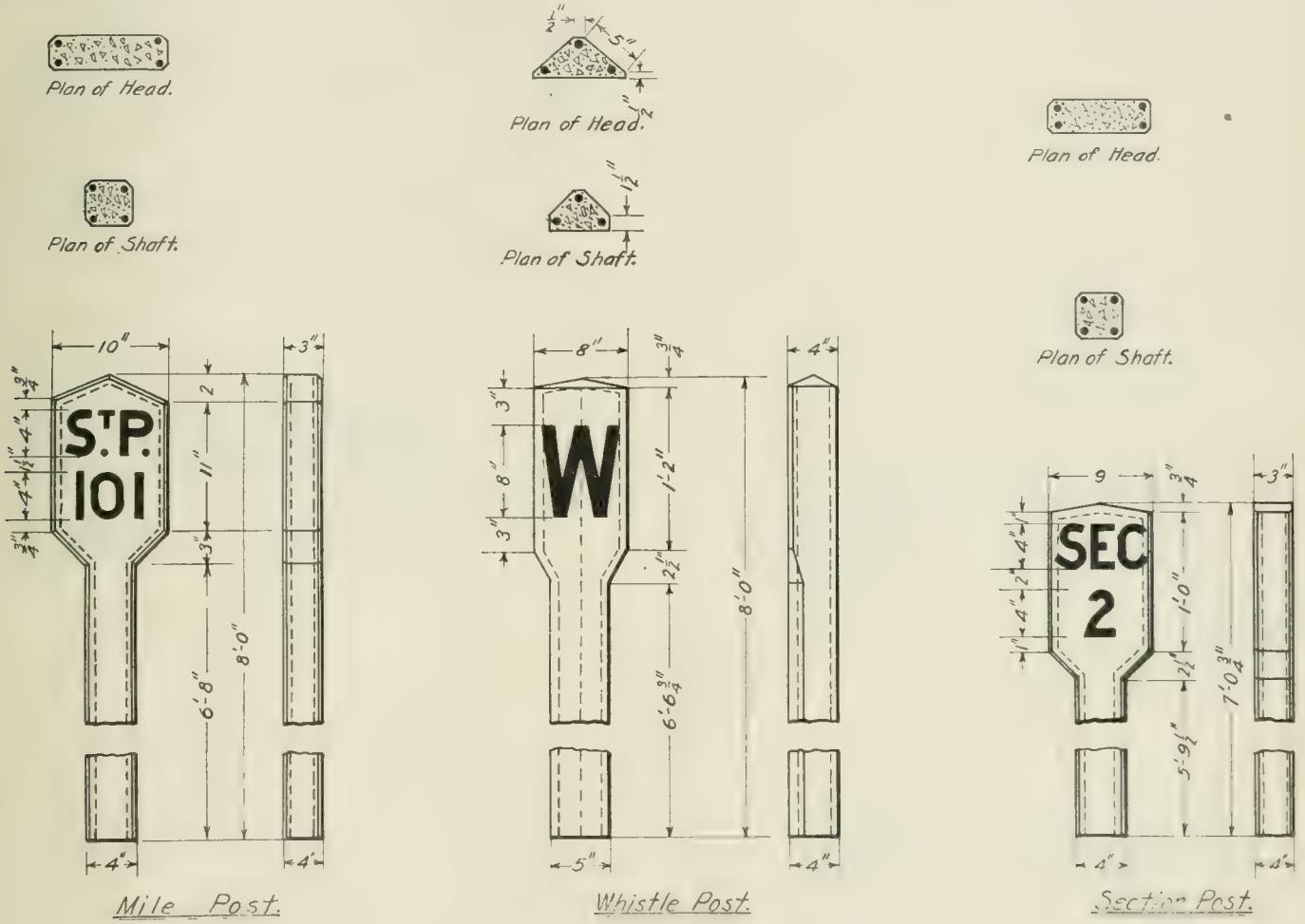
cutting the track and the rails in the track had been previously arranged so that the joints came at the right place to allow dropping the switch in the quickest time possible.

Double slip switch work was much more difficult. A No. 10 slip switch requires ties from 11 to 14 ft. long and timbers 10 in. x 12 in. and 12 in. x 12 in. from 8 to 14 ft. in length, laid, not square across the main line, but at right angles with the diagonal line of the switch. All ties and timbers had to be placed exactly according to the shop plan in order that all the plates might be in their proper position and that the entire turnout would be in proper line and gage when the work was completed. After the ties had been placed, one-half of the switch was assembled on each side of the track in which it was to be placed. The different parts of each half of the slip were bolted together, rails were cut for the connection and bolted on to the frog and stock rails. Switch plates were distributed between the ties and everything possible was done before the track was cut. When everything was in readiness, an opportunity was selected when there was some time between trains. Enough rail was taken out to allow one side of the switch to be quickly thrown in place with lining bars and spiked in a few places, gaging to the rail on the opposite side of the track. Trains were then allowed to pass over until an opportunity came to throw in the other side and gage it. The plates and switch rods were then put on by a few expert men. In handling this work care was taken to see that the original track was in perfect line and surface over the switch ties before the switch was thrown in, so that no lining or surfacing would be necessary before letting trains over. This work was all done with foreign labor. Eight No. 10 and four No. 8 double slip switches were installed under heavy traffic without any trains being diverted to other tracks and without any delay to traffic.

CONCRETE SIGN POSTS.

The Chicago, St. Paul, Minneapolis & Omaha has had concrete mile posts, whistle posts and section posts in service two years with very satisfactory results. The details of these posts are shown in the accompanying figure. The concrete consists of one part cement and two parts coarse sand. The reinforcing bars are ¼ in. round steel and are placed not less than ¾ in. from the surface.

The concrete is placed wet and well puddled before it sets to remove air bubbles. On all surfaces that are to bear letters or figures an ⅛-in. layer of the cement mixed wet enough to trowel easily is laid first and carefully worked to insure a smooth surface. After casting the posts are allowed to set for 48 hours before the sides of the molds are removed and for 48 hours more before the bottom plank is removed. In dry weather the posts are sprinkled during setting or covered with damp sacks to prevent too rapid drying of the surface.



Concrete Sign Posts on the C. St. P. M. & O.

They are made at the company shops at Hudson, Wis., and are shipped out over the system through the storekeeper as required. During the time that these posts have been in service they have proved that they are not affected by frost and are much easier to keep straight than wooden posts, since they do not heave in the ground in cold weather as wooden ones are likely to do. They are very neat in appearance, hold the paint better than wood, and are fireproof.

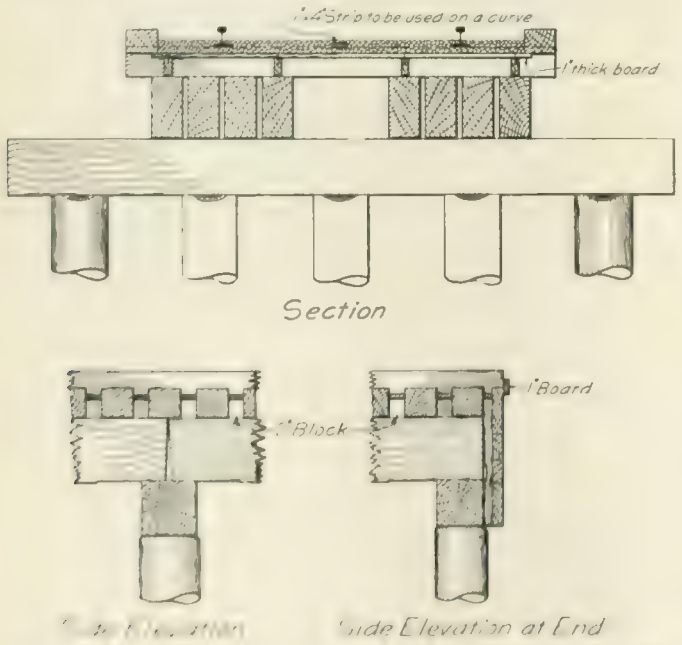
Concrete with reinforcing bars taken from stock			
Wood	2.00	2.00	1.25

PROTECTION OF WOODEN BRIDGES FROM FIRE.

Methods of protecting wooden bridges from fire are being carefully investigated on many roads. A large number of the roads have adopted some form of protection as standard, while others are seriously considering taking such action. The report of the committee of the Association of Operating Officers of the Chicago & North Western, published in the *Railway Age Gazette* of May 19, is an illustration of the movement in this direction. While timber bridges are being replaced by steel and concrete structures on many lines as fast as they require renewal, they will continue to exist on lines of less traffic for many years. As in the case of a washout, the burning of a trestle is a serious matter, not only because of the financial loss involved, but also because of the danger of accidents and the necessity of either tying up traffic entirely until the bridge can be rebuilt or by detouring it over another line. Somewhat closely allied with the subject of fireproofing is that of protection of timber against moisture, and in many cases the method adopted for one protects against both actions.

CAUSES OF FIRES.

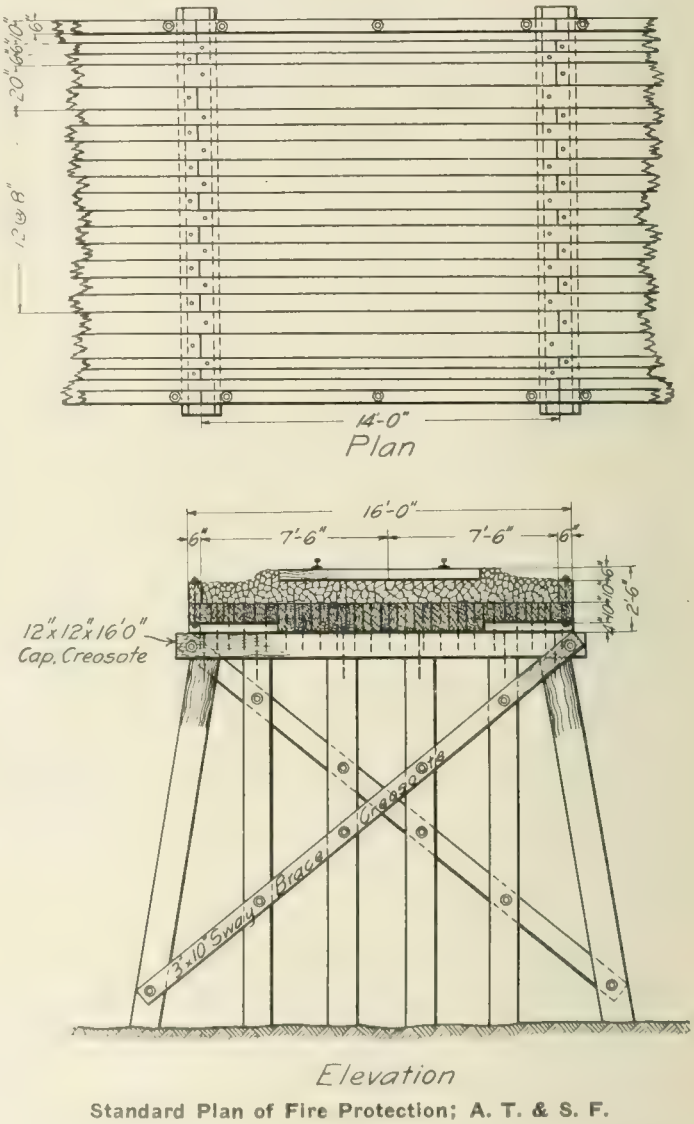
Fires in trestles start either from brush or grass fires on the ground beneath, or from live coals dropping from the ash pans of passing locomotives and lodging in the deck. A comparatively small number of fires also results from forest fires or adjacent conflagrations, while occasionally one will be started from a fire left smouldering by tramps under a bridge. Brush and grass fires can be very largely eliminated by requiring the section forces to keep all brush and vegetation cleared away from below the structures. In addition to this, the base of the piles should be surrounded with a strip of cinders, slag or gravel, which will not support vegetation and which will prevent fires



Standard Plan of Applying Ballasted Deck to Existing Trestle; C. R. I. & P.

from creeping up to the bridge. About 90 per cent. of the fires [illegible] originating on the deck of the structure, at open joints affording excellent lodgment for cinders, which will often smoulder for some time before actually breaking into flame. Especially [illegible] portions of the bridge are the [illegible] where, because the decay in the wood is apt to be farthest advanced.

The trouble with fires appears to have rapidly increased since the recent federal legislation requiring changes in the design of the locomotive ash pans has gone into effect. These regulations require that the pans be self-dumping, and after dumping it is frequently impossible to close them tight, because of cinders lodging, or owing to the warping of the pans, in which cases they scatter coals continuously along the track. It is necessary that the maintenance department have the full co-operation of the mechanical department in elminating as far as possible the cause of these fires, both by a prompt repair of the defective ash pans and by properly instructing and disciplining careless firemen. In many instances the number of the engine starting a fire is ascertained and reported. On most roads the



Standard Plan of Fire Protection; A. T. & S. F.

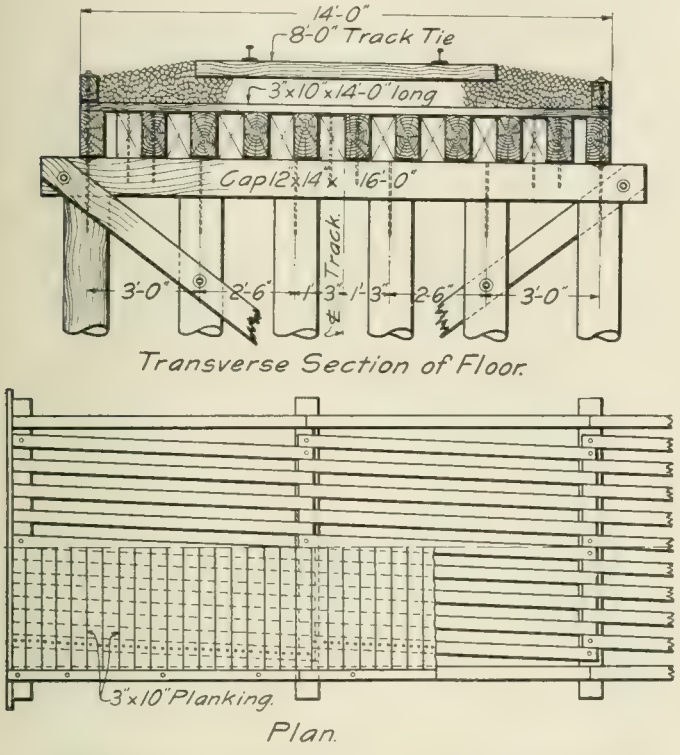
custom is to follow up such a report to see if the engine was properly inspected before leaving the terminal. If the ash pan is found to be in good condition the matter is then placed before the engine crew.

Another detail which should be given careful consideration is the removal of all rotten or sap wood from the timber, for such material affords the best lodgment for sparks and the decayed timber catches fire most readily. The track forces should be carefully instructed to keep all such material cleaned off. They do not ordinarily do this unless their attention is called to it and they are especially instructed. The removal of the decayed timber also tends to increase the life of the rest of the member. With no such material for sparks to lodge in a large proportion of coal falling on the timber do no damage. In fact, some roads do not consider it necessary to provide any protection for the new bridges and apply it only after the structure has had from one to two years' service. Careful attention should

be given to the subject of fire prevention, as well as fire protection, for this is much less expensive.

Open trestles have become such fire traps that many roads are providing some sort of protection for all new structures. In the construction of the Chicago, Milwaukee & Puget Sound all timber bridges were fireproofed from one end to the other. Many roads are also protecting structures already in service, and it seems probable that in a few years practically all timber structures will be protected in some manner.

The Canadian railway commissioners require track walkers to patrol all wooden bridges, the whole of which cannot be seen



Standard Plan of Fire Protection for New Structures; C. R. I. & P.

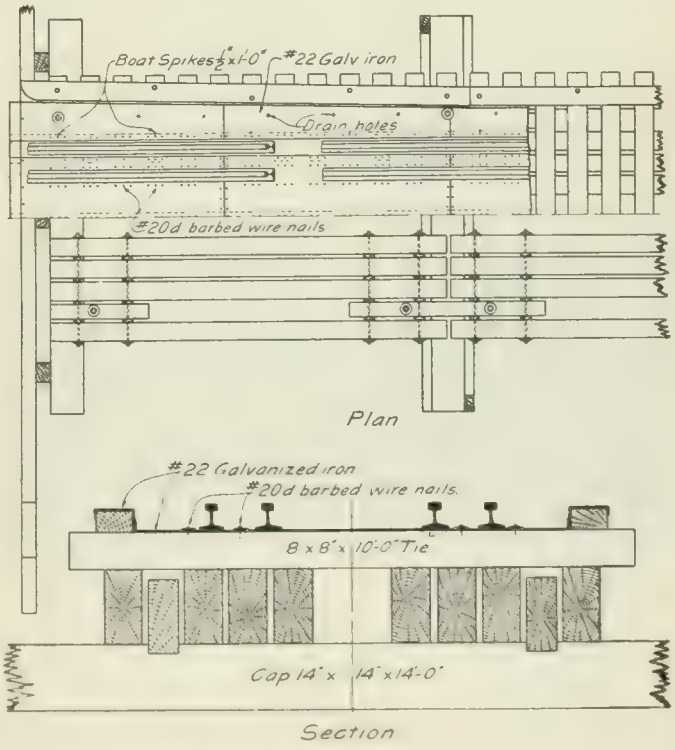
by an approaching train for a distance of at least 1,000 ft., and which are not protected from fire in a manner approved by the commission from May 1 to October 31. The track walker must patrol the track at least twice every 24 hours at intervals of not less than eight hours. It is also required that all brush be cleared away from beneath such structures and that water barrels be provided at frequent intervals. As the Canadian railways have done very little until recently towards fireproofing their trestles, track walkers are provided generally to comply with these requirements.

The annual fire loss is usually kept in the terms of the cost per lineal foot of trestle on the road, which is found by dividing the total loss in dollars by the total amount of trestles in service. This loss varies largely from year to year, and in making any estimate the average of several years should be considered. It very frequently happens that the fire loss for one year will be unusually high, owing to the destruction of one large structure. Climatic conditions, such as very dry weather, also greatly affect the losses, and render any one year's figures misleading.

BALLASTED DECK PROTECTION.

The more general forms of fire protection consist either in the construction of a ballasted deck or in the placing of a metal covering over all or part of the deck. Frequently other methods, such as the painting of a structure with fireproof paint, are adopted, but they are used only to a limited extent. The type of protection most generally used is the ballasted deck, which may either be applied to an old structure or built in connection with a new bridge. In adapting it to an old trestle planks are placed between the ties, forming with the ties a continuous floor, and the ballast is placed upon this. The principal point of difference on the various roads is the position of this plank vertically with reference to the tie. In some cases it is placed with its lower surface on the stringer flush with the tie, while in other cases it is placed with its upper surface level with the top of the tie. Other roads place the plank in all intermediate positions. The first plan offers the serious objection that a large area of the tie is exposed to the moisture which is retained by the ballast and its life is correspondingly decreased. On the other hand, if the plank is placed flush with the top of the tie no resistance is offered to the movement of the ballast over the deck, and the draft as well as the vibration created by moving trains bunch the ballast and leave portions of the timber entirely unprotected. A compromise of the two extremes, in which the top of the plank is placed about 1 in. below the top of the tie, has the minimum disadvantages in that but a small area of the tie is exposed to moisture, while sufficient lodgment is secured for the ballast to hold it in position.

The ballast should be either of coarse gravel or, preferably, crushed stone. With gravel the fine material will sift through the deck, leaving the stones, which will roll and offer little resistance to lateral movement of the track. Crushed stone is not open to this objection, and, while somewhat more expensive, is being used in most cases. Clay has been used on one road with good success, where it was found to practically waterproof the deck as well. The Duluth, South Shore & Atlantic has used stamped sand with better results than either gravel or clay. The application of a ballasted deck to an old structure in any case



Galvanized Iron Covering; C. B. & Q.

will result in shortening somewhat the life of the timber, as any ballast will hold moisture to a certain extent and hasten decay. For this reason several roads, including the Northern Pacific, have abandoned the ballasted deck for such structures and adopted other methods. The accompanying plan, showing the practice of the Chicago, Rock Island & Pacific, is typical of good practice in the application of ballasted decks to existing structures.

In constructing a ballasted deck in connection with a new bridge all the deck material is creosoted to resist the attack of

moisture contained in the ballast. In general, the piling has a life equal to that of two open decks and by treating the deck it will have a life equal to that of the piling. At first thought, the use of creosoted material in the system of fire protection might be considered unwise, but experience has shown the fire hazard to be small. Tests made by the New Haven road, both in the laboratory and in the field, showed that while creosoted ties ignited more readily and burned more fiercely than untreated ties, the effects were not nearly so serious, for in the burning of the creosote a film of carbon or soot formed on the surface of the timber which protected it and the fire did not work into the wood as far as in the untreated timber. Again, with such a deck only the guard rails are exposed to sparks falling from above.

The floor of the ballasted deck is either formed of stringers located closely together upon which the ballast is placed directly, or of planks laid side by side on sufficient stringers to carry the load. The plan of the Atchison, Topeka & Santa Fe, shown herewith, is an example of the first type. The deck is composed of 8-in. x 14-in. stringers placed side by side, upon which 10 in. of ballast is placed, the span length between bents being 14 ft. Beyond the ends of the ties 10-in. x 10-in., and 6-in. x 10-in. stringers are used with 4-in. planks on the caps. On the Seaboard Air Line 6-in. x 12-in. stringers are used, with a span length of 12 ft. 6 in. About six-tenths cubic yards of ballast is required per lineal foot of single track trestle. The standard plans of the Rock Island provide for 8-in. x 16-in. stringers placed 8 in. apart and skewed 8 in. in a span of 15 ft. Above these 3-in. x 10-in. planks are placed, and the ballast placed on this plank floor. On the Alabama Great Southern a similar arrangement is used, except that 6-in. x 16-in. stringers are placed parallel to the center line of the bridge.

Both types of ballasted deck structures are open to the objection that proper inspection is made more difficult, and that the cost of making repairs is largely increased. The item of repairs is, of course, more serious with the old structures than with a new structure built with a creosoted deck, as the latter type

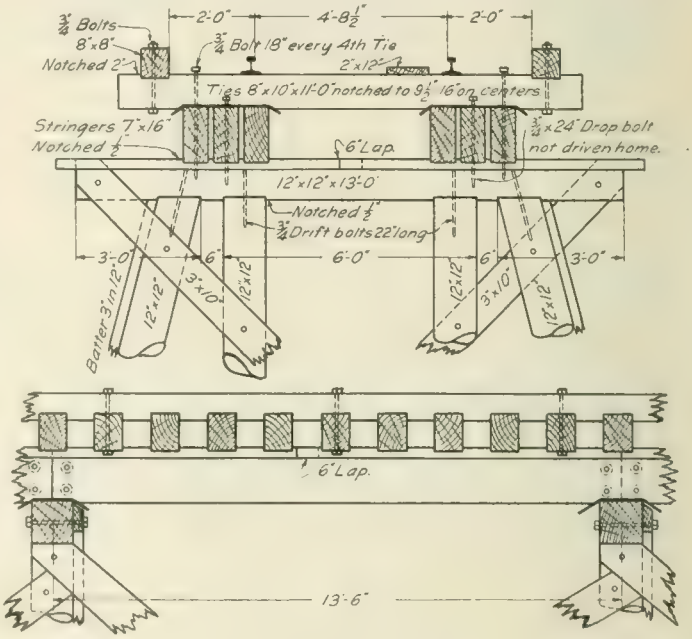
Method of Insulating Where Galvanized Iron Covering is Used.

should not require any repairs for a number of years. The cost of applying the ballasted deck to an old structure is about 30 cents per lineal foot, while the cost of the creosoted ballasted deck ranges from about $19 to $22 per lineal foot, or from $7 to $10 per lineal foot, the cost of the unprotected open deck.

In protecting trestles with a metal covering galvanized iron is most generally used, although some of the commercial forms of pure iron are beginning to be used to a limited extent. Two methods of placing this metal protection are common. One is to place the covering on top of the ties, thus protecting the entire deck, while the other is to cover but the caps and stringers. Either method also serves to protect the timber from

stringers have been covered for a number of years, the object being primarily to protect against moisture, but at the same time also protecting against fire. No. 22 galvanized iron is generally used, although No. 24 galvanized iron is used in some instances.

In covering the deck with metal some roads place it only inside the rails, as it is here that most of the coals drop from the ash pans. In other cases, the metal is carried under the rails from the outside fender to fender, and in many instances the fenders as well are covered, as shown in the drawing illustrating the practice on the Chicago, Burlington & Quincy. This latter method of complete protection costs from 75 cents to 80 cents per lineal foot of bridge. One serious objection to the use of galvanized iron is that with the metal commonly used corrosion resulting from the chemical action of the water and cinders is very destructive. When holes appear this covering



Stringers and Caps Covered with Galvanized Iron; Southern Railway.

assists rather than retards ignition by affording lodgment for the sparks, and becomes a menace rather than a protection. The dissatisfaction with this metal has led several roads to experiment with various forms of pure iron, which, although more expensive, are expected to give a relatively higher life. A completely covered deck with the iron in contact with the rails is seriously objectionable in automatic signal territory, and, if used, must be insulated. One road which is now installing automatic signals is removing the covering from the bridges within the limits of the signal work, because of this difficulty. However, the track can be readily insulated by removing a small strip of the metal along the center line of the track and covering the gap with a small wooden strip, as illustrated in the accompanying view showing the practice of the Northern Pacific in automatic signal territory. It has also been found difficult to prevent the covering from working loose as the vibration creates a strong tendency for the metal to creep. The action of brine dripping from refrigerator cars is also destructive to galvanized iron.

Where only the caps and stringers are covered, as illustrated by the practice on the Southern, the cost is reduced to about 40 cents per lineal foot of bridge. Although by this method ties and fenders are not protected, the more important members are, and if a spark should lodge in a tie the fire would not spread to any extent. Some object to this type of protection, because of the increased difficulty in inspection of the members, and the fact that the condition of the interior stringers cannot

be readily determined. This difficulty can be largely eliminated by placing the best timbers on the inside and the poorer ones where they can be watched. The life of timber protected in such a way from moisture should be that of three or four decks, and there should be no reason for the weakening of the inner chords if the poorer material is properly removed at the time the deck is renewed. Several instances have been noted where timber so protected has been found to be in good condition after over 20 years of service.

The action of salt water is very severe on galvanized iron, and on some roads near the seashore, such as the New Haven, it has been necessary to substitute zinc for galvanized iron.

OTHER METHODS.

The use of fireproofing paints has not been generally adopted throughout the country, but has been confined very largely to the New England states and Canada, where certain products have given good results. The use of a paint is one of the methods approved by the Canadian railway commissioners as complying with their requirements for fire protection. Fire-resisting paint is largely used on the Boston & Maine, New York, New Haven & Hartford and Central of Maine, and is standard on these roads. It has not been tried to any extent in the west until recently, but a number of roads are making careful tests of such materials now under conditions approaching actual service as closely as possible. From the favorable results secured in these tests so far, it appears probable that the use of paint will become more general throughout the country. One advantage of the use of paint is the ease of application. Also, it does not interfere in any way with inspection and repairs of a structure. The cost of paint applied to the deck averages about 29 cents per lineal foot of bridge. Where paint has been used it has been found to be effective for from three to five years, at the expiration of which time the structure should be repainted. Paint should be reapplied also following a fire, as it loses a large part of its effectiveness when exposed to one hot conflagration.

Another material used to a limited extent to protect bridges against fire is whitewash. This has been used on a number of roads, and while somewhat unsightly in appearance, has given good results. Whitewash also acts beneficially as a preservative of timber. Salt is also used with very good results in a number of instances, acting both as a fire retardant and as a preservative. The Illinois Central has used zinc treated material in open deck structures in several places with good results, finding that timber treated in this way was very hard to set on fire. In some few cases thin concrete or earth fire walls have also been considered by certain roads, but their use is very limited.

While several roads place ballasted decks on existing structures, the general practice is to protect such bridges with a galvanized iron covering until they require renewal, at which time ballasted decks are built. A comparatively heavy outlay for a ballasted deck for a structure with but a few years' life is not considered advisable. A combination of galvanized iron protection for caps and stringers with the ties protected by a fire-resisting paint should give an economical protection which would ward off fires for the remainder of the life of the structure. In building the new structures the ballasted deck is frequently adopted because of the advantages from the track standpoint as well as fire protection, and its use is in accordance with present day good practice.

The government of Brazil has adopted the plans to extend the Central Railroad of Brazil from Pirapora to Belem on the northern coast. This project will bring the state of Amazonia into closer touch with central and south Brazil, and will shorten the time necessary for the trip between Rio de Janeiro and Belem from 12 days to 3 days. The contract for carrying out this project will be submitted for public competition.

WOOD PRESERVERS' ASSOCIATION.

The eighth annual convention of the Wood Preservers' Association will be held at the Hotel Sherman, Chicago, January 16, 17 and 18, 1912. Papers will be presented as follows: Production of the Wooden Cross Tie, by A. R. Joyce; Treating Seasoned versus Unseasoned Ties, by F. J. Angier, superintendent timber preservation Baltimore & Ohio; Cutting and Seasoning Timber, by A. Meyer, superintendent Chicago, Burlington & Quincy tie plant; Creosotes and Creosoting Oils, by David Allerton; Efficiency in Plant Operation, by E. A. Sterling, forester Pennsylvania Railroad; Creosote Oil Specifications and Methods of Analysis, by S. R. Church, chemist Barrett Manufacturing Company; Inspectors and Inspection of Material and Treatments at Commercial plants, by R. L. Allardyce; Preservation of Power Transmission Poles, by W. R. Wheaton, timber engineer San Joaquin Light & Power Company; Wood Block Pavement from Construction Standpoint, by Day I. Okes, the Kettle River Company.

In addition to these papers, Howard F. Weiss, assistant director of the forest products laboratory at Madison, Wis., will give an illustrated lecture on the Structure of Commercial Woods in Relation to Their Injection with Preservatives. Other papers will be presented by W. F. Goltra, president W. F. Goltra Tie Company; R. J. Calder, secretary International Creosoting & Construction Company; J. H. Nelson, Carolina Pine Lumber Company; M. Fredendoll, chemist Atchison, Topeka & Santa Fe; J. H. Waterman, superintendent timber preservation Chicago, Burlington & Quincy; Dr. von Schrenk, consulting timber engineer Chicago, Rock Island & Pacific, and H. M. Rollins, superintendent Gulfport Creosoting Company.

The annual banquet for members and friends will be given on Wednesday evening.

The association is completing a very prosperous year. The membership has nearly doubled during the year, and a great deal of interest is being taken in its work.

SECTION FOREMEN'S INSPECTION TRIPS.

The plan was adopted on the Shasta division of the Southern Pacific last summer of sending the section foremen over the division on an inspection trip monthly. The foremen on alternate sections only made this trip at the same time, and the jurisdiction of those foremen remaining at home was extended over the two sections for that day to provide for the regular track patrol and any emergency. The men gathered at some point on the line and Division Superintendent J. W. Metcalf's car was turned over to them. The car was attached to one of the regular trains and the men traveled over the division noting the conditions of the different foremen's track and discussing it among themselves. The foremen called attention to any irregularities or deviations from the standards provided by the company, and these were checked closely with prints which were carried on the trip, and any faulty ideas corrected. The maintenance rules of the company were also discussed freely and explained for the benefit of the foremen. Methods of maintaining track were also talked over among them for the special benefit of the younger foremen, who received much information which was of assistance to them in handling their work more rapidly and economically.

The roadmaster and the division accountant made the trip with the men, the division engineer and superintendent remaining away so that they would feel more free to discuss and criticise one another's work. Before the first trip was made they were given to understand that this arrangement was made primarily for business and would not be continued unless direct benefits were secured. The men entered heartily into the spirit of the plan and gained much good from the mutual criticisms and suggestions.

In the evening the men were gathered about a table in the

car and the accountant explained the various accounts established by the Interstate Commerce Commission, and used by maintenance of way employees, instructing them regarding the proper preparation of their reports. After this a general discussion was indulged in, and any points of doubt or interest brought out and settled.

The local officials are highly pleased with the results and expect to continue these trips next year. In addition to giving the men a broader view of track work, they tend towards uniformity of work on the division as well as increased efficiency, for the foremen absorb many new ideas on them. It is found that the men are not backward in criticising one another, and this criticism acts as a strong incentive for each of them to keep his work in good condition, for when a man is once criticised for some detail he is quite certain to see that he is not caught on the same point the next trip. Such criticism is often more effective than that of the higher officers. Several of the foremen have written unsolicited letters to the division officers telling of the benefits they have received.

THE TURNOUT.*

BY F. S. STEVENS,
Engineer Maintenance of Way, Philadelphia & Reading.

Much has been said and written on the subject of turnouts and probably nothing that is new can be offered, but perhaps attention can be invited to some features of merit that are not in such common use as they would be if the benefits to be gained by their use were better understood or more generally recognized.

The most symmetrical and desirable form of turnout from an operating standpoint would be a continuous curve from point of switch to point of frog, the curve being tangent to the center line of track at both points, and the turnout distance being equal to twice the width of the gage multiplied by the number of the frog. A switch that would make such ideal conditions of installation and operation possible has not yet been invented, the nearest approach being the split or point switch, making an angle of approximately 1 deg. with the main rail. Where switches of this angle are installed, speeds of from 30 to 35 ft. per second can be maintained with little discomfort, and as at this speed the turnout curve of approximately 3 deg. that would be used with a No. 15 frog can be operated without superelevation and with less discomfort than is caused by the change of direction at the point of the switch, it follows that frogs of less angle need not be used unless other conditions than speed of operation over turnouts become the governing factors.

The extreme points of all switches should be protected from contact with wheels as far as possible to prolong the life of the switch rails by avoiding wear where the metal has the least section. It has been demonstrated frequently that where switches with thick points are used and the extreme points are struck at intervals by passing wheels, the metal wears off rapidly because after the wheels strike such points they recoil, the switch rails soon become very blunt and cars with badly worn or sharp flanges are liable to be derailed. This condition is seldom found where switches with fine and well-fitting points are used, because such points provide a relatively smooth surface for the flanges of the wheels to follow and the hard impinging and grinding blows that are received by blunt switch points are avoided, so that the rails wear evenly throughout their length, last much longer, are safe to continue in service until the rails are worn out, and are, therefore, much more economical to use.

[illegible] outs where split switches are used, but common practice appears to confirm the view that in ordinary main line and yard [illegible] proximately four times the switch angle. If this practice were followed a switch 10 ft. long would not be used with a frog of less angle than No. 5, a switch 15 ft. long would not be used with a frog of less angle than No. 8, a switch 20 ft. long would not be used with a frog of less angle than No. 10, and a switch 26 ft. long would not be used with a frog of less angle than No. 15.

It is also proper to invite attention to the advantage that can sometimes be gained where the length of the radius is the controlling factor, by curving both switch and frog, using a frog of the least angle that will meet conditions and turning part of the angle back of the frog, thereby increasing the radius and making it possible in some cases to operate engines, the use of which would otherwise be prohibited.

In cases where room is limited and it is important that the greatest possible length of radius be used, some time can generally be saved by making a diagram on tracing linen of the frog angle to be used and from the intersection of the gage lines draw the radial lines; then by placing this tracing over the plan of the existing track and sticking a pin through the radial line at the point from which the diagram will rotate to the point to be reached, the greatest radius possible with the frog angle assumed will be shown, and as the radius of the turnout curve should be a little longer than the radius of the curve back of the frog, the use of the diagram will also show whether the frog angle assumed is the proper one, and if not, whether a less or greater angle should be used.

In arranging for new installations the first and most important matter is to decide on the angle of frog most suitable to be used, or that will best meet the conditions as to room available, character and volume of traffic to be handled and speed of movement. If room is limited, the minimum length of radius that is permissible is often the controlling factor, when, to secure the best possible results, both frog and switch must be curved on the turnout side, to the end that all distance available may be utilized in turning angle and thereby secure the easiest curvature that the fog angle and the other conditions will permit.

If that part of the switch rail back of the planing that is bent to form part of the turnout curve is longer than the wing rail of the frog, that also becomes a part of this curve, and the distance from point of switch to point of frog is correspondingly shortened, because with given switch and frog angles the distance from point of frog to center of the turnout curve cannot be changed. But as the switch generally makes a somewhat greater angle with the main rail than was used in computing the turnout distance, it follows that in adjusting the theoretical to a practical distance to avoid unnecessary use of rail or to cut rail to advantage, it is proper to reduce the theoretical distances given in the table, within reasonable limits, this reduction being small, of course, when frogs of large angle are used and increasing as the frog angle diminishes. But as a reduction in distance is a concession that is admissible only on the basis of a corresponding increase in switch angle, the reduction should not be much in any case, and as the distances, or lengths of rail, on both the lead and turnout sides are given, the proper difference in length should be maintained, and it is desirable that, where it is possible to do so, a cut of one rail be made in such a way as to make the lengths required on both sides.

If, however, the question is one of maintaining speed or avoiding unnecessary loss of time by reduction of speed in passing through turnouts or crossovers, the switch angle instead of the frog angle becomes the more important matter for consideration, because the angle of the switch causes an abrupt change in direction without any easement whatever. To reduce the shock as much as possible, the angle is reduced in our longer and easier switches to approximately one degree, but this is too great a change in direction to be made at high speed. Therefore the speed must be modified to meet track conditions, with the result that more or less time must be lost when turnouts must

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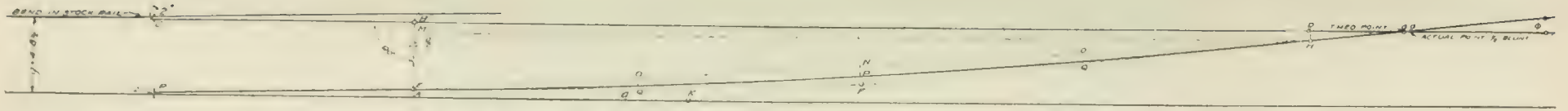


SWITCH RAILS PLANED TO ⅛ THICKNESS AT POINT AND SQUARE WHEN HALF THROWN

THEORETICAL POINT OF ALL FROGS ⅔ OF TOTAL LENGTH FROM TOE AND ⅓ OF TOTAL LENGTH FROM HEEL

FROG RATIO	LENGTH	ANGLE Φ	SINE	TANGENT	COSINE	DEGREE OF CURVE	RADIUS	DISTANCE FROM HEEL	LENGTH OF SW. FROG TOE	LENGTH OF SWITCH	ANGLE OF SWITCH Θ	RAD. OF SW. TOE	SINE	SPREAD AT HEEL	Φ÷2	SINE	TANGENT	COSINE	DIST. FROM G.-E. IN SW. Θ	Θ/2	SINE	LEAD SIDE BO	TURNOUT ARC EH	TOTAL LEAD SIDE CG+T	Φ÷2	SINE	TURNOUT RADIUS	TURNOUT CURVE	MIDDLE ORDINATE	SIDE ORDINATE
1-3	15	18°55'28"	3243210	3428833	9453947	6°00'	125	135'	10.0	10.455	2°44'41"	1°20870	0479167	21	10°00'0"	1879881	1813398	9827717	4300	1°22'23	0239620	23.520	24.020	27.560	8°05'20	1407092	85.0620	67°22	.846	.654
1-4		14°19'00	2465333	2539866	9692851		167	317						50	8°29'44"	1477154	1429416	9890209	2731			18.193	18.512	34.175	5°43'06"	1002170	92.2050	62°10	.464	.348
														21					4500			30.225	30.505	34.305			151.930	37°42	.705	.573
1-5		11°25'16"	1980183	2020119	9801198		208	1814	11.0	11.478	2°37'48"	1°22.956	0435606	50	8°22'44"	1456216	1431131	9893407	1°14.54	0217958	30.671	30.936	35.142	5°32.56	1023874	150.907	37°58'	.770	.577
									10.0	10.455	2°44.41	1°20.870	0479167		7°05.0"	1233	1212.6	9923073	3020	1°22.23	0239620	24.285	24.514	40.194	4°20.14"	0756266	161.914	35°22	.464	.348
														21					4500			36.320	36.526	40.703			241.251	23°45	.690	.517
									11.0	11.478	2°39.38	1°22.936	0435606		6°57.32	1211.571	1192.056	9926334	"	1°14.54	0217958	36.966	37.179	41.478	4°27.44	0778017	238.697	24°00	.724	.543
1-6		9°31'38	1653162	1678311	9862071		250	0995	13.0	13.652	2°49.30	1°31.304	0531433		6°37.33	1153.850	1136.62	9933208	"	0°34.55	0150740	38.812	39.052	44.889	4°47.43	0835813	233.306	24°35	.817	.612
									10.0	10.455	2°44.41	1°20.870	0479167	50	6°08.12	1069004	1053116	9943698	3215	1°22.23	0239620	29.875	30.094	46.123	5°23.25	0591370	254.282	22°32	.445	.333
														21					4500			41.962	42.121	46.595			353.911	16°06	.625	.467
									11.0	11.478	2°39.48	1°22.956	0435606	50	6°00.43	1047358	1036.316	9945000	3215	1°14.54	0217958	30.536	30.715	47.786	5°30.33	0863147	250.313	22°55	.471	.353
														21					4500			42.821	42.992	47.898			350.365	16°21	.659	.494
									5.0	15.652	1°49.50"	1°31.304	0531434	50	5°40.44"	0989530	0979440	9950922	3215	0°54.55"	0158739	32.319	32.514	53.569	5°30.54	0871156	242.045	23°41	.546	.409
														21					4500			45.325	45.510	52.149			338.788	16°55	.764	.573
1-7		8°10'17"	4213471	4335922	9898471		292	0855	16.5	17.217	1°39.31"		0290404		5°35.44"	0975057	0979072	9952349	"	0°49.55	0145197	45.996	46.189	53.477	5°39.33	0956618	336.585	17°01	.792	.594
									10.0	10.455	2°44.41	1°20.870	0479167	50	5°27.32	0951316	0935563	9954646	3355	1°22.23	0239620	35.147	35.280	51.459	2°42.45	0473144	372.609	15°23	.418	.313
									11.0	11.478	2°39.48	1°22.936	0435606		5°20.05	0929596	0913564	9956600	"	1°14.54	0217958	35.966	36.107	53.258	2°50.14	0494986	364.566	15°45	.447	.335
									13.0	13.652	1°49.50"	1°31.304	0531433		5°00.03	0871702	0857503	9961934	"	0°54.55"	0158739	38.348	38.509	59.640	3°10.13	0553035	347.971	16°28	.530	.397
									16.5	17.217	1°39.51"	1°34.435	0290404		4°55.04	0857260	0846.42	9963187	"	0°49.55	0145197	38.993	39.157	67.785	3°51.19	0567557	344.776	16°37	.554	.415
									18.0	18.783	1°31.31	1°37.565	0266179		4°50.54	0846.84	0834.22	9964250	"	0°45.45	0133078	39.550	39.718	68.842	3°19.23	0579657	342.409	16°46	.576	.432
1-8		7°09'10"	1244963	1254772	9922220		333	0747	13.0	13.652	1°49.50"	1°31.304	0531444		4°29.30	0783341	0778535	9969287	3461	0°54.55	0158739	44.078	44.210	65.411	2°39.40	0464284	475.937	12°01	.513	.385
									16.5	17.217	1°39.51"	1°34.435	0290404		4°24.30	0768640	0771091	9970416	"	0°49.55	0145197	44.909	45.047	67.742	2°44.30	0478764	470.252	12°11	.539	.404
									18.0	18.783	1°31.31	1°37.565	0266179		4°20.20	0756456	0753875	9971540	"	0°45.45	0133078	45.825	45.988	69.958	2°48.40	0490870	465.979	12°18	.562	.421
1-9		6°21'35	1107703	1114453	9935841		375	0665	15.0	15.652	1°49.50"	1°31.304	0531444		4°01.47	0714103	0711592	9974416	3543	0°54.55	0158739	49.518	49.630	70.893	2°15.52	0395117	627839	9°07	.490	.367
									16.5	17.217	1°39.51"	1°34.435	0290404		4°00.45	0699643	0701.56	9975445	"	0°49.55	0145197	50.540	50.654	73.413	2°20.57	0409630	618.089	9°16	.517	.387
									18.0	18.783	1°31.31	1°37.565	0266179		3°56.33	0687353	0689.18	9976335	"	0°45.45	0133078	51.302	51.345	75.877	2°25.02	0421760	610.802	9°25	.544	.408
									20.0	20.869	1°22.22"	1°41.738	0239383		3°51.58	0674254	0675.78	9977245	"	0°41.11	0119794	52.441	52.566	78.816	2°29.36	0435032	603.944	9°29	.572	.429
1-10		5°43'30	0997339	1002454	9945012		417	0538	16.5	17.217	1°39.51"	1°34.435	0290404		3°31.43	0644333	0645.70	9979219	3610	0°49.55	0145197	55.039	56.031	78.856	2°0.49	0354276	790.697	7°15'	.407	.372
									18.0	18.783	1°31.31	1°37.565	0266179		3°31.30	0658259	0658.52	9979992	"	0°45.45	0133078	57.009	57.107	81.426	2°06.00	0366437	779.086	7°21	.524	.393
									20.0	20.869	1°22.22"	1°41.738	0239383		3°32.56	0618002	0620.18	9980823	"	0°41.11	0119794	58.229	58.339	84.646	2°10.51	0379712	767.950	7°28	.555	.415
									24.0	25.043	1°08.38"	1°50.086	0199653		3°26.04	0559065	0560.15	9982902	"	0°34.19	0099821	60.225	60.272	90.042	2°17.26	0399670	755.872	7°36	.603	.452
1-11		5°12'19	0907243	0911100	9958176		458	0544	20.0	20.869	1°22.22"	1°41.738	0239383		3°17.20	0573704	0571564	9985528	3664	0°41.11	0119794	63.676	63.882	90.154	1°58.58	0334362	955.065	6°00	.534	.400
									24.0	25.043	1°08.38"	1°50.086	0199653		3°10.28	0553158	0554.61	9984683	"	0°34.19	0099821	66.081	66.184	96.399	2°01.30	0353424	933.093	6°08	.587	.440
									26.0	27.130	1°03.21"	1°54.260	0184295		3°07.50	0546113	0546.82	9985077	"	0°31.40	0092115	67.014	67.107	99.472	2°04.29	0362028	926.613	6°11	.608	.456
1-12	20	4°46'10	0831898	0834479	9965333	8.00	500	0665	20.0	20.869	1°22.22"	1°41.738	0239383		3°04.20	0535947	0536.71	9985628	3543	0°41.11	0119794	66.035	66.117	94.533	1°41.58"	0296565	1114.343	5°08	.491	.368
									24.0	25.043	1°08.38"	1°50.086	0199653		2°57.28	0516001	0516.68	9986618	"	0°34.19	0099821	68.586	68.674	101.086	1°48.50	0316530	1084.605	5°17	.544	.408
									26.0	27.130	1°03.21"	1°54.260	0184295		2°54.30	0508351	0509.00	9987071	"	0°31.40	0092115	67.618	69.708	104.118	1°51.89"	0324235	1074.776	5°20	.565	.423
									28.0	29.217	0°58.50"	1°58.435	0171131		2°52.34	0501765	0502.40	9987603	"	0°29.25	0085568	70.529	70.623	107.029	1°55.44	0330776	1067.338	5°22	.584	.438
1-13		4°24'18	0768060	0771033	9970446		542	0614	24.0	25.043	1°08.38"	1°50.086	0199653		2°46.28	0484043	0484.61	9988532	3594	0°34.19	0099821	74.181	74.266	106.723	1°57.50	0284547	1304.705	4°24	.490	.368
									28.0	29.217	0°58.50"	1°58.435	0171131		2°41.24	0469806	0470.28	9988958	"	0°29.25	0085568	76.454	76.512	112.976	1°42.44	0298794	1280.146	4°29	.571	.428
1-14		4°03'28	0713427	0716325	9974452		583	0571	24.0	25.043	1°08.38"	1°50.086	0199653		2°37.03	0456681	0457.16	9989507	3637	0°34.19	0099821	79.378	79.650	112.161	1°28.25	0257168	1548.416	3°42	.512	.384
									28.0	29.217	0°58.50"	1°58.435	0171131		2°32.09	0442442	0442.87	9990208	"	0°29.25	0085568	82.159	82.212	118.722	1°33.19	0271414	1514.328	3°47	.536	.418
1-15		3°49'06	0665931	0668141	9977180		625	0533	24.0	25.043	1°08.38"	1°50.086	0199653		2°28.52	0432900	0433.30	9990626	3675	0°34.19	0099821	84.838	84.900	117.463	1°20.14"	0253367	1818.852	3°09	.496	.372
									26.0	27.130	1°03.21"	1°54.260	0184295		2°26.15	0425199	0425.58	9990956	"	0°31.40	0092115	86.379	86.438	120.998	1°22.52	0241026	1792.900	3°12	.520	.390
									28.0	29.217	0°58.51"	1°58.435	0171131		2°23.56	0418660	0419.03	9991233	"	0°29.25	0085568	87.720	87.789	124.345	1°25.08	0247618	1772.488	3°14	.544	.408
									30.0	31.304	0°54.55"	1°62.608	0159722		2°22.00	0412944	0413.29	9991470	"	0°27.27	0079872	88.935	89.003	127.360	1°27.05	0253988	1756.794	3°16'	.564	.423
1-16	26	3°34'47	0624373	0625539	9980350	10.00	667	0624	28.0	29.217	0°58.50"	1°58.435	0171131		2°10.48	0397829	0398.14	9992080	3584	0°29.25	0085568	90.052	90.096	126.699	1°17.58	0226776	1986.277	2°53	.518	.384
									30.0	31.304	0°54.55"	1°62.608	0159722		2°14.31	0392162	0392.46	9992310	"	0°27.27	0079872	91.332	91.394	131.999	1°19.56	0232496	1905.410	2°56	.538	.399
1-18		3°10'86	0553117	0553397	9984438		750	0553	28.0	29.217	0°58.50"	1°58.435	0171131		2°04.53	0383191	0383.45	9993300	3653	0°29.25	0085568	100.334	100.387	139.284	1°06.03	0192119	2617.649	2°11'	.485	.362
									30.0	31.304	0°54.56"	1°62.608	0159722		2°02.55	0357474	0357.70	9993610	"	0°27.27	0079872	102.142	102.197	142.892	1°08.00	0197791	2583.282	2°13	.506	.379
1-20	30	2°51'51"	0499683	0500030	9987351	12.00	833	0600							1°53.25	0329759	0329.93	9994360	3608			109.374	109.418	132.207	0°58.28	0170064	3216.818	1°47	.465	.348
									33.0	34.434	0°49.49"	1°68.869	0144899		1°50.30	0322345	0322.50	9994800		0°24.54	0072430	111.891	111.936	157.124	1°C' 01"	0177480	3133.308	1°49	.497	.378

NOTE-

THE FOLLOWING TURNOUTS LISTED IN THE TABLE HAVE THE FROG CURVED AND THE SWITCH CURVED BACK OF PLANING: FROG RATIO, 1-3; SECOND AND THIRD OF FROG RATIO 1-4; SECOND, THIRD AND FOURTH OF FROG RATIO 1-5; AND SECOND, FOURTH, SIXTH AND SEVENTH OF FROG RATIO 1-6.

ALL OTHRS LISTED IN THE TABLE HAVE STRAIGHT FROG AND STRAIGHT SWITCH.

Theoretical and Practical Dimensions of Turnouts.

be used. In some cases it is possible to overcome most of the trouble by placing the frog on the center line of track, thus bisecting both the frog angle and the switch angle as to change of direction of moving trains and thereby avoiding the necessity for material reduction in speed. In either case, however, it appears that the use of frogs of a less ratio than one to fifteen is unnecessary, because on account of light curvature the change of direction after passing the switch at proper speed is made without discomfort and in safety, and as frogs of small angle are very costly both to install and to maintain, it appears to be desirable to keep the frog angle as large as is consistent with the conditions that must be met.

In this connection it is proper to invite attention to the difficulties to be met in properly operating switches of extreme length and to the little, if any, advantage that is gained by their use. The standard length of rail is now 33 ft., and the standard weight can be said to be 90 lbs. per yard. The standard length of rails weighing 50 to 60 lbs. per yard was 30 ft. It appears, therefore, that the standard length has not been increased in proportion to the increase in weight and this is one reason why switches 30 ft. in length are not well adapted to ordinary use. Switches of all lengths and angles should be provided with heel blocks to fill the space between the heel of the switch and the stock rail and fit the rails as well as any other splice bar. The stock rail should pass at least 6 ft. beyond the heels of switches so that the ills that are caused by joints placed close together may be avoided. These conditions could not be produced by using rails 33 ft. and switches 30 ft. in length, and as there does not appear to be any reason to expect that the standard length of rails will be increased in the near future, we must consider the reasonable alternative of shortening the switch.

If we use switches 30 ft. in length and permit the heels of them to droop to a noticeable extent, the body of the switch will drag on the plates and the rails will not move into position on either side until they are struck by the wheels of a passing train. This is surely a very undesirable condition, but it is not uncommon when switches of this, or even somewhat shorter, length are used, and the trouble increases as the switches become somewhat worn, so that some remedy without too much sacrifice of the advantages of a small switch angle appears to be necessary.

In some cases a switch 24 ft. in length has been thought to be satisfactory; others have used switches 27 ft. long and have had no trouble as to loss of time, so that it may not be unreasonable or improper to suggest 26 ft. as a suitable length for a maximum limit when fair speed must be maintained. The angle would be approximately one degree and the joint at both heel and toe of switch could be made to clear the joints in the main or stock rails enough to avoid interference and to avoid also a joint in the stock rail opposite the heel of the switch, but the conditions would be much better if the joints in the stock rails could be further removed.

The advantages to be gained from the use of heel blocks are generally recognized. The switch rails need the rigid and ample support at their heels that apparently cannot be supplied in any other way, and if the heel blocks are properly fitted and afford the same support as angle bars and the bolts pass through the holes bored in the body of the stock rails instead of through the holes provided for a splice, the heel of the switch is properly and efficiently supported and there is then no excuse for the "down at the heel" appearance so frequently noted.

It is important that the entire length of the switch be carried on suitable switch plates with a uniform height of riser throughout. It is also important, and particularly so in turnouts of short [illegible] desirable that the lead and turnout rails be cut at the mills to proper length, so that both frog and switch can be spliced to the same rail and the greatest possible rigidity obtained. This practice has frequently been followed and in every case noted [illegible] and it has been found to be much easier to keep frogs and switches in proper condition than where lead and turnout rails are spliced. The main track or ladder track shrould be in good surface and accurately lined before guard rails and turnout rails are spiked.

Another matter of importance that merits attention is the fact that all switch rails in being moved or shifted from one position to the other must either be curved alternately throughout their length, as will be the case if firmly and properly held by the splice bars, or they may swing freely, making an angle at the heel, as may be the case if the switch is neglected and the splices are allowed to become so loose that they act merely as hinges. If the splice bars at the heels of switch are drawn down by the bolts to as close and rigid a fit as it is possible to get by the aid of both a hammer and a wrench, and the heel blocks fit both the main or stock rail and the switch or turnout rail accurately and at least three ties intervene between the joint at the heel of the switch and the nearest joint in the stock rail, the switch will be securely held in place and it will be necessary only to maintain these conditions to secure durability and low cost of maintenance. If then the head rod only is applied, the switch rails will move freely and the rigid joint at the heel will produce approximately the same results as if the switch rails were continuous to the frog; but on account of the danger of breakage of some important part it is thought to be desirable to put on more rods and in doing so the common practice is to suppose both switch rails to be straight at all times, or exactly as they are when they are neglected and the splices at their heels are simply hinges, with the result that if these switches do receive proper attention and the splices are kept tight, the additional switch rods that have been put on are too short and the switch rail that should lie straight is drawn in by the tension on the opposite switch rail that should lie in a curve, the gage is crowded by one of the rails and both are strained by the short rods. This may not be quite the right way to state the case, because the switch rods are supposed to be of the same length and the clips or lugs attached to the rails should vary in length according to the section of rail used and their position on the switch, but at a given position on the switch rail the distance from the back of the rail to the center of the hole in the clip or lug should be the same regardless of the section of rail used, so long as the angle of the switch is unchanged.

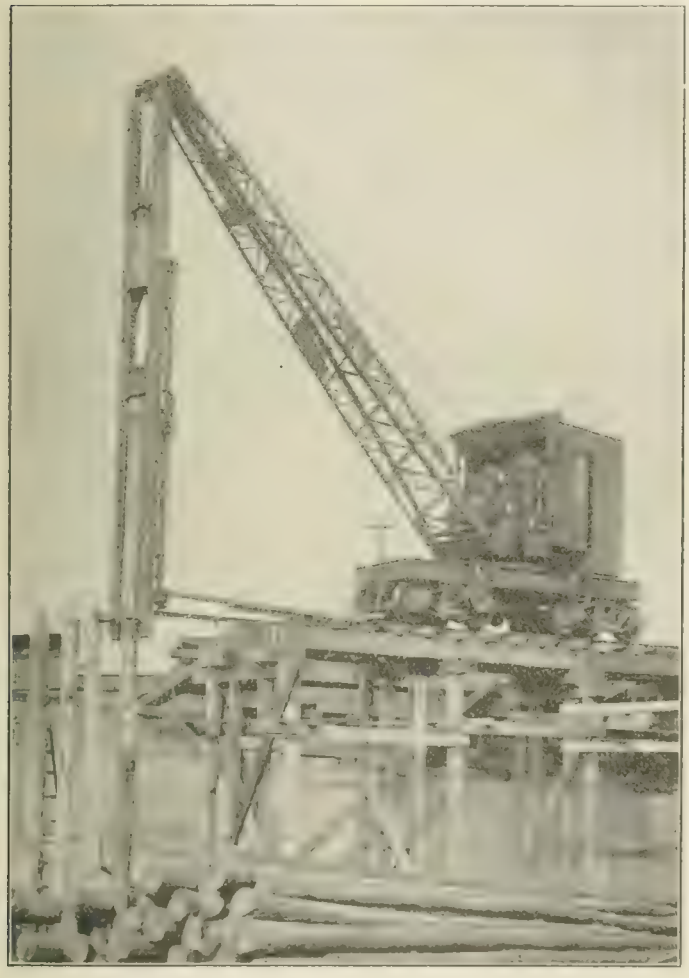
It is evident that to have switches that will work freely and be easy to operate it is necessary that they should work as well with two or three rods on them as with one, and that to secure this result it is necessary that the rods should fit without strain at all times. To accomplish this it is necessary to treat one rail as being straight or a part of the main track and the other as a curve with the line of the switch rail in its working position, a tangent common to both the turnout curve and the switch rail in its curved position. The distance from back of switch rail to center of hole in the lug in all cases should be one-half of the distance remaining after subtracting the distance between centers of holes in the switch rods from the total distance back to back of switch rails, thereby securing an equal distance from back of switch rail to center of hole on opposite sides and making all switch rails of one angle of planing interchangeable. The switch rods back of the No. 1 rod, or the rod near the point of the switch, being generally simply idlers provided to serve in emergencies and incidentally perhaps to relieve the head rod somewhat, add stiffness to the switch as a whole, and insure a more uniform movement of the rails.

The table of turnouts attached was computed by the methods recommended by the Committee on Track of the association.

It is not expected that any one person will make general use of the entire table, or that switches and frogs of all ratios or angles that have been considered will be used by any one person or company, but it is believed that nearly or quite all of them, except possibly a few at the bottom of the list, will be [illegible]

LOCOMOTIVE CRANE ON CONSTRUCTION WORK.

The New York, Chicago & St. Louis has used a Brownhoist locomotive crane extensively for various kinds of work in connection with its track elevation in Cleveland. Among other duties it has used the crane for driving piles. A common pile driver was first used for this, but the contractor believed that this was costing too much, and devised a plan for driving the piles with a locomotive crane by fastening guides to the end of the crane boom and operating it similarly to the regular drop hammer method, as shown in the accompanying view. Two 25-ft. guides are hung from the end of the crane by a bolt and are free to swing back and forth. When driving, the lower end of the guides are held rigid by a brace fastened to the completed portion of the trestle. The piling is securely held in the guides by several cross braces on the back side and by an



Driving Piles with a Locomotive Crane.

iron bar placed across the two hooks at the bottom of the guide in front. The hammer is operated with a single hoisting rope and hook controlled by the operator of the crane. A bolt inserted in one of the guides acts as a trigger for releasing the hammer at the top. The crane hoists the piles up into the guides before driving with the same hoisting rope that operates the hammer, the hammer being held at the top of the guides by a bolt placed through the guides while this is being done. After one bent has been driven the tops of the piles are sawed off and capped and the deck built out, the crane assisting in handling and placing the timbers, ties and the rail.

The road has driven 40-ft. piles through shale 20 ft. into the ground in this manner. The guides are easily and quickly removed from the crane, which is then ready for other work without any change in its mechanism or operation. In one instance, it is said that the guides were removed in four minutes' time.

ECONOMY AND EFFICIENCY IN MAINTENANCE.*

BY F. E. CRABBS,
Roadmaster, C. & N. W., Chicago.

It is not economy to have an insufficient force of labor to keep up your track. If you have not sufficient men to care for the track, it leads to the destruction of your rail and ties, the first most important part of your railway. Bad track also leads to the destruction of your rolling stock and causes derailments. Experience has proven that the practice of making records when laying rail and ballasting is not economical. Comparisons should not be based solely on records of the greatest number of feet laid or surfaced, but also on the thoroughness of the work. Economy will be the greatest in the end on perfect work. It is a great loss to work over sixty men in one gang on reconstruction under traffic. Better results are obtained from smaller gangs. A great saving can frequently be made and better work done, where steel is to be relaid or a general surface made on double track for several miles, by operating a single track during certain hours. If crossovers are too far apart it will often pay to put in a temporary connection for this work and station an operator at such connections during working hours.

It is a practice with most railways when business is slack to decrease the track forces. This is a mistake, as one man will accomplish more in the slack time than one and a half men will accomplish in the busy time, and his work will be done much better. Then, when the busy time comes, one is prepared to handle the business safely, and will be able to decrease the force with resulting economy.

A practical man should be at the head of the track department, and should be authority on all rail to be taken out. In many cases steel is taken from track when it could be made to ride for a few years longer if the necessary help were put on to put the track to surface or, possibly, if new ballast were added.

In a large terminal I find that the work could be done for about one-half if section forces could get the chance to work. Yardmasters will insist that they cannot spare the room and will continue to use a track until some derailment occurs, then they can clear it. Why not clear the track before and save the delay and damage?

The practice of carrying a large surplus of material in each yard or section is expensive and unnecessary. In many cases it is customary to keep a supply of material, such as frogs and switches in each yard. However, it is only necessary to carry one frog of the different weights of rail for emergencies, all other material being ordered on a monthly requisition. Each frog and switch should be carefully inspected frequently, and one which it will be necessary to take out in the next thirty days should be noted and requisition made for a new one.

No roadmaster should ever abuse any foreman or laborer. He should learn to know each foreman, and at the same time give him to understand that he is a foreman and that you are the roadmaster. Talk with him as the superintendent would talk with you. If you have any new work to do, explain to the foreman what is to be done. Then explain how you want it done and any live foreman will have a few ideas of his own. Let him tell them. If they are better or as good as yours, tell him he is right, and he will do more and better work for you than if he had followed your instructions entirely. In this way you always have the good will of your foremen and laborers, also, and you place that confidence in your foremen which means all to both roadmaster and foremen. In other words, get your men to working for your interests, and the company will get results.

A 25-year concession has been granted for the construction and operation of a railway from Rio Grande, Brazil, to Uberaba, as a continuation of the Pontal line.

*From a paper entered in the contest on How the Roadmaster Can Promote Efficiency, which closed July 1, 1911.

General News Section.

Announcement is made that commencing January 1, the Pennsylvania Company will take over the operation of the Cleveland, Akron & Cincinnati.

The Southern Pacific now uses on its Tucson division Mountain instead of Pacific time. The division extends from Yuma to El Paso, 564 miles.

Committees representing the firemen of the Illinois and Missouri divisions of the Chicago & Alton are conferring with the management regarding a new schedule of working conditions and wages.

The Canadian Pacific has decided to adopt oil as a fuel on its line through the Rocky mountains, between Kamloops and Field in the province of British Columbia. Arrangements are being made to make this change in the spring.

At Johannisthal, Germany, on Saturday last, Mr. Suvelack, carrying in his aeroplane one passenger, remained "on the wing" 4 hours and 23 minutes, or more than twice the length of time recorded in the best previous attempt of this kind.

After mediation by the United States Commissioner of Labor, Dr. Charles P. Neil, the southern lines of the Queen & Crescent have granted an increase of wages to locomotive enginemen of approximately 10 per cent. for passenger runners and 7 per cent. for freight.

Passenger train No. 80 of the Atlantic Coast Line was stopped by robbers near Hardeeville, S. C., at two o'clock on the morning of December 12, and the mail car was robbed of its registered packages. The robbers boarded the train at some station, and climbed over the tender, covering the engineman with revolvers before he knew of their presence.

Edward S. Murphy, a chief clerk for the Belt Railway of Chicago, was arrested on December 6 on the charge of embezzling approximately $4,600 of the company's funds during a period of about four years, during which he had been employed, until about two weeks ago, as station agent. His case was continued in the Municipal court until December 22.

On Saturday last, December 9, the Los Angeles Limited of the Union Pacific was run from North Platte, Neb., to Omaha, 291 miles, in 300 minutes. The train arrived in North Platte three hours late and the fast run was made that a sick woman might reach a hospital in time for a surgical operation. Five stops averaging six minutes each were made. Deducting this time from 300 minutes the running time was 270 minutes.

On Saturday night, December 9, the oldest employee of the Maine Central, William Frye of Skowhegan, ended his service for the company. He had worked for the Maine Central and its predecessors 63 years, mostly as sectionman, but for the last 16 years as gate tender. He boasts that there never has been an accident at a crossing which he was tending. He is a native of Ireland, in good health, and hopes to enjoy his pension a long time.

At Toronto, Ont., last week, three employees of the passenger department of the Canadian Pacific were arrested on the charge of [illegible] hundred dollars by juggling with claims for rebates on passenger fares. It appears that passengers having unused tickets to be redeemed and who live in places remote from Toronto were defrauded of their rights by protracted correspondence which exhausted their patience; and then, by means of forged signatures and altered vouchers, the [illegible] to put the money in their own pockets.

The Southern Pacific is having built at its Oakland shipyards the largest ferryboat in the world, to be run across the Carquinez Straits between Port Costa and Benicia, Cal. The new steamer will be known as the Contra Costa, and will be 433 ft. [illegible] ft. wide, [illegible] a tonnage of 3,400 tons. The Southern Pacific already has in service at this strait what is called the largest car ferry in the world, the Solano, built in 1879. The [illegible] is [illegible] inch longer than the Solano, [illegible] 30 cars to the [illegible] in 1879. [illegible] was illustrated and described in the *Railroad Gazette* of July 30, 1880.

Congressman Esch of Wisconsin has introduced in the House a bill providing for the valuation of the physical property of all interstate railways, requiring each company to begin the work at once and to make periodical reports to the Interstate Commerce Commission. Representative Roberts of Nevada has introduced a bill to prohibit interstate railways from owning or controlling vessels engaged in trade through the Panama canal. Members of the House committee on interstate commerce have gone to Panama to inspect the canal. A number of bills have been introduced in Congress providing for the abolition of the commerce court.

James Rowan, an employee of the Northern Pacific, passed through New York this week on his way to Ireland for a vacation, which is wholly paid for by his employer; and "Uncle Jim" is such an interesting figure that some of the New York reporters devoted a column to him and his experiences. He is a track walker in the mountains of the Yakima Valley, Washington, and has served the company in that capacity for 32 years, or since the road was built. Ten years ago, while riding on his speeder, a passenger train knocked him off a bridge into the river and he was severely injured, but he pulled through and returned to his work; and instead of suing the company for damages, he thanked the officers for what they had done and said that he should never forget the company's kindness.

The Delaware & Hudson has recently purchased a gas-electric car to be used on its Saratoga division. This is the first car of this kind to be put in service in local passenger traffic on this road and is intended to give an improved and more frequent train service. The car is made of steel; it is 68 ft. long, 10 ft. 5 in. wide and weighs 47½ tons. The entrances to the car are on the sides at about the center. The main compartment is located in the rear of the car, and the smoking compartment is forward of the entrance. The main body of the car will seat 85 passengers and the smoking compartment 16. Beyond the smoking compartment is a small baggage room, and the front end of the car is occupied by a 200 h. p. gasoline engine, which drives an electric generator at 550 revolutions a minute. The car is capable of running 40 miles an hour.

By a lease for 994 years, which has been agreed upon this week, the New York, New Haven & Hartford has divested itself of its interests in the electric and gas lighting properties in a number of Connecticut towns which were acquired some years ago with certain trolley roads. These lighting plants and gas works are situated in Waterbury, Naugatuck, Watertown, Cheshire, Norwalk and Greenwich. These plants, heretofore managed through the Housatonic Power Company, are now leased to a new company, the United Electric Light & Water Company, which has been chartered in Connecticut in the interest, it is understood, of the United Gas Improvement Company, of Philadelphia. The same parties were interested in these properties before they passed to the New Haven road through the Connecticut Railway & Lighting Company. Power stations used wholly or in part for railway purposes are not included in the lease and in some cases will continue to furnish electric current for the properties now disposed of, the prices to be charged for this service being regulated by a clause in the lease. The rental under the lease is to be $365,000 a year. Assuming that this means a capitalization of about $9,000,000, it appears that, according to the estimates of good judges, the property has been transferred at a reasonable valuation. Following the disposal to the New Haven of some of its steamboat interests and of the New York, Ontario & Western Railroad, this is a third important move in a notable policy of contraction.

A Friendly (?) Despatcher.

In a conversation over a telephone between a chief despatcher and a conductor, the chief said: "I wanted to run you through, but they wouldn't stand for it with that light tonnage." The conductor said something, and the chief replied: "Go over your figures again, Tom, and see if you cannot make it 1,900 tons." Tom ran over the figures again and said: "This time I only

make it 1,500 tons." The chief said: "Certainly must be some mistake, Tom. I could do better than that myself. Must be something wrong with your pencil." Then the conductor became aware of what was wanted and said: "Hit me on the bean; that's where I need it most," and that time Tom's tonnage was 1,913, on paper; the 13 tons added to keep off suspicion, although these 13 tons were of cobwebs. The other 400 was a plain steal. And if it was not for the advice of friends I would name that man and his road.—*J. W. James.*

Unfilled Tonnage Report of the Steel Corporation.

The statement issued by the United States Steel Corporation, covering the month of November, shows that the unfilled tonnage on November 30 was 4,141,955 tons. This is an increase of 447,627 tons over the previous month. Orders for new business in November were 39,371 tons a day. Shipments were smaller than in October, indicating that specifications on many of the large orders were delayed. The unfilled tonnage of the Steel Corporation is now larger than it has been at any time since June 30, 1910, when it was 4,257,794 tons.

Postal Car Conference.

The conference committee of the railways, to which was entrusted negotiations with the committee of the postoffice department for the formulation of uniform specification for steel postal cars, met at the New Willard Hotel, Washington, D. C., on December 4. In addition to the committee, representatives of a number of railways were present. A few minor changes were made in the specification as published in the *Railway Age Gazette* of November 24, 1911, page 1049, and it was then approved for submission to the representatives of the postoffice department.

At a meeting of the representatives of the railways with those of the postoffice department on December 5, the chairman of the latter committee made a statement reviewing the previous action and the chairman of the conference committee of the railways, C. A. Seley, stated the process by which the proposed specification had been reached.

It is understood that after the representatives of the postoffice department have considered the specification, as revised, they will desire another conference with the representatives of the railways, at which time a standard interior arrangement will be further discussed. A report of progress covering the principal business of the meetings of December 4 and 5 will be given in more detail, together with a list of the roads authorizing the committee to represent them, in a bulletin from the committee on relations of railway operation to legislation, which we expect to publish next week.

The Comfort of Passengers on the Lehigh Valley.

The "passenger efficiency inspector" of the Lehigh Valley Railroad, recently appointed, is charged with duties supplementing those of the trainmasters. His work has more to do with the comfort of passengers—the little things that make the difference between a pleasant and an unpleasant journey—than with the mechanical or more "strictly business" phases of train operation. An officer of the road writes:

The person who holds this place was formerly inspector of passenger transportation. Then, however, his work was largely of a routine kind, and he stayed in the office a great part of the time. Now he is on the road continually. His duties have a considerable range and do not follow any fixed groove. He is supposed to exercise discretion in observing the conditions of passenger transportation and in giving directions to employees. In a way he is a sort of traveling instructor.

The trainmasters are not able to do this sort of work with the same detail as the new man. They have a multitude of other duties. Their time is partly taken up by freight trains, and it is impossible for them to attend to the intimate details which mean so much to the passengers.

The passenger efficiency inspector covers the entire road, main line and branches. He reports to the division superintendent any infraction of rules that he notices or any condition which seems undesirable, and also sends a copy of the report to the general manager. His work is such that it is of particular interest to the higher officers, and they are observing the working of the scheme closely.

The traveling inspector is by no means a detective. His inspection is quite open and he is clothed with authority to admonish conductors or trainmen when he finds them derelict. If he finds a car overheated, or underheated, or dirty; if he finds that for some reason or other it is not running smoothly; if he sees a trainman or conductor speaking to a passenger roughly or indifferently—any of these is an occasion for his attention. He may notice that baggage is being unloaded too slowly at a station, owing to the indolence of the baggagemaster, in which case he admonishes the offender to move more energetically and not to repeat the slow performance.

The higher officers of the company are much pleased, so far, with the results of this experiment. Undoubtedly, it has created an incentive for the passenger train crews which did not exist before. It is, in fact, additional inspection, since the trainmasters are just as busy as they ever were.

Peace with English Railway Employees.

Press despatches of December 11 report that the conferences between the directors of the railway companies and representatives of the employes' unions which have been held since the strike of a few months ago have resulted in a peaceful settlement; and that the basis of the settlement is substantially the same as that which was recommended in the report of the Royal Commission. The unions did not get complete recognition, but the leaders think that they have made some little progress in that direction. Access of the workmen to their employers concerning matters in dispute is much facilitated.

The agreement accepts the Royal Commission's scheme subject to the following changes:

Deputations are to be received within a fortnight after the receipt of a petition from the men for an increase of wages; the percentage of signatures requisite for validating the petition is not to be fixed at 25 per cent. unless the companies and the men disagree as to the number required; in the event of the companies proposing to alter wages or hours of work the employees are to be notified by circular at least a month before the proposed change.

The first meeting of the board of conciliation under the revised scheme will not be held before May, 1912. The pay of extra men employed in the freight department is to be at a rate per hour not below the minimum paid to permanent employees.

Japanese Version of "How To Be a Good Trainmaster."

To give his life as an atonement because the Emperor of Japan had to spend an hour in a common waiting-room, Moji Shijiro Shimidzu, a trainmaster, threw himself under a train. Shimidzu had been in charge of arrangements of a journey the Emperor made from Kyushu, after witnessing the army maneuvers. The imperial train was delayed by a derailment at a misplaced switch. Shimidzu left a letter saying that he considered it his duty to pay for the Emperor's embarrassment with his life. The Emperor was much distressed when the incident was reported to him.—Press Despatch.

[The sociologist would characterize as an "adverse selective influence" the spirit which prompts a man with high ideals to deprive the world of his services. Suicide may be a delicate compliment, but it doesn't move trains.]

Proposed Illinois Central Terminal Improvements in Chicago.

Plans which include the erection of a new passenger terminal station by the Illinois Central in Chicago within five years and a complete rearrangement of its terminal right of way, and which also contemplate electrical operation at some future date, was made public in a message by Mayor Harrison to the city council on Monday night.

The Illinois Central and the Board of South Park Commissioners have signed a contract by which the railway is to surrender to the park board all its riparian rights to the shore of Lake Michigan between Park Row and Fifty-first street, nine-tenths of which is now owned by the railway, and in turn receives additional land to permit of a widening and straightening of its terminal trackage. The present passenger station on Park Row is to be razed and the land occupied, as well as several acres of made land to the east of it, conveyed to the park board, as an addition to Grant park to be used in part as a site for

the Field Museum. The new station is to be erected south of Twelfth street on Michigan avenue, fronting on Twelfth street.

The agreement is a part of a comprehensive scheme for improvement of the city's lake front, which includes the construction of a parkway by filling in a strip of land connecting Grant and Jackson parks separated from the main land by a lagoon, the extension of Twelfth street as a boulevard 118 ft. wide through to the lake front, and a yacht harbor opposite Grant park.

Under the agreement the railway company cedes to the park board all its holdings, except its right of way lying east of Michigan avenue in the block between Park Row and Twelfth street, and all shore land lying east of a defined boundary line extending south to Fifty-first street. The principal benefit received by the railway company through the agreement is a broadened right of way between Thirteenth and Forty-ninth streets. It will have a right of way averaging 400 ft. in width, and in addition, it receives between Sixteenth and Twenty-fifth streets the right to fill in an additional 260 ft., giving room for additional switching facilities south of Twelfth street. When the improvements are completed it is estimated that 65 per cent. of the switching now done north of the Park Row station will be done farther south.

North of the station the plan provides that when the terminals shall be operated by electricity the tracks may be covered over to a width of 50 ft. on the west side between Twelfth and Randolph streets and 50 ft. on the east side between Twelfth and Monroe streets, and the board shall have the privilege of extending the east and west streets for their full width over the tracks between Harmon Court and Monroe street. While no agreement is made regarding the adoption of electricity those who have been instrumental in negotiating the agreement seem to feel confident that this is but the next step in the development of the plan. The execution of the plan requires a settlement of many details, including the approval of the federal government engineers to some changes of the shore line, and of the city council for the vacation of several streets and the cession of some property to the park board.

According to the terms of the contract made public in the Mayor's message, it would appear that the greater benefits are derived by the city. However, the ownership of the riparian rights on the lake front by the railway has long been a source of friction with the city authorities, and it is believed that the public relations of the Illinois Central will be greatly improved. The city and park board officials and the newspapers have expressed a strong appreciation of the spirit of the co-operation displayed by President Markham and the railway officials.

It is believed that the plan may result eventually in locating the stations of all railways entering Chicago on the south on Twelfth street. A tentative plan has already been worked out for the location of the proposed Chicago & Western Indiana terminals and the Lake Shore-Rock Island terminals on Twelfth street, and it is understood that the roads interested in the new union station are also considering the Twelfth street location.

Cost of Carrying Freight Down Hill.

A paper by President L. A. Delano of the Wabash Railroad on "Terminations" was read on Tuesday at the meeting of the National Business Congress, held in Chicago, for the purpose of discussing means of influencing legislation less destructive of business interests. Mr. Delano discussed the nature and development of various kinds of transportation service, incidentally exposing some of the fallacies of the waterway arguments. He said in part:

"Occasionally, we read a wonderful tale of the economy of [illegible] We are told of a [illegible] of coal [illegible] the Ohio and Mississippi rivers from the coal fields in Pennsylvania to the market in New Orleans. The bare cost of such transportation is a mere noth[illegible] or 7,000 ton train of cars down grade from the mines to tide[illegible] with the average cost of [illegible] The expense of bringing back the boats [illegible] element of the cost of the service rendered on the return of the cars is on the railway. The cost [illegible] conditions, must be taken into consideration in determining the [illegible]

"That railway managements, like men in other commercial undertakings, realize the force of the principle that 'half a loaf is better than no bread,' goes without saying. It is no argument against a railway corporation that rates in territory parallel to or competing with water transportation are lower than those where such competition does not exist. It would be equally true if the government undertook the manufacture or sale of any commodity without profit or at less than cost; such action would break the price of that commodity; and it is equally true that the manufacturer or merchant who by reason of government competition had to sacrifice a large share of his profit on the sale of some commodities would be compelled to average up by making a larger profit on the remainder of his business."

Boston Dock Commission.

The governor of Massachusetts on December 6 made the following appointments to the new board of dock commissioners, which is to make improvements in the harbor and docks at Boston, planned for by a law under which the sum of $9,000,000 has been appropriated: Hugh Bancroft, Boston, chairman, Joseph A. Conry, Rear Admiral Francis T. Bowles, U. S. N. (resigned). Geo. E. Smith, chairman of the Harbor and Land Commissioners, is a member of the board by virtue of his office, and the fifth member will be named by Mayor Fitzgerald.

President Willard on the Present Railway Situation.

In an address at Baltimore on December 8 at a dinner given by the citizens of Baltimore to the visiting Governors of several western and southern States, Daniel Willard, president of the Baltimore & Ohio, said in part:

Notable among the laws passed by the federal congress is the Interstate Commerce Act, with successive acts amendatory thereto, and I believe it may be fairly said that the Interstate Commerce Act, as it stands today, is sufficiently broad and comprehensive to cover substantially all of the practices originally complained of, and with its administration resting in the hands of an able commission, as is the case at present, it would seem that the people might now feel that their interests have been properly safeguarded, and there is good reason for believing that they do so feel. This is perhaps best shown by the changed attitude of the press. Five years ago, out of 100 articles, taken from as many papers, having reference to the railways, at least 65 would be found to be distinctly hostile to the roads, and the remaining 35 indifferent or merely lukewarm in their support. Now a similar investigation would show at least 90 distinctly favorable to the roads, and practically none opposed. I doubt if record of a more sudden or complete change of public opinion, as indicated by the utterances of the press, can be found, and as far as that goes, it ought to be very gratifying to the railways and their friends, and it is. Unfortunately the solution of a question of such magnitude is not simple, and while under a government such as ours all things must eventually adjust themselves in harmony with public opinion, the period of complete adjustment is frequently somewhat protracted.

The American railway as it is today is the result of private enterprise. It has been built up with funds voluntarily advanced by those who have invested their money in railways, for exactly the same reason that would have prompted them to invest in any other commercial or industrial undertaking; that is, the hope of private gain. There is no inherent difference in principle between the selfishness of the railway stockholder and the selfishness or self-interest of the merchant or manufacturer; both seek to increase their profits and for exactly the same reasons. There is this difference, however—it is now sought to establish a maximum return in the one case, and there is no fixed limit in the other.

Louis D. Brandeis in a recent article in the *Engineering Magazine* wrote as follows:

"To secure successful administration of any railroad, the rewards should be proportioned to the success. The establishment therefore of any rule fixing a maximum return on capital invested in railroads would tend to prevent efficiency by placing a limit on achievement. Today efficiency in management is in danger of being punished whereas it should be rewarded."

He also says:

"Large earnings are frequently accepted as evidence that rates are too high, and invite a demand for reduction, whereas in fact

the large earnings may be due wholly to better judgment, greater efficiency and economy in administration. To take from railroads the natural fruits of efficiency—that is, greater money rewards—must create a sense of injustice suffered, which paralyzes effort, invites inefficiency and produces slipshod management."

While I find myself unable to agree fully with Mr. Brandeis in some things, I am heartily in accord with his views just quoted. The danger he foresees is a very real one.

Today the presence of a surplus above interest and dividend requirements as the result of a year's operation is looked upon in many quarters as evidence of such a degree of prosperity as to justify a reduction of rates, or an increase of wages, or both, and it has come about that the railway is well-nigh unable to effectively resist either. That this condition exists, every railway officer present will, I believe, bear evidence.

Railway development in the past has been, and in the future will be, so long as the existing condition continues, largely a matter of interest on money so invested. The capital requirements for the next five years will not be less than $500,000,000 per year, and we have most excellent authority for believing that they may approach the enormous sum of $1,000,000,000 per annum. The Baltimore & Ohio during its last fiscal year paid out more than $27,000,000 for additional facilities and equipment, or at the rate of over $6,000 per mile of its entire system, and during that period built no new lines whatever. This rate of expenditure, if applied to the 245,000 miles of American railways, would make the enormous aggregate of $1,470,000,000, and if we assume that the Baltimore & Ohio needs were perhaps greater than the average—which may or may not be so—and reduce the amount one half, we still have over $735,000,000—a sum well above the minimum mentioned. In this connection we may well consider the words of one of the able members of the Interstate Commerce Commission, who said:

"We can provide by legislation the sort of cars which a railroad shall use, and the rates which it shall impose; we cannot by legislation force one single dollar of private capital into railroad investment against its will."

The problem, then, which confronts the railways at the present time is, where, and by what means, is to be obtained the great amount of new capital needed to provide the additional facilities and new mileage necessary to properly meet the requirements of a growing country—and when finally obtained, how will the additional obligations for interest or dividends be met? We rather choose the ills we have than fly to those we know not of. In the past the railways have generally been able to raise new capital when needed, because such investments as they offered were supposed to include a reasonable promise of possible large reward. Today the situation is changed. There is little, if any, ground under existing conditions for hope of large reward in connection with railway investments, and even the stability of moderate returns is frequently questioned. When the people decided to exercise their right to regulate—by law provided, they took upon themselves at the same time the responsibilities attending the exercise of that right. There can be no evasion of the responsibility accompanying the exercise of power.

Doubtless the railways were guilty of many, if not all, of the things with which they were charged. Their managers were human and subject to the usual human limitations, but granting to be true all that was urged against them, the roads are necessary, and their development must go on if the country is to grow, as we hope and expect it will. It is a matter of general belief, however, that during the last two or three years railway development has failed to keep pace with the general growth of industrial capacity. What, then, with all this in mind, had best be done? What remedy, if any, is there to suggest? I should feel that I had fallen far short of what might properly be expected of me if, after pointing out the difficulties which I believe to exist, I failed to suggest a possible solution. While the situation, as I view it, is serious, it is by no means hopeless.

Private capital in the past, plus the hope of large reward, which hope, however, was frequently without foundation, has given the American people the greatest and most effective transportation system in the world. The American railway is the largest single industry in the United States next to agriculture, and it has done what no other American industry has done—it has manufactured and sold its output—that is, transportation—cheaper than is done in any other country in the world, and at the same time has paid to its employees wages from two to three times as high as are paid for similar work in any other country, and its capitalization, which is frequently criticized, is less than $60,000 per mile, as compared with:

England	$275,040	Austria	$112,879
Belgium	169,806	Germany	109,788
France	139,390		

The figures I have used are all a matter of public record and can be easily confirmed.

What has been done can be done again. The same spirit and enterprise which produced the railways as we have them today will, under favorable conditions, keep them abreast of the requirements of the future. The men in charge of the railway properties at the present time have nearly all worked their way up slowly from the ranks. They are not ignorant of the changed conditions, nor are they unmindful of the responsibilities resting upon them as quasi-public servants. They appreciate fully the opportunities afforded them by their position, to be useful to the people and communities served by the properties with which they are connected. But who can blame them—who can criticize, if in view of all I have said, they hesitate to recommend expenditures which would add largely to capital liabilities, while feeling uncertain about their ability to meet the increased charges?—a different course would properly mark them as unworthy of their trust. The remedy which I have in mind rests upon no other foundation than the inherent fairness of the American people.

As I have previously shown, public opinion which was almost wholly adverse to the railways a few years ago, is now clearly in favor of a more liberal treatment of the carriers. The people, I believe, are beginning to recognize that a policy, based upon ample and efficient transportation facilities, with such rates and conditions as will permit the roads to pursue a liberal, but not extravagant, programme of maintenance and expansion, is much better for the country as a whole than a policy which is bound to result eventually in a lack of facilities and all that the term implies.

New York Railroad Club.

The fifth annual Christmas entertainment and social reunion of the New York Railroad Club will be held at the United Engineering Societies building, on December 15, 1911, after a brief business session. The programme will include a vaudeville entertainment and supper. Owing to limited accommodations, the attendance will be restricted to actual members. Authority to issue invitations to special guests is reserved to the president of the club.

Canadian Society of Civil Engineers.

The annual meeting of the Canadian Society of Civil Engineers will be held at Montreal, Que., January 24-26, 1912.

Air Brake Association.

The nineteenth annual convention of the Air Brake Association will be held at Richmond, Va., May 7-10, 1912.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

Air Brake Association.—F. M. Nellis, 53 State St., Boston, Mass.; annual, May 7-10, Richmond, Va.

American Association of Demurrage Officers.—A. G. Thomason, Boston, Mass.

American Association of General Passenger and Ticket Agents.—W. C. Hope, New York; next convention, Seattle, Wash.

American Association of Freight Agents.—R. O. Wells, East St. Louis, Ill.; annual, June 18-21, Chicago.

American Association of Railroad Superintendents.—O. G. Fetter, Carew building, Cincinnati, Ohio; 3d Friday of March and September; annual, March 17, Chicago.

American Electric Railway Association.—H. C. Donecker, 29 W. 39th St., New York.

American Railway Association.—W. F. Allen, 75 Church St., New York.

American Railway Bridge and Building Association.—C. A. Lichty, C. & N. W., Chicago. Next annual convention, third week in October, 1912, Baltimore, Md.

American Railway Engineering Association.—E. H. Fritch, Monadnock Block, Chicago; annual convention, March 19-21, 1912, Chicago.

American Railway Master Mechanics' Association.—J. W. Taylor, Old Colony building, Chicago. Annual convention, June 17-19, Atlantic City, N. J.

American Railway Tool Foremen's Association.—M. H. Bray, N. Y., N. H. & H., New Haven, Conn.

American Society for Testing Materials.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.

American Society of Civil Engineers.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

American Society of Engineering Contractors.—J. R. Wemlinger, 13 Park Row, New York; 2d Tuesday of each month, New York.

American Society of Mechanical Engineers.—Calvin W. Rice, 29 W. 39th St., New York.

Association of American Railway Accounting Officers.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.

Association of Railway Claim Agents.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 22, 1912, Los Angeles, Cal.

Association of Railway Electrical Engineers.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago.

Association of Railway Telegraph Superintendents.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.

Association of Transportation and Car Accounting Officers.—G. P. Conard, 75 Church St., New York; December 12-13, Louisville, Ky.

Canadian Railway Club.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.

Canadian Society of Civil Engineers.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

Car Foremen's Association of Chicago.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

Civil Engineers' Society of St. Paul.—D. F. Jurgensen, 116 Winter St., St. Paul, Minn.; 2d Monday, except June, July and Aug., St. Paul.

Engineers Society of Pennsylvania.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

Engineers' Society of Western Pennsylvania.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

Freight Claim Association.—Warren P. Taylor, Richmond, Va.; annual, May 15, Buffalo, N. Y.

General Superintendents' Association of Chicago.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

International Railway Congress.—Executive Committee, rue de Louvain, 11 Brussels; 1915, Berlin.

International Railway Fuel Association.—D. B. Sebastian, La Salle St. Station, Chicago.

International Railway General Foremen's Association.—L. H. Bryan, Brown Marx building, Birmingham, Ala.

International Railroad Master Blacksmiths' Association.—A. L. Woodworth, Lima, Ohio. Convention, August 15, Chicago.

Iowa Railway Club.—W. B. Harrison, Union Station, Des Moines, Ia.; 2d Friday in month, except July and August, Des Moines.

Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York; annual convention, May 14-17, Pittsburgh, Pa.

Master Car Builders' Association.—J. W. Taylor, Old Colony buiuding, Chicago. Annual convention, June 12-14, Atlantic City, N. J.

Master Car and Locomotive Painters' Association, of United States and Canada.—A. P. Dane, B. & M., Reading, Mass.; next annual convention, second week in September, 1912.

New England Railroad Club.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

New York Railroad Club.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

Northern Railway Club.—C. L. Kennedy, C., M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.

Omaha Railway Club.—H. H. Maulick, Barker Block, Omaha, Neb.; second Wednesday.

Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

Railway Club of Pittsburgh.—J. B. Anderson, Penna. R. R., Pittsburgh, [illegible]

[illegible] G. F. Stewart, St. L. S. W. Ry., St Louis, Mo.; annual, May 12, 1912, Kansas City, Mo.

Railway Signal Association.—C. C. Rosenberg, Bethlehem, Pa.

Railway Storekeepers' Association.—J. P. Murphy, Box C, Collinwood, [illegible]

[illegible] L. O. Robinson, Richmond, Va., 2d Monday, [illegible]

[illegible] Way Association.—L. C. Ryan, C. & N. W., Sterling; September, 1912, Buffalo, N. Y.

St. Louis Railway Club.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

Society of Railway Financial Officers.—C. Nyquist, La Salle St. Sta[illegible]

[illegible] Officers.—E. W. Sandwich, A. & [illegible]

[illegible] A. J. Merrill, Grant Bldg., [illegible]

[illegible] May, July, Sept., Nov., Atlanta [illegible]

[illegible] McCabe, La Salle Hotel, Chicago.

[illegible] 30 Broadway, New York, last [illegible]

Traffic Club of Pittsburgh.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings [illegible]

[illegible] L. E. Machir, 7042 Stewart [illegible]

[illegible] J. M. [illegible], Buffalo, first Saturday [illegible]

[illegible] W. P. Hardee, L. S. & M. S., Detroit, [illegible]

[illegible]—W. O. Thompson, N. Y. C. & H. R. [illegible]

Western Canada Railway Club.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 3d Monday, except June, July and August, Winnipeg.

Western Railway Club.—W. [illegible] Old Colony building, Chicago, 3d [illegible]

Western [illegible] J. H. Wrenn, 1776 Monadnock Block, Chicago [illegible] except July and August, Chicago.

Wood [illegible] E. E. Nugent, B. & O., Baltimore, Md., [illegible]

Traffic News.

The Chicago & North Western has put on a regular line of sleeping cars between Minneapolis and Los Angeles.

George Hodges has been appointed assistant general agent of the American Railway Association, with office at Chicago, effective January 1.

T. C. Powell, vice-president of the Southern Railway, addressed a meeting of the Cincinnati Passenger Traffic Club on December 9 on "Taking the Public Into Our Confidence."

The Southern Railway now runs a sleeping car daily each way through between St. Louis, Mo., and Jacksonville, Fla. Southbound, the train leaves St. Louis at noon and arrives at Jacksonville the next evening at 8:20.

Beginning December 17 the "North Coast Limited" of the Northern Pacific will be run through to and from Chicago over the Chicago & North Western, using the new line of the C. & N. W. recently completed between Milwaukee and Wyeville.

Shipments of deciduous fruits east from California in the season closing November 30 amounted to 12,530 cars, estimated to contain 26,000 lbs. each. This is an increase of something more than 10 per cent. over shipments in the season of 1910.

Sugar merchants in New Orleans estimate that cold weather which prevailed in Louisiana and Texas last week, followed by warm weather, has damaged the sugar crop more than 25 per cent., thus inflicting on the producers losses aggregating many millions of dollars.

Freight tariffs have been filed by the Union Pacific, the Denver & Rio Grande, the Colorado & Southern and the Colorado Midland, effective December 15, making voluntary reductions in a list of about 50 commodity rates out of Denver, applying within a radius of about 200 miles.

During the first seven days of December the Missouri Pacific-Iron Mountain system handled the largest freight traffic of any week in the history of the road, a total loading of 27,580 cars. On Thursday, December 7, a record for local loading in one day was made, a total of 3,698 cars.

The Chicago, Milwaukee & Puget Sound has just taken at Seattle, to be carried to New York, a shipment of 620 tons of copper ores from Alaska. It is said that the shipping of ore to the Atlantic coast was made unnecessary by the congested conditions at the reducing works on the Pacific coast.

Frank T. Scanlan, of the Northern Michigan Transportation Company, was elected president of the Chicago Transportation Association at its recent annual meeting. The other officers elected were: Vice-president, Ray E. Clark; secretary, H. E. MacNiven; financial secretary, George H. Brown, and treasurer, J. W. Betts.

The new "Sunset Limited" of the Southern Pacific, running twice a week between New Orleans and San Francisco, in 70 hours 50 minutes, as announced in the *Railway Age Gazette* of November 3, page 920, went into service December 4. Each train is made up of six new cars built by the Pullman Company. An excess fare of $10 is charged each passenger between the termini and $5 between intermediate points.

Shippers in Oklahoma City received and sold during the [illegible] months ending the first of December, 800 carloads of bananas. These merchants supply practically the whole of the state of Oklahoma, and the quantity named is double that con[illegible] that [illegible] two years ago. It is estimated that the 800 cars contained 500,000,000 bananas. Most of this fruit comes from Northern Panama and Southern Costa Rica.

The Spokane Chamber of Commerce has petitioned the Interstate Commerce Commission to suspend its recent order reducing distributive class rates from Tacoma, Portland and Seattle to points in Washington, Oregon, Idaho and Montana by 20 per cent., as reported in the *Railway Age Gazette* of December 1, page 1115, pending a final determination of the intermountain cases, involving rates from the east to Spokane and other intermediate western cities.

Six hundred bags of walnuts, weighing 86 tons, were shipped from Shanghai to Minneapolis recently by the ocean and rail lines of the Canadian Pacific Railway, and were carried through in 26 days. The shipment left Shanghai in the Canadian Pacific steamship Empress of India November 7, and arrived at Vancouver November 24. From Vancouver a special train took the nuts to Portal in four days, and from there the Soo Line rushed the shipment to Minneapolis, reaching there on December 2.

The National Baggage Committee, representing organizations in 18 large cities, following a meeting in St. Louis on December 9, wrote to the chairman of the various railway passenger associations, demanding the following regulations in relation to the carriage of baggage: (1) 150 lbs. free; (2) excess per 100 lbs. not over one-eighth first-class fare; (3) minimum charge 25 cents; and, (4), a uniform standard for the size of trunks to be fixed at 45 inches, with a penalty of 5 pounds for each additional inch. They desire to hold conferences with the railway men concerning the proposed rules.

The bill-of-lading frauds brought to light in the southern states last year are now again before the public, by reason of the trial, in the Federal court at Huntsville, Ala., of John W. Knight, member of the firm which was most prominently mentioned in connection with the frauds. The accounts say that the aggregate amount of the frauds discovered by the lawyers was $6,000,000, but the only charge against Knight appears to be that of using the United States mails for a fraudulent purpose. Numerous freight agents testified at the trial that certain bills of lading purporting to represent shipments of cotton had not been signed by them and that the records of their respective offices show no such shipments.

The Public Service Commission's record of passenger train performances on the steam railways of the state of New York for the month of October, just issued, shows that during the month the number of trains run was 63,265. Of the number of trains run, 84 per cent. were on time at the division terminal. The average delay for each late train was 23.8 minutes, and the average delay for each train run was 3.7 minutes. The principal causes of delays were: Waiting for trains on other divisions, 35.0 per cent.; waiting for train connections with other railways, 14.2 per cent.; train work at stations, 13.0 per cent.; trains ahead, 7.7 per cent.; engine failures, 6.2 per cent.; meeting and passing trains, 6.0 per cent.; wrecks, 4.7 per cent.

The Maine Central and the Canadian Pacific have issued orders forbidding employees acting as agents to distribute freight for several parties when the freight comes in a single consignment to one party. A practice had come into vogue of firms in large cities accumulating a carload of goods and shipping it at carload rates to the destination, with some railway employee, preferably the freight agent, as consignee. That consignee would distribute the goods to the different parties who had ordered them, and in some instances the distribution is understood to have involved reshipments. Railway employees at several places in northern Maine had become solicitors of sales for firms making such shipments.

Announcement was made on Monday of a settlement of the controversy between the transcontinental railways over the division of through passenger fares between the Missouri river and the Pacific coast which resulted several weeks ago in the refusal of the Southern Pacific, the Western Pacific and San Pedro, Los Angeles & Salt Lake to continue the then existing through sleeping car routes over the Burlington and the Rock Island. The Interstate Commerce Commission about a year ago ordered a reduction in the local passenger fares between Salt Lake and Ogden on the east and San Francisco and Los Angeles on the West, whereupon the Burlington and the Rock Island demanded that the new rates be made the basis of the division of the through rates. The western lines insisted on the old division, which gave 50 per cent. to the lines east and 50 per cent. to the lines west of Ogden and Salt Lake; and, on the refusal of the eastern lines to continue the old rates suddenly served notice of the discontinuance of through service. It is now announced that a compromise has been reached and that the through car lines affected (to and from Chicago and St. Louis) will be restored at once.

Members of the Illinois Manufacturers' Asosciation held a meeting on December 8, in Chicago, to protest against the new class rates applied on through freight from Central Freight Association territory as proportions between Mississippi and Missouri river points, which become effective on December 30, under the recent order of the Interstate Commerce Commission in the Burnham-Hanna-Munger case. The protest was based on the claim that the rates discriminate against shippers and industries in Illinois by placing them at a disadvantage of five cents per hundred pounds first class, four cents second class, three cents third and fourth classes and two cents fifth class, as compared with shippers in places east of the Illinois-Indiana state line and those on the Missouri river. The commission's order prescribes a scale of class rates based on 55 cents first class. In a previous decision the commission had reduced the 60-cent first class rate to 51 cents. At the meeting a recommendation was made that the board of directors of the association ask the commision to restore the rates to their old basis. The St. Louis Business Men's League has asked the roads to apply the same reduction locally from Chicago and St. Louis to the Missouri river as is applied by the commission on through traffic.

The bill to greatly increase the powers of the California State Board of Railroad Commisisoners, referred to in our issue of December 8, page 1181, gives the commission jurisdiction over street railways, pipe lines, gas companies, electric light and power companies, telegraph and telephone companies and water companies, as well as railways, express companies and sleeping car companies. It is proposed that the commission consist of five members instead of three, to be appointed by the governor. Present members will serve out the terms for which they were elected, but new members will serve for a term of six years. One section of the bill provides that public utilities corporations chartered in other states, not already doing business in California, shall not be allowed to do business in the state. The powers of the commisison over railway rates as proposed are in many respects similar to those of the Interstate Commerce Commission, but the commisison is also empowered to fix rates, compel adequate service, equipment and facilities, to order improvements and additions and changes in equipment, to order track connections between steam railways and electric railways, and to require the maintenance and operation of safety devices. It is authorized to make a valuation of all property of public utility companies and such companies are required to furnish the commission with data bearing on this subject and to keep accounts in such form as the commission may direct. The bill also includes a provision requiring a certificate of public convenience and necessity from the commission for the construction of any new plant or extension.

Revenues and Expenses in September.

The summary of revenues and expenses of steam roads in the United States for September, prepared by the Bureau of Railway Economics, shows that the railways whose returns are included operate 227,272 miles of line, or about 93 per cent. of all the steam railway mileage in the United States. The total operating revenues for the month of September, 1911, amounted to $245,914,342. This includes revenues from freight and passenger traffic, from carrying mail and express, and from miscellaneous sources. Compared with September, 1910, the total operating revenues of these railways show an increase of $161,730. That this increase was due exclusively to the increase in mileage of these roads in 1911, as compared with 1910, is proven by the fact that when reduced to a per mile basis for the two years, total operating revenues show a decrease. Thus total operating revenues per mile of line amounted to $1,082 in September, 1911, and $1,097 in September, 1910, a decrease for 1911 of $15, or 1.4 per cent. This decrease in operating revenues resulted from a decrease in freight revenue of $12 per mile, and in passenger revenue of $5 per mile.

Operating expenses, which include all the costs of maintaining track and equipment, operating trains, securing traffic, and of administration, amounted to $156,997,223. This was $974,474 less than for September, 1910. Operating expenses per mile amounted to $691, compared with $705 in September, 1910. This represents a decrease of $14 per mile, or 2.0 per cent., which was due to decreases in all the primary operating expense accounts except that of maintaining equipment. In the cost of maintaining way and structures, i. e., track and buildings, there was a decrease compared with September, 1910, of $6 per mile,

or 4.2 per cent., while the cost of conducting transportation declined $7, or 2.1 per cent.

Net operating revenue, which is total operating revenues less operating expenses, shows a decrease as compared with September, 1910, of nearly $1 per mile, or 0.1 per cent. By cutting down operating expenses the railways have been able largely to overcome the decrease of $15 per mile in operating revenues. The net revenue for each mile of line for each day of September averaged $13.04, as compared with $13.06 for September, 1910. It should be recalled that net revenue is gross profit before anything has been taken out for taxes, rentals, interest on bonds, appropriations for betterments, or dividends.

Taxes for the month of September amounted to $9,610,856, or $42 per mile, an increase of 8.5 per cent. over September, 1910.

The operating ratio for September, that is, the per cent. of total operating revenues which was absorbed in operating expenses, was 63.8 per cent., as compared with 64.7 per cent. in August, 1911, and 64.3 per cent. in September, 1910.

The western group of railways show a decrease in total, operating revenues per mile as compared with September, 1910, of 4.7 per cent., and the eastern group a decrease of 0.2 per cent., while the operating revenues per mile of the southern group increased 6.7 per cent. over September, 1910. Operating expenses per mile decreased 1.4 per cent. on the eastern railways as compard with September, 1910, and on the western railways 4.6 per cent., but increased on the southern railways 4.8 per cent. The cost of maintenance of way and structures shows a decrease per mile in every group in comparison with September, 1910. Net operating revenue per mile in the western group declined 4.8 per cent. as compared with September, 1910, while that of the eastern group increased 2.2 per cent., and that of the southern group 10.6 per cent. Taxes increased in all the groups as compared with September, 1910, the increase per mile amounting to 6.3 per cent. in the western group, 7.7 per cent. in the southern group, and 10.8 per cent. in the eastern group.

The returns for the nine months of the calendar year 1911, compared with those of the corresponding months of 1910, show decreases in total operating revenues per mile of 3.1 per cent., and in net operating revenue per mile of 5.5 per cent. The greatest relative decrease in net operating revenue was that of 10.0 per cent. in the western group.

Comparison of the returns for the three months of the fiscal year 1912 with those of the corresponding months of the fiscal year 1911 shows a decrease in total operating revenues per mile of 1.8 per cent., and in net operating revenue per mile of 1.1 per cent. The considerable decrease of 8.8 per cent. in the net operating revenue per mile of the western group contrasts with increases of 4.6 per cent. in the eastern group and 7.9 per cent. in the southern group.

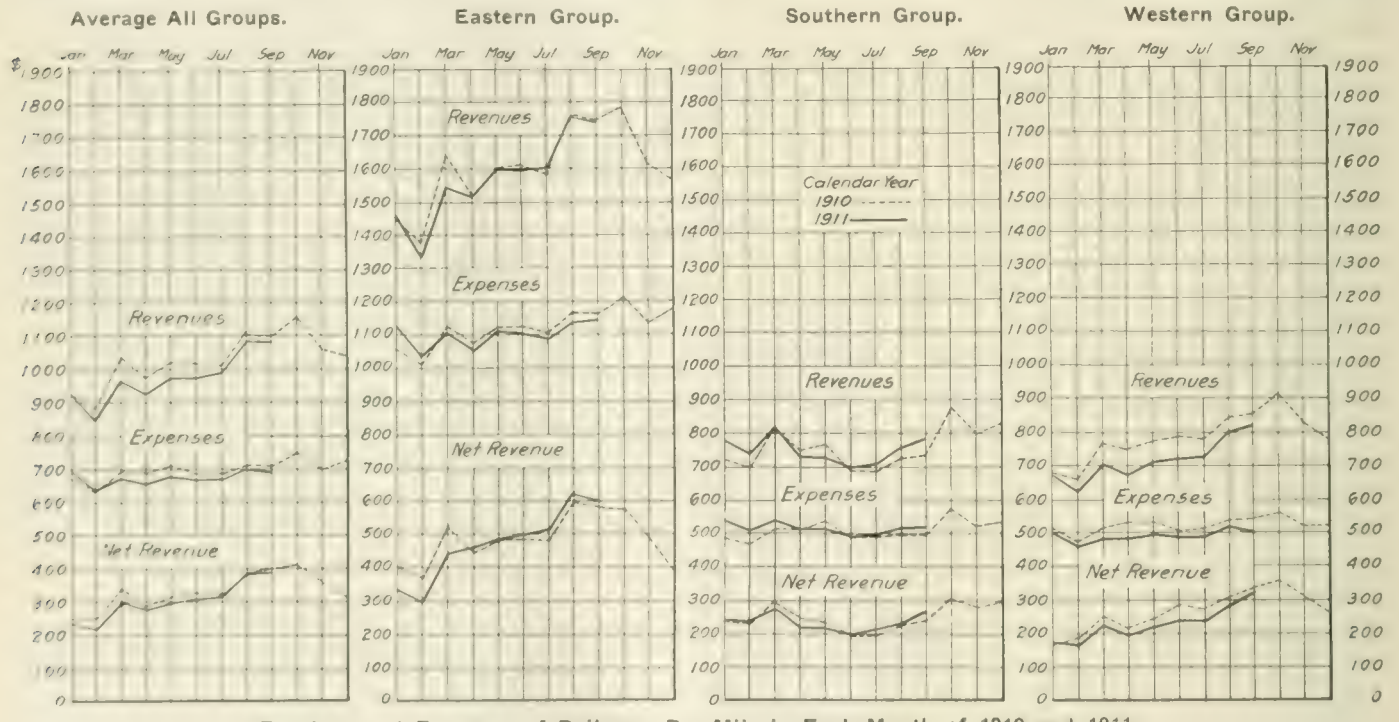
The diagrams show the variations in operating revenues, operating expenses, and net revenue per mile for the separate months of the calendar year 1910 and of the calendar year 1911 to date.

The following table shows the percentage of the various classes of expenses to total operating revenues:

	Sept., 1911.	Sept., 1910.	Fiscal yr. ended June 30, 1911.	Fiscal yr. ended June 30, 1910.	3 mos. ended Sept. 30, 1911.	3 mos. ended Sept. 30, 1910.
Maint. of way and structures	13.3	13.7	13.1	13.4	13.7	14.2
Maint. of equipment	14.4	14.2	15.3	15.0	14.8	14.5
Traffic expenses	1.9	2.0	2.1	2.0	2.1	2.1
Transportation expenses	31.9	32.1	35.5	33.4	32.5	32.5
General expenses	2.3	2.3	2.6	2.5	2.3	2.3
Total	63.8	64.3	68.6	66.3	65.4	65.6

Chicago & North Western Opens New Line.

The new line of the Chicago & North Western through central Wisconsin from Milwaukee to Wyeville, 154 miles, of which a map and description were published in connection with the Milwaukee Belt Railway in the *Railway Age Gazette* of February 24 last, page 354, was opened for the transportation of freight and passengers on Monday, December 11. The line was built under the name of the Milwaukee, Sparta & North Western. It traverses a country part of which has heretofore been without railway facilities and runs through some of the richest and most fertile agricultural lands in the state, including a splendid stock raising and dairying district. The new track connects with the present line at Lindwerm, 8 miles north of Milwaukee, and at Wyeville it connects with the Chicago, St. Paul, Minneapolis & Omaha, for Minneapolis and St. Paul. A further extension from Wyeville to Sparta, connecting with the western lines of the system, is still under construction. By the new line the North Western is given practically a water level route between Lake Michigan ports, Lake Superior ports and the Twin Cities. In connection with the Milwaukee Belt Line means will be provided for running some of the through passenger trains to Duluth and the Twin Cities through Milwaukee by a direct route.

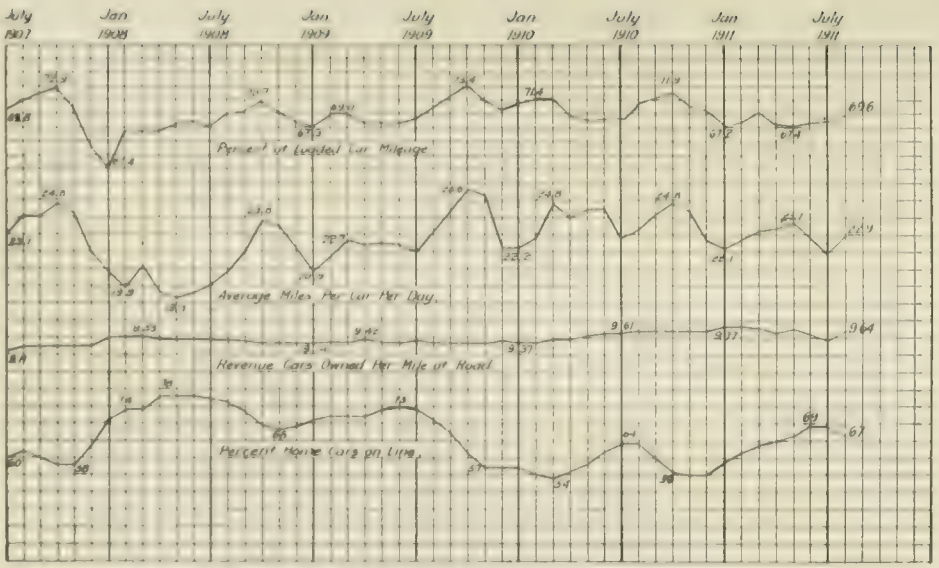


Earnings and Expenses of Railways Per Mile in Each Month of 1910 and 1911.

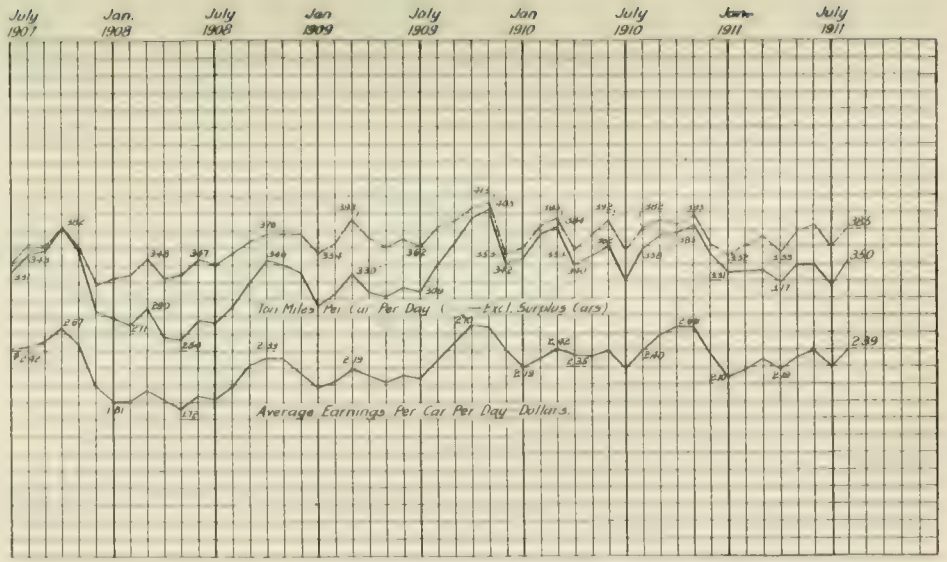
Freight Car Balance and Performance.

Arthur Hale, chairman of the committee on relations between railways of the American Railway Association, in presenting statistical bulletin No. 110, covering car balance and performance for August, 1911, says:

"Traffic conditions prevailing during August, 1911, show a



Car Loading and Performance in 1907 to 1911.



Car Earnings and Ton Mileage In 1907 to 1911.

CAR BALANCE AND PERFORMANCE IN AUGUST, 1911.

	New England.	N. Y., N. J., Del., Md., Eastern Pa.	Ohio, Ind., Mich., Western Pa.	Va., W. Va., No. and So. Carolina.	Ky., Tenn., Miss., Ala., Ga., Fla.	Iowa, Ill., Wis., Minn.	Mont., Wyo., Neb., Dakotas.	Kan., Colo., Okla., Mo., Ark.	Texas, La., New Mex.	Ore., Idaho, Nev., Cal., Ariz.	Canadian Lines.	Grand Total.
Revenue freight cars owned	78,360	497,705	214,695	184,402	170,919	391,349	18,656	136,495	29,699	144,484	107,127	1,973,891
Average number of system cars on line	47,338	335,543	149,742	117,790	113,790	286,854	7,448	95,434	25,519	70,709	76,832	1,326,999
Railway owned cars: Average foreign on line	36,297	141,429	85,891	50,200	44,582	104,690	11,944	40,411	15,299	52,382	31,725	614,750
Total Railway owned cars on line	83,635	476,972	235,633	167,990	158,372	391,544	19,392	135,845	40,818	123,091	108,557	1,941,749
Excess	5,275		20,938			195	736		11,119		1,430	
Per cent. of cars on line to total owned:												
Home	60	67	70	64	67	73	40	70	86	49	72	67
Foreign	46	28	40	27	26	27	64	30	51	36	29	31
All railway	106	95	110	91	93	100	104	100	137	85	101	98
Private cars on line	3,488	31,212	11,928	2,461	6,068	15,235	1,818	7,902	3,261	10,813	2,638	96,824
Total, all cars on line	87,123	508,184	247,561	170,451	164,440	406,779	21,210	143,747	44,079	133,804	111,195	2,038,573
Per cent. of cars in shop	8.50	9.54	10.32	6.81	9.54	7.58	5.86	9.03	5.64	6.09	8.30	8.59
No. of freight engines owned	1,312	7,523	3,058	3,081	2,660	6,342	525	2,646	816	2,686	2,127	32,946
Average cars on line per freight engine owned	66	66	81	55	62	64	40	54	54	50	52	62
Total freight car mileage	2,199,267	511,250,845	138,306,768	125,977,945	123,075,468	290,138,738	28,430,201	89,216,051	30,815,840	117,042,482	92,561,837	1,616,893,039
Average miles per car per day	18.6	21.5	20.6	23.8	24.1	23.0	43.1	21.0	22.6	28.2	26.9	22.9
Per cent. loaded mileage	71.5	67.5	68.5	65.6	70.7	71.6	72.7	70.7	69.0	73.0	74.0	69.6
Tonnages of freight, including company freight	549,207,784	8,153,448,271	2,500,862,293	2,063,773,034	1,701,434,153	5,556,166,606	393,654,117	1,246,964,865	357,931,804	1,707,000,481	1,269,217,674	22,488,661,082
Average lot miles, including company freight:												
Per car mile	10.8	16.0	17.0	16.4	14.0	13.8	14.5	14.0	11.6	14.8	13.7	15.0
Per loaded car mile	14.0	23.7	24.6	25.0	19.8	19.3	19.9	19.9	16.8	20.2	18.5	21.6
Per car per day	200	367	351	390	339	321	654	297	262	416	368	350
Gross freight earnings	$6,161,619	$49,983,486	$14,677,161	$11,370,243	$11,136,314	$29,863,400	$3,097,083	$10,611,293	$3,399,862	$15,984,427	$9,084,527	$165,333,215
Average daily earnings: Per car owned	$2.04	$3.31	$2.20	$1.99	$2.10	$2.46	$5.36	$2.51	$3.69	$3.57	$2.73	$2.47
Per loaded car on line	2.36	3.41	2.01	2.18	2.27	2.46	5.15	2.52	2.69	4.21	2.69	2.51
All cars on line	2.28	2.27	1.91	2.15	2.18	2.37	4.71	2.38	2.49	3.87	2.63	2.39

marked improvement over the preceding month although the performance averages are slightly less than those of August, 1910. With the same per cent. of cars on line, the average miles per car per day increased from 21.9 in July, 1911, to 22.9 in August, 1911, and the per cent. of loaded mileage increased from 67.7 in July, 1911, to 69.6 in August, 1911, indicating the increase in traffic.

"There are also increases in the average tons per loaded car and the tons per car per day, the former increasing from 21.1 in July, 1911, to 26.1 in August, 1911, and the latter increasing from 317 in July, 1911, to 350 in August, 1911. The ton miles per car per day excluding surplus cars show an increase of 25 tons over the preceding month. The average daily earnings of all cars on line increased from $2.17 in July, 1911, to $2.39 in August, 1911, and the same item excluding surplus cars shows an increase of from $2.44 in July, 1911, to $2.61 in August, 1911."

The table on the preceding page shows car balance and performance figures for August and the charts show earnings and performance in 1907 to 1911.

Football Traffic on the New Haven Road.

The biennial Yale-Princeton football game at New Haven on November 18 last was this year for almost the first time affected by rain. It had poured the night before, drizzled through the early hours of daylight, then sprinkled for an hour, and not until near noon did the skies suddenly clear. The influence of the wet weather, as traced in the comparative returns of New Haven railway traffic for 1911 and 1909, are interesting. That traffic, measured in passengers carried, shows an increase from 32,295 to 37,784, or about 18 per cent., while revenue increased from $45,058 to $48,317, or a little more than 7 per cent. The increases were partly due to a larger number than usual of tickets sold at Princeton, but much more to the decrease of automobile travel due to the rain and the muddy roads. This particularly affected the "long distance" automobile travel—as that from New York—as shown by the increased railway business from that city.

The total capacity of the stands at the Yale field is about 33,000 spectators; the total number of automobiles parked outside the field or taken back to New Haven was estimated at 2,000, which at so low an estimate as four persons each, exclusive of chauffeurs, would give 8,000 passengers. This, in a general and indefinite way, indicates the absolute size of the competition with steam railway and trolley.

The company this year again has handled without mishap its great rush of football business on lines where normal passenger business is very intensive. It has four tracks between New York and New Haven, which beyond New Haven divide into two double track lines to Springfield, Mass., and Providence, R. I. But at New Haven its station and track room are pretty meager except as freight sidings can be used; and there is but one double track trolley connecting the station with the city. The schedules will show how well the extra business was handled, especially between New York and New Haven—73.23 miles. Those schedules, with comparative travel and revenue for the two last games, are annexed:

[illegible] & HARTFORD RAILROAD

YALE PRINCETON FOOTBALL SERVICE, Nov. 18, 1911.

A	8:04	10:05	12	415
B	9:00	10:51	12	633
C	9:12	10:58	12	438
50	9:18	11:19	12	540
D	9:29	11:13	10	259
F	9:25	11:22	10	256
H	9:50	11:42	12	886
10	10:10	11:47	7	111
12	10:07	12:08	12	583
J	10:10	12:12	10	275
1st 54	12:01	1:38	6	350
Spt. R.	....	11:59	12	377
2d 54	12:01	1:50	11	448

Trains from Other Divisions.

65	....	9:27	8	160
79	....	10.33	10	387
U	....	11:32	12	290
809	....	11:42	7	130
V	....	11:55	12	594
283	....	12:19	11	350
51	....	1:26	11	300
811	....	1:52	5	200
Waterbury	....	11:40	8	173
659	....	9:23	5	120
5	....	11:48	8	155
61	....	12:47	10	244
661	....	1:50	3	85
9	....	1:18	6	47
11	....	1:56	10	200
1105	....	9:15	4	41
1107	....	11:49	6	229
1011	....	9:15	4	53
1031	....	1:22	4	108
1407	....	9:02	2	35
1409	....	1:30	3	100
1411	....	12:18	4	200
				17,937

Trains from New Haven to New York.

Train.	Left New Haven.	Arrived New York.	Cars.	Passengers.
15	4:18 p.m.	6:00 p.m.	5	154
B	4:28	6:23	12	748
A	4:37	6:37	10	603
287	4:39	8:03	6	300
C	4:47	6:43	12	765
G	4:57	7:08	12	1,300
H	5:12	7:10	12	1,300
17	5:20	7:28	12	825
K	5:32	7:25	12	1,233
289	5:41	8:45	6	400
I	5:45	7:50	12	888
D	6:06	7:56	10	277
O	6:07	8:08	12	838
E	6:11	8:04	10	268
N	6:18	8:25	12	427
55	6:26	8:40	12	267
J	6:24	8:13	10	279
M	6:28	8:35	10	425
O	6:34	8:49	10	325
P	6:41	8:58	10	341
21	6:49	9:02	11	382
1st 57	7:04	9:04	10	165
2d 57	7:20	9:20	12	560
PRR. Spl.	6:43	....	4	93
59	7:56	9:35	9	396
23	8:20	10:00	5	108
25	9:15	11:00	..	386
293	9:38	12:34	6	104
71	12:11	....	12	60

Trains to Other Divisions.

22	5:53	....	9	340
666	5:24	....	4	210
668	6:17	....	4	110
24	6:45	....	7	63
26	7:24	....	9	210
672	11:30	....	3	96
802	5:03	....	6	452
60	6:13	....	12	350
286	6:28	....	4	195
80	6:56	....	10	140
806	7:22	....	4	110
64	8.14	....	8	190
66	10:15	....	7	287
70	1:19	....	11	65
42	12:50	....	11	30
104	6:18	....	5	185
141	6:20	....	4	227
1406	5:45	....	4	250
1410	7:44	....	4	50
1	12:10	....	5	150
1	5:17	....	11	469
X	5:52	....	11	494
Waterbury Spl.	5:30	....	8	189
				19,079

The super-crowding of three trains leaving New Haven immediately after the game will be noticed. Comparison of travel and revenue follow:

AUTOMOBILE REVENUE, YALE PRINCETON FOOTBALL GAMES, Nov. 18, 1911, AND Nov. 13, 1909.

	1911.		1909.		Increase.	
Special Tickets.	No. Pass'rs.*	Revenue.†	No. Pass'rs.*	Revenue.†	No. Pass'rs.*	Revenue.†
[illegible]	18,570	$28,783	17,844	$26,766	726	$2,017
[illegible]	1,412	494	1,400	490	12	4
[illegible]	740	555	804	603	d 64	d 48
[illegible]	600	240	656	262	d 56	d 22
[illegible]	412	329	276	220	136	108
[illegible]	276	179	270	175	6	3
[illegible]	40	52	212	265	d 172	d 213
Other [illegible]	268	196	446	329	d 178	d 133
[illegible]	22,318	$30,830	1,908	$29,110	410	$1,717
[illegible]	15,466	13,947	10,387	12,169	5,079	1,778
[illegible]	37,784	$44,777	32,295	$41,281	5,489	$3,496
[illegible]		$2,457	....	$2,384	....	$73
[illegible]		1,082	....	1,392	....	d 310
		$3,540		$3,776	....	d $236
Grand Total	37,784	$48,317	32,295	$45,058	5,489	$3,259

* Cents omitted.

The street car traffic in New Haven on the day of the game (October 28), as compared with that of a normal Saturday, increased about 33,000, as follows:

	Nov. 18, 1911.	Oct. 28, 1911.	Inc. or Dec.
Number of revenue passengers carried..	154,810	123,210	i 31,600
Number of transfer passengers carried..	27,940	25,799	i 2,141
Number of free passengers carried.....	1,867	2,040	d 173
	184,617	151,049	33,568

For the Yale-Harvard football game at Cambridge a week later—and including the day before and the day after—the increased earnings of the New Haven road for special trains and cars were $6,847, and for regular travel increase $17,172, a total of $24,019.

Special instruction to train and station men were of the same nature as those in former years, which have been heretofore noticed. Engines under steam were kept attached to wrecking cars at New Haven, Harlem River and Hartford. All of the trains out of New York had to be hauled by electric locomotives, and in nearly every case these engines took the trains through to Stamford, 33 miles. Special arrangements were made to return these engines right to New York the moment they were detached from eastbound trains at Stamford. During the movement of the football trains all freights were required to clear the time of the passenger trains 20 minutes. Conductors were required to have their trains properly made up, lighted and manned for the return trip by 3:30 p. m.

The Cotton Crop.

The United States department of agriculture estimates that the total production of cotton in the United States for the season of 1911-12 will amount to 7,121,713,000 lbs. (not including linters), equivalent to 14,885,000 bales of 500 lbs. gross weight.

The estimated production, with comparisons, by states, follow:

	Pounds Lint.	Bales of 500 lbs., Gross Weight.		
	1911.	1911.		Average 5 yrs.,
States.	(000 are omitted.)	(000 are omitted.)	1910. (Census.)	1905-1909. (Census.)
Virginia	10,957	23	14,815	12,084
N. Carolina.....	445,808	935	706,142	610,268
S. Carolina.....	706,404	1,480	1,163,501	1,068,802
Georgia	1,223,168	2,560	1,767,202	1,765,231
Florida	35,135	73	58,949	58,127
Alabama	765,280	1,600	1,194,250	1,196,571
Mississippi	572,046	1,195	1,262,680	1,387,331
Louisiana	188,810	395	245,648	580,047
Texas	2,051,832	4,280	3,049,409	3,070,723
Arkansas	438,102	915	821,233	816,280
Tennessee	201,054	420	331,947	290,205
Missouri	39,757	83	59,633	48,076
Oklahoma	438,102	915	923,063	734,604
California	5,258	11	5,986	.....
All other	.....	.....	4,158	2,202
United States..	7,121,713	14,885	11,608,616	11,640,551

Drainage Congress Organized.

As the result of a division between the "wets" and the "drys" among those interested in reclamation work, the National Drainage Congress was organized at a meeting in Chicago last week by delegates to the National Irrigation Congress, whose annual convention was in session throughout the week. The new body was organized for the purpose of promoting the reclamation of wet and swampy lands throughout the United States, by methods similar to those favored by the Irrigation Congress in promoting the reclamation of arid lands in the west. Its formation was an alternative to a proposed division of the scope of the older body between irrigation and drainage. The congress will have representation from every state in the Union. E. T. Perkins, of Chicago, was elected first vice-president with executive authority until the next meeting, when a full list of officers will be chosen.

One of the aims of the Drainage Congress will be to advocate the passage of a bill now pending before the federal congress providing for a drainage reclamation fund to be set aside from the proceeds of the sale of public lands. Vice-President W. L. Park, of the Illinois Central, was one of the speakers before the congress, supporting a policy of reclamation by drainage. He said that the question of bringing under subjugation 75,000,000 acres of overflowed lands distributed throughout 40 states was one of the most important before the nation, and promised that the proposed work would be strongly supported by the railways.

"The agency through which this is to be brought about is immaterial," said Mr. Park. "In my opinion, and in that of many others, in order that it may be done quickly, the government should undertake the work and the credit for initiating this movement should go to this organization. It is not paternalism, as some contend, to supply water to the arid lands in the manner in which it has been done under the reclamation act; neither is it paternalism to take from our swamp lands the same water, under the same conditions; on the other hand, it is the wisest public policy.

"The basis of our prosperity lies now, and must always remain, in the soil. Unless we so regard it, disaster is sure to follow. Drainage as a basis of development is only one of the many economic problems our government must take cognizance of. It is, however, the most important at this time."

The National Irrigation Congress elected the following officers for the ensuing year: President, Senator Francis G. Newlands of Nevada; national secretary, Arthur Hooker, Spokane, Wash.; foreign secretary, Dr. E. McQueen Gray, Albuquerque, N. M.; vice-presidents, R. Ensinger, Spokane, Wash.; J. B. Case, Abilene, Kan.; John Fairweather, Fresno, Cal.; S. H. Lea, Pierre, S. D., and Richard F. Burgess, El Paso, Tex.

INTERSTATE COMMERCE COMMISSION.

President Taft has reappointed Commissioner James S. Harlan for a term of seven years.

The commission has suspended until April 3 the proposed advances in rates on lemons, C. L., from California to points in Colorado and the Middle West. It was proposed to increase the rate from $1 to $1.15.

The Omaha Grain Exchange has filed a complaint with the Interstate Commerce Commission alleging unlawful discrimination in the grain rates of the Chicago, Milwaukee & St. Paul railway to Omaha, South Omaha and Council Bluffs, as compared with the rates to Minneapolis.

Conflicting Tariffs.

J. J. Badenoch Co. et al. v. Chicago & North Western. Opinion by the commission:

In a case where conflicting rules which effect a freight rate are published, effective on the same date, in separate tariffs by the same railway, the railway should apply the rule which will result in the lower charge. (21 I. C. C., 36.)

Export Rate on Flour Reduced.

Board of Railroad Commissioners of Kansas et al. v. Missouri Pacific et al. Opinion by Commissioner Harlan:

Carload rates on flour from Glen Elder, Kan., to New Orleans, La., for export found unreasonable. (22 I. C. C., 24.)

No Discrimination Against Laredo.

Board of Trade of Laredo, Tex., v. International & Great Northern et al. Opinion by Commissioner McChord:

Complaint is made that the all-rail rate on all classes and commodities of traffic, except on grain, is higher from eastern seaboard territory and Pacific coast territory to Laredo than to Corpus Christi, San Antonio and other Texas common points. Laredo has been given a Texas common point rate on grain because the orders of the Texas railway commission had fixed intrastate rates in such a way that the convenience of shippers was served by the granting of a through rate, while the railway company did not lose any more money than it did already from the working of the state commission law. At one time the differential to Laredo in other traffic was taken off, but the railway company claims that this was almost at once found to be a mistake and that these differentials were restored as soon as possible. Owing to severe competition between the rail carriers themselves running from Chicago, St. Louis and other points into Texas, and owing to ocean and rail competition from the East via Galveston, the present Texas common point rates are lower then they otherwise would be, and the rates to Laredo are in themselves not unreasonable, the whole contention being that Laredo is discriminated against in favor of San Antonio and Corpus Christi. It is not shown that there is any appreciable competition between Laredo, San Antonio and Corpus Christi. The complaint, therefore, is dismissed. (22 I. C. C., 28.)

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF OCTOBER, 1911.

Name of road	Mileage operated at end of period	Operating revenues: Freight	Passenger	Total, inc. misc.	Operating expenses: Maintenance: Way and structures	Maintenance: Of equipment	Traffic	Transportation	General	Total	Net operating revenue (or deficit)	Outside operations, net	Taxes	Operating income (or loss)	Increase (or decr.) comp. with last year
[illegible]	141	[illegible]	$40,943	$187,300	$21,883	$27,025	$3,916	$51,989	$5,294	$110,107	$47,193	—$136	$4,600	$42,457	—$7,462
[illegible]	300	[illegible]	[illegible]	4,84,300	38,499	109,357	11,432	122,717	10,461	292,466	131,834	—214	15,048	116,572	3,600
[illegible]	104	[illegible]	43,882	187,934	18,319	19,133	4,299	67,366	7,730	112,047	75,487	1,425	13,986	63,926	3,755
[illegible]	104	[illegible]	37,774	148,117	23,839	11,488	2,057	41,357	7,228	85,939	62,178	—81	12,560	49,537	1,671
[illegible]	7,811	[illegible]	1,[illegible]	7,029,963	1,221,460	1,142,281	150,803	2,271,414	156,862	4,943,820	3,036,143	.....	328,290	2,707,853	—188,369
[illegible]	95	[illegible]	60,388	309,428	28,867	48,082	17,304	104,015	8,935	207,103	102,375	.....	16,300	86,075	28,835
[illegible]	4,[illegible]	[illegible]	[illegible]	[illegible]	372,166	400,689	46,193	910,401	67,505	1,796,954	985,210	—	107,000	878,210	77,165
[illegible]	4,[illegible]	[illegible]	1,[illegible]	8,[illegible]	1,100,751	1,397,778	175,704	2,759,664	153,602	5,587,479	2,[illegible]	—66,798	241,199	2,364,347	307,560
[illegible]	[illegible]	[illegible]	[illegible]	153,824	29,300	16,171	1,055	59,300	8,703	114,529	39,295	825	18,206	21,914	1,135
[illegible]	[illegible]	[illegible]	[illegible]	303,322	52,064	31,636	2,986	84,868	10,148	181,702	121,620	.....	9,250	112,370	15,113
[illegible]	[illegible]	[illegible]	23,498	908,653	71,107	142,434	7,719	196,307	7,718	425,185	483,468	.....	7,000	476,468	117,661
[illegible]	[illegible]	[illegible]	1,381,185	4,115,842	584,910	553,597	47,566	1,711,943	80,358	2,978,374	1,136,968	16,358	178,586	974,740	— 5,544
[illegible]	[illegible]	[illegible]	[illegible]	154,560	39,863	32,699	1,569	58,695	6,282	139,108	15,452	.....	2,600	12,852	—23,986
[illegible]	[illegible]	[illegible]	[illegible]	8,811	8,726	23,461	522	24,589	2,434	59,732	—983	—38	1,400	—2,421	10,221
[illegible]	[illegible]	[illegible]	[illegible]	832,569	104,249	162,408	9,444	264,184	16,802	557,087	275,482	229	17,000	258,711	—42,262
[illegible]	[illegible]	[illegible]	13,[illegible]	174,850	11,799	23,103	4,604	35,216	7,851	82,573	92,277	.....	8,000	84,277	16,889
[illegible]	[illegible]	[illegible]	1,708	10,637	577	101	923	2,487	443	4,531	6,106	.....	500	5,606	2,189
[illegible]	[illegible]	[illegible]	[illegible]	466,729	2,421,638	245,333	322,750	37,335	620,676	36,959	1,263,053	1,158,585	—39,199	94,060	1,119,386	236,196
[illegible]	[illegible]	[illegible]	[illegible]	32,640	317,867	52,492	22,054	1,234	77,184	2,140	155,104	162,763	53	9,000	153,816	50,699
[illegible]	[illegible]	[illegible]	[illegible]	376,483	50,183	56,549	7,751	151,349	9,569	275,401	101,082	650	12,200	89,532	—23,386
[illegible]	[illegible]	[illegible]	[illegible]	197,015	28,955	25,236	3,363	66,093	4,070	121,717	75,298	.....	5,000	70,298	20,328
[illegible]	[illegible]	[illegible]	[illegible]	1,397,978	217,839	254,484	43,002	473,276	33,628	1,022,229	375,749	—2,575	36,500	336,674	55,699
[illegible]	[illegible]	[illegible]	[illegible]	1,471,325	177,670	262,488	29,185	488,232	39,432	996,507	474,818	—1,981	38,500	434,337	31,390
[illegible]	[illegible]	[illegible]	[illegible]	499,827	93,228	84,508	21,683	216,241	11,589	427,249	72,578	.....	16,450	56,128	—7,278
[illegible]	[illegible]	[illegible]	[illegible]	7,384,406	954,796	894,117	112,363	2,681,496	120,346	4,763,110	2,561,288	801	275,000	2,287,089	318,640
[illegible]	[illegible]	[illegible]	[illegible]	8,320,216	924,060	1,269,486	118,440	2,511,371	189,872	5,013,229	3,306,985	—1,840	264,445	3,040,700	—556,112
[illegible]	[illegible]	[illegible]	[illegible]	1,[illegible]	145,952	161,190	45,946	460,045	33,484	846,617	405,644	268	33,037	372,875	40,273
[illegible]	[illegible]	[illegible]	[illegible]	368,838	50,511	70,863	7,780	122,903	8,394	260,451	107,877	—185	13,900	93,792	28,198
[illegible]	[illegible]	[illegible]	[illegible]	619,721	82,293	74,372	19,145	205,624	15,882	397,316	213,405	.....	26,184	187,221	37,300
[illegible]	[illegible]	[illegible]	[illegible]	1,583,690	94,884	116,666	57,901	496,261	20,002	785,714	796,976	26,620	79,335	744,261	106,339
[illegible]	[illegible]	[illegible]	[illegible]	6,141,525	955,877	780,630	113,187	2,253,265	87,056	4,190,015	1,951,510	—2,380	237,650	1,711,480	—190,616
[illegible]	[illegible]	[illegible]	[illegible]	1,[illegible]	17,817	31,393	7,363	67,516	6,159	130,248	32,377	.....	4,300	28,077	—8,727
[illegible]	[illegible]	[illegible]	[illegible]	268,431	26,159	15,532	9,366	83,207	7,978	142,242	121,179	—224	6,512	114,443	29,113
[illegible]	[illegible]	[illegible]	[illegible]	5,[illegible]	869,116	707,121	153,723	2,116,845	135,866	3,982,671	1,942,232	—11,221	230,222	1,700,789	—42,697
[illegible]	[illegible]	[illegible]	[illegible]	1,[illegible]	143,435	146,343	23,226	537,292	31,403	881,699	607,936	810	69,970	538,726	—97,608
[illegible]	[illegible]	[illegible]	[illegible]	168,476	24,096	28,483	2,669	48,651	6,884	110,783	57,690	—137	8,700	48,853	.....
[illegible]	[illegible]	[illegible]	[illegible]	832,937	94,539	194,986	20,518	227,799	18,333	556,175	276,762	—1,625	21,800	253,337	—50,197
[illegible]	[illegible]	[illegible]	[illegible]	122,968	21,536	25,824	2,777	45,297	2,880	98,314	24,374	.....	5,700	18,674	4,941
[illegible]	[illegible]	[illegible]	[illegible]	343,368	51,718	54,150	4,624	109,492	4,745	224,729	118,664	.....	19,000	99,664	9,752
[illegible]	[illegible]	[illegible]	[illegible]	2,667,279	268,402	463,714	77,639	1,026,280	52,215	1,888,249	809,030	—1,484	100,000	707,546	71,753
[illegible]	[illegible]	[illegible]	[illegible]	203,353	21,888	34,128	6,820	83,449	6,387	151,672	51,681	—562	8,000	43,119	8,207
[illegible]	[illegible]	[illegible]	[illegible]	764,413	86,186	145,829	9,232	233,885	27,093	502,225	262,188	—704	24,700	236,784	—71,983
[illegible]	[illegible]	[illegible]	[illegible]	268,424	48,769	31,428	4,831	83,581	7,049	175,659	92,765	449	5,141	88,073	—42,899
[illegible]	[illegible]	[illegible]	[illegible]	1,955,818	151,749	286,558	19,361	631,341	43,071	1,132,080	823,738	—2,729	50,000	771,009	—90,416
[illegible]	[illegible]	[illegible]	[illegible]	3,301,710	401,263	499,869	63,355	964,283	61,199	1,989,949	1,311,761	51,060	178,500	1,184,321	—60,194
[illegible]	[illegible]	[illegible]	[illegible]	2,193,056	384,665	368,632	56,250	767,898	51,334	1,628,779	564,277	—989	73,000	490,288	—163,350
[illegible]	[illegible]	[illegible]	[illegible]	110,474	11,873	14,589	2,573	35,269	3,754	68,058	42,416	.....	3,000	39,416	4,438
[illegible]	[illegible]	[illegible]	[illegible]	106,074	21,484	18,256	1,983	33,538	4,027	79,288	26,786	—216	8,100	18,470	— 6,322
[illegible]	[illegible]	[illegible]	[illegible]	173,797	34,156	22,189	2,637	75,089	5,372	139,443	34,354	—16	6,000	28,338	2,964
[illegible]	[illegible]	[illegible]	[illegible]	938,074	90,888	66,002	666	142,538	9,656	307,750	628,324	6,434	38,693	596,065	32,404
[illegible]	[illegible]	[illegible]	[illegible]	856,111	99,381	80,916	1,765	131,408	11,740	325,210	530,901	6,064	34,473	502,492	—102,334
[illegible]	[illegible]	[illegible]	[illegible]	283,330	48,403	27,240	9,028	106,102	8,863	199,636	83,694	1,517	18,000	67,211	—6,293
[illegible]	[illegible]	[illegible]	[illegible]	626,637	78,323	84,287	11,850	165,600	23,422	363,482	257,155	—2,231	21,076	233,848	10,534
[illegible]	[illegible]	[illegible]	[illegible]	891,848	77,342	169,050	4,259	235,613	14,142	500,406	391,442	.....	16,725	374,717	68,686
[illegible]	[illegible]	[illegible]	[illegible]	4,430,568	418,540	727,797	99,621	1,454,105	102,719	2,802,782	1,627,886	14,230	163,026	1,479,090	184,829
[illegible]	[illegible]	[illegible]	[illegible]	270,626	58,784	50,703	5,720	92,770	10,147	218,124	52,502	—303	15,500	36,699	17,229
[illegible]	[illegible]	[illegible]	[illegible]	493,281	35,990	60,811	7,656	162,228	14,726	281,411	211,870	—1,039	12,000	198,831	—42,051
[illegible]	[illegible]	[illegible]	[illegible]	942,587	111,702	150,715	30,130	350,357	23,522	666,426	276,161	—3,427	30,442	242,292	—7,129
[illegible]	[illegible]	[illegible]	[illegible]	345,322	23,433	44,176	11,805	143,035	9,418	231,867	113,455	.....	2,100	111,355	2,535
[illegible]	[illegible]	[illegible]	[illegible]	453,119	44,566	78,108	10,840	179,086	15,337	327,937	125,182	331	22,965	102,548	23,193
[illegible]	[illegible]	[illegible]	[illegible]	7,112,815	664,570	636,920	91,807	1,659,447	93,120	3,145,764	3,967,051	23,192	281,967	3,708,276	562,408
[illegible]	[illegible]	[illegible]	[illegible]	160,960	24,629	30,692	2,644	45,783	7,864	111,612	49,348	.....	4,370	44,978	—24,319
[illegible]	[illegible]	[illegible]	[illegible]	1,343,066	251,556	165,453	25,445	443,612	29,614	915,680	427,386	.....	35,761	391,625	—5,808
[illegible]	[illegible]	[illegible]	[illegible]	656,758	84,239	115,973	8,181	201,658	17,982	428,033	228,725	.....	42,300	186,425	—98,273
[illegible]	[illegible]	[illegible]	[illegible]	124,320	21,890	11,454	1,930	36,917	3,134	75,325	48,995	.....	4,416	44,579	8,187
[illegible]	[illegible]	[illegible]	[illegible]	568,629	58,084	98,917	19,934	201,800	19,206	397,941	170,688	—944	24,974	144,770	—127,680
[illegible]	[illegible]	[illegible]	[illegible]	363,662	41,220	46,188	7,618	145,228	8,304	248,558	115,104	.....	9,670	105,434	27,743
[illegible]	[illegible]	.....	.....	219,508	33,064	26,536	2,534	97,326	7,601	167,061	52,447	3,249	5,500	50,196	- 11,352
[illegible]	[illegible]	[illegible]	[illegible]	316,439	49,872	46,217	2,218	90,236	7,205	195,748	120,691	44	9,004	111,731	—4,374
[illegible]	[illegible]	[illegible]	[illegible]	848,741	78,456	124,158	27,420	265,090	30,224	525,348	323,393	.....	34,612	288,781	—62,629
[illegible]	[illegible]	[illegible]	[illegible]	488,256	76,930	93,536	12,988	187,166	10,650	381,270	106,986	.....	19,886	87,100	—1,853
[illegible]	[illegible]	[illegible]	[illegible]	4,351,609	442,087	518,288	88,616	1,302,162	64,293	2,415,446	1,936,163	1,332	170,000	1,767,495	663,597
[illegible]	[illegible]	[illegible]	[illegible]	144,064	17,928	17,102	1,235	43,334	3,881	83,480	60,584	.....	3,500	57,084	5,349

Mileage operated on October 31, 1910—[1] 347; [2] 7,547; [3] 4,402; [4] 4,443; [5] 599; [6] 204; [7] 573; [8] 236; [9] 631; [10] 1,276; [11] 7,692; [12] 9,075; [13] 1,489; [14] 340; [15] 615; [16] 1,910; [17] 470; [18] 7,395; [19] 247; [20] 1,982; [21] 1,247; [22] 819; [23] 2,553; [24] 360; [25] 167; [26] 293; [27] 608; [28] 89[illegible]; [29] 1,959; [30] 7,274; [31] 1,518; [32] 350; [33] 113; [34] 1,662. — Indicates Deficits, Losses and Decreases.

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF OCTOBER, 1911 (CONTINUED).

Name of road.	Mileage operated at end of period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
		Freight.	Passenger.	Total, inc. misc.	Maintenance: Way and structures.	Maintenance: Of equipment.	Traffic.	Transportation.	General.	Total.					
Lehigh Valley	1,431	$2,974,955	$373,679	$3,465,305	$402,034	$585,443	$83,037	$1,135,495	$66,148	$2,272,157	$1,193,148	—$14,501	$106,900	$1,071,747	—$179,890
Long Island	398[5]	315,928	524,518	876,744	175,013	117,838	13,722	404,357	20,202	731,132	145,612	56,441	53,554	148,499	—89,547
Louisiana & Arkansas	255	86,644	17,769	109,671	19,524	16,279	2,350	32,279	4,798	75,230	34,441	.....	3,150	31,291	—959
Louisiana Western	207	94,077	50,852	154,522	18,543	31,810	8,249	52,608	6,968	118,178	36,344	370	6,402	30,312	—44,696
Louisville & Nashville	4,701[38]	3,850,622	1,035,474	5,182,855	691,030	842,734	91,138	1,523,937	89,794	3,238,633	1,944,192	420	148,950	1,795,662	252,918
Louisville, Henderson & St. Louis	197	72,360	36,299	115,312	24,179	13,158	4,282	37,421	3,432	82,472	32,840	458	3,000	30,298	4,691
Maine Central	1,165[37]	637,206	290,092	983,623	199,431	117,252	12,442	335,179	22,644	686,948	296,675	- 651	44,245	251,779	—8,754
Manistique Central	1,894[35]	1,949,857	636,707	2,866,021	376,823	310,505	70,326	1,023,345	42,242	1,823,291	1,042,730	1,264	110,000	933,994	399,844
Maryland Valley	37[39]	107,324	43,754	162,189	26,372	20,563	3,032	43,177	6,974	100,118	62,071	276	5,484	56,863	—7,595
Merchants, St. Paul & Sault Ste. Marie	1,007	283,272	103,443	432,919	47,668	49,885	10,658	172,364	12,858	293,433	129,486	38	20,570	108,954	57,858
Missouri, Kansas & Texas of Texas	1,343[3]	8[5],937	403,778	1,297,305	221,625	74,033	25,629	514,084	28,799	864,170	433,135	—182	22,500	410,453	—78,711
Mobile & Ohio	1,114	962,372	129,503	1,146,792	120,771	196,813	34,990	361,917	30,645	745,136	401,656	- 969	24,595	376,092	117,270
Monongahela	64[41]	92,559	2,310	103,539	18,316	6,580	475	22,063	1,944	49,378	54,160	.....	4,000	50,160	—908
Morgan's La. & Tex. R. R. & S. S. Co.	404[42]	248,450	110,472	380,783	50,453	52,157	14,565	161,195	12,900	291,270	89,513	—2,425	18,698	68,390	—51,855
Nashville, Chattanooga & St. Louis	1,255	741,012	247,135	1,057,483	163,636	186,471	35,337	378,711	24,337	789,482	268,001	—745	23,816	243,440	2,107
New Orleans & North Eastern	195	297,585	53,691	371,779	31,494	62,954	9,410	136,319	11,450	251,627	120,152	199	9,250	111,101	19,847
New Orleans Great Northern	282	99,993	31,946	140,754	23,763	18,364	2,581	41,663	7,290	96,661	44,093	—114	3,000	41,979	—5,331
New Orleans, Mobile & Chicago	434	179,564	30,633	170,804	24,435	17,051	2,629	48,285	8,293	100,693	70,111	231	4,512	65,830	—1,806
New York Central & Hudson River	3,501[13]	5,815,770	2,649,30	9,454,242	1,331,135	1,490,991	223,193	3,293,835	208,647	6,609,841	2,844,411	11,494	625,803	2,230,102	70,655
New York, Chicago & St. Louis	561	819,553	140,712	1,001,351	110,005	111,057	46,845	400,829	16,698	685,434	315,917	- -1,359	44,000	270,558	—61,718
New York, New Haven & Hartford	2,091	2,867,946	2,364,381	5,235,126	710,104	619,567	31,833	2,087,138	196,829	3,645,471	2,089,655	94,459	345,000	1,839,114	—85,250
New York, Ontario & Western	565[14]	573,158	100,536	720,399	113,567	95,996	10,430	287,019	15,337	522,349	198,050	—1,265	17,917	178,868	6,107
New York, Philadelphia & Norfolk	112	233,580	35,861	289,718	28,990	53,983	3,473	107,497	12,352	206,295	83,423	.....	7,500	75,923	13,288
New York, Susquehanna & Western	159	183,374	49,035	259,657	24,419	23,378	1,724	95,474	6,963	149,858	109,799	5,668	17,873	96,594	—10,458
Norfolk & Western	1,060[43]	2,941,765	460,678	3,445,794	450,766	672,339	52,236	1,006,678	63,604	2,245,623	1,200,171	—1,406	115,000	1,083,765	—179,902
Northern Central	607[49]	183,024	75,080	278,227	35,112	30,101	5,603	85,688	13,127	169,931	108,296	—300	7,500	100,496	5,930
Northern Pacific	4,745	929,110	208,124	1,701,495	132,653	235,706	16,199	583,528	22,708	989,793	211,702	974	40,336	172,340	60,619
Northern Pacific	6,016[48]	4,839,719	1,406,337	6,604,917	786,217	609,269	95,916	1,845,403	87,301	3,424,106	3,180,811	30,907	330,246	2,881,472	552,892
Oregon Short Line	1,667[19]	1,487,295	430,098	2,037,275	199,088	125,495	33,265	463,587	31,436	852,871	1,184,404	3,507	130,258	1,057,653	94,426
Oregon Washington R. R. & Nav. Co.	1,890	1,038,999	450,053	1,604,017	188,544	127,938	47,685	507,936	43,153	915,256	688,761	—1,641	131,150	555,970	.....
Peoria & Northern	296	139,100	31,163	178,022	24,557	38,687	2,683	56,608	4,478	127,013	51,009	.....	6,353	44,656	—15,670
Pere Marquette	1,415	3,733,959	726,405	4,877,915	628,726	873,233	82,284	1,562,517	84,790	3,231,550	1,646,395	1,468	173,430	1,474,433	119,090
Pittsburgh & Lake Erie	3,975[30]	10,499,130	2,954,893	14,353,718	1,517,133	2,652,083	194,665	5,013,333	320,667	9,697,881	4,655,837	—74,417	605,931	3,975,489	—90,170
Pittsburg & Shawmut	351[31]	194,012	65,485	280,715	35,698	37,156	5,337	107,813	5,374	191,378	89,337	.....	10,500	78,837	—16,522
Pittsburgh & West Virginia	2,331[32]	1,162,223	328,761	1,609,287	208,848	248,878	34,084	644,448	31,618	1,167,866	441,421	—4,873	56,289	380,259	98,880
Pittsburgh, Shawmut & Northern	71[33]	87,466	685,972	1,667,126	217,735	269,281	27,986	653,276	33,373	1,201,651	465,475	.....	50,698	414,777	69,543
Pittsburgh & Western	217[34]	1,371,216	130,640	1,443,323	170,395	256,222	12,710	313,137	23,001	775,455	666,868	—406	30,530	635,932	—244,869
Pittsburgh, Cincinnati, Chic. & St. Louis	1,467[3]	2,448,380	684,397	3,533,146	486,699	611,100	74,565	1,220,480	66,685	2,459,529	1,073,617	—735	137,834	945,048	—51,784
Pittsburg, Shawmut & Northern	240	117,588	7,747	135,431	13,633	27,496	1,092	32,965	3,597	78,783	43,648	.....	1,574	42,074	15,513
Richmond, Fredericksburg & Potomac	83	190,366	74,740	297,611	21,782	27,510	2,896	71,399	5,208	123,795	73,816	.....	1,000	72,816	9,098
Rutland	468	177,609	110,497	320,819	37,132	35,211	6,603	127,504	5,871	212,321	108,498	.....	10,573	97,925	8,310
St. Joseph & Grand Island	347	101,140	40,343	153,834	28,133	15,057	4,892	61,029	5,665	114,776	39,058	176	5,711	33,523	—7,368
St. Louis & San Francisco	4,731	2,574,141	1,022,208	3,855,567	457,060	465,132	92,851	1,239,877	101,361	2,356,281	1,499,286	.....	161,738	1,337,548	142,001
St. Louis, Brownsville & Mexico	509[24]	124,188	54,410	191,835	41,991	11,204	2,984	60,880	8,107	125,166	66,369	.....	4,500	61,869	32,971
St. Louis Merchants' Bridge Terminal	9	.....	299	165,573	21,999	13,060	12,430	77,829	4,602	116,920	48,653	.....	5,700	42,953	—15,736
St. Louis, San Francisco & Texas	243	85,896	34,026	136,338	25,047	14,516	3,459	51,589	4,718	99,329	36,909	.....	921	35,988	25,525
St. Louis Southwestern of Texas	703	335,471	109,894	474,968	46,347	76,033	12,708	163,170	18,354	316,612	158,356	—148	10,000	148,208	29,011
San Pedro, Los Angeles & Salt Lake	1,113[57]	438,411	262,695	751,512	153,539	160,064	32,990	297,848	17,181	662,522	88,990	—2,708	24,750	61,532	—130,567
Seaboard Air Line	964	160,448	34,084	113,473	17,737	12,374	3,710	38,473	5,291	77,085	66,388	.....	2,339	64,059	5,117
Southern	7,088[58]	3,965,968	1,412,375	5,826,118	639,805	938,662	134,189	1,847,499	151,832	3,711,977	2,114,191	15,049	196,774	1,932,466	89,559
Southern Illinois & Missouri	260	86,646	33,396	121,331	22,931	8,495	2,509	40,668	3,415	78,018	43,303	.....	5,442	37,861	9,672
Southern Railway in Texas	124	113,015	16,102	133,564	27,450	28,483	2,365	41,792	4,009	104,098	29,466	.....	3,535	25,931	—28,046
Sunset	569	70,885	16,326	99,817	6,763	1,671	195	23,121	374	33,004	58,793	.....	3,390	55,403	7,005
Tennessee Central & New York	80	59,486	34,798	106,996	9,740	7,001	2,606	39,045	2,085	60,177	46,819	.....	6,220	40,599	3,355
Texarkana & Fort Smith	88	94,594	31,949	134,761	23,509	19,246	5,037	44,978	7,307	100,027	34,734	.....	4,212	30,022	- 15,901
Texas & Pacific	1,[illegible]	82	364,843	958,605	38,153	18,126	1,007	87,126	6,236	150,948	107,657	3,729	30,980	80,406	—8,236
Texas Central	475	33,114	65,413	348,937	52,231	80,415	7,365	229,388	8,432	379,834	71,103	114	12,248	58,969	5,982
Texas & Pacific	1,[illegible]	1,176,014	421,751	1,737,779	141,606	161,533	30,008	611,305	40,084	984,536	748,193	—8,641	42,579	696,973	130,273
Texas Central	139	49,430	37,771	500,940	85,236	66,884	7,144	161,496	7,593	328,353	172,587	—1,033	25,706	145,848	—28,196
Toledo, St. Louis & Western	150	304,577	36,656	353,150	47,317	71,713	8,437	129,372	8,791	265,630	86,520	.....	14,500	72,020	—53,614
Toledo, Peoria & Western	96	54,799	14,094	337,523	33,859	26,960	9,059	125,257	12,547	207,682	129,841	.....	5,835	124,005	39,119
Union Pacific	3,[illegible]	3,[illegible]	930,616	4,910,679	405,569	479,595	100,506	1,254,813	107,183	2,347,666	2,563,013	2,383	175,100	2,390,296	— 213,965
Union Pacific Coal	9	110,675	21,647	133,956	9,773	.....	976	6,005	2,277	19,031	114,925	.....	5,923	109,002	—8,337
Union Pacific Coal Co. Pennsylvania	31	.....	.....	439,359	10,901	73,310	100	121,919	2,433	238,593	200,766	3,672	4,000	200,338	69,883
Vandalia	857	609,967	220,184	917,762	121,379	166,800	28,089	336,864	19,564	672,696	247,066	.....	28,301	218,765	- 41,708
Virginian	171	7,[illegible]	41,638	144,243	21,196	19,805	3,959	39,037	4,579	87,816	36,427	217	6,300	30,344	—8,989
Virginia & Southwestern	346	178,[illegible]	17,481	152,518	16,597	36,184	1,862	13,057	4,300	92,020	60,708	.....	4,710	56,088	19,554
Wabash	4,[illegible]	2,[illegible]	21,[illegible]	419,962	44,959	69,748	4,858	121,458	7,922	248,035	170,927	6,359	14,000	163,286	38,098
Washington Southern	75	11,[illegible]	[illegible]	88,960	11,980	10,655	1,118	34,369	2,474	60,596	28,364	.....	3,245	25,019	6,872
West Jersey & Seashore	2[illegible]	1,[illegible]	247,293	446,620	91,237	104,945	14,046	224,803	10,011	445,042	1,578	—474	23,473	- 22,369	—127,677
Western Maryland	157	608,079	54,406	708,651	75,413	122,581	8,709	224,713	14,794	446,215	262,436	4,168	30,859	235,745	91,770

[1] Mileage operated on October 31, 1910, [illegible]; [2] 1,179; [3] 1,746; [4] 333; [5] 1,248; [6] 64; [7] 348; [8] 3,587; [9] 545; [10] 1,951; [11] 603; [12] 470; [13] 5,815; [14] 1,594; [15] 3,970; [16] 351; [17] 2,337; [18] 717; [19] 191; [20] 1,468; [21] [illegible]; [22] 7,0[illegible]; [23] 56; [24] 84; [25] 444; [26] 3,412; [27] 182; [28] 473; [29] 353. —Indicates Deficits, Losses and Decreases.

REVENUES AND EXPENSES OF RAILWAYS.

THREE MONTHS OF FISCAL YEAR, 1911.

Name of road	Mileage operated at close of year	Operating revenues — Freight	Passenger	Total transportation	Maintenance — Way and structures	Of equipment	Operating expenses — Traffic	Transportation	General	Total	Net operating revenue (or deficit)	Outside operations, net	Taxes	Operating income (or loss)	Increase (or dec.) comp. with last year
[illegible]	[illegible]	$[illegible]	[illegible]	[illegible]	[illegible]	$[illegible]	$[illegible]	$[illegible]	$[illegible]	$[illegible]	$135,876	—$51	$18,400	$117,425	—$56,337
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	492,972	—914	59,592	432,466	—20,887
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	297,006	6,595	58,942	242,659	60,340
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	277,294	612	34,520	243,386	39,198
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4,603,391	605,476	8,380,960	679,355	19,286,700	10,108,552	.....	1,195,172	8,913,080	—1,744,833
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	824,731	.....	47,800	776,931	94,357
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2,921,426	.....	428,000	2,493,426	191,608
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	10,551,517	—204,936	967,486	9,379,095	199,159
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	113,572	3,321	72,825	44,068	—9,793
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	430,321	.....	37,000	393,321	56,614
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2,077,999	.....	28,000	2,049,999	354,278
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4,284,121	89,897	701,643	3,672,375	—347,547
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	114,799	.....	10,400	104,399	— 4,403
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	—11,146	— 282	5,600	—17,028	—30,775
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1,109,649	1,258	68,000	1,042,907	—192,197
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	371,586	1,138	30,000	342,724	151,701
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	22,267	.....	2,000	20,267	10,694
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4,029,014	159,051	376,181	3,811,884	791,622
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	525,685	256	36,000	489,941	131,299
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	410,801	3,741	47,900	366,642	28,803
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	208,769	.....	20,000	188,769	54,556
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1,645,129	—11,016	146,000	1,488,113	35,323
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1,750,109	—5,746	154,000	1,590,363	—16,097
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	275,871	.....	60,288	215,583	—72,395
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	9,066,221	10,791	1,100,000	7,977,012	243,568
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	11,415,912	—27,078	1,057,683	10,331,151	252,597
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1,371,100	761	132,148	1,239,713	86,245
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	310,529	1,826	55,600	256,755	126,678
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	853,987	.....	93,684	760,303	30,789
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2,534,477	95,202	317,336	2,312,341	87,917
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	562,833	374,971	—1,001	32,028	341,942
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	99,487	.....	17,200	82,287	—7,457
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	6,123,749	31,702	957,882	5,197,569	—1,523,719
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	6,165,036	—41,421	850,427	5,273,188	—469,283
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1,735,179	6,317	263,811	1,477,685	—520,132
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	204,110	—125	34,800	169,185	.....
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1,253,394	86	87,200	1,166,280	—90,365
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	103,365	.....	21,800	81,565	—8,286
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	424,162	.....	79,200	344,962	—7,093
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3,682,502	—6,061	390,000	3,286,441	1,138,270
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	173,487	—821	32,000	140,666	18,848
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	961,174	—3,880	98,800	858,494	—136,453
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1,927	20,565	332,393	—131,475	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3,557,313	—4,430	194,968	3,157,915	279,865
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	5,019,346	164,182	644,000	4,539,528	6,477
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2,605,151	14,574	286,000	2,333,725	—426,150
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	212,805	.....	12,000	200,805	21,857
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	127,728	1,698	32,851	96,575	—34,370
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	116,954	4	28,584	88,374	15,362
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2,693,670	22,027	160,326	2,555,371	—395,718
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2,739,628	37,936	169,166	2,608,398	—2,287,120
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	385,490	9,500	72,000	322,990	—59,124
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	841,053	—6,605	84,303	750,145	—130,411
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1,444,904	.....	66,900	1,378,004	455,736
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	6,358,151	66,689	575,495	5,851,345	176,155
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	81,058	—303	62,000	18,755	—10,124
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	765,314	—2,894	48,500	713,920	—17,535
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1,226,316	18,015	121,768	1,086,533	117,485
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	337,405	.....	8,400	329,005	94,547
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	615,408	—128	91,905	523,375	136,636
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	12,934,286	110,470	1,135,867	11,908,889	1,898,994
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	209,617	.....	18,435	191,182	—26,505
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	873,781	—118,636			
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1,044,707	.....	168,315	876,392	—265,468
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	173,542	.....	15,542	158,000	—1,926
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	756,385	—5,002	85,616	665,767	—73,785
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	900,003	337,981	.....	38,584	299,397	51,627
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	625,829	237,237	21,731	22,000	236,968	104,049
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	713,028	499,375	42	36,551	462,866	—23,511
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2,059,162	1,113,143	.....	138,447	974,696	—253,400
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1,406,932	587,655	.....	79,524	508,131	97,211
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	328,144	181,836	.....	14,000	167,836	9,612

Mileage operated on October 31, 1910—[1] 347; [2] 7,547; [3] 4,492; [4] 4,434; [5] 599; [6] 204; [7] 573; [8] 236; [9] 631; [10] 1,276; [11] 7,692; [12] 9,075; [13] 1,489; [14] 340; [15] 615; [16] 1,910; [17] 470; [18] 7,395; [19] 247; [20] 1,982; [21] 1,247; [22] 819; [23] 2,553; [24] 360; [25] 167; [26] 293; [27] 608; [28] 808; [29] 1,959; [30] 7,274; [31] 1,518; [32] 350; [33] 113. — Indicates Deficits, Losses and Decreases.

REVENUES AND EXPENSES OF RAILWAYS.

FOUR MONTHS OF FISCAL YEAR, 1912—(CONTINUED).

Name of road.	Mileage operated at end of period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
					Maintenance										
		Freight.	Passenger.	Total, inc. misc.	Way and structures.	Of equipment.	Traffic.	Transportation.	General.	Total.					
Lehigh Valley	1,431	$10,995,403	$1,951,747	$13,393,641	$1,517,715	$2,261,431	$335,896	$4,342,497	$264,094	$8,721,633	$4,672,008	—$77,238	$422,500	$4,172,270	$55,089
Long Island	398[36]	1,137,151	3,007,374	4,315,989	519,021	435,153	64,326	1,671,977	79,686	2,770,163	1,545,826	341,936	214,214	1,673,548	126,044
Louisiana & Arkansas	255	337,549	72,902	429,982	93,830	68,499	9,303	117,408	19,035	308,075	121,907	.....	12,700	109,207	—52,299
Louisiana Ry. & Navigation	1,775[45]	10,905,852	4,535,752	17,516,306	1,908,817	2,154,990	360,661	5,100,016	283,483	9,807,967	7,708,339	13,318	575,000	7,146,657	2,271,698
Louisiana Western	207	588,158	110,967	630,904	71,617	111,248	29,689	193,727	27,002	433,283	197,621	—52	25,360	172,209	—62,063
Louisville & Nashville	4,704[39]	13,428,659	4,317,281	18,813,314	2,857,274	3,318,091	364,530	5,712,354	345,316	12,597,565	6,215,749	1,492	595,800	5,621,441	723,130
Louisville, Henderson & St. Louis	199	262,063	155,244	443,641	105,713	47,801	12,258	134,986	12,157	318,275	125,366	1,574	12,000	114,940	5,771
Maine Central	1,165[37]	2,226,047	1,458,526	3,911,327	820,339	425,890	41,724	1,307,396	88,393	2,683,741	1,227,586	—1,025	168,179	1,058,382	94,398
Michigan Central	1,804[38]	6,682,931	3,119,237	10,822,376	1,158,501	1,123,628	280,175	3,815,966	173,837	6,552,107	4,270,269	18,143	440,000	3,848,412	1,483,599
Midland Valley	373[39]	320,206	149,381	500,669	110,540	84,757	13,123	155,312	23,830	387,562	113,107	335	21,937	91,505	3,597
Minneapolis & St. Louis	1,027	1,010,345	485,892	1,622,302	183,057	203,742	42,174	662,185	48,402	1,139,560	482,742	—28	79,046	403,668	—198,961
Missouri, Kansas & Texas of Texas	1,345[40]	2,393,924	1,401,649	4,029,846	901,169	371,911	94,710	1,792,619	112,565	3,272,974	756,872	—4,170	90,000	662,702	—440,325
Mobile & Ohio	1,114	3,117,599	525,458	3,851,027	452,187	713,888	130,592	1,325,258	122,186	2,744,111	1,106,916	—4,448	98,380	1,004,088	87,475
Monongahela	64	378,659	9,354	393,556	70,475	28,073	1,126	88,322	7,773	190,768	202,787	.....	9,700	193,087	2,673
Morgan's La. & Tex. R. R. & S. S. Co.	404[41]	972,136	412,983	1,463,306	196,958	219,363	53,076	580,171	50,490	1,100,058	363,248	—12,087	74,792	276,369	—67,922
Nashville, Chattanooga & St. Louis	1,255	2,743,922	1,070,333	4,082,439	630,502	740,673	144,727	1,468,724	99,577	3,084,203	998,236	—4,198	95,264	898,774	49,221
New Orleans & North Eastern	195	905,679	213,939	1,195,566	114,321	220,445	36,963	420,706	45,356	837,691	357,875	—4,442	37,000	316,433	—34,107
New Orleans Great Northern	282	402,019	125,072	571,169	84,903	71,760	10,607	174,628	27,620	369,518	201,651	—340	8,000	193,311	—31,291
New Orleans, Mobile & Chicago	404	444,627	128,433	610,002	97,612	65,341	10,823	183,532	30,693	388,011	222,001	—110	17,990	203,901	—13,083
New York Central & Hudson River	3,591[42]	20,933,188	12,506,099	37,238,222	5,060,290	5,168,128	812,203	12,537,313	882,822	24,460,756	12,777,466	110,215	1,984,192	10,903,489	1,908,994
New York, Chicago & St. Louis	561	3,059,000	644,819	3,858,943	496,414	401,296	184,872	1,489,446	67,829	2,639,857	1,219,086	3,982	166,000	1,049,104	33,140
New York, New Haven & Hartford	2,061[43]	10,309,791	9,908,457	22,180,322	2,578,087	2,497,954	133,001	7,972,581	646,427	13,818,050	8,362,272	494,113	1,296,000	7,566,385	19,686
New York, Ontario & Western	565[44]	2,380,823	872,217	3,394,140	510,027	520,016	39,686	1,174,533	63,806	2,308,068	1,086,072	4,960	71,667	1,019,365	—177,618
New York, Philadelphia & Norfolk	112	931,679	172,864	1,188,142	129,631	202,168	16,058	437,147	48,834	833,878	354,264	.....	30,000	324,264	—31,979
New York, Susquehanna & Western	152	708,961	218,123	1,033,463	120,233	93,856	7,786	368,631	21,880	612,386	421,077	14,406	71,494	363,989	44,142
Norfolk & Western	2,004[45]	11,346,240	1,651,248	13,469,739	1,765,527	2,460,753	202,354	3,729,399	238,848	8,396,881	5,072,848	—7,169	460,000	4,605,679	142,108
Northern Pacific	6074[46]	635,831	323,173	1,051,851	123,152	129,329	23,772	335,954	51,450	663,657	388,194	—2,687	30,000	355,507	15,427
Northern Central	472[47]	3,248,586	869,113	4,358,235	534,570	827,694	60,834	2,098,643	93,422	3,615,163	743,072	3,432	161,347	585,157	—56,354
Northern Pacific	6,016[48]	15,627,287	6,348,395	23,369,816	3,346,838	2,430,272	392,222	6,791,349	326,973	13,287,654	10,082,162	182,179	1,168,491	9,095,850	—622,469
Oregon Short Line	1,617[49]	5,130,421	1,848,028	7,391,249	949,706	607,123	115,547	1,633,780	136,167	3,442,323	3,948,926	4,340	414,032	3,539,234	—1,379
Oregon-Washington R. R. & Nav. Co.	1,890	3,855,157	1,975,925	6,311,606	823,049	511,342	180,534	1,944,958	159,225	3,619,108	2,592,498	9,549	351,563	2,250,484	.....
Pecos & Northern Texas	296	451,453	122,887	609,912	85,269	120,787	9,084	178,967	18,410	412,517	188,395	.....	16,694	171,701	—28,897
Pennsylvania Co.	1,415	14,411,902	3,235,561	19,126,576	2,374,154	3,228,403	301,772	6,008,795	336,056	12,249,180	6,879,396	—580	690,267	6,188,549	—607,414
Pennsylvania R. R.	3,678[50]	38,589,547	12,574,380	54,591,092	6,086,090	10,283,112	730,321	19,256,634	1,346,294	37,702,451	16,888,641	—423,520	2,423,725	14,041,396	—966,049
Perkiomen & Eastern	351	756,442	269,008	1,109,237	161,612	154,420	23,741	432,673	22,574	795,120	314,217	.....	42,000	272,217	—86,394
Pere Marquette	2,331[51]	3,857,869	1,698,877	6,045,183	714,217	866,457	154,295	2,488,888	127,332	4,351,189	1,693,994	—10,659	225,047	1,458,288	153,125
Philadelphia, Baltimore & Washington	713[52]	3,300,152	2,715,737	6,623,444	85,893	1,071,816	102,121	2,550,396	142,291	4,720,517	1,902,927	.....	202,791	1,700,136	128,318
Pittsburg & Lake Erie	215[53]	5,058,629	585,712	5,810,610	610,113	842,906	58,143	1,244,124	93,686	2,848,972	2,961,638	—652	121,060	2,839,926	—569,393
Pittsburg, Cincinnati, Chi. & St. Louis	1,457[54]	9,401,702	3,001,690	13,880,994	2,054,291	2,433,016	278,580	4,614,634	258,975	9,639,496	4,241,498	—3,896	510,943	3,726,659	39,294
Pittsburg, Shawmut & Northern	240	408,050	38,891	454,547	60,540	97,502	4,397	127,941	14,979	305,359	149,188	.....	6,350	142,837	64,572
Richmond, Fredericksburg & Potomac	83	397,375	277,459	766,963	84,285	105,498	11,349	279,626	22,945	503,703	263,260	.....	4,000	259,260	23,411
Rutland	468	642,185	467,444	1,284,432	161,693	169,121	31,442	475,176	25,417	862,849	421,583	.....	44,764	376,819	—16,858
St. Joseph & Grand Island	319	392,429	168,316	609,314	99,464	67,252	21,216	229,958	21,176	439,066	170,248	206	22,845	147,609	63,849
St. Louis & San Francisco	4,731	8,606,746	4,137,161	13,732,731	1,727,025	1,829,350	354,244	4,616,611	382,381	8,909,611	4,823,120	.....	634,235	4,188,885	18,478
St. Louis, Brownsville & Mexico	509[55]	481,907	229,983	769,856	159,915	47,427	11,419	248,268	32,222	499,251	270,605	.....	18,000	252,605	166,981
St. Louis Merchants' Bridge Terminal	9	.....	1,052	564,894	103,785	37,223	1,767	286,793	20,123	449,691	115,203	.....	22,800	94,403	—138,985
St. Louis, San Francisco & Texas	243	266,834	121,875	416,609	74,106	66,727	12,292	183,211	17,736	354,072	62,537	.....	4,562	57,975	44,593
St. Louis Southwestern of Texas	703	978,692	392,445	1,468,817	179,108	314,767	46,606	532,583	66,342	1,139,406	329,411	—805	40,000	288,606	147,495
San Pedro, Los Angeles & Salt Lake	1,113[56]	1,698,858	1,097,805	2,979,425	598,454	584,730	125,650	1,120,610	68,229	2,497,673	481,752	—12,512	99,125	370,115	—105,646
Santa Fe, Prescott & Phoenix	364	370,115	139,016	543,189	82,925	53,146	12,077	160,550	21,373	330,071	213,118	.....	13,325	199,973	13,995
Southern	7,088[57]	13,467,117	6,201,316	21,313,300	2,446,623	3,508,462	542,638	7,017,405	584,016	14,099,144	7,214,156	33,016	787,153	6,460,019	365,681
Southern in Mississippi	280	211,692	137,142	378,055	9,006	34,055	9,547	142,583	13,938	292,129	85,926	.....	21,092	64,834	27,547
Southern Kansas of Texas	124	362,558	65,658	444,118	93,457	89,473	8,277	156,041	16,774	364,022	80,096	.....	9,477	70,619	—78,803
Spokane, Portland & Seattle	158[58]	290,362	68,590	373,438	37,235	5,689	260	89,987	1,171	134,351	239,077	.....	13,559	225,518	8,930
Staten Island, Binghamton & New York	80	208,429	157,984	414,950	68,557	24,334	10,865	136,701	9,020	249,477	165,473	.....	24,880	140,593	16,487
Tennessee Central	293	393,447	150,479	550,032	87,766	74,100	20,312	187,530	37,182	406,890	143,142	.....	16,848	126,294	—62,369
Terminal R. R. Ass'n of St. Louis	35[59]	.....	1,015	885,941	142,771	84,510	2,975	297,608	21,955	549,819	336,122	30,268	108,980	257,410	—70,660
Texas & New Orleans	458	859,115	357,786	1,294,595	220,055	224,956	28,216	476,630	35,728	1,005,585	289,010	—1,946	48,992	238,072	—15,197
Texas & Pacific	1,884	3,676,713	1,566,554	5,572,360	609,708	818,136	111,012	2,138,413	167,805	3,845,074	1,727,186	—8,247	156,815	1,562,124	389,455
Toledo & Ohio Central	440[29]	1,605,112	265,401	1,970,247	267,621	235,475	28,396	605,860	32,677	1,170,029	800,218	—3,511	97,462	699,245	—77,950
Toledo, St. Louis & Western	450	1,122,430	181,054	1,389,124	182,030	252,213	34,194	481,590	33,072	983,099	406,025	.....	58,000	348,025	—66,090
Trinity & Brazos Valley	462	626,198	161,414	815,732	115,306	103,684	39,611	340,077	43,078	641,756	173,976	.....	18,670	155,306	148,948
Union Pacific	3,566[61]	12,387,438	3,989,759	17,885,126	1,744,257	1,737,716	427,538	4,476,912	399,743	8,786,166	9,098,960	12,759	646,600	8,465,119	—1,106,157
Union R. R. of Baltimore	9	422,094	84,926	512,690	39,015	.....	3,859	23,024	9,091	74,989	437,701	.....	23,691	414,010	—43,528
Union R. R. of Pennsylvania	31	.....	.....	1,761,115	137,613	328,437	407	520,325	10,535	997,317	764,098	15,901	14,500	765,499	179,243
Vandalia	807	2,216,546	910,983	3,499,669	559,719	645,506	111,200	1,280,706	79,235	2,676,366	823,303	.....	112,304	710,999	106,190
Vicksburg, Shreveport & Pacific	171	248,355	170,730	458,172	81,442	89,129	12,783	145,276	18,471	347,101	111,071	—1,655	25,200	84,216	—56,377
Virginia & Southeastern	240[62]	506,338	61,992	583,139	66,089	107,300	7,363	157,995	15,121	353,868	229,271	.....	18,840	210,431	78,166
Virginian	474[63]	1,434,072	104,246	1,580,778	177,642	270,110	19,961	417,810	31,526	917,049	663,729	20,834	62,600	684,563	180,529
Washington Southern	35	132,078	146,588	258,457	43,763	38,923	4,870	137,169	10,220	234,945	123,412	.....	12,979	110,433	—27,099
West Jersey & Seashore	355[64]	619,734	2,023,640	2,813,737	350,593	422,313	57,120	1,012,998	41,017	1,884,041	929,696	—12,151	93,894	823,651	—127,677
Wheeling & Lake Erie	457	2,402,742	245,687	2,821,833	358,505	465,539	31,111	843,691	54,636	1,753,482	1,068,351	9,260	114,804	962,807	169,880

Mileage operated on October 31, 1910—[34] 389; [35] 1,662; [36] 4,590; [37] 1,179; [38] 1,746; [39] 323; [40] 1,348; [41] 348; [42] 3,587; [43] 2,041; [44] 545; [45] 1,951; [46] 602; [47] 470; [48] 5,815; [49] 1,594; [50] 3,970; [51] 2,337; [52] 717; [53] 191; [54] 1,468; [55] 501; [56] 1,105; [57] 7,093; [58] 56; [59] 34; [60] 444; [61] 3,412; [62] 188; [63] 473; [64] 353. —Indicates Deficits, Losses and Decreases.

Hoarding Coal Cars Forbidden.

Missouri & Illinois Coal Co. v. Illinois Central. Opinion by Commissioner Lane:

The Illinois Central established a rule prohibiting the sending of its coal cars loaded with coal to the lines of certain designated carriers in order to retain on its own line sufficient cars to serve the communities dependent on it for fuel. Complainant attacks the rule as improperly limiting its market as a producer and dealer in coal. The temporary confiscation by carriers of the cars of other railways and the placing of embargoes against cars being sent off of the lines of the owners are alike unlawful and the railways are expected to make such rules for the return of cars as will terminate such abuses.

The railways of the country are called on to so unite themselves that they will constitute one national system; they must establish through routes, keep these routes open and in operation, furnish the necessary facilities for transportation, make reasonable and proper rules of practice as between themselves and the shippers, and as between each other.

An embargo may be justifiable because of the physical inability of the carrier for some reason to deal with traffic which overwhelms it, but an embargo placed against connecting carriers because of their failure to promptly return cars is not consonant with the service which the carriers constituting the through route are required by law to give.

Railways are required under the act to serve the through routes which they have established with other carriers without respect to the fact that in rendering such service their equipment may be carried beyond their own lines.

Carriers are required to make reasonable rules and regulations with respect to the exchange, interchange, and return of cars used upon through routes and for the operation of such through routes, and where they have failed in this respect the commission is empowered to determine the individual or joint regulation or practice that is just, fair, and reasonable. (22 I. C. C., 39.)

Discrimination Against Chicago in Grain Rates.

Pennsylvania Brothers v. Louisville & Nashville et al. Opinion by the Commission:

The defendants have made the rule that grain moving from Omaha and surrounding territory to Atlanta and other points in the Southeast, via Mississippi river and Ohio river crossings, not passing through Chicago, would be granted a lower rate than grain from the same point of origin to the same destination which goes through Chicago. This applies on the defendants' lines south of Cincinnati and Louisville. The commission finds that such adjustment is a discrimination against Chicago shippers, Chicago, and the railways participating in the Chicago movement. Reparation is therefore awarded. (22 I. C. C., 62.)

Rebate Through Division of Rates.

In re division of joint rates on coal to points in North Carolina. Opinion by Commissioner Lane:

A complaint was made by certain coal dealers in Durham, N. C., that one dealer named Mason could sell coal at $5 a ton and make a profit, while the other dealers had to sell it at $6 a ton. Mason paid the same freight rate as the other coal dealers. His plant is at East Durham, which is connected with Durham by the Durham & South Carolina Railroad, the distance being about one mile. Mason's office is on the land of the Chatham Lumber Company, all of whose stock is owned by the Williams & McKeithan Lumber Company. Williams & McKeithan also own the Durham & South Carolina Railroad. Coal sold by all the dealers largely comes from the New River district, and the rates to Durham and to East Durham are the same. The divisions of rates, however, to East Durham are as follows: The Chesapeake & Ohio hauls the coal 221 miles and gets 91 cents; the Norfolk & Western hauls the coal 116 miles, and gets 77 cents; and the Durham & South Carolina hauls the coal one mile and gets 62 cents; a total of $2.20. Mason claimed that he could make a small profit because he did his business himself and with the help of his sons, and the commission finds that there is no division of property between Mason and the Durham & South Carolina Railroad, nor between Mason and either the Chatham Lumber Company or Williams & McKeithan, and no part of the division of rates goes into Mason's pocket, and the reason that he can make a profit at $5 a ton is not in any way connected with the division of rates as between the carriers. The commission, however, wants to know why the Norfolk & Western is willing to allow for so short a haul so large a proportion of the through rate. Durham coal merchants may well argue, but if the Norfolk & Western can afford to pay 62 cents as the division for the one mile haul to East Durham, the through rate of $2.20 to Durham is altogether excessive and unreasonable.

The plain fact is that the Norfolk & Western is paying the Williams & McKeithan Lumber Company, which owns the Durham & South Carolina, an excessive rate for the haul from Durham to East Durham, and thus *pro tanto* reduces the cost to which the lumber company, as a shipper of lumber, is put. Whatever the railway receives from its connection over and above what it is entitled to *as a railway* reduces by just so much the rates on lumber and all else which the Williams & McKeithan enterprise must pay. Mason was solicited to establish himself on the tracks of the Durham & South Carolina by officers of the lumber company, after the Chatham Company had proposed to the Norfolk & Western that it would go into the coal business in East Durham, and had been warned by the traffic manager of the Norfolk & Western that this would be dangerous under the Act to Regulate Commerce. The commission is justified in the belief that the coal business was not seductive to the Chatham Lumber Company, but that it was the fine division of this rate that made this enterprise at East Durham so attractive to the railway owned by the same concern that owned the lumber company.

The record plainly shows that the Norfolk & Western and the Durham & South Carolina are meeting opposition in the cartage of coal to Durham and East Durham, which arises out of an alliance between the Seaboard Air Line and the Durham & Southern. The Durham & Southern is owned and controlled by the same interests that own and control the American Tobacco Company. The Durham & Southern has a remarkable traffic agreement with the Seaboard Aid Line by which the latter surrenders the position of terminal carrier on a large portion of the Durham traffic, both in and out, to the Durham & Southern, which for its 20-mile haul reecives 40 per cent. of the Seaboard's division on through business via the Virginia gateway. The Seaboard Air Line has its own line into Durham and East Durham, while the Durham & Southern has only trackage rights over the Seaboard into these towns. The traffic manager of the Seaboard speaks of this surrender of terminal carrier privileges as a preferential tariff arrangement. There is a short way of stating the proposition. The Seaboard Air Line bought the business of an industry, or of a group of financiers having large traffic at its control, by allowing its traffic at one point to be taken away from it under a management allied to that of the industry. An order is issued against the Seaboard Air Line to show cause why its rates into and out of Durham on all classes and commodities should not be reduced, and against the Norfolk & Western that it show cause why its rates on coal into Durham should not be reduced. (22 I. C. C., 51.)

Conference Rulings.

On inquiry as to the legal propriety of a proposed agreement by an association of general baggage agents providing, in substance, that an intermediate line shall forward to checked destination by the most direct route any baggage received by it not fully routed; that the initial line shall report to the lines actually moving the baggage the amount of any excess baggage charges collected by it; and that in case there is more than one station at destination the initial as well as the terminal line shall be advised of the station at which the baggage may be found, it was held, that, subject to such modified conclusions as may be required in the light of further information, the commission sees no present objection to such rules if properly published in the tariffs.

Telegrams from a shipper relating to his traffic must be paid for by him, but a carrier may lawfully answer such a message at its own expense.

Locomotives while equipped with snowplows or flangers are to be regarded as cars of special construction within the meaning of the order of March 13, 1911.

The order entitled "United States Safety Appliance Standards," adopted on March 13, 1911, is interpreted with respect to the details mentioned as follows: 1. That gondola and ballast cars

with swinging side doors at ladder locations may be considered as cars of special construction.

Ladders and handholds need not be applied to swinging side doors.

A side vertical handhold shall be placed on corner post of such cars, as nearly as possible over sill step.

2. That high-side gondola and ballast cars with end platforms 18 inches or more in length may be considered as cars of special construction.

Ladders shall be placed on such cars as prescribed for high-side gondola and hopper cars, with sill step under ladder, or as near under ladder as car construction, will permit. Ends and side of cars to be equipped with handholds in the same manner as flat cars.

3. Ladders—spacing of ladder treads. That the spacing of top ladder treads shall be taken from eave of roof at side of car, whether latitudinal running board is used or not. (Shown on plates illustrating United States safety appliance standards, issued by the commission July 1, 1911.)

4. Box and other house cars—automobile cars with swinging end doors—end ladders:

That these cars may come under the head of cars of special construction, as per clause on page 37 of the order, and the end ladders placed as nearly as possible to designated location.

Refunds Should Be Made Promptly.

Interstate Grain Co. v. Chicago & North Western et al. Opinion by the commission:

The defendants admitted that an overcharge had been made but claimed that a charge of $2 should be made for reconsignment of certain shipments. The commission takes this opportunity to call attention to the fact that under the act it is as unlawful for a carrier to overcharge a shipper as to give him a rebate. An assumption that overcharges generally arose out of carelessness of some clerk cannot be used as a defense in every case. The increase in the number of cases of overcharges seems to make it advisable that the provision of the law about overcharges should be more strictly enforced, and the commission expects that whenever a formal or informal complaint is submitted to a railway, it will answer at once admitting whether overcharge has been made and give evidence that refund has been effected. (22 I. C. C., 34.)

STATE COMMISSIONS.

The Public Utility Commissioners of New Jersey have ordered the railways of the state to furnish passengers on trains with individual drinking cups, when called for. The law of that state forbidding the use of common drinking cups has been in force several months, but the railways have compelled passengers either to furnish their own cups or, in some cases, to secure them from an automatic delivering device, requiring a payment of one cent for each cup.

The New York Public Service Commission, Second district, holds that a railway company is not required to refund cash fares paid by a holder of a commutation ticket when such person fails to present his ticket for passage. The decision was made on the complaint of J. Heron Crosman of New York City, who complained that at times he had left his New York, New Haven & Hartford commutation ticket at home, had taken a receipt for cash fare paid from the train conductor, and that upon subsequent presentation of such train receipt at a ticket office with his commutation ticket, refund was refused.

COURT NEWS.

The Supreme Court of the United States has sustained the employers' liability law of Arkansas.

The Commerce Court, in a case where they were asked to dismiss because of lack of jurisdiction, held that since the circuit courts had the right of review of any order of the Interstate Commerce Commission involving reparation, the Commerce Court also has that power and can therefore review any order of the I. C. C. involving reparation.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

W. R. Sullivan, assistant to president and assistant secretary of the Atlantic Coast Line, at Wilmington, N. C., has resigned to go with the banking firm of Redmond & Co., New York, effective January 1, 1912.

S. S. Butler, general agent of the St. Louis & San Francisco at New York, has been appointed assistant to vice-president, in charge of all traffic on the Frisco Lines in Louisiana and Texas, with office at Houston, Tex., effective January 1.

The office of auditor of the Cincinnati, Lebanon & Northern will be abolished, effective January 1, and the duties of that office will be assumed by the comptroller, reports of cars and mileage, or per diem reports to be sent to the special agent at Pittsburgh, Pa., and drafts to be made on the treasurer at Pittsburgh.

J. C. Wallace, special examiner of the Interstate Commerce Commission, and previously in the office of the auditor of the Michigan Central, has been appointed auditor of disbursements of the Cleveland, Cincinnati, Chicago & St. Louis, with office at Cincinnati, Ohio, succeeding George N. Wellman, assigned to other duties.

Robert Alfred Brand, who has been elected fourth vice-president of the Atlantic Coast Line, with office at Wilmington, N. C., as has been announced in these columns, was born on December 12, 1858, in Clarendon county, S. C. He began railway work on January 1, 1877, as a clerk with the Wilmington, Columbia & Augusta, and was later telegraph operator and agent at Sumter, remaining in that position until 1894. He was then general agent of the same company and its successor, the Atlantic Coast Line, until August, 1902, when he became general freight agent, and at the time of his recent election, as fourth vice-president, was freight traffic manager of the Atlantic Coast Line at Wilmington, N. C.

Operating Officers.

J. H. Marcy has been appointed superintendent of dining service of the Boston & Albany, with office at Boston, Mass.

J. W. Maring has been appointed assistant superintendent of the St. Louis & San Francisco, with office at Amory, Miss., succeeding W. Rudd, transferred.

D. J. Madden, supervisor of locomotive operation of the Erie Railroad at Cleveland, Ohio, has been appointed trainmaster of the Chicago and Hammond terminals of that road.

J. E. Nelson, trainmaster of the Canadian Northern at Rainy River, Ont., has been appointed superintendent, with office at Port Arthur, Ont., succeeding A. Wilcox, promoted.

T. B. Hamilton, superintendent of the Pennsylvania Lines West at Cleveland, Ohio, has been appointed general superintendent of the new Central division, with office at Toledo.

The line of the Arizona Eastern embraced in and known as the Cochise division has been attached to the Globe division, under the jurisdiction of C. C. Mallard, superintendent, with office at Globe, Ariz.

O. C. Wyman, chief despatcher of the Cleveland, Cincinnati, Chicago & St. Louis at Riverside, Ohio, has been appointed trainmaster of the Cincinnati Northern, with office at Van Wert, Ohio. F. L. Elliott succeeds Mr. Wyman.

C. C. Riley, who recently resigned as general superintendent of the Kansas City Southern, as has been announced in these columns, has been appointed assistant to the general manager of the Baltimore & Ohio, with office at Baltimore, Md.

J. O. Crockett, general manager of the Buffalo & Susquehanna at Buffalo, N. Y., having resigned, that position has been abolished and the duties of that office will, in future, be assumed by E. R. Darlow, assistant receiver, with office at Buffalo.

R. B. Ayres, superintendent of the Eastern division of the Texas & Pacific at Marshall, Tex., has been appointed super-

intendent of the Transcontinental division, with office at Texarkana, Tex., succeeding R. C. Andrews, who has been transferred to the Eastern division in place of Mr. Ayre. R. E. Boswell, trainmaster at Big Springs, Tex., has been appointed superintendent of terminals, with office at Fort Worth, Tex., succeeding S. E. Carnahan, appointed general yardmaster at Fort Worth.

F. M. Smith, whose appointment as superintendent of the Lake Shore & Michigan Southern, with office at Chicago, has been announced in these columns, was born at Dorset, Ohio. He received a high school education and began railway work with the Lake Shore & Michigan Southern on November 14, 1886. He was telegraph operator on the Franklin division of the Lake Shore for seven years and for almost five years division claim agent. For five years, from January 1, 1898, he was claim agent on the western division, with office at Chicago, and during 1903 and 1904 was trainmaster of the Indiana, Illinois & Iowa, now the Chicago, Indiana & Southern, at Kankakee, Ill. Early in 1905 he was transferred to the western division, where he remained three months, and he was then for seven months trainmaster on the Michigan division. Mr. Smith was appointed assistant superintendent of the western division, with office at Chicago, in November of the same year, from which position he was promoted as above on December 1.

Traffic Officers.

A. S. Wagner, passenger and ticket agent of the Missouri, Kansas & Texas at Houston, Tex., has been appointed district passenger agent of the Texas & Pacific, with office at El Paso, Tex.

W. W. Richardson, assistant general passenger agent of the Pennsylvania Lines West at Pittsburgh, Pa., has been appointed general passenger agent of the Southwest System, with office at Pittsburgh.

Frederick S. Holbrook, chairman of the Official Classification Committee at New York City, has been appointed general traffic manager of Wells Fargo & Co., with office at New York, effective January 1, 1912.

J. P. Anderson has been appointed contracting freight agent of the Missouri, Kansas & Texas, with headquarters at Fort Worth, Tex., succeeding F. S. Fisher, resigned to accept service with another company.

The office of auditor of the Cincinnati, Lebanon & Northern having been abolished, effective January 1, Clay Rockwell, auditor and general passenger and freight agent, will hereafter devote all of his time to traffic matters.

J. M. Mauden, city ticket agent of the Toledo, St. Louis & Western and the Chicago & Alton at St. Louis, Mo., has been appointed traveling passenger agent, with office at St. Louis, and George V. Cardner succeeds Mr. Mauden.

R. C. Melvin has been appointed traveling freight agent of the Texas & Pacific, with office at San Francisco, Cal., reporting to the Pacific Coast traffic agent at Los Angeles, Cal. He succeeds W. J. Lane, resigned to accept service with another company.

G. W. Lewis has been appointed freight soliciting agent of the Southern Railway, with office at Huntsville, Ala., succeeding T. C. Sanford, resigned. W. R. Wyatt has been appointed freight soliciting agent at Mobile, and J. A. Lechler has been appointed freight soliciting agent at Atlanta, Ga.

E. C. Gentry, city passenger and ticket agent of the St. Louis & San Francisco at Fort Smith, Ark., has been appointed traveling passenger agent, with office at Pittsburgh, Pa. O. B. Lozier, traveling passenger agent at Chicago, has been transferred to the territory formerly in charge of W. H. Oram, also with office at Chicago, who has resigned. C. G. Jump succeeds Mr. Lozier, with office at Chicago.

J. W. Piatt, traveling freight agent of the Cincinnati, New Orleans & Texas Pacific and the Alabama Great Southern at Cincinnati, Ohio, has been appointed traveling freight agent, with office at Cincinnati, of the Queen & Crescent Despatch, which [illegible] these roads, the Alabama & Vicksburg, the New Orleans & Northeastern, the Vicksburg, Shreveport & Pacific and the St. Louis-Louisville lines of the Southern Railway. L. E. Banta, traveling freight agent of the C. N. O. & T. P. at Indianapolis, Ind., has been appointed traveling freight agent of the Queen & Crescent Despatch, with office at Louisville, Ky., and W. E. Hurley, traveling freight agent at Jacksonville, Fla., has been appointed traveling freight agent, with office at Cleveland, Ohio. All three men will report to E. Schryver, manager of the Queen & Crescent Despatch at Cincinnati.

Engineering and Rolling Stock Officers.

W. F. Muff, roadmaster of the Middle division of the Atchison, Topeka & Santa Fe, with office at Newton, Kan., has resigned to engage in other business.

J. A. Zehner, division engineer of the Lehigh Valley at Wilkesbarre, Pa., has been appointed division engineer with office at Hazleton, succeeding M. H. Elkin, deceased. F. N. Loughnan, supervisor at Wilkesbarre, succeeds Mr. Zehner.

H. E. Brashares, signal supervisor of the Chicago & Western Indiana, has been appointed inspector of signals of the Great Northern, with office at St. Paul, Minn., succeeding C. R. Hodgdon, appointed signal engineer of the Canadian Pacific.

M. J. Brundage, formerly with the signal department of the Chicago, Rock Island & Pacific, has been appointed signal supervisor of the Chicago & Western Indiana, with headquarters at Chicago, succeeding to H. E. Brashares, resigned to go to the Great Northern.

Burt Anderson has been appointed assistant signal engineer of the Atchison, Topeka & Santa Fe, with office at Topeka, Kan. Edgar Winans has been appointed signal supervisor of the Coast lines, with office at Los Angeles, Cal., succeeding P. B. Hyde, resigned to accept service with another company.

T. A. Palmer, roadmaster of the Chicago, Rock Island & Pacific at El Dorado, Ark., has been appointed roadmaster between mile post 97 and El Dorado on sub-division No. 53, between El Dorado and Winnfield, La., on sub-division No. 54, and between Winnfield and Packton, La., on sub-division No. 55, with office at El Dorado, succeeding George Woods, transferred. S. J. Rufer has been appointed roadmaster between Haskell, Ark., and mile post 97 on sub-division No. 53, and between Tinsman, Ark., and Crossett, sub-division A, succeeding Mr. Palmer.

M. M. Cooke, assistant engineer of the Wichita Falls Route, has been appointed chief engineer of the Wichita Falls & Northwestern of Texas, the Wichita Falls & Northwestern and the Wichita Falls & Southern, with office at Wichita Falls, Tex. Mr. Cooke began railway work in the engineering department of the St. Louis Southwestern in 1902 as a rodman and later was instrument man and draftsman on that road. From 1907 to 1909, he was draftsman and instrument man on the Panama canal, and since that time has been assistant engineer of the Wichita Falls route.

Henry Smith Elliott, whose appointment as division engineer of the Erie Railroad, with office at Hornell, N. Y., has been announced in these columns, was born July 26, 1879, at Albany. He was educated in the Rensselaer Polytechnic Institute, graduating in the class of 1900. The same year he entered the service of the Albany & Hudson Railway & Power Company. The following January he went to the Erie Railroad as a rodman, and in February, 1902, he was appointed assistant engineer, which position he held about two years. He was then made supervisor, and from September, 1907, until March of the following year, was in charge of construction work, and was then appointed assistant supervisor of terminals. On February 1, 1910, he was appointed assistant engineer of the New York division and terminals, and in March, 1911, was appointed assistant engineer in the office of the engineer of maintenance of way, which position he held at the time of his recent appointment as division engineer.

Purchasing Officers.

J. Q. Lalor has been appointed division storekeeper of the Union Pacific, with office at Denver, Colo., succeeding George Wheadon, resigned.

J. T. Andrus, purchasing agent of the Oregon-Washington Railroad & Navigation Company at Spokane, Wash., having resigned and his position having been discontinued, the purchases for that division are made by R. Koehler, general purchasing agent, with office at Portland, Ore.

OBITUARY.

Frank Edward Snow, general passenger agent of the Canada Southern before that road was absorbed by the Michigan Central, died at Detroit, Mich., on December 11.

Edward W. Cover, superintendent of the Southern Missouri & Arkansas from January, 1897, until February, 1902, when that road was taken over by the St. Louis & San Francisco, died at the home of his daughter at Cape Girardeau, Mo., on December 3. Mr. Cover was born December 12, 1852, and began railway work in 1883 as joint agent for the St. Louis Coal Railroad, and the St. Louis, Alton & Terre Haute, now the Illinois Central, at Pinckeyville, Ill. For several years since 1902 he was agent of the Frisco at Campbell, Mo.

Edward Preble Wilson, formerly general passenger agent of the Cincinnati, New Orleans & Texas Pacific, died at Hamilton, Ohio, on December 7. Mr. Wilson was born at Washington, Pa., in 1838, and graduated from Washington College in 1859. In October, 1863, he entered the freight department of the Louisville & Nashville, and from that time until July 1890, was continuously in railway service. He held various positions in the freight and passenger departments, and from 1877 to 1885 was with the Cincinnati Southern and its successor, the Cincinnati, New Orleans & Texas Pacific, first as general superintendent and general passenger agent, then as general freight and passenger agent, and later as general passenger agent. He was arbitrator of the Chicago, St. Louis & Missouri River Passenger Association from 1885 to 1886, then for three months commissioner of the Southwestern and Northwestern Passenger Associations, and for four years, from October, 1886, was general passenger agent of the Chicago & North Western. In July, 1890, he became commissioner of the Cincinnati freight bureau, which position he held until 1898. From the latter year until his retirement from business he was connected with a number of commercial organizations and transportation clubs in the vicinity of Cincinnati.

Richard N. Durborow, general superintendent of motive power of the Pennsylvania Lines east of Pittsburgh, Pa., and Erie, with office at Altoona, died of heart disease at Philadelphia on December 9. Mr. Durborow was born in Philadelphia on April 10, 1860, and was educated at Cheltenham Academy and Maryland Military Institute. He entered the service of the Pennsylvania Railroad in February, 1879, as an apprentice in the West Philadelphia machine shops. In September of the following year he was transferred to Altoona, and upon the completion of his apprenticeship he entered the mechanical engineer's department at Altoona. In March, 1890, he was appointed inspector in the West Philadelphia car shops, and in October, 1892, he was made assistant general foreman of the same shops. He was promoted to acting master mechanic in November, 1895, and the following March became master mechanic at the West Philadelphia shops. On May 15, 1900, he was promoted to superintendent of motive power of the Philadelphia, Baltimore & Washington, and the following August was made superintendent of motive power of the Buffalo & Allegheny Valley division. In October, 1901, he was appointed superintendent of motive power at Altoona, and since June 28, 1911, was general superintendent of motive power at Altoona. Out of respect to the memory of Mr. Durborow, all the shops of the Pennsylvania Railroad in Altoona, as well as a number of business houses, were closed December 11, the day of his funeral.

R. N. Durborow

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Durham & South Carolina has ordered 1 ten-wheel locomotive from the Baldwin Locomotive Works.

The Kanawha, Glen Jean & Eastern has ordered 1 mikado locomotive from the Baldwin Locomotive Works.

The Missouri, Oklahoma & Gulf has ordered 2 consolidation locomotives from the Baldwin Locomotive Works.

The Chicago & North Western is said to have ordered 15 switching locomotives, 15 passenger locomotives and 45 freight locomotives from the American Locomotive Company. This item has not been confirmed.

CAR BUILDING.

The Chesapeake & Ohio, is making inquiries for 200 freight cars.

The Chicago, Rock Island & Pacific is in the market for 15 cabooses.

The Buffalo, Rochester & Pittsburgh is in the market for 100 flat cars.

The Canadian Pacific has ordered 90 oil tank cars from the American Car & Foundry Company.

The Delaware, Lackawanna & Western is in the market for 200 steel hopper cars and 200 refrigerator cars.

The Harriman Lines have ordered 65 all steel combination baggage and postal cars from the Pullman Company.

The Elgin, Joliet & Eastern is said to be in the market for 700 all-steel dump cars. This item has not been confirmed.

The San Diego & Cuyamaca is figuring on 3 coaches, 1 combination baggage, mail and passenger car, and 1 baggage car.

The Minneapolis, St. Paul & Sault Ste. Marie is said to be in the market for 300 refrigerator and vegetable cars. This item has not been confirmed.

The Western Live Stock Express Company, Chicago, is not in the market for refrigerator cars as was mentioned in the *Railway Age Gazette* of December 8.

The Nashville, Chattanooga & St. Louis is said to have ordered 200 box cars from the American Car & Foundry Company. This item has not been confirmed.

The Intercolonial has ordered 52 box cars from the Canadian Car & Foundry Company, 5 passenger cars from the Preston Car & Coach Company, and 9 box cars from the company's shops.

The Chicago, Burlington & Quincy has placed an order with the Crawford Locomotive & Car Company for 500 steel center sill constructions, to be applied as reinforcements to old equipment in its railway shops.

The Chicago & North Western is said to have ordered 600 automobile cars from the Western Steel Car & Foundry Company, and 500 flat cars from the Standard Steel Car Company. These cars are said to be in addition to those mentioned in the *Railway Age Gazette* of December 8. This item has not been confirmed.

IRON AND STEEL.

The Pennsylvania has ordered 2,000 tons of bridge steel from the American Bridge Company.

The Chesapeake & Ohio has ordered 2,500 tons of bridge steel from the American Bridge Company.

The Chicago, Burlington & Quincy has ordered 500 tons of bridge material from the American Bridge Company.

The Delaware, Lackawanna & Western has ordered 700 tons of rails from the Pennsylvania Steel Company.

The Nashville, Chattanooga & St. Louis has ordered 10,000 tons of open hearth rails from the Tennessee Coal, Iron & Railroad Company.

The Northern Pacific has ordered 1,800 tons of bridge steel from the American Bridge Company.

The Boston & Maine has ordered 100 tons of bridge steel from the McClintic-Marshall Construction Company, and is in the market for 150 tons for a bridge at Lynn, Mass.

The Lehigh Valley has ordered 12,000 tons of rails. The Bethlehem Steel Company will roll 8,000; the Pennsylvania Steel Company, 2,000: and the Maryland Steel Company, 2,000.

The Pennsylvania Railroad has issued specifications for 36,000 tons of structural steel for the Hell Gate viaducts, to connect with the approaches to the bridge over the East river, New York.

General Conditions in Steel.—The Steel Corporation has received orders for new business at the rate of over 45,000 tons a day since the first of the month. The improvement, while not sensational, is expected to last several months at least. During the past week several mills which had been idle for months were started up again to fill some orders for early delivery. Prices are showing a tendency to stiffen and there has been an increase during the week of $1 a ton on wire. Orders from the railways have been heavy, especially for bridge material, and it is expected that many large rail orders will be placed very soon within the next few weeks.

SIGNALING.

The Western Pacific will install 75 miles of lower quadrant two-position automatic block signals within the next year between Spring Garden and Oroville, Cal. One electric interlocking plant of 40 levers will also be installed at Sacramento.

The Chicago & Western Indiana is planning to install two drawbridge interlocking plants, one at 126th street in Chicago, where the main line crosses the Calumet river, and the other at the Calumet river bridge on the Dolton branch. These plants will have 12 and 11 levers, respectively.

The Chicago, Indianapolis & Louisville will install 133 miles of three-position, upper quadrant, automatic block signals on its line between Monon, Ind., and Bloomington, Ind. This road is now completing an installation of 161 miles between Hammond and Indianapolis.

The Nashville, Chattanooga & St. Louis will install 20 miles of lower quadrant, two-position automatic block signals between Chattanooga and Shellmound, Tenn., in the near future. Four interlocking plants are under construction at Wauhatchie, Hooker, Whiteside and Shellmound. These machines will represent a total capacity of about 112 levers.

The Cleveland, Cincinnati, Chicago & St. Louis is planning to install 25 miles of automatic block signals during the next year. These will be three-position upper quadrant, and will protect the line between Ivorydale and Middletown, O. This road is also planning to build seven interlocking plants on the Cincinnati division. These will be electro-mechanical plants, and the total number of levers will be about 200.

The Wabash is considering the installation of 58 miles of lower quadrant two-position automatic block signals. The automatic signals now being installed between Staunton and Mount Olive, Ill., will be ready to be put in service January 15. The new work is planned for the lines between Williamsport and Riverside, [illegible] Peru and La Grange. Two mechanical interlocking plants of [illegible] levers each, will be installed at [illegible]

The New York, Ontario & Western is planning to install 28 miles of automatic block signals during the next 12 months. On [illegible] between Cadosia and Unadilla on the Scranton division, disk signals will be put up, and on 12 miles, between [illegible] and Cadosia on the [illegible] and distant "B" semaphores will be erected. The semaphore signals will be [illegible] two-position. The road is also planning to install two mechanical interlocking plants of 56 levers each, one at Scranton and the other at Campbell Hall.

Supply Trade News.

The W. K. Kenly Company, Chicago, will, on January 1, move its main office from the First National Bank building to the Peoples Gas building.

The Falls Hollow Staybolt Company, Cuyahoga Falls, Ohio, has recently installed threading machines in its plant and is now equipped to make individual stays.

George W. Daves, formerly signal engineer of the Chicago & Alton, is now in the sales department of the Edison Storage Battery Company, Orange, N. J., with office at Orange

Frank R. Coates, recently a vice president of the Inter Ocean Steel Company, Chicago, and formerly chief engineer of the Chicago Great Western, has been made president of the Toledo Railways & Light Company, succeeding A. E. Lang, resigned.

William H. McIntyre, president of the San Antonio & Aransas Pass and formerly fourth vice-president of the Equitable Life Insurance Company, New York, has been made first vice-president and general manager of Manning, Maxwell & Moore, New York, a newly created position. Mr. McIntyre retains his position as president of the San Antonio & Aransas Pass.

The Baldwin Locomotive Works, Philadelphia, Pa., has recently acquired the right to build the Garrett type locomotives for service in the United States and Canada. The special feature of these locomotives is that they are of high capacity and will operate on lines having sharp curves. They were described in the *Railway Age Gazette* of November 12, 1909, page 917.

The Allith-Prouty Company, Albion, Mich., which on April 1 last succeeded to the business of the Allith Manufacturing Company, Chicago, and the T. C. Prouty Company, Albion, has moved its general offices and also the Chicago and Albion factories, to Danville, Ill., where it has recently erected and equipped a $50,000 building for the manufacture of door hangers, floor hinges and hardware specialties.

The Carborundum Company, Niagara Falls, N. Y., has been awarded the grand prize for the exhibit of abrasive materials at the Turin Exposition, Turin, Italy. American manufacturers of many products were represented at the exposition, which was held from April 15 to October 31 of this year. The Carborundum exhibit showed a complete line of Carborundum wheels, Aloxite wheels, Carborundum dental wheels, Carborundum sharpening stones and razor hones.

The Supreme Court of the District of Columbia has rendered a decision sustaining the claims of Peter H. Murphy, president of the Standard Railway Equipment Company, St. Louis, Mo., against the Baltimore & Ohio, for infringement of the Murphy patents covering the Murphy outside metal car roof. The decree declares the Murphy patents to be valid and to have been infringed by the roof used by the Baltimore & Ohio. A permanent injunction was issued prohibiting the railway company from further use of this roof, except those already applied, pending an appeal to a higher court. The question of the amount of damages to be assessed was referred to the auditor of the court.

The annual report of the Canadian Car & Foundry Company, Montreal, Can., for the year ended September 30, 1911, shows that real estate, buildings, machinery, patents and good will are valued at $10,147,297. The total issue of preferred and common stock of the Canadian Steel Foundries, entered at cost, is $1,350,000; manufactured product, materials and supplies, at or below cost, $2,505,609; accounts receivable, $2,102,294; cash in banks and on hand, $198,081; total current assets, $5,217,700 Of the 7 per cent. cumulative preferred stock, $7,500,000 is authorized and $5,000,000 is outstanding. Part consideration for purchase of capital stock of the Canadian Steel Foundries was $1,100,000. Of the common stock, $5,000,000 is authorized and $3,875,000 is outstanding. Of the first mortgage 30 year 6 per cent sinking fund gold bonds due 1939, $7,500,000 are authorized and $3,500,000 are outstanding. Total current liabilities are $1,784,711. The balance on September 30, 1910, was $404,197, after 2 per cent. dividends had been paid on the common stock. Profits for the year were $1,007,138. Dividends of 7 per cent. on the preferred stock were $385,000. The surplus for the year was $632,138.

Gross sales for the year were over $12,500,000, a considerable increase over the gross sales of the previous year, but the serious trade depression in the United States necessitated a reduction in the percentage of profit on the sales. Notwithstanding the greater volume of business transacted, the inventories and accounts receivable remained at substantially the same figures as in the previous report. At the close of the fiscal year the unfilled orders on the company's books were, roughly, $5,000,000, but by the middle of November they had increased to about $10,000,000. Extensions were authorized to the passenger car departments at Amherst, N. S., and Turcot, Montreal; a new steel freight car department for the Turcot works; an addition to the steel car plant at the Dominion works, Halifax, N. S., and an extension to the malleable iron foundry at Amherst were also authorized. These improvements are now all under way, and steel underframe cars are being built at the Turcot works. The total cost of the improvements will be about $350,000. Shortly after the first of the year the Canadian Steel Foundries, Montreal, was formed to take over the properties of the Montreal Steel Works and the Ontario Iron & Steel Company, Welland, Ont., to furnish facilities for the production of steel castings. For this purpose $3,650,000 6 per cent. first mortgage and collateral trust bonds were issued, the principal and interest being guaranteed by the Canadian Car & Foundry Company. Of this issue, $750,000 was set aside to redeem a previous issue of bonds, of the same amount, of the Montreal Steel Works. All of the issued capital stock of the Canadian Steel Foundries, or $1,400,000 preferred and $3,000,000 common, is owned by the Canadian Car & Foundry Company. It was found advisable to make extensive improvements at the Welland plant, and the new plant at Montreal will not be completed and ready for operation until next spring.

TRADE PUBLICATIONS.

Air Hose.—Guilford S. Wood, Chicago, has issued an original mailing folder illustrating the elasticity of the rubber used in Honesthose for pneumatic and air hoist hose.

Rock Drills.—The Ingersoll-Rand Company, New York, has devoted form No. 4003 to Little Giant rock drills. These drills are designed so as to give the necessary valve travel with a very short piston stroke, and for this reason they have a very wide range of effective stroke. The drills are described in detail and illustrations, diagrams and tables are given. The booklet also includes a full list of parts with numbers for ordering, and illustrations of each separate part.

Condensers.—The Wheeler Condenser & Engineering Company, Carteret, N. J., has published bulletin No. 107 on high vacuum jet condensers. Special attention is devoted to the Wheeler rectangular jet condenser, which is constructed on the counter-current principle. Tables are included showing a high percentage of efficiency. One chapter discusses air removal from jet condensers and the value of cold air pump suction. Wheeler barometric ejector condensers and Wheeler direct-acting jet condensers are also illustrated and described.

San Pedro, Los Angeles & Salt Lake.—The passenger department of this company has issued an attractive booklet describing the reconstruction of the line through the Meadow Valley wash in southeastern Nevada, for the purpose of locating the tracks on a higher level out of the reach of floods. The work involved the reconstruction of 76 miles of track through the gorge, and the entire work was completed in thirteen months. The work included the building of 10 tunnels of a total length of 5,972 ft., and 24 bridges of a length of 4,925 ft. Of the 85 crossings of the stream on the original line 61 are avoided by the new high line. The booklet includes many excellent illustrations showing the old line and the new higher level track.

With the completion of the railway from Orsono, in southern Chile, south to Puerto Montt, another important link was forged in the chain of railways which it is planned to extend from the southern to the northernmost point in the republic. The completion of this line enables freight and passengers to be transported from Puerto Montt direct to Valparaiso, in the northern part of Chile.

Railway Construction.

New Incorporations, Surveys, Etc.

Algoma Central & Hudson Bay.—The Soo division has been extended from Pangissin, Ont., north to Batchewana, 11 miles. R. S. McCormick, chief engineer, Sault Ste. Marie.

Batesville Southwestern.—An officer writes that an extension has been projected from Yocona, Miss., to Charleston, 11 miles. R. J. Darnell, lessee, Memphis, Tenn. (November 24, p. 1079.)

Big Sandy & Cumberland.—This line has been extended from Matney, Va., to Rife, two miles. G. W. Litz, general manager, Hurley.

Bismarck, Bellevue & Western.—An officer writes that the line has been located from Bismarck, Mo., west to Sunlight, 20 miles. H. Rohwer, chief engineer, 700 Fullerton building, St. Louis. (June 9, p. 1333.)

Brinson Railway.—An officer writes that preliminary surveys have been made for an extension from Waynesboro, Ga., to Athens, 105 miles. S. T. Grimshaw, chief engineer, Springfield.

Buffalo, Batavia & Rochester (Electric).—The New York Public Service Commission, Second district, has received a petition for a proposed new electric railway between the cities of Buffalo, N. Y., and Rochester. The proposition involves the consolidation of the Buffalo & Williamsville, the Buffalo & Depew and the Buffalo, Genesee & Rochester, under the name of the Buffalo, Batavia & Rochester. The Buffalo & Depew now runs from Buffalo to Depew, and the Buffalo & Williamsville extends from Buffalo to the easterly bounds of the village of Williamsville, Erie county. The Buffalo, Batavia & Rochester and the Buffalo, Genesee & Rochester hold certificates of public convenience and necessity to build between Buffalo and Rochester. The Buffalo, Batavia & Rochester also has franchises from all the towns and villages through which the proposed line will pass, with the exception of the towns of Pembrook and Churchville, which franchises have expired. The new company proposes to build an extension of the Buffalo & Williamsville, which in connection with the proposed line of the Buffalo, Genesee & Rochester will form a continuation of the Buffalo & Depew. These proposed routes join near the village of Batavia, and will form one continuous connected line of railway. Arrangements have been made with the Batavia & Genesee Construction Company to enter into a contract to build and equip the railway from Buffalo to Rochester.

Buffalo & Depew.—See Buffalo, Batavia & Rochester.

Buffalo, Genesee & Rochester.—See Buffalo, Batavia & Rochester.

Buffalo & Williamsville.—See Buffalo, Batavia & Rochester.

Butte, Boise & San Francisco.—This company, which was organized in Montana with $25,000,000 capital, to build from Butte, southwest through Montana, Idaho, Oregon and California, to San Francisco, it is understood, is letting contracts and construction work will probably be started in April, 1912. An advisory board, of which Dr. W. H. Haviland is a member, will have its headquarters at Butte, Mont. (November 3, p. 930.)

Cary North & South.—An officer writes that surveys are being made from Cochran, Ga., to Milledgeville, 64 miles. D. B. Dunn, chief engineer, Macon. (May 12, p. 1132.)

Central Railroad of Oregon.—The Hot Lake branch has been opened for business from Union, Ore., west to Hot Lake, eight miles. R. H. England, vice-president and general manager, Union.

Central Vermont.—An officer writes that this company proposes to start work early next year on the following lines, for which surveys have been completed: Southern New England Railroad from Palmer, Mass., to the Massachusetts-Rhode Island state line, 41 miles; Southern New England Railway, from the Massachusetts-Rhode Island state line to Providence, R. I., about 30 miles, and the Southern Vermont, from Windsor, Vt., to Brattleboro, about 50 miles. G. C. Jones, general manager, St. Albans.

Charlotte Harbor & Northern.—A branch has been opened for business between Cottman, Fla., and Tiger Bay, 25 miles. G. S. Bruce, chief engineer, Boca Grande.

Chicago, Memphis & Gulf.—An officer writes that this company has projected an extension from Hickman, Ky., northeast to Clinton, 16 miles. S. G. Latta, president and general manager, Dyersburg, Tenn.

Chicago, Milwaukee & Puget Sound.—An officer writes that work is now under way by Caughren, Boynton & Co., Spokane, Wash., building the Idaho & Western from Atlas, Idaho, to Coeur d'Alene, 3.9 miles. E. O. Reeder, chief engineer, Seattle, Wash. (November 17, p. 1036.)

Announcement has been made that work is to be started at once extending the branch line from Lewiston, Mont., northeast to Roy, about 35 miles. The estimated cost of the work is $3,500,000. E. O. Reeder, chief engineer, Seattle, Wash.

Chicago & North Western.—See an item regarding opening of new line of this company under Traffic News.

Clear Lake Railway.—An officer writes that the plans call for building from Hopland, Mendocino county, Cal., on the main line of the Northwestern Pacific east, thence north to Lakeport, on the west side of Clear lake, 24.2 miles. When this work is completed a branch is to be built east to Kelseyville, three miles, and an extension is also to be built from Lakeport north to Upper Lake, 10 miles. Steamer service around Clear lake is also contemplated. A grading contract for a 6.5-mile section east from Hopland has been let to Elliot & Axman, with temporary headquarters at Hopland. C. M. Hammond, president, Upper Lake. (November 17, p. 1036.)

Crystal City & Uvalde.—The Gardendale-Fowlerton division has been opened for business from Gardendale, Tex., to Fowlerton, 26 miles. E. Breaker, chief engineer, Crystal City.

Decatur Pana & Southern.—Incorporated in Illinois, with office at Decatur, to build from Decatur, Ill., south to Pana, about 40 miles. The incorporators include H. S. Ashcraft, H. G. Hodgkins, J. W. Larkott and J. Martin, all of Chicago.

El Paso & Southwestern.—An officer writes that work is now under way on an extension from Fairbanks, Ariz., to Tucson, 66.88 miles. MacArthur Bros. Co., Chicago, are the contractors. Work is also under way rebuilding a section of the old line on an entirely new location between Lewis Springs, Ariz., and Fairbanks, 10.53 miles. Lee Moor, Fairbanks, is the contractor. J. L. Campbell, engineer maintenance way, El Paso, Tex.

Gainesville Midland.—See Georgia Roads.

Georgia Roads.—A preliminary reconnoisance has been made for a line from Athens, Ga., via Smithsonia, Lexington and Sandy Cross to Washington. G. J. Baldwin, Savannah, president of the Gainesville Midland is interested.

Goldsboro, Seven Springs & Swansboro.—Incorporated in North Carolina with $1,500,000 capital, to build from Goldsboro, N. C., to Swansboro, 70 miles. The incorporators include R. C. Griffin and William A. Robertson.

Great Northern.—An officer writes that work is now under way on the following lines: Fargo, N. D., to Surrey, 2.10 miles; Vaughn, Mont., to Augusta, 40 miles; Bluestem, Wash., to Klaxta, 39 miles. A. H. Hogeland, chief engineer, St. Paul, Minn.

Hampden Railroad.—According to press report a contract has been given to C. W. Blakeslee & Son, New Haven, Conn., to build [illegible] miles section at the eastern end of this line. The company was organized to build from Springfield, Mass., to Bondsville, 20 miles. R. D. Gillett, president, Westfield. (June [illegible] p. 1334.)

Hazelwood Park & Lake Beach (Electric).—Dibble Hawkins & Co., Empire Bldg., Seattle, Wash., have the contract to build from [illegible] to Lake Union, seven miles, and have sublet the work as follows: For the grading to McDonald & Moore, for the ties and poles to the A. M. Baum Construction Company, Seattle. W. H. Mattin, president, Seattle. (October 13, p. 734.)

Idaho Northern Railroad.—This road has been extended from Emmett, Idaho, to Plaza, five miles. E. H. Dewey, president and general manager, Nampa. (November 24, page 1080.)

Illinois Central.—See an item under General News regarding the proposed terminal improvements to be carried out by this company in Chicago.

Indianapolis, Chicago & Meridian (Electric).—This company is planning to start work at once on a line from Indianapolis, Ind., north to Gary. John Shafer, president, Chicago.

Idaho & Western.—See Chicago, Milwaukee & Puget Sound.

Johnson City Connecting.—Incorporated in Illinois with $5,000 capital, and office at East St. Louis. The plans call for building a railway in Williamson county. The incorporators include: E. J. Pearson and T. L. Phillips, both of St. Louis, Mo.; L. O. Whitnel, H. L. Browning and T. E. Gillespie, all of East St. Louis, Ill.

Kansas City Southern.—An officer writes that work was carried out during 1911 on changes of line to reduce grades on eight sections, aggregating 17.61 miles in Oklahoma from Bunch to Hodgen; also from Bear Creek Junction, Ark., to Neal Springs, 8.54 miles, and from Pickering, La., to Neame, 3.30 miles; a total of 29.45 miles. In addition the grade has been reduced on the present alinement on five sections, a total of 15.3 miles, of which 5.6 miles are in Oklahoma; 1.5 miles in Texas and 8.2 miles in Louisiana. Work is now under way on changes of line to reduce the grades on seven sections between Grandview, Mo., and Neosho, 27 miles. Porter Bros., Seattle, Wash., are the contractors. In addition work is under way reducing the grades on present alinement on 22 sections, aggregating 47.4 miles, of which 32.3 are in Missouri, 3.4 in Arkansas, 0.7 in Texas and 11 in Louisiana. 29.45 miles of new line was built during the year and 21.13 miles of old line removed. C. E. Johnston, chief engineer, Kansas City, Mo. (April 14, p. 925.)

Lexington & Eastern.—See Louisville & Nashville.

Louisville & Nashville.—An officer writes that work is now under way on the Lexington & Eastern from Dumont, Ky., to McRoberts, on about 103 miles. Lane Brothers Co., Alta Vista, Va.; Mason & Hanger, Richmond, Ky.; Jones Bros., Columbus, Ohio; W. J. Oliver, Knoxville, Tenn.; Luck Construction Co., Roanoke, Va., and Winston & Co., Richmond, Va., are the contractors. The company expects to have the grading work finished early in 1912.

Work is now under way on the Wasioto & Black Mountain from Harlan, Ky., up Clover Fork river to Ague, about five miles. This work is being carried out by the company's men. W. H. Courtenay, chief engineer, Louisville, Ky.

Maine Central.—An officer writes that this company has completed relocation work on 6.36 miles from a point east of Cumberland Junction, Me., to a point east of Mill Road. This replaces the 6.80 miles between Cumberland Junction and Gray. T. L. Dunn, chief engineer, Portland.

Nazas Valley & Pacific.—An officer writes that this company has just finished locating the line, and financial arrangements are being made. The plans call for a line from Tepehuanes, Mexico, to Guanacevi, about 62 miles. A branch will probably be built to Inde, 33 miles. J. T. Odell, president, New York. (February 10, p. 301.)

New York Subways.—The New York Public Service Commission, Second district, has given a contract to Patrick McGovern, Boston, Mass., for building section nine of the Lexington avenue subway, between Sixty-seventh and Seventy-ninth streets in the borough of Manhattan.

Oregon Roads.—The Crosset Timber Company, Astoria, Ore., has secured right-of-way, it is said, for building a logging line from Knappa, to the Big Creek district in Clatsop county.

Paragould & Memphis.—An officer writes that this company plans to build an extension between Caldwell, Mo., and Paragould, Ark., 17 miles, and between Manilla and Lepanto, 12 miles. J. W. Vail, president and general manager, Caldwell, Mo.

Paris & Mt. Pleasant.—An officer writes that surveys are being made for an extension from Bogata, Tex., to Mt. Pleasant, 28 miles. H. P. Mobberly, chief engineer, Paris.

Pennsylvania Lines West.—It is understood that work will be started next year on the construction of a low-grade short line branch on the Cleveland & Pittsburgh division between Smiths

Ferry, Pa., and Bayard, Ohio. Rights-of-way are now being secured.

PORTLAND EUGENE & EASTERN (Electric).—Grading work has been started on the line from Eugene, Ore., to Monroe. A. Welch, manager, Portland. (June 9, p. 1334.)

REDDING & RED BLUFF (Electric).—This company's plans call for a line from Redding, Cal., to Red Bluff, about 35 miles. It is said that the line is to be built as an extension of the Northern Electric and the Vallejo & Northern railways.

RUPERT & NORTHEASTERN.—Incorporated in West Virginia with $5,000 capital and office at Boston, Mass. The plans call for building from Rupert in Greenbrier county, W. Va., to Fenwick in Nicholas county. The incorporators include C. A. Ellis, H. L. Shattuck, S. T. Gano, J. F. Hill and H. L. Higginson, all of Boston.

SACRAMENTO & EASTERN.—Incorporated in California with $1,000,000, to build from Sacramento, Cal., northeast via Fair Oaks and Orange Vale to Folsom, about 20 miles. It has not yet been decided whether steam or electric motor cars will be used for the motive power. The incorporators are connected with the Northern Electric Railway, and include C. P. Hammond, Berkeley; L. J. de Sabla, S. Lilienthal, San Francisco; G. F. Springer, Oakland, and H. W. Furlong, Pleasantville.

SAN FRANCISCO, VALLEJO & NAPA VALLEY (Electric).—The reorganization company now in control of this property, it is understood, will soon commence construction work on an extension from St. Helena, Cal., to Calistoga, about 10 miles. E. Z. Hennessy, vice-president, Napa, Cal.

SOUTHERN NEW ENGLAND.—See Central Vermont.

SOUTHWESTERN TRACTION.—Incorporated in Indiana with a capital of $50,000, and headquarters at Indianapolis, to build from Mooresville, Morgan county, southwest to Sullivan, about 90 miles. The first 20 miles between Mooresville and Eminence will be built next spring. The directors include J. W. O'Hara, J. A. Davidson, J. A. Johnson and F. F. James.

SOUTHERN VERMONT.—See Central Vermont.

TIDEWATER & SOUTHERN (Electric).—An officer writes that this company has finished work on five miles from Turlock, Cal., west toward Modesto, and work is now under way from Stockton to a connection with the line at Turlock, 44 miles. J. H. Wallace, chief engineer, Stockton. (Nov. 24, p. 1081.)

TONOPAH & GOLDFIELD.—It is said that this company will build a three-mile line from Goldfield, Nev., to the Florence Goldfield Mining Company's property. R. W. Cattermole, chief engineer, Goldfield, Nev.

TRINITY VALLEY & NORTHERN.—An officer writes that surveys have been made for building an extension from Lumus, Tex., to Lamb, seven miles. A. J. Wise, chief engineer, Houston, Tex.

TWIN FALLS, ARTESIAN & OAKLEY.—Incorporated with $500,000 capital and headquarters at Twin Falls, Idaho. The plans call for building from Twin Falls southeast via Artesian City to Oakley, about 45 miles, with branches to various places. H. T. West, president.

UNION PACIFIC.—An officer writes that work is now under way by the Phelan-Shirley Company, Omaha, Neb., on an extension from Callaway, Neb., northwest to Gandy, 37.29 miles. R. L. Huntley, chief engineer, Omaha.

UNITAH RAILWAY.—An officer writes that surveys are being made for a change of line from Atchee, Colo., to Sewall, 20 miles. M. W. Cooley, general manager, Mack.

UNITED PROPERTIES (Electric).—This company, which was incorporated at Wilmington, Del., has filed articles of incorporation at Sacramento, Cal., with a capital of $200,000,000. The company operates the Key Route and other electric railways. Plans are being made to build at once from Oakland, Cal., to Sacramento. The incorporators include F. Smith, C. B. Seabrushie, H. R. Ewart, H. W. Davis.

WASIOTO & BLACK MOUNTAIN.—See Louisville & Nashville.

WICHITA FALLS ROUTE.—An officer of the Wichita Falls & Northwestern writes that work is now under way on seven miles north of Woodward, Okla., also on two miles south of Woodward and on a section of 25 miles north of Hammon, the present northern terminus. The grading has been let to small contractors in one, two and three mile sections. M. Westbrook, Aberline, Tex., has the contract for track laying and bridge work on 50 miles, and the remainder of the work is being carried out by the company's men. Maximum grades are ¾ of 1 per cent.; maximum curvature 3 deg. M. M. Cooke, chief engineer, Wichita Falls, Tex.

WICHITA FALLS & NORTHWESTERN.—See Wichita Falls Route.

RAILWAY STRUCTURES.

BUFFALO, N. Y.—The Lehigh Valley's proposition to buy the Hamburgh canal strip in Buffalo for $500,000 and make sundry improvements, including the elevation of its tracks, the elimination of grade crossings and the building of a new passenger station within two years, has been accepted by the board of aldermen.

BRINKLEY, ARK.—The Chicago, Rock Island & Pacific will build a one-story brick passenger station to cost $25,000.

CHICAGO, ILL.—See an item under General News regarding the proposed terminal improvements to be carried out by the Illinois Central in Chicago.

EL PASO, TEXAS.—Work on the reinforced concrete freight house is to be started about January 1, 1912, by the Texas & Pacific at El Paso. The cost of the work is about $75,000.

EUGENE, ORE.—The Oregon Electric has given a contract to the J. McAchem Co., for building bridges over the Willamette and Santiam rivers.

EVERETT, WASH.—The Great Northern is having plans made, it is said, for a reinforced concrete viaduct to be built over its tracks on Broadway.

FT. WILLIAM, ONT.—The Grand Trunk Pacific Railway has awarded a contract to John S. Metcalf Company, Limited, Montreal and Chicago, for the design and construction of a two and a half million bushel concrete storage elevator at the Mission Island terminal.

GREAT RIVER, N. Y.—The New York Public Service Commission, Second district, has ordered the elimination of the grade crossings on the Long Island Railroad known as the Cuttings crossing and the Vanderbilt crossing of the South Country road and the Pond road crossing, situated east of Great River station. Overhead bridges will be provided with a width of 35 ft., and a clearance above the tracks of not less than 21 ft., with a sidewalk on one side of each bridge. The bridges will be constructed of steel and reinforced concrete. The approaches to the bridges are to be 40 feet wide. The Long Island is to prepare the general plans and specifications. The approximate cost of the elimination of the crossings will be $74,000.

LAFAYETTE, LA.—The Southern Pacific is reported as contemplating the construction of a new outside yard with drill track, storage facilities, roundhouse, small machine shop and blacksmith shop.

NEWMAN, GA.—The Atlanta & West Point and the Central of Georgia have awarded the contract for a union station 105 ft. x 160 ft.

OMAHA, NEB.—According to press reports the Chicago, Rock Island & Pacific has bought land in Omaha as a site for a new terminal.

SAN PEDRO, CAL.—The Southern Pacific has applied to the war department for an extension of six months in which to complete the drawbridge now under construction at San Pedro harbor. (Aug. 4, p. 270.)

SPOKANE, WASH.—Bids are being received by the Northern Pacific, it is said, for elevating the tracks in Spokane. It is understood that the company is also planning to put up new shops and a roundhouse.

TALLEQUAH, OKLA.—The St. Louis & San Francisco will build a brick depot with tile roof to cost about $12,000.

YORK, PA.—An officer of the Pennsylvania Railroad writes that authorization has been granted the company to construct a passenger tunnel and an intertrack fence at York.

Railway Financial News.

Atlantic Coast Line.—This company has sold to Brown Brothers, New York, $2,500,000 series B 4½ per cent. equipment trust bonds, maturing semi-annually to 1921.

Canadian Northern.—This company is offering in London $35,000,000 3½ per cent. 50-year debenture bonds at 93. These bonds are guaranteed by the Dominion government.

Canadian Pacific.—The directors have authorized an issue of $18,000,000 additional common stock to be offered to stockholders at 150, each stockholder having the right to subscribe for one share of new stock for every ten shares of stock now held. The last previous issue of common stock was made in October, 1909, when $30,000,000 stock was offered to stockholders at 125.

Central of Georgia.—The two committees representing the first, second and third 5 per cent. income bonds, have made arrangements with the Illinois Central, which controls the Central of Georgia, for the purchase by the I. C. of these bonds at 95 for the first income, 92½ for the second and 90 for the third income bonds. There are outstanding $4,000,000 first income, $7,000,000 second income and $4,000,000 third income bonds, but it is understood that the Illinois Central had already bought all but about $5,000,000 of these bonds before the present arrangements with the two committees. In addition to the price of the bonds, the Illinois Central is to pay interest not so far paid on these bonds. There is about 6 per cent. accrued on the first income, 12 per cent. on the second and 18 per cent. on the third. For a number of years suits have been tried in the courts to compel the Central of Georgia to pay interest on these income bonds.

Chicago & Western Indiana.—The company has sold to J. P. Morgan & Co. $1,800,000 general lien 4 per cent. bonds.

Chicago, Rock Island & Pacific.—The C. R. I. & P. Railway has sold to Speyer & Co., New York, $3,500,000 first and refunding mortgage 4 per cent. bonds, due 1934. The whole issue has been resold to Harris, Forbes & Co.

Cleveland & Pittsburgh.—This company is to issue $1,073,950 stock to reimburse the Pennsylvania Railroad for additions and betterments made under the lease of the C. & P. by the Pennsylvania.

Colorado Short Line.—The Midland Terminal, which is controlled by the Colorado Short Line, has leased the Cripple Creek Short Line, which runs from Colorado Springs to the Cripple Creek mining district.

Cripple Creek Short Line.—See Colorado Short Line.

Detroit, Toledo & Ironton.—January 9 has been fixed as the date of sale of the Detroit, Toledo & Ironton properties covered by the general lien and divisional first mortgage and by the consolidated mortgage.

Illinois Central.—See Central of Georgia.

Joliet & Southern.—It is understood that foreclosure proceedings have been brought against this road, which runs between Joliet and Chicago Heights and Joliet and Aurora.

Lake Shore & Michigan Southern.—See the New York Central and Hudson River.

Missouri Pacific.—The Kansas Utilities Commission has approved of the issue of $3,000,000 Missouri Pacific equipment bonds.

New York Central & Hudson River.—This company has asked permission of the New York Public Service Commission, Second district, to buy the majority stock of the New York, Ontario & Western from the New York, New Haven & Hartford. The New York, New Haven & Hartford owns $2,200 of the total outstanding $4,000 preferred stock, and $29,160,000 common stock of the N. Y., O. & W. out of the total outstanding $58,114,000. The New York Central has agreed to pay $13,108,298, payable in 50-year 4½ per cent. debenture bonds, which would, of course, be issued to the New York, New Haven & Hartford. In 1904 the New York Central had an option on the N. Y. O. & W. stock, but did not exercise it. The New York, Ontario & Western carries about 2,700,000 tons of anthracite coal, which is only about 3½ per cent. of the total tonnage of anthracite coal shipped from the fields.

The New York Central & Hudson River has also asked permission of the commission to buy the outstanding minority stock of the New York & Harlem. The New York & Harlem owns the New York Central main line from the Grand Central station to Chatham, N. Y., and owns a considerable part of the property on which the new Grand Central terminal is being built. The New York & Harlem is leased to the N. Y. C. & H. R. at an annual rental of 10 per cent. on the 26,879 shares of preferred stock and 10 per cent. on the 173,121 shares of common stock (par value of both common and preferred, $50 per share). The New York & Harlem also has $12,000,000 3½ per cent. mortgage bonds outstanding. None of the New York & Harlem stock is now owned by the New York Central & Hudson River, but the railway company asks permission to buy this stock at $350 a $50 share.

The New York Central & Hudson River has sold to the New York, New Haven & Hartford the remaining half of the controlling stock of the Rutland Railroad. The other half of this controlling interest was sold to the New Haven by the N. Y. C. & H. R. in February. (See Feb. 24, p. 370.) It is understood that the price is about $2,500,000, or the same that was paid for the other half of the stock.

This company and the Lake Shore & Michigan Southern have asked the New York Public Service Commission, Second district (state), for the approval of an issue of $15,000,000 4½ per cent. equipment trust certificates of 1912, maturing one-fifteenth annually beginning January 1, 1919. The New York Central Lines ask permission to sell these certificates at not less than 97.

New York & Harlem.—See New York Central & Hudson River.

New York, New Haven & Hartford.—See New York Central & Hudson River.

New York, Ontario & Western.—See New York Central & Hudson River.

Northern Securities Company.—An annual dividend of 3 per cent. has been declared on the company's $3,950,000 stock stubs. This compares with 4 per cent. declared in the latter part of 1910 and 2½ per cent. declared in the latter part of 1909.

Oregon-Washington Railroad & Navigation.—This company has sold $5,000,000 4 per cent. bonds on which bankers had an option.

Placerville & Lake Tahoe.—This property has been ordered sold at public auction on December 27. The road runs from Camino, Cal., to Placerville, eight miles.

Pennsylvania Company.—See a note in regard to the Cleveland, Akron & Cincinnati in General News.

Pennsylvania.—See Cleveland & Pittsburgh.

Rutland.—See New York Central & Hudson River.

St. Lawrence & Adirondack.—An annual dividend of 4 per cent. has been declared on the $1,615,000 stock, all of which is owned by the New York Central & Hudson River. The last dividend paid by the company was 4 per cent. in 1908.

The department of public works of Honduras has received the draft of a contract for the construction of a railway from Puerto Teloa, on the northern coast of Honduras, to Zacate Grande Island on the Gulf of Fonseca. According to the plan, the railway will traverse the entire republic, passing through Tegucigalpa, and branches will extend through the principal towns to the boundaries of Guatemala, Salvador and Nicaragua. The concessionaire agrees to construct at his own expense a wharf provided with lights and guardhouse at each terminal of the line and also to erect custom and warehouses for the account of the state. The concessionaire further agrees to submit to the government a preliminary report and sketch of the railways, as well as a definite drawing of the first 12 miles, repeating this report each four months until the line is completed. Preliminary work must be commenced within a year from date of contract, while the wharves and buildings must be completed within four years.

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SO conservative an authority and critic as the London *Times* describes as "a real crisis" the demand for nationalizing the railways of England made by the socialist and labor parties in that country and growing out of the railway strikes. Probably the description is too strong, and an expression of that ultra-conservative feeling, which in the American party phrase has "viewed with alarm" the national drift in the British islands toward old age pensions, employment insurance and similar forms of government paternalism. But one phase of the movement draws attention. It has started in the basic idea of a readjustment of railway wages upward; it has assumed already a political and party aspect; and it is attached to the implied, if not actual, theorem of delivering votes to candidates who favor railway nationalization and taking them away from candidates who do not favor it. All this is *before* nationalization and, indeed, at apparently the incipiency of the movement in England. What, then, would be the status and attitude of labor *after* the railways were nationalized, if they should be? Applying the query to our own country, where would be the limits of organized labor's dictation, where the checks on party timidities and resulting concession? We have one clue to the situation in the pension legislation now pending in Congress, though the analogy is a mild one as compared with the output of labor law-making that might follow federal railway ownership. There stands, too, the recent example of France to show us that state ownership gives no immunity from a strike. And all this refers to the labor branch of state ownership alone, leaving such matters as operation, finance and rates to their own complexities.

UNDER the readjusted scheme of railway taxation in New Jersey, the railway companies pay this year on their property in that state $7,319,301, as compared with last year's $5,347,524—an increase of $1,971,777, or about 37 per cent. On the other hand, the New York, New Haven & Hartford pays this year on its steam railway property to Connecticut in taxes $1,076,231, as compared with $1,248,324 in 1910—a reduction of $172,073, or nearly 13 per cent.—while the taxation of all the steam and street railways in the state falls from $1,790,150 to $1,659,264—a reduction of $130,886, or somewhat more than 7 per cent. The reduction is caused in the Connecticut case chiefly by the lower market price of the stocks on which the tax is levied, that value thus becoming an important variable from year to year. New Jersey and Connecticut are both eastern states, and almost adjacent to each other, and, though due to widely different causes—and an exceptional cause in New Jersey—the contrast of results is suggestive as an illustration of the lack of harmony in systems of state railway taxation which prevails throughout the country. To harmonize those systems a somewhat unique plan is proposed by Allan Ripley Foote, president of the National Tax Association. He proposes, in the first place, a flat rate of 2 per cent. on operating revenue of all railway corporations, and next, a small fractional rate based on the difference between operating cost and revenue. His plan has the merit of simplicity and the assessment applies to definite and readily ascertainable sums. But it bears hard on the very poor roads which perhaps are earning nothing over fixed charges. For such a line the more flexible "market value" basis for taxation is much more equitable and satisfactory. For other lines the problem of just and fair taxation remains unsolved, but without diminishing the need of the states somehow getting together and at least reducing their wide disparities.

BOTH the Illinois Central Railroad and the city of Chicago are to be congratulated on the arrangement announced last week by which the railway company surrenders to the Board of South Park Commissioners its ownership of a part of the shore line of Lake Michigan and agrees to build a new passenger station, receiving in return an increased width of right-of-way. Especially is the Illinois Central management to be commended for the public spirit and the disposition to co-operate with the city authorities shown throughout the negotiations. The bargain made is one with which each party feels satisfied, which, after all, is the best kind of a bargain. There is little doubt that as far as physical value is concerned the Illinois Central has given up far more than the city. On the other hand, the railway should receive its reward from the results of improved relations with the city government and the public. In spite of a decision of the Illinois supreme court confirming the Illinois Central's riparian rights, the people of Illinois and of Chicago for many years have been taught to regard it as a usurper, and the fact that its right-of-way has occupied Chicago's "front yard" has been a source of public irritation. The Illinois Central has been most bitterly criticized by the Chicago newspapers, yet overnight, as a result of the concession made by it, the tone of the

press changed from one of captious and unreasoning fault-finding to one of almost fulsome commendation. The railway has been put in a new light which can hardly fail to be of much value to it. While the agreement with the South Park board has no direct bearing on the question of the electrification of the Illinois Central's Chicago terminals, the making and execution of the plans just agreed on should remove for a time all bitterness from the discussion of the subject of electrification, so far as it is concerned; and by the time the station is completed, three or five years hence, the railways and the people of Chicago will have received a report of the investigation of the entire subject of electrification in Chicago now being made by the commission appointed by the Chicago Association of Commerce.

CO-OPERATION of the right sort between railways and shippers is provided for by the recent action of Chicago railway and industrial traffic officers in appointing a joint conference committee to handle problems that may arise in connection with the administration of the Chicago uniform switching rules. Under the plan as outlined, the railways entering Chicago will first select a committee of their own traffic officers, and the shippers will then appoint a similar committee of their own. Each body will have its own chairman and hold individual meetings, but if occasion arises the two will be called together for joint decision and action. In the nature of things this joint committee will have no definite powers over the tariffs involved, and it is believed that its convening will be required but seldom, but the mere fact of its existence is expected to hold in check the tendency to allow differences of opinion between the buyers and sellers of freight service to develop into serious controversies. In the practical application of rules to a complicated situation, such as must necessarily exist in a railway and industrial center like Chicago, it is too much to expect that occasions for friction will not arise, but as good a means as that adopted for providing for co-operation can hardly fail of accomplishing material results. That the plan now being worked out is as a seed sown in prepared ground is shown by the history of the present Chicago uniform switching agreement, which is the product of the united endeavors of representatives of both the transportation and industrial interests of the city. The conference committee is, in a sense, but the establishment as a permanent institution of the committee, including representatives of the leading commercial organizations of Chicago and the railways, which spent over two years whipping into workable shape the switching agreement put into effect last August as a substitute for rule 23 of the Illinois Railroad Commission. The tariffs made were not entirely satisfactory to either interest, but agreement on them was acclaimed as a marked improvement over the alternative of commission regulation and court litigation.

ANOTHER instance where co-operation between the transportation and industrial interests is likely to bear good fruit is afforded by the action being taken by both regarding the bill pending before Congress to require the railways to enlarge their overhead and lateral clearances. The Special Committee on Relations of Railway Operation to Legislation has estimated, on the basis of reports from 109 railways, that the passage of this bill would put the railways of the United States to an expense of [illegible] It was designed, it, to regulate railways. But industries also have many miles of railway track in connection with their plants, the clearances of which would have to be enlarged to comply with the bill. There would be further large expense to industries involved in making the alterations in plants [illegible] the changes in the clearances of adjacent tracks of the transportation companies. In this case the shippers are not only indirectly interested in the proposed additions to the railways' expense, which would have [illegible] but they are directly concerned with the principle of being subjected to a similar expense. The National Industrial Traffic League has taken up the matter by appointing a committee to investigate and report on the effect of the proposed clearance bill on the industrial interests. This committee, of which F. T. Bentley, traffic manager of the Illinois Steel Company, is chairman, has already begun its work by sending out blanks for the members of the League to fill out. While it has not got far yet with its investigation, it has found that the expense of complying with the law in a single large plant would amount to the respectable total of $3,980,000. For another plant a merely preliminary investigation disclosed that the cost would reach $1,600,000, at which point the inquiry was abandoned in dismay because it was seen that literal compliance with the bill would involve reconstruction of the whole works! Frequently laws have been passed which have entailed unreasonable expenditures by the railways, and there was none to voice a protest against them but the railways themselves. If the clearance bill is pressed for passage the situation will be made to present a somewhat different aspect by co-operation with the railways by the industrial interests.

DOWN to the end of a period closing about ten years ago, the railway companies of Connecticut followed the even then time-dishonored custom of giving free passes for the session to members of the state legislature. Finally, a statute was enacted forbidding free passes; but it was enacted also that the state should provide session mileage books purchased from the railway companies, which the legislators could obtain on assignment to the state of their old-time mileage—fixed by the state constitution at 25 cents each way for the regular or an extra session. Then a member of the legislature, living say 10 miles from Hartford, in effect, got for $5 a general mileage book good on the particular line during the whole session of the legislature which this year (1911) lasted eight and a half months; and to such an arrangement, obviously welcome to the legislators, the railways, which in 1911 have received some $37,000 from the state for mileage books, are not averse. But the plan has now struck a snag. Governor Baldwin, on a question of paying a small residual balance to a railway company, asked the attorney-general of the state to pass on the constitutionality of the "mileage book" statute and from him has come the remarkable finding that, while the constitution has been violated, the bill had better be paid as a matter of "custom." To let "custom" over-ride a state constitution introduces us to a new phase of the antique political aphorism: "What is the constitution among friends?" Also, if the Connecticut statute is unconstitutional, what is the status of the large moneys paid the railways in past years under it? And, as it requires two legislatures and a ratifying popular vote to amend the Connecticut constitution, what will be the mileage book status of the legislature to be chosen next November and to meet in 1913? The lot of a state legislature deprived at one fell stroke of both free passes and state-bought mileage books is too pathetic for words.

THAT the Wabash should have been operated in such a way as to keep it out of the hands of a receiver for so long is a fact that its operating management may well be proud of. Probably the receivership has been inevitable ever since 1908, but in the meantime, without credit and without anywhere nearly adequate additional capital, the road has earned its fixed charges. It is unfortunte, of course, that the finances of the company could not have been readjusted without the expenses of receivership; but that some sort of a readjustment was absolutely necessary a mere glance at the price at which the Wabash securities are selling clearly shows. The burden of the receivership will have to be borne by the investors who have put their money into its securities, and that is exactly where the burden belongs. The receivership of the Wabash is a good example of how impossible it is for a railway company to pass along the burden of unwise financing so as to place it on the shoulders of the shipping and traveling public. If any road ever had an incentive to charge higher rates because it needed the money, the Wabash was that road, but rates should be based on the general situation, not on the condition of either the strongest or the weakest roads. The Wabash could not charge any more than its com-

petitors, therefore the penalties for former financial mistakes are not borne by the public but will be borne by the stock and bondholders of the company. The present security holders may be innocent enough of any improper financial methods; certainly the present operating management of the road is not responsible for these financial mistakes. The mistakes which have led to the present receivership have been commented on before in these columns. They may be summed up by saying that the credit of the Wabash, already a company capitalized at a higher figure than its earning power would warrant, was used to gain an entrance for the Gould roads into Pittsburgh, and was exhausted at the very time at which the Wabash itself should have used this credit to pay for additions and betterments to its existing property. If, however, the reorganization is drastic enough, the receivership may be a blessing, both to the company itself and to the shippers who will benefit by additional capital being put into the road. It will be extremely interesting to watch the progress of the Missouri Pacific's rehabilitation and compare it with that of the Wabash, because the two Gould roads present such striking contrasts. The Missouri Pacific was in by no means such difficult financial straits as the Wabash, and the Goulds retained control of the company and succeeded in making arrangements for future financing without any receivership, while, on the other hand, the property itself had been inefficiently operated and maintained. In contrast, the Wabash had been very efficiently operated and maintained, while its finances were in such a complicated tangle that a receivership was the only possible course, and it appears as if the Goulds had not retained undivided control.

A BRIDGE carrying one of the important thoroughfares over the main tracks of one of the busy railway lines in Philadelphia was found to be on the verge of collapse, a short time ago, although at that time it was under a very heavy street car, teaming and pedestrian traffic. This is but one instance of a condition existing all too frequently in many cities. In this case workmen had repaired the floor of the bridge but a short time before and, while inspection would have been easy at that time, the condition of the structure had not been noted. It is said that after a personal inspection experts were unable to account for the fact that the bridge stood up at all even without any load. In another case in the same city, about two months ago a bridge over the tracks of another railway collapsed while workmen were engaged in repairing it, causing the death of two men and the injury of eight others. When the Kansas City Terminal Railway Company took charge of the maintenance of structures over its tracks under the terms of a new ordinance about a year ago, an inspection of them was made at once, and similar conditions were found. Traffic was immediately stopped on several bridges until proper repairs could be made. In one case, while repairs were being made on a bridge carrying very heavy street car traffic, the structure buckled when the hand rail was removed. Other instances of weakened bridges have been found in Chicago and other cities. These cases are confined almost entirely to bridges maintained by municipalities, and they indicate that but little attention is being given to the proper inspection and maintenance of these structures. These cities have regularly organized engineering departments, whose duty it is to attend to such work. The effects of the corrosive action of locomotive gases on steel have been known for many years and should be guarded against in all cases. Bridges subject to such action should be inspected by the city authorities as regularly as the railways inspect similar structures for which they are responsible, and the railways should be supplied with copies of such inspection reports that they may be able to know that proper precautions are being taken. While not causing the same degree of danger to railway operation as a structure carrying tracks, an unsafe viaduct or bridge over the tracks is a menace to the safety of railway operation as well as of the public using the structure. The railways are careful to require that proper precautions be taken at crossings of high tension electric power lines and of other railway lines. They should also be able to get the same precautions taken at street crossings maintained by cities. The failure of municipalities to do their plain duty in respect to such matters, while requiring the railways to spend huge sums to make railway operations and structures safe, is a striking example of inconsistency, and may indicate how much active solicitude for public safety public officials would show if they were operating the railways instead of trying to tell railway managers how to do it.

SELDOM has an editorial in this or any other paper produced such great and immediate effects as the one entitled, "Abolish the Present Giving," in our issue of December 1. It has resulted in action which, it is believed, practically ends the practice mentioned, so far as the railway and railway supply business are concerned. Men engaged in other businesses might well follow the example set. The *Railway Age Gazette* does not claim all the credit for this reform. Its comments merely crystallized the views of railway and supply men on the subject and precipitated action which, sooner or later, probably would have been brought about by some other means if it had not been brought about in this way. No better illustration could be afforded of the high character of most of those who are responsibly concerned with the sale and purchase of railway supplies, or of their desire and appreciation of the need of putting and keeping their business relations on a basis that cannot be criticized. However much the custom in question has been abused, there are many who have participated in it who did not begin and have not continued doing so from improper motives. But even most of these have bowed to the opinion of the majority. The example set in this case might well be followed in others. Railway men cannot effect all the reforms in their business that are needed without the co-operation of other interests. They cannot eliminate all unfair discrimination in rates without the co-operation of shippers; they cannot get as good rails as safe operation requires without the co-operation of the rail manufacturers; they cannot reduce the large majority of accidents without the co-operation of their employees. Cannot railway managers get that co-operation of other interests which is necessary to change the various conditions that need changing? A still broader question may well be asked. Cannot "big business" generally, by the voluntary co-operation of those directly concerned reform itself in accordance with reasonable public demands? The practical abolition of the giving of presents by railway supply men to railway men is a relatively small thing; but may we not hope and believe that it is a sign of a new spirit among business men which will accomplish larger things?

THE COST OF CITY TICKET OFFICES.

ONE way in which it would seem the railways could effect substantial economies, while not only not impairing, but actually improving, their public service, would be by establishing joint city ticket offices in the large cities. A committee of passenger officers after a thorough investigation not long since reported unanimously in favor of such a move at St. Louis. It estimated that at that time the rentals paid for uptown ticket offices in that city were $142,600 a year, and that the cost of operating them was $55,906, a total of $198,506. It estimated that the rental of an adequate joint ticket office would be $50,000, and the cost of operating it, $51,000, a total of $101,000, or a saving of $97,506 a year.

Figures the *Railway Age Gazette* has obtained show that since then there has been an increase in the annual cost of the St. Louis offices. The present rentals aggregate $12,4[illegible] a month, and the salaries of those employed in them, $6,715 a month, a total per year of $230,076. In Kansas City the rentals for the city ticket offices of 11 roads aggregate $3,110 a month and the salaries $3,176 a month, a total of $75,432 a year. We have also got some figures for the city ticket offices of 13 railways in Chicago. Their annual rental is $141,500, and their annual pay-roll $155,700, making a total of $297,200. This includes the figures for only about one-half the city ticket offices in Chicago, and probably an estimate of $550,000 a year for the rentals and pay-rolls of them

all is not far wrong. Therefore, we estimate that the rentals and pay-rolls of the city ticket offices in only the three cities of Chicago, St. Louis and Kansas City aggregate over $855,000 a year, an amount equal to the interest at 5 per cent. on $17,100,000. It is probably conservative to say that 50 per cent. of this, or almost $430,000 a year, could be saved, by the establishment of joint city ticket offices. That so much could be saved in three cities indicates how large an aggregate economy could be made by similar means in the entire country.

Of course, if the economy that could be effected were compared with the total operating expenses of the railways of the United States, or even with the operating expenses of the passenger service alone, it might seem small. But, if all of the relatively small economies that might be made were effected they would aggregate a very large sum; and to pursue a policy of not making any particular economy, because it alone would not greatly contribute to net earnings would be to act on a principle which, if consistently carried out, would wipe out all net earnings.

As for the service rendered to the public, only casual consideration is necessary to show that it would be improved by carrying out such a plan as that outlined by the St. Louis committee. Under this scheme the location of the joint office was to be as central and convenient for the public as could be secured. Complaints and inquiries were to be handled by an information bureau which was to be very carefully organized. Room was to be provided in the office for the St. Louis Transfer Company, both telegraph companies, a taxicab stand, a separate Pullman office and both telephone companies. The superintendent and assistant superintendent of the office were to be appointed by the Terminal Railroad Association, and would, therefore, be absolutely neutral. Ticket sellers were to sell tickets over any and all roads and were to observe the strictest neutrality. The street men or other representatives of the individual roads were not to be allowed to solicit or influence business inside the office, and authority was to be given to the superintendent to enforce this regulation.

Under present conditions few or no city ticket offices have all the conveniences which it was proposed to provide in this joint office. As long as individual offices are maintained, if a traveler desires to ride over one road and finds he cannot get a sleeping car reservation on it he must go out and hunt for the office of a competing line. This subjects him, especially in bad weather, to inconvenience which he would be saved by the establishment of joint offices. In some places the establishment and operation of a single joint office would be impracticable. For example, in New York it would be necessary to have at least an uptown and downtown office, and doubtless more than one uptown. But whether in any given city it would be necessary to have one or more joint offices, the economy that it would be to the railways and the convenience it would be to the public to have all ticket offices joint seems obvious.

The main difficulties in the way of establishing joint offices are differences of opinion as to the way the expenses should be divided between the railways, and doubt and fear as to how such an arrangement would affect the business of the roads individually. Two plans for the division of rentals and expenses were suggested by the St. Louis committee. One was for each road to pay a minimum contribution of $1,500 a year to rent, and a minimum contribution of $1,500 a year to expense account, the rest of the rent and expense to be pro-rated among the roads on the basis of actual ticket sales made in the office. The second [illegible] each road to pay a minimum of $3,000 and a maximum of $9,000 a year for rent and expenses. Unquestionably, a [illegible] could be worked out [illegible] the St. Louis [illegible] to [illegible] the [illegible] individual roads [illegible] to [illegible] much ground there was [illegible] and [illegible] by the fact that some of the strong roads thought a joint office would hurt them to the benefit of the weak roads, and that some of the weak roads thought it would hurt them to the benefit of the strong roads.

[illegible] such an arrangement could and probably would be made better than it is now; substantial economies in the aggregate would be effected; and even though some roads gained more by the change than others, it is very questionable if any would actually lose by it.

EXCESSIVE CAR WHEEL LOADS.

THE proposed use of 80-ton freight cars with four-wheel trucks for special service naturally suggests some consideration of the effect of excessive loads on the rail, the wheels and the journals of very high-capacity cars. The limits for the unit pressure on these details have been frequently fixed by engineers, as failures of structures or material have developed, but these limits have steadily increased as the traffic conditions have demanded larger capacity in railway equipment. In this development the design and proportion of the structure have been made adequate for the service, and material has been so improved as to safely sustain the load, but with increasing wear and more rapid destruction as the greater loads have been imposed. In 1882 the M. C. B. Association discussed a report on the Capacity of Freight Cars—Can it be Safely Increased above 20 Tons? The car wheel load was then 8,000 lbs., and 12,000 lbs. was regarded as a proper limit for the weight on a locomotive driver. (Master Mechanics' Association Proceedings, 1882, page 25.) Even at that time the Pennsylvania and the Reading were experimenting with locomotives with a load of 16,000 or 17,000 lbs. per wheel, and the Great Northern of England was operating a locomotive carrying 20,000 lbs. per driver. In the United States we now have engines with a load of 30,000 lbs. per driving wheel.

The proposed 80-ton car will weigh about 50,000 lbs., and the total weight of the loaded car will be 210,000 lbs., which when carried by 8 wheels produces a static load on the rail of 26,250 lbs. Weights on drivers have always greatly exceeded the load on the smaller car wheels, and there are reasons, apart from the effect of the difference in diameter on the rail, why small wheels will not endure as severe service as large ones. It is taken for granted that solid steel or steel tired wheels will be used for the high-capacity cars, as the solid steel wheel is already largely used for 50-ton cars. The smaller steel wheels or tires do not render as satisfactory service under heavy loads and high speeds as the larger locomotive tires, principally for the reason that the manufacturer is not able to put into the small tire sufficient mechanical work to obtain uniform physical properties for the full circumference of the tire, and in the service portions of the tread thickness.

The experience with 36-in. steel-tired wheels under locomotive tenders is instructive on this point and illustrates the great difficulty which the solid steel wheel makers will find in their effort to produce a wheel adequate for the service under 80-ton cars. The steel tender wheels have failed by shelling out, and portions of the metal of inferior physical structure on one-third of the circumference have worn so as to make an eccentric tire which has caused such severe impacts on the rail as to require the removal of the wheels after a short service.

The average load on these wheels is 18,000 lbs., and the maximum static load 20,400 lbs.; many of them give only six months' service, or 30,000 miles, after the first or second turning. The tire defects develop most rapidly in winter, and this has been explained as due to two causes; first, the increased stress caused by the greater shrinkage on the wheel center at low temperature; and, second, the effect of cold on the steel structure. The popular opinion has always been that extreme cold makes steel more brittle, but investigation has shown that much of the failure of steel in winter has been due to other causes. Good authority now holds that there is a molecular change due to unequal contraction between the different components which make up the micro-structure of the steel, and this increases the brittleness at extremely low temperatures. The principal cause of the shelled-out spots is entrained impurities, which become the starting point of failure in different portions of the tread. The texture of the steel is coarse and fragile, incident to soaking

in the furnace at the high temperatures to which it is subjected in fabrication. The surface of the tread is made more dense by rolling, but the interior portion has an inferior structure, as is shown by the short service obtained after the first or second turning. Locomotive tires receive much more work in rolling than the smaller car and tender wheels, and tires which are worked from both sides should render longer service than solid wheels which are rolled mainly on the outer surface of the tread.

It would appear, therefore, that solid steel wheels under loads of 25,000 to 30,000 lbs. should be made of metal having a higher degree of purity and more uniform physical properties in the entire circumference of the tread. They should also be annealed to secure a finer grain, and it may be found economical to harden the tread and flange by oil tempering. Tires made in this way are now being tested, and the results should show whether the process could be profitably applied to steel car wheels for the high-capacity freight cars.

In a paper read at the last International Railway Congress, published in the Bulletin of October, 1911, Dr. P. H. Dudley has proposed a new method of measuring the tonnage service of rails and wheels. He explains that the tonnage supported by a given portion of the bearing surface of a rail due to a passing wheel is the total wheel load multiplied by the number of wheels passing over it. The tonnage sustained by the metal in the treads of the wheel is the total wheel load multiplied by the number of revolutions, and this tonnage accumulates more rapidly than that of the rail. It is greater also as the diameter is less and the number of revolutions larger, so that the tonnage service of 36-in. tender wheels is much greater than that of the 75 or 80-in. drivers, though the load on the latter may be much larger. It will explain also why the service obtained from steel tired tender wheels is so much less than that of the same-size wheels under Pullman cars, as the load on the former is 9 or 10 tons per wheel and on the latter only 5 or 6 tons. We may now determine what the relative service tonnage of the tires of Pullman wheels, tender wheels and driving wheels will be by the method of measurement proposed by Dr. Dudley.

Wheels 36 in. in diameter under Pullman cars and tenders make 560 revolutions per mile. Pullman wheels 36 in. in diameter with a load of 5 tons per mile, therefore, render a service of $560 \times 5 = 2{,}800$ tons per mile. Tender wheels 36 in. in diameter, with a load of 9 tons per wheel render a service of $560 \times 9 = 5{,}040$ tons per mile, and a 78-in. driving tire making 258.6 revolutions per mile, with a load of 15 tons per wheel, renders an equivalent service of $258.6 \times 15 = 3{,}879$ tons per mile.

In this way it is shown that the large drivers with excessive wheel loads do not accumulate tonnage upon the tread of the tires as rapidly as tender wheels. The 33-in. steel wheels for 80-ton freight cars will have a static load of 13 tons per wheel and make 611 revolutions per mile, so that they must render a tonnage service of 7,943 tons per mile, or nearly 3 times that of Pullman wheels, and more than 1½ times that of the tender wheels which are failing so rapidly from excessive wheel load on tires of small diameter, showing that a satisfactory steel wheel for the heavy freight cars must be superior to those now in general use. This method of comparing the service of steel tires indicates that mileage alone is not a sufficient measure, but the weight on wheel and the diameter of tire should be included, and these items will help the tire and wheel makers in selecting the service which requires special steel and special treatment of the tire in order to avoid excessive wear and short life.

The method thus far considered has used the static load on the wheel and does not take account of tire wear, which is due to the speed of revolution and should increase as the square of the speed. This "generated wheel effect" may increase the load on the wheel 50 per cent., depending on the condition of the tire and the stiffness of the rail. With truly circular wheels mounted concentric on the axles and running on a good track with heavy rails, the generated wheel effect is slight, but as the wheel wears irregularly and becomes eccentric, and the rail surface is not maintained it may almost equal the static load, and the total load tending to produce abrasion and shelling out will be double the static load. This feature of wheel and rail wear is too indefinite to include in any accurate comparison, but is favorable to wheels under heavy freight cars on account of their slow speed. A further study of the subject with some experience with small wheels under what is now regarded as excessive loads and running at comparatively slow speeds may result in formulae for tire wear which shall take account of speed as well as diameter and load. The strength, wear and friction of larger diameter journals for 80-ton freight cars will also be important questions for observation and future study.

SHALLOW BRIDGE FLOORS.

COINCIDENT with the introduction of the concrete trestle and the concrete slab deck, another interesting development in the field of railway bridge design within the past few years, has been that of the shallow bridge floor. Considerable attention was given to this type of floor several years ago, but within the past three or four years interest in it has been revived and its development has been rapid. The development is described in the paper by Mr. Dalstrom in this issue, together with details of different types of floor design. A floor of this same general type was also described in the issue of the *Railway Age Gazette* of October 20 in connection with a description of the belt line of the Chicago & North Western at Milwaukee. While there always have been places where the clearance has been limited and where it would seem advisable to decrease the depth of the floor, and thereby increase the clearance, the number of such cases has greatly multiplied in recent years. The large amount of track elevation work in different cities, and especially in Chicago, and also the large number of railway grade crossings eliminated are very largely responsible for the attention given to the shallow floor design. In such work the grade of the track is determined by the clearance required from the low point of the steel to the grade of the street or track below, and the closer the grade of the track is brought to this low point of the steel the less the amount of filling and masonry for retaining walls that is necessary.

From the standpoint of the construction engineer the minimum depth of floor is advisable. However, from the standpoint of the bridge engineer other things must be considered. As shown in the comparison of costs of the ordinary open floor and the shallow trough floor for 170-ft. span, the excess in cost of the shallow floor over the open floor is 66 per cent. For other spans the ratios would vary, but the excess is large in all cases. Where conditions make it possible to use either type of floor considerably more than this excess in first cost can be economically expended in additional grading to raise the tracks enough to put in the deeper floor and still maintain the desired clearance. The deflection and vibration in a shallow floor are greater than in an ordinary floor. For this reason the different parts tend to become loosened more rapidly, and more frequent inspection and repairs are necessary, materially increasing the maintenance cost. However, there are many cases where other limiting conditions occur, such as the location of the bridge on ruling grades where the reduction of 12 or 18 in. in depth of floor makes an improvement in operating conditions. In such cases the shallow floor is justified in other grounds than those of economy of first cost.

It is necessary that the bridge engineer use careful judgment in deciding where shallow floors are advisable. The locating engineer will frequently maintain that it is impossible to provide clearance for the standard floor at points where he would never have thought of other than the standard floor a few years ago, and where a slight adjustment in grade line will allow the deeper floor to be used. The shallow floor is of great advantage in certain places where limiting conditions are encountered, but is hardly justified under ordinary conditions where the deeper floor can be used with a slight readjustment of grades or additional expense for grading. This development of the shallow floor is, however, of considerable importance to bridge engineers and enables them frequently to meet conditions more satisfactorily than would be possible by any other type of construction.

Letters to the Editor.

A STATISTICIAN MISTAKE.

December 6, 1911.

To the Editor of the Railway Age Gazette:

Professor Ripley's article in your issue for December 1, 1911, furnishes a curious illustration of the persistence of error even in its crudest form. Professor Ripley says:

"For the year 1900 the increase in stock was more than two and a half times as great as the increase in funded debt; but, as the statistician of the Interstate Commerce Commission remarks, this can hardly be interpreted as a healthful tendency, since the increase in indebtedness alone exceeded the probable cost of railway construction during the year."

The foregoing is based upon the following which appeared in Professor Adams' report on Statistics of Railways in the United States for the year 1900:

". . . it is pertinent to notice that the increase of $457,080,062 in railway securities is synchronous with an increase in mileage of 4,051.12 miles. It can hardly be claimed that the issue of securities for the construction of this new mileage would exceed $120,000,000, which would leave an increase of $337,080,062 to be explained in some other manner. . . . It is a significant fact, and not entirely in harmony with the trend of previous years, that the increase in stock is more than two and a half times as great as the increase in funded indebtedness. Ordinarily this would be regarded as a helpful tendency, but this can hardly be so interpreted in the present instance, in view of the fact that the increase in bonded indebtedness alone is in excess of the probable cost of railway construction during the year." Thirteenth Annual Report on Statistics of Railways in the United States, p. 54.

The fact is that what Professor Adams criticized in the foregoing extract, and what Professor Ripley now follows him in condemning, never happened. Both have been led astray by the duplication in capitalization due to ownership of railway shares and bonds by railway corporations. The real increase in securities, outstanding as against the railway system as an whole, between 1899 and 1900, was $115,942,880, but during that year shares in other companies owned by railways increased $262,720,673, and bonds $78,416,509.

In the Yale Review for August, 1902, I commented upon this remarkable instance of a statistician falling into a pitfall of his own digging, as follows:

"When public opinion regards railway capitalization as excessive, as it undoubtedly does; when a widely prevalent prejudice conceives that this over-capitalization is the cause of high rates, and when not a few citizens honestly believe that the total par value of railway securities has been increased with the deliberate purpose of defrauding the shipping and traveling public and deceiving legislative bodies, the adoption by a federal statistical agency of a method which exaggerated the total capitalization existing on June 30, 1900, by more than one-fifth of the actual amount and has never failed to overstate it by at least 16 per cent., is a matter of no slight moment. That the danger lurking in the method adopted is not less than has been suggested is demonstrated by the fact, that although he had used substantially the same form of presentation for twelve [illegible] far misled as to make the fictitious increase in capitalization [illegible] the basis of an unfavorable criticism of current methods of railway [illegible] increase in actual capitalization was only 25.37 per cent. of that which was made the basis of the adverse comment. . . . [illegible] cancelled by the increase in the holdings of railway securities by railway corporations. The actual increase in capitalization amounted to $115,942,880, or less than the amount which the statistician suggested as a suitable addition on account of the 4051.12 miles of new construction." American Statistical Practice, I. The Interstate Commerce Commission, Yale Review, August, 1902, pp. 176-7.

Professor Ripley fell into the error which he now repeats when he wrote the report on railway transportation for the United States Industrial Commission (Report, Vol. XIX., p. 401) and I called attention to the needed correction in an article entitled "The Industrial Commission and the Railways," which appeared in the Political Science Quarterly for December, 1902.

In the Yale Review article already quoted herein I ventured to predict that the error due to this form of duplication would become so great that a more reasonable method of compilation would have to be adopted by the Interstate Commerce Commission. I then said, in part:

"If the tendencies that have recently been most prominent in the development of inter-corporate relations in the railway field are maintained, the present method of dealing with capitalization in the annual reports will sooner or later have to be abandoned, for until a better method is adopted the error will constantly increase in proportion." American Statistical Practice, I. The Interstate Commerce Commission, Yale Review, August, 1902, pp. 177-8.

Senator Zeb Vance used to tell of a scarecrow that was so hideous that it made the crows bring back all the corn they took during the year before it was erected. The commission has recently and partially corrected its refusal to allow for this sort of duplication of par values, but there seems to be no method of correcting the erroneous statements of the past or of putting an end to their calculation.

H. T. NEWCOMB.

"THE TRUTH ABOUT RAILWAY ACCIDENTS."

Chicago, December 13, 1911.

To the Editor of the Railway Age Gazette:

All railway men must feel indebted to the *Railway Age Gazette* for the article in its issue of December 8, page 1166, on "The Truth About Railway Accidents."

In the last paragraph you put your finger on the spot to which I have been trying to draw attention for several years when you said:

"The railway managers have been at fault in not promptly refuting the many misrepresentations regarding railway accidents and other matters that have been so generally made and widely disseminated."

Not only with respect to accidents, but with regard to other matters concerning which the public has been misinformed, railway managers have done but very little—nothing systematically—to set the people right. Even what they are doing today is in the form of a very scattering fire.

T. J. NORTON,
General Attorney, Atchison, Topeka & Santa Fe.

[illegible], December 11, 1911.

To the Editor of the Railway Age Gazette:

The article in your issue of December 8, "The Truth About Railway Accidents," prompts the writer to call attention to the manner in which some station platforms are constructed on double and four-track roads, viz., by placing one platform on the outside of one track where it logically belongs, but placing the other platforms between tracks without either increasing the track centers or providing suitable fence or railing to prevent one stepping in front of one train while getting out of the way of [illegible]. The location for a platform is laid enough when the edge of same does not extend more than 5 ft. from the center of the track, but it extends much farther when built up to the rail.

I presume this style of construction is put in on the assump-

tion that trains do not pass on adjacent tracks when people are getting on and off trains, but the fact is, as all who are observant can see for themselves, that trains frequently do pass, or if they do not actually pass each other right at the platform, it is often necessary for one to stand between trains in order to avoid missing the train he wishes to take.

For example: A northbound train which is scheduled to stop is approaching a station, and at the same time a southbound train is approaching which is not scheduled to stop. The southbound train is able to reach the station before the northbound actually stops, and consequently continues on its way at full speed, leaving the passenger to take his choice between standing on the narrow platform close to the moving train, or possibly missing his train entirely if the train he wishes to take does not choose to wait until the other train has passed.

While I do not know that the arrangement of the platform above described has been the cause of any large percentage of accidents, it does seem like a very dangerous arrangement and, with possibly few exceptions, entirely unnecessary. To the writer, platforms built *between and close* to the rails, look like an invitation to walk on the track, something which I believe we all will agree is undesirable any and everywhere.

RAILWAY SUPPLY MAN.

MOTOR CARS IN COLLISION.

Omaha, Neb., December 14, 1911.

To the Editor of the Railway Age Gazette:

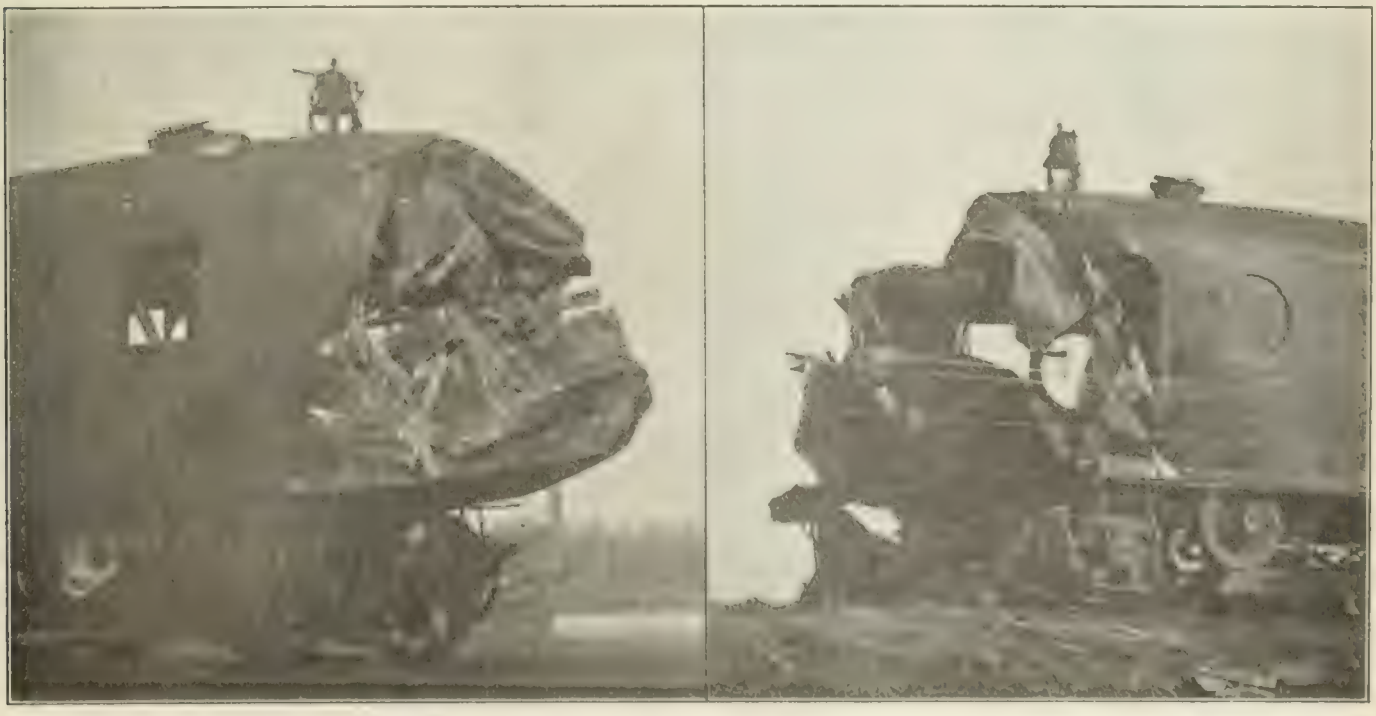
Two 70 ft. McKeen steel gasolene motor cars recently met in a head-on collision with the damage to the cars illustrated in photographs. The speed at the time of the accident, which occurred on a sharp curve, was between 75 and 85 miles per hour. There was no loss of human life, and while some of the passengers sustained slight bruises, none of them nor any member of the crew suffered a broken bone. Notwithstanding the terrific shock the cars did not telescope and suffered no damage except to the pointed front ends and adjacent supporting and bracing members. The gasolene engines were not damaged and not a wheel of either car was derailed. Beyond the point where the steel structure shows distortion or disfiguration the car framing and roof sheets are all in perfect condition.

The features of the McKeen motor car frame which produce a construction of extremely light weight with such tremendous strength are the wedge-shaped front end with the round rear end; the single center sill I-beam connecting the forward with the rear end of the car; the steel channel side sills, which are continuous around the entire car; and the depressed side sill in the middle of the car, which enables a combination plate and truss girder to be worked out of the side of the car. Thus the sides of the car are utilized for carrying the weight and assuming the major portion of the stresses in case of impact. The distance from the side sill to the plate gives a depth of girder of about 8½ ft., which could not be obtained except by the use of the round windows, which enables the diagonal braces to run up to the requisite height.

There are no posts in the car, but there are ribs and stays similar to those of a ship, the channel iron sections extending from one side of the sill upwards, forming the posts, carlins, and posts on the other side of the car, tying all together and in combination with both the side sills. The rigid rectangular brace in the center and over the body bolster at the end affords much strength in this style of construction. The rigid triangular braces connecting the depressed side sills with the center sill are also a unique and very efficient feature of the car design. Therefore, in a collision the car has the whole metal cross section brought into play resisting the shock. Not only the sills, but the side plates, the steel siding, the roof, and all other metal forming a part of the steel frame assumes its proportion of the burden, whether it be a shock incident to a collision, or to stresses incident to a heavy load.

W. R. McKEEN, JR.,
President, McKeen Motor Car Company.

According to the *Berliner Tageblatt*, Germany's new West African territory is to be linked up with its East African territory by a service of motor cars across the continent, passing through the Belgian Congo. The connecting of different districts by a service of motor cars has already been tried with encouraging success in the Belgian Congo. New roads will have to be cut through forest and hewn out of mountainous country. Branches will have to be built and a considerable amount of organization will be necessary before the scheme gets into working order. Already a number of German engineers and military officers are surveying the ground and studying the best route. The new territory referred to is that just ceded by France to Germany in settlement of the Morocco dispute.



Ends of Two Motor Cars Which Collided at High Speed.

TYPES OF SHALLOW FLOORS FOR RAILWAY BRIDGES.*

BY O. F. DALSTROM.

In railway bridges of the through type, designed for crossings where local conditions do not govern the depth of the floor system, that depth is determined by sections that give the greatest economy of material consistent with simplicity of construction and facility of erection.

THE SHALLOW TROUGH FLOOR BRIDGE.

The floor beam usually determines the depth of floor in designs of open floor through bridges, whether truss or plate girder type. The term "depth of floor" will be used throughout this discussion to indicate the distance from base of rail to lowest steel of span. If considerations governing the design of the trusses produce panels of considerable length, the stringers, instead of the floor beams, may determine the depth of floor. A single-track truss span of 350 to 400 ft., with trusses 18 ft. 6 in. or 19 ft. centers, may have panels over 30 ft. in length. In such a design the economical depth of the stringer would be about the same as that of the floor beam. In common practice the floor beam would still be made deeper than the stringer to obtain simple details of connection between these members.

But conditions of grade and requirements of clearance below the bridge may make it necessary, in a measure, to disregard economy of material and simplicity of construction and erection to obtain designs that will meet all the requirements in special cases. Difficult conditions of grade under clearance, necessitating extreme shallowness of floor, are frequently encountered in crossings over streets and over other railways; and the type best adapted to any particular crossing must be determined by a careful study of the local conditions.

A crossing over another railway usually requires that the grades be carried above the normal grade of the line, with a through bridge over the railway at the apex of the grades. If the approach grades are long and heavy, the slightest reduction in the depth of the floor of the bridge means an appreciable reduction in the cost of the approaches. And—what may be of greater significance than the reduction of the cost of bridge and approaches—it means the reduction of grades that would be costly and otherwise objectionable, or practically impossible, from the standpoint of operation, where local conditions determine the limit of running out of the grade.

The files of the bridge department of the C. & N. W. contain the plans of a large number of bridges that have been designed to meet extreme conditions of clearance grade and curvature. A few of these designs have been selected, with special reference to shallowness of floor, as typical. Fig. 1 shows the floor details in the design of a double track through truss bridge of 170 ft. span, in which the depth of floor is 1 ft. 11 in. This bridge is designed for Cooper's Class E-50 locomotive; or a concentration of 60,000 lb. on each of two axles spaced 6 ft. 0 in. center to center.

The floor is of trough construction, the troughs being placed [illegible] the bridge. Each trough carries a tie under each track, as shown in transverse section through troughs and floor beams in Fig. 1; the tie is supported at four points on horizontal angles riveted to the tops of diaphragms extending between the webs of the troughs. In every alternate trough, except those adjacent to the floor beam, special diphragms are provided near the ends of the ties. To these diaphragms the ties are anchored by bolts through the horizontal angles at [illegible] that the bolts will be about 4 in.—a convenient working distance—inside the guard rail. The horizontal legs of the angles [illegible] bolts accessible after the ties are put in place. The tie bolt [illegible] beams, as they would interfere with the driving of the field rivets [illegible]

*Presented, as designed, before the Engineers' Society of Minnesota, December 13, 1911.

The troughs (half-section, B-B), are carried by longitudinal girders which are parallel to the trusses, and placed at a sufficient distance from the lower chord to permit ready inspection of the chord and girder. The longitudinal girders are carried by the floor beams (half-section A-A), which are designed to receive the entire panel load and transmit it to the truss.

The troughs are designed to carry a concentration of 60,000 lb. on each track, each concentration distributed over two ties. This gives a load of 30,000 lb. on each of the two ties carried by the trough, or 60,000 lb. carried by the trough. The floor beam is designed to carry the load from the intermediate troughs, concentrated at the bearings of the longitudinal girders, 2 ft. 1 in. from the center lines of the trusses; and, in addition, to carry its part of the load on the ties in the adjacent troughs.

The heavy load carried by the floor beam, together with its greater length, requires in this member a section considerably heavier than that of the troughs. The depth back to back of angles is made the same in the floor beam and troughs, but the addition of flange material required to give the necessary section modulus in the floor beam, makes the extreme depth of this member somewhat greater than that of the trough sections. This extreme depth of floor beam determines the depth of floor for this type of bridge. By flattening the rivets under the rail and allowing a clearance of 1 in. from the base of rail to the tops of the flattened rivet heads, a satisfactory section is worked out with a depth of floor of 1 ft. 11 in.

It will be noted that the material in the floor beam and trough sections is not disposed symmetrically with reference to a horizontal line at the middle of the section. In order to obtain the most effective distribution of material, the neutral axis is maintained at the middle of the section. The metal is increased on the tension or lower side to make up for the reduction of section by rivet holes, no allowance for reduction of section by rivet holes being necessary on the compression or upper side of the section.

The depth of the longitudinal girders is made considerably greater than economic considerations require for the section. This is done to obtain a good detail at the end bearing and at the connection to the floor beam.

The top flange of this girder is unsymmetrical, being composed of a plate and an angle, the angle placed with its face against the web, the horizontal leg projecting over the top of the web and outward from the track. This detail of the top flange is to gain an additional horizontal clearance, as at this point the structure approaches nearer to the clearance diagram than at any other place except at the end post, where the edge of the cover plate is coincident with the extreme vertical line of the clearance diagram. An advantage in erection is also obtained by this detail of top flange section, as it permits setting the trough sections in place on the bottom flanges of the girders, with only a very slight displacement of the girders from their permanent position.

To further facilitate erection of the troughs, the stiffeners are omitted from the inner side of the longitudinal girder. The end connection angles of the troughs, which are field riveted to the web of the girders, are placed high enough so that the tie bolt diaphragms near the ends of the troughs will not interfere with the driving of the field rivets at the ends of the troughs in which the tie bolt diaphragms occur.

The troughs are drained through 1 in. gas pipes fitted into holes in their bottoms and projecting slightly below the trough to form a drip. The projection of the drain pipes must not extend below the line of low steel determined by the rivet heads on the under side of the extreme cover plate of the bottom of the floor beam. The upper ends of the drain pipes are threaded into washers to hold them in place. The lower part of the troughs is filled with asphalt mastic, the surface sloping toward the drain pipes and flashed over the washers at the upper ends of the pipes. A layer of broken stone covered with gravel is spread over the mastic for a protection.

The deflection of the floor under a maximum load is con-

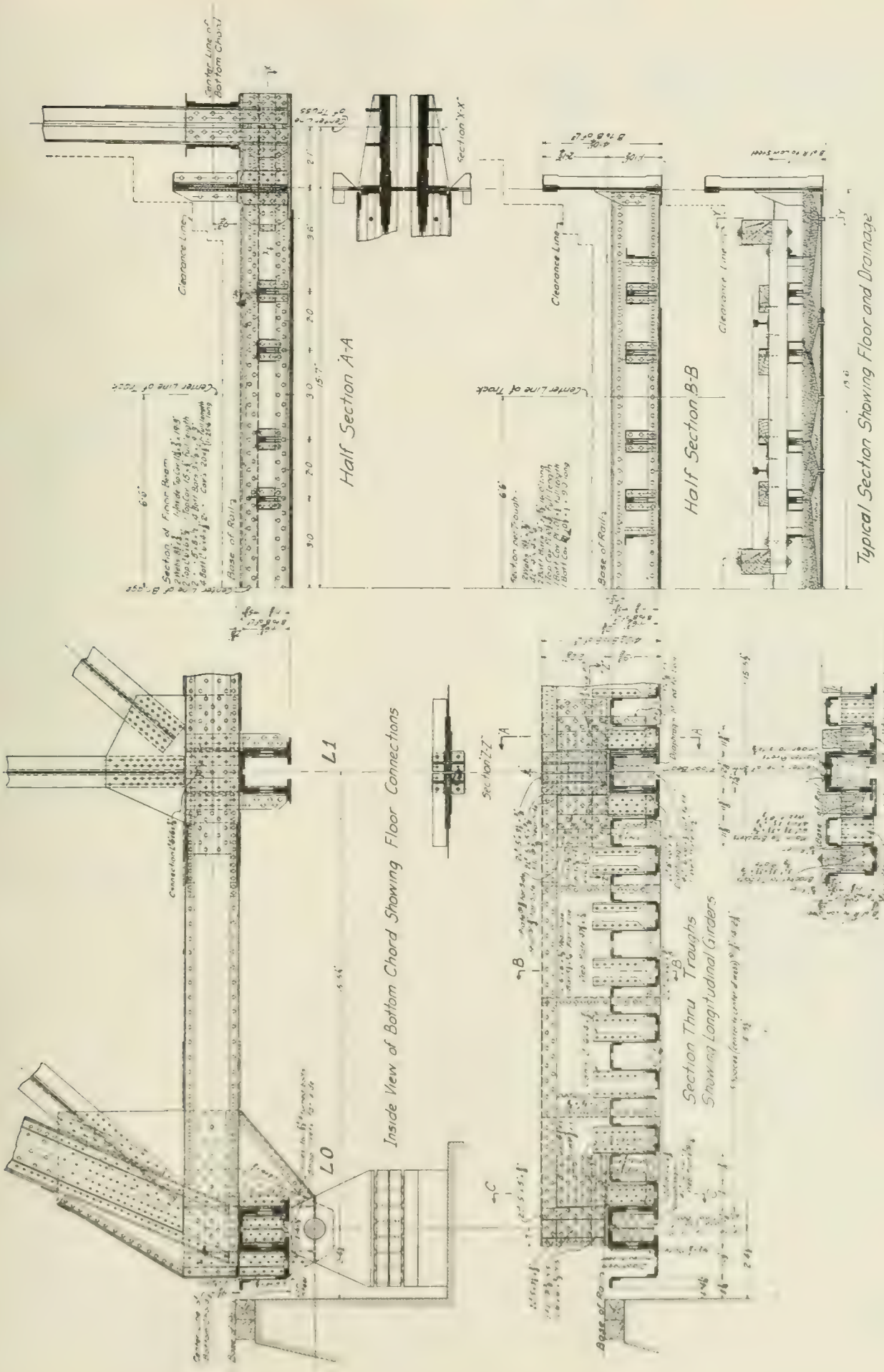

Half Section A-A
Half Section B-B
Typical Section Showing Floor and Drainage
Inside View of Bottom Chord Showing Floor Connections
Section Thru Troughs Showing Longitudinal Girders
Transverse Section Thru Troughs and Floor Beam Near Center Line of Bridge
Center Line of Track
Clearance Line
Base of Rails
Section X-X
Section Z-Z
L1
L0

Fig. 1—General Details of Shallow Trough Bridge Floor.

siderably greater than that of floors designed for depths determined by economical sections. Under maximum load the theoretical deflection at the center of the floor beam is 0.65 in. The erection of truss bridges of the open trough floor type requires a special order of work in riveting, owing to the longitudinal girders being located so close to the trusses. After the girders have been placed in position, no riveting can be done on the inside of the lower chord opposite the girder. On this account all riveting in the trusses below the level of the tops of the girders must be done before the girders go into place, which means that all lower chord splices, floor beam connections to trusses, and web member connections to gusset plates, up to the level of the tops of the girders, must be riveted before placing girders and trough sections. There is no interference from the girder in driving the rivets on the outside of the truss, but these rivets, up to the level of the tops of the girders, should be driven at the same time that the riveting on the opposite side of the truss is done.

In the development of this type of shallow floor for double track bridges, the first efforts were directed toward obtaining an open floor design, with stringers beneath the track, transmitting the load directly to the floor beam. The excessive bending moment in the floor beam, resulting from this arrangement, made it impracticable to design a floor beam that would come within the required limits of depth of floor.

Following this, a trough floor type was designed, differing from the one shown on Fig. 1 in that it had no longitudinal girders to carry the troughs. Instead, the troughs were extended to the trusses and connected to the bottom chord in the same manner that the floor beam in Fig. 1 is connected to the chord at the panel point. The bottom chord was designed to act as a girder, to carry the panel loads to the panel points. This design brought the depth of floor within the required limits, but made the troughs excessively heavy. The bottom chord was necessarily made deep and heavy, since it had to act as a beam for the floor troughs at the same time that it was doing duty as a tension member in the truss.

The next step was the introduction of the longitudinal girder. This was placed as close to the track as the clearance diagram would permit, to reduce as far as possible the bending moment, and thereby the sections, of the floor troughs. The introduction of the longitudinal girder changed the bottom chord from a combined beam and tension member to a simple tension member, and elminated from it the objectionable secondary stresses produced by the vertical loads applied at the trough connections.

Below are given a few figures for the comparison of a 170 ft. double-track span of the above type, and a double-track span of the same length, with the usual open floor construction, in which the floor beam and stringer sections are determined by the economical depth.

	Trough Floor Type.	Deep Floor Type.
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

[illegible] rapidly. At 2 ft. 4¼ in. depth, the weight is 4,100-lb. per lineal [illegible] sponding decrease in weight until the minimum thickness of material in sections is reached.

[illegible] erecting would be about the same for both types. The number of field rivets per ton is somewhat less in the shallow floor type than in the other type; but an allowance, for which no figures are at present available, must be made for the order of procedure in riveting, which requires that part of the riveting be done before all the material in the bridge is assembled, and for the additional falsework and blocking that are necessary under the floor system to provide for the uninterrupted movement of the trains.

The comparison of costs of the two types erected would show about the same relation as that of the costs of fabrication.

The range of application of floors of this type in double-track truss bridges would cover depths of floor of about 3 ft. and under, if the panel lengths do not exceed 15 ft. With a depth of floor over 3 ft. an open floor bridge is practicable and would be more economical.

For double-track through girder bridges, where panel lengths can be varied as desired, the application would be limited to about 2 ft. 6 in. depth of floor.

THE SHALLOW OPEN FLOOR BRIDGE.

A design of open floor, double-track bridge, with 1 ft. 6 in. depth of floor is shown in Fig. 2. This is the plan of a bridge erected near Mapleton, Wis., on the new line of the M. S. & N. W. The design shown is for a double-track bridge, but the type is applicable to crossings with any number of tracks at the standard distance of 13 ft. centers. The limitation of this type of bridges is in the direction of span lengths, being suitable only for spans of less than 40 ft.

The relation of the clearance diagram to the girders shows that in the longer spans the girders and not the floor beams or stringers determine the depth of floor. The section of the middle girder, which carries load from both tracks, is exceptionally heavy, while that of the floor beams have no shapes over ⅝ in. thick. In shorter spans, 20 to 25 ft., it would be possible to make a shallower girder and reduce the depth of the floor beam so that the depth of the floor would be about 1 ft. 3 in. At that depth the stringer would be so shallow that any further attempt to reduce the depth of floor would result in stringers so shallow and short, and floor beams so close together, that the floor would consist of floor beams connected by diaphragms acting as stringers. It would be approximating the type described above under the name of shallow trough floor bridges.

In spans of 15 ft. or less, the girders can be brought under the third offset of the clearance diagram, making the floor beams shorter and lighter. At this point the depth of floor would probably be determined by the stringer, and the floor beam would be designed in accordance with that depth.

THE RAIL GIRDER.

Fig. 3 is the plan of a girder designed to carry a track over a 4 ft. 6 in. clear span in places where there is not sufficient space for stringers and ties below the rail. Conditions requiring such designs are not uncommon in railway yards and in city streets, where pipes and conduits are laid close to the grade of the track.

This design consists essentially of an independent girder for each rail, built up of Z shapes and bars. Section E-E is a transverse section of the girder, showing the rail held in place by cast iron clips bolted to the webs of the Z's. The depth of floor is 3 in., using the term in the same sense as in the discussion of the [illegible]

In the design of the girder it is assumed that both rail and girder will be effective in resisting the bending under load. They will act as separate units, however. Both rail and girder will be deflected the same amount, but as they are of different sections, the stresses in the extreme fibers will not be the same, but will be proportionate to the distance of the extreme fiber from the neutral axis in each case. This distance in the girder is 3 in. In the rail shown it is 2⅞ in., or 0.96 of that of the girder.

[illegible] section modulus of the girder given below. Section E-E.

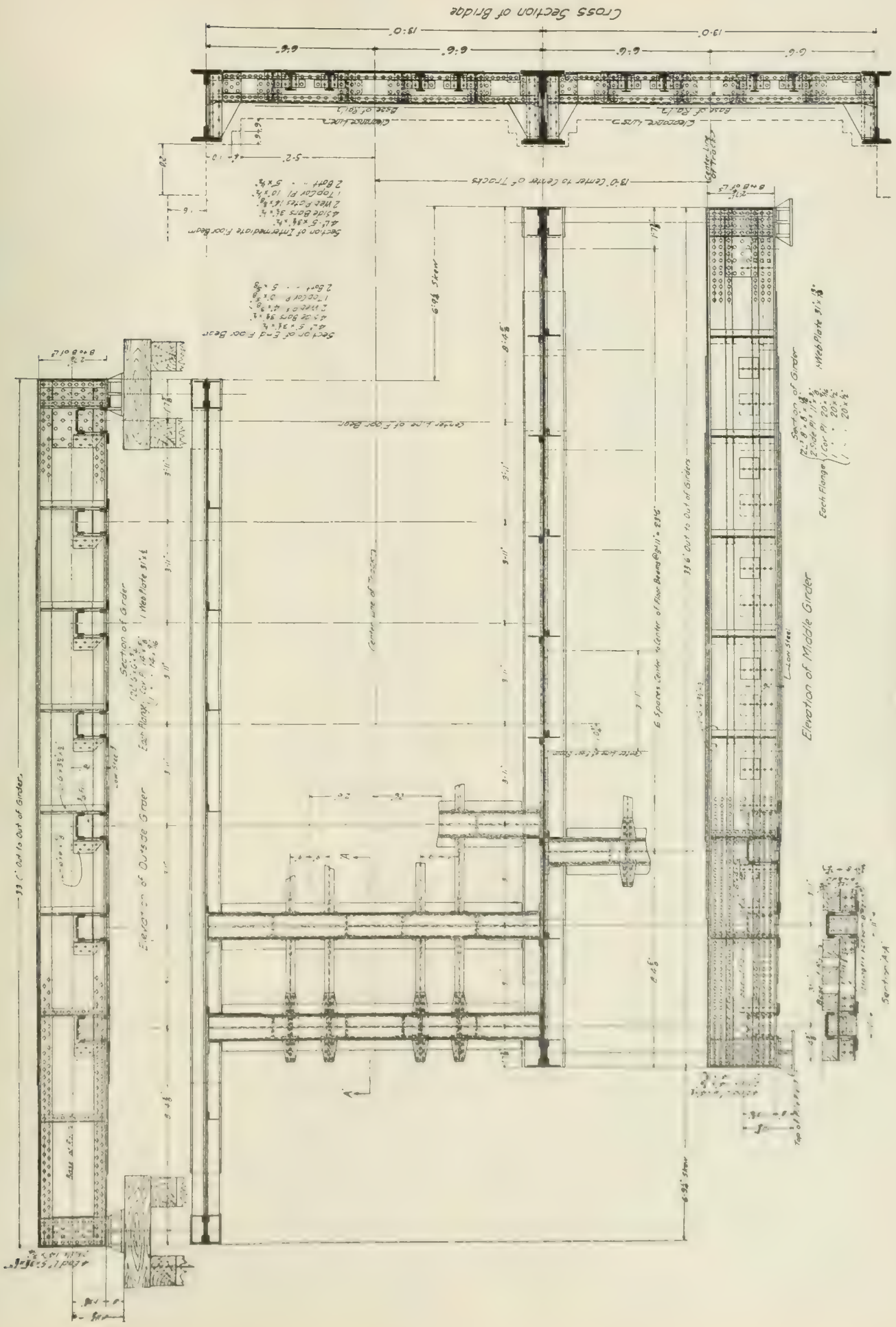

Cross Section of Bridge
Elevation of Middle Girder
Elevation of Outside Girder
Section of Girder
Section of End Floor Beam
Section of Intermediate Floor Beam
Section AA
Web Plate 91 x 3/8
Each Flange
Cover Pl. 20 x 1/2
Cover Pl. 20 x 1/2
Top Cover Pl. 10 x 1/2
2 Bott. - 5 x 5/8
Center Line of Track
Center Line of Floor Beam
Center Line of Girder
Base of Rail
Elevation of Rail
13'-0" Center to Center of Tracks
13'-0"
6'-6"
5'-2"
33'-0" Out to Out of Girders
33'-0" Out to Out of Girders
6 Spaces Center to Center of Floor Beams @ 13'-0"
Web Plate 91 x 3/8
Section of Girder
Each Flange
Cover Pl. 20 x 1/2
Cover Pl. 20 x 1/2
Top of Rail
Base of Rail
Elevation of Rail

Fig. 2—General Details of Shallow Open Bridge Floor.

is the actual section modulus of the net section of the girder. The "effective" section modulus given for the rail is 0.96 of the actual section modulus of the rail. The sum is the effective section modulus of girder and rail acting as separate units, and deflected the same amount.

Assuming a span of 5 ft. 0 in. center to center of bearing under maximum load of 30,000 lb. at the center of span, the bending moment at center of span is 900,000 in. lbs., counting dead load and impact equal to live load. This gives a maximum fiber stress of about 18,000 lb. in the girder.

Section E-E shows a 90-lb. A. S. C. E. rail section, on the

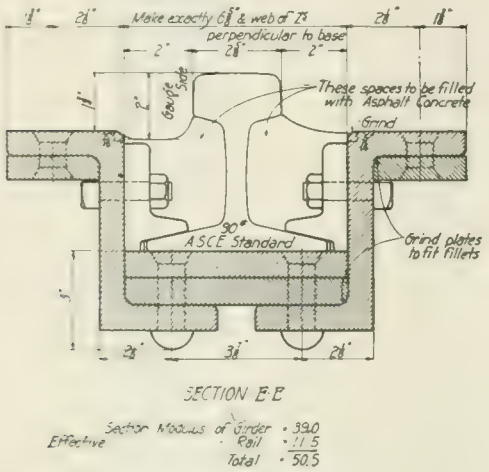

Make exactly 6" & web of I" perpendicular to base
These spaces to be filled with Asphalt Concrete
Grind
90# A.S.C.E. Standard
Grind plates to fit fillets
SECTION E-E
Effective Section Modulus of Girder 39.0
Rail 11.5
Total 50.5

Fig. 3—Details of Rail Girder for Shallow Bridge Floors.

girder. Any type of rail can be used with the girder by varying the details of the cast iron clips to conform to the section of the rail to be used. The space in the girder on each side of the rail is filled with asphalt mastic, to protect the steel and provide a run off for drainage.

The weight of a pair of girders of the section shown in section E-E is about 1,500 lb. The weight of a pair of the special section is practically the same as that of the standard section.

EXTENSION OF TRACK PANS ON THE PENNSYLVANIA.

The recent decision of the operating department of the Pennsylvania Railroad to use four engines instead of three on eastbound trains between Conemaugh, Pa., and Gallitzin has made it necessary to increase the length of the track pans in the two eastbound tracks at Wilmore from 1,800 ft. to 2,600 ft., and the work of extending these pans is now under way. This water station is located 11 miles east of Conemaugh and 12 miles west of the summit of the heavy grade against eastbound trains rising from Conemaugh. It is probably the largest individual water station in the country, as over 2,250,000 gallons of water are used there daily.

In this connection it is interesting to note the provision which it is necessary to make to allow locomotives to take water on this exceedingly busy four-track line. Two alternate plans are in use at different points on the part of the line in question. At some places track pans are provided so that the trains will take [illegible] be brought to a stop and supplied with water from standpipes. However, the stopping of a train on the main line long enough for four engines to take water from standpipes will ordinarily result in tying up several other trains behind it and soon blocking the line. For this reason when water is taken from standpipes it becomes necessary [illegible] such freight trains can head in and several trains take water at the same time. At Denholm on the Middle division and Thorndale on the Philadelphia division, both of which points are also coaling stations, such a plan has been adopted, twelve side tracks being provided, on which as many trains can take water at the same time.

OPPORTUNITIES FOR ECONOMY ON RAILWAYS.

BY L. C. FRITCH, C. E.*

II.

MATERIALS AND SUPPLIES.

The railways of the United States on June 30, 1909, according to the report of the Interstate Commerce Commission, had on hand material and supplies to the value of $206,849,619. The interest alone on this amount, at 5 per cent., is $10,342,481 per year. But this is not the only item represented in the cost of carrying this stock. There should be added depreciation at from 6 to 12 per cent., obsolescence, or loss from such causes as make the material unfit for use owing to changes in standards or materials, making necessary the disposition of such material at scrap values, and waste which affects many items of material and supplies.

Adding all these items together, the cost of carrying material and supplies on hand is variously estimated at from 20 to 25 per cent. Using the lower figure, the cost to the railways for carrying material and supplies on hand would be $41,369,924 a year.

The interesting question is: To what extent can economy be effected by reducing this annual cost?

Taking the entire mileage of roads, the average amount of materials and supplies per mile of line was $880. Does this represent the minimum amount of stock that it is practicable to carry on hand? To determine this question we must first establish what is a reasonable period for which supplies should be carried to meet practical requirements.

Measured by the annual expenditures for material and supplies, it is estimated that the amount carried on hand June 30, 1909, represented about four months', or 120 days', supply. There are some items of which a six months' supply is necessary, and others of which a thirty days' supply is sufficient. If, on the average, three months' supply is ample, then the present supply is 25 per cent. greater than is actually necessary.

On this basis the over-supply for the period named would be $51,712,405, which costs for carrying, on the above basis, $10,342,481.

There is great diversity in the amounts of material and supplies carried, as is shown by the following statement of a number of representative lines:

MATERIAL AND SUPPLIES ON HAND JUNE 30, 1909.

R[illegible] N	Mileage	Amount.	Per mile of road.	Ratio per mile to opt. expense per mile of trk. Per cent.
1	2,233	$4,043,817	$1,811	14
2	10,178	10,669,440	1,048	20
3	2,610	7,111,778	2,724	16
4	[illegible]	[illegible]	1,203	10
[illegible]	[illegible]	[illegible]	1,407	12
[illegible]	[illegible]	[illegible]	[illegible]	13
7	2,392	3,325,423	1,400	10
8	1,394	2,084,199	1,500	11
9	5,299	11,689,285	2,206	10
10	591	1,270,410	2,150	12
11	1,476	2,331,178	1,578	7
12	1,575	3,058,778	1,942	11
13	1,792	2,244,634	1,252	12
14	1,942	2,576,612	1,327	14
15	1,345	2,982,599	2,143	11
16	1,420	2,013,749	1,418	9
17	7,050	4,375,468	625	13
18	2,515	1,080,483	430	6
19	1,703	1,588,703	934	11
[illegible]	[illegible]	[illegible]	80	17
21	1,230	1,426,878	1,160	17
22	4,577	6,546,055	1,432	17
23	10,075	8,588,838	859	14
[illegible]	[illegible]	[illegible]	765	17
[illegible]	[illegible]	[illegible]	670	11
[illegible]	[illegible]	[illegible]	850	16
[illegible]	[illegible]	[illegible]	890	19
28	5,698	6,166,686	1,082	17
[illegible]	[illegible]	[illegible]	911	14
[illegible]	[illegible]	[illegible]	2,413	36
31	10,294	9,561,451	928	11
United States ...	235,402	206,849,619	880	13

By multiplying by two the percentage in the last column, which [illegible] the ratio there named between material on hand per mile of [illegible] Western correspondent American Railway [illegible] Mr. Fritch's first article in this series appeared [illegible] and dealt with fuel economy.

road and operating expenses per mile of road, the approximate fraction of a year's supply is derived. This is based on the general theory that about one-half the operating expenses cover material and one-half labor. Thus, taking a road which shows 17 per cent., the amount of material on hand is about four months' supply. The average for all roads is about three months' supply. The minimum is about one and one-half months and the maximum eight months. Therefore, it is assumed that any road showing a percentage over 12 is carrying a larger supply than roads generally find it necessary to carry.

One railway may show a large value of supplies carried per mile of road, but on account of large density of traffic and heavy operating expenses, may show a lower percentage and therefore a smaller comparative stock on hand. Thus the road showing the largest value of supplies carried per mile of road, $2,774, only shows a ratio of 13, or the average for all the roads in the United States, while another road having only $890 per mile of road, has a ratio of 19, the first road having 94 days' supply, while the last has 128 days', or 50 per cent. more.

Value of supplies carried per mile of road is not a fair criterion of the amount of material required to be carried. The volume of traffic, source of supply and many other factors enter into the problem.

However, where a large system with dense traffic is able to operate with a supply of $1,000 per mile and another system of equal mileage and traffic shows $2,000 per mile, it is safe to assume that the latter is overstocked and there is room to economize in this particular.

The reason for the wide variation in the practice of roads is largely that the store department on some lines is not organized in a way and conducted on lines that are commensurate with its importance. In order to keep supplies within proper limits the necessary statistics must be kept and checks applied daily to hold the various elements within reasonable bounds.

The writer believes that the best practice requires that the store department be kept entirely independent of the operating department, in order that it may properly exercise its authority over the stock without the prejudice and influence which subordination naturally involves. The officer in charge of the stores department should be the purchasing agent, who should report directly to the president, or an executive officer, and directly under the purchasing agent, the general storekeeper, whose duty it should be to supervise the ordering of supplies on duly authorized requisitions, but whose constant aim should be to keep the stock at the minimum consistent with reasonable requirements. Division storekeepers should be responsible to the general storekeeper, as far as the maintenance of stocks is concerned, and to the operating officers as to its disbursement.

There is a tendency to always be on the safe side and order "enough and more" for good measure. The over-plus often represents waste or stock returned to be carried indefinitely and ultimately to find its way into the scrap pile.

One of the causes of over-ordering is the large amount of rush work on railways. It proceeds along these lines: A certain piece of work is contemplated. It must be done at once. Estimates and plans are hurriedly gotten out. Many items are mere guesses. From 10 to 15 per cent. is added to cover contingencies. The material is ordered in the same hasty manner.

Another familiar procedure is to plan a certain piece of work, estimates being carefully made and every detail being covered. The work is not decided on for some time. Then changes are made, altering the plans so carefully prepared. Suddenly an order comes that the work must be done at once. Rush plans and estimates are made and percentages added, and the result is that more material is bought than a careful management would have required.

Another cause of overstocking is the cutting down of requisitions. The blue pencil is responsible for more money wasted through over-supply than it has ever saved by cutting down requisitions. It does not take long for the average man to find out that requisitions are cut, with the inevitable result that orders are padded with the expectation of their being cut down. If they should then escape the blue pencil over-supply results.

If men were taught to order only what is reasonably required, and a check were kept on the quantity of supplies of each kind carried and a mark set beyond which supplies must not go, our material supply would be greatly reduced.

The question of quality of material is an important one and is often overlooked and price is permitted to be the governing consideration. "The best is always the cheapest," but rarely, if ever, is the cheapest the best. Many times a quality of material is used where a much lower grade would answer all requirements, but this question should be determined by the user and not by the purchaser of the material. Recently it was observed on an important railway that first-class treated ties were being used in side tracks where second-class untreated ties would answer every purpose at one-third the cost. Doubtless on some points on this same railway second-class untreated ties were used in important main lines. This is flagrant misuse of material, which is one of the evils practiced to an alarming extent.

The quality of material desired for specific purposes should be stated in plain terms in the specifications, no room being left for doubt in the minds of the purchasing officers. If it is possible to secure "something just as good" it should be substituted only after consultation with the officer who ordered the material. It will be found that those railways secure the best materials at the lowest cost which have well prepared specifications and which have an established system of inspection which insures getting the material ordered under the specifications. The railways which lack such system are apt to get the material rejected by other roads.

There is a distinct loss in the use of poor material in any work on railways. The cost of labor is steadily increasing; it forms a large proportion of the cost of work; and as the cost of applying poor material is as great as, if not greater, than that of applying first-class material, the saving made by buying inferior material is more than offset by the labor cost resulting from frequent renewals due to the poorer quality.

This principle finds so many applications in railway work that illustrations are unnecessary. One, however, may be mentioned. The renewal of ties is one of the largest items in maintenance of track. An order for several hundred thousand ties may be awarded to a low bidder on a margin of 1 or 2 cents per tie less than that quoted by a responsible firm. When the order is finally filled it will develop that ties of an inferior character are furnished, being undersized or old stock rejected by more rigid inspections, and the result is from one to three years' less life in track than would have been secured from the superior article which might have cost 2 cents per tie more. The inferior tie will probably have a life of six years, while the superior one would last eight or nine years, or nearly 50 per cent. longer. Cases of this kind are not mere suppositions, but are actually found in practice.

There is great abuse, or misuse, of material. When ordering, its purpose must be kept clearly in mind and all orders properly superintended by a competent authority. The system on many large roads is to have some clerk in the office of last resort censure the orders. He may be competent to pass upon quantity, and may arbitrarily reduce the amount ordered; but rarely is the quality made the subject of intelligent review. As much might be saved in intelligent review of quality as of quantity.

It should be a feature of every department organization that its orders should be faithfully and intelligently reviewed by a responsible head, and that strict economy should be practiced in the matter of quantity and quality of material ordered, its purpose being always considered as of first importance. Full and complete information is necessary on orders to enable purchasing officers to intelligently and economically discharge their duties.

One of the principal causes of large stocks of materials is the

lack of proper and reasonable standards regarding devices, methods and practices. A settled policy and well-established standards, which have been thoroughly tried out, reduce the stock to be carried. A road which lacks standards and a settled policy soon acquires a multiplicity of types of various kinds, which make necessary the carrying of large stocks to meet requirements of renewals and repairs.

Take, for illustration, repairs to locomotives. The cost of this item will be found to be greatest on roads having the greatest number of types of locomotives in use. There are on most roads from six to ten types or classes of locomotives in freight and passenger service, respectively, while the classes of services are at most three in passenger and three or four in freight service. In other words, there are as a rule about twice the number of types that are necessary under an established policy of reasonable standards.

The same remarks apply to freight cars; a multiplicity of types makes it necessary to carry large stocks of material for repairs and renewals.

Over-supply, or what may be termed over-insurance, is often resorted to, resulting in an economic waste. We must certainly provide for the future, but in how many instances do we provide for 100 per cent. insurance when 25 or 50 per cent. will answer? The investment made over and above actual requirements represents dead capital and brings no returns. We build 100,000-lb. capacity box cars and use them in handling merchandise with a lading of 10,000 to 12,000 lbs., when prudence would have dictated 60,000 to 80,000-lb. capacity cars as answering all requirements of the traffic handled. We limit bridges on lines of moderate traffic to carry maximum axle loads of 60,000 to 65,000 lbs., when 50,000 to 55,000-lb. loading would be good practice.

There can be no criticism offered against absolute safety, but when a certain point has been reached, an expenditure beyond that becomes extravagance. Good judgment consists in determining that point.

Proper supervision over the stock of material and supplies carried requires that statistics shall be kept in such a manner that tendencies to over-supply may be promptly detected and necessary remedies applied. Reports, to be made monthly by each department and by each division store keeper, and consolidated by divisions and finally for the system, are suggested below. These reports should be made through the auditor in order that they may be properly checked and represent accurately the amounts of material and supplies as shown on the balance sheets of the company:

MATERIAL AND SUPPLIES IN STOCK.

MAINTENANCE OF WAY MATERIALS.

Item.	*Value.*	*Day's Supply.*
[illegible]		
Building "		
Material in temporary tracks...		
[illegible]		
Paints, varnishes, etc.		
Manufactured material		
Articles in process of manufacture		

Item.	*Value.*	*Day's Supply.*
Fuel—coal		
" —wood		
" —oil		
Stationery		

MISCELLANEOUS DEPARTMENTS.

Ice		
Cafe car supplies		
Stationery		
Tools		
Merchandise		
General supplies		

Reports of the above nature, accurately and promptly rendered and faithfully reviewed by a competent authority, will tend to keep in check the material and supply account.

Another important element in the proper care of material stock is the keeping of proper inventories. Each department, sub-department, storeroom and shop should at all times have an inventory which should be kept posted up to date and should balance with the monthly material report above recommended. There should be an exchange of inventories between the storehouses and shops of the various divisions, and no supplies should be ordered that can be transferred from one department or division to another. The "Chinese walls" surrounding division storerooms and shops should be torn down, and an exchange of supplies freely made between various parts of the whole system. In this way stocks can be kept down to a minimum and often rush orders can be filled from other parts of the road.

The results secured on roads which have developed modern and scientific methods of handling the stores department are astonishing, and those roads which have given the matter the best attention show the lowest average stocks of material and supplies on hand.

The railways are the largest purchasers of supplies in our industrial life, consuming from $700,000,000 to $800,000,000 worth of material annually. An investment by any road of 1 per cent. of its material bills in proper supervision over its conservation will net a saving of nearly 10 per cent. We must surround this large expenditure with every reasonable safeguard and check; and results can only be secured through intelligent, constant and competent supervision.

FOREIGN RAILWAY NOTES.

The president of Nicaragua approved on August 5, 1911, the contract submitted by the representatives of the United Fruit Company for the construction of a railway from Bluefields Bluff north to the Cooringwar river, and passing on the west by the Lagunda de Perlas. The term of the concession is 85 years, after which time the railway is to become the property of the state.

The Argentine government will soon submit a project for selling the line built from Diamante to Curuzu Cuatia to the Entre Rios Railway. It is not improbable, therefore, that the government will hand over the concession to the Entre Rios Railway, with the condition that the company refund the amount already spent. The total cost of the line is estimated at about $10,000,000. The government believes that the line will be better managed in the hands of the Entre Rios Railway.

The extension of the Argentine North Eastern Railway from Santo Tome, Argentina, to Posadas, about 98 miles, was provisionally opened for traffic as far as Apostoles in August, 1910; and on May 1, 1911, as far as Posadas. On June 30, 1911, 1,200 men were at work, and embankments and cuts had almost been completed according to the plans. The floods of last May, however, have shown the necessity of heightening the embankments for a distance of 6 miles in the Pindapoy valley. This work is now under way. Already 97.7 miles of main line and 2.6 miles of siding have been laid. The line has been ballasted with stone or gravel for 30.6 miles and with earth for 31.8 miles. Nine bridges have been finished, and work on the two remaining ones across the Pindapoy and Pindapoy Chico is well advanced. The smaller bridges and culverts have been finished throughout a distance of 73 miles.

ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.

The winter meeting of the Association of Transportation and Car Accounting Officers was held at Louisville, Ky., December 12 and 13, with 100 members present, and President G. W. Taylor in the chair. Edmund F. Trabue, counsel for the Illinois Central and the Chicago, Indianapolis & Louisville, made an address emphasizing the value of the bureau method of administration of the demurrage rules.

The report of the executive committee indicates a membership operating 246,608 miles and having in service 2,443,894 cars. Changes were proposed in the constitution and by-laws to be finally passed on at the next meeting. The American Railway Association was requested to authorize the publication in the Official Railway Equipment Register of a complete list of private car companies that have accepted the assignment of reporting marks made under authority of the American Railway Association.

The association concurred in the opinion of the Committee on Car Service that it is not necessary to handle tank cars of railway ownership under instructions of the owner in manner similar to the method of handling tank cars of private ownership. In connection with the report of the Committee on Car Service a reference was made to the practice of certain roads putting embargoes on the movement of their cars to certain connections. This precipitated an interesting discussion in which many methods were advanced with a view to either protecting the car owner by the return of its cars, or by providing it with a number of cars equal to the number owned. The discussion culminated in the adoption of a resolution asking the co-operation of the American Railway Association in arranging a meeting of representatives of railways to make rules to govern handling of cars.

The recommendation of the committee with regard to a proposed change in Rule 7, code of per diem rules, requiring the short-routing to owner of cars of railway ownership that are in a condition "unsafe to load," at a reciprocal rate to be apportioned amongst the lines handling the car on its last movement from the rails of the owner, was returned to the committee for further consideration.

The association adopted for submission to the American Railway Association the proposed new rule, to be added to the per diem code, providing for the payment of per diem on new cars of railway ownership en route empty from builder to owner under filed tariffs, the same to be subject to reclaim. The association also adopted for submission to the American Railway Association the recommendation of the committee that Rule 8 of the code of per diem rules be eliminated from the code. The rule at present provides that the road holding a car awaiting the receipt of repair material from the owner may reclaim from the owner the per diem charges for the days accruing until receipt of material.

The committee reported the election of C. P. Dugan (Norfolk Southern) to fill the vacancy caused by the election of J. M. Daly to the second vice-presidency.

The Committee on Office Methods and Accounting reported that 235 private car owners have adopted reporting marks as assigned by the committee and are applying the same to their cars. The plan of the committee in this connection contemplates a separate and distinct set of marks for each private line of cars, for the purpose of preventing confusion in identifying ownership. The list was adopted for submission to the American Railway Association as a report of the progress being made by this association in accordance with resolution of the A. R. A. in May, 1910.

The association concurred in the opinion of the committee that it is unnecessary to issue junction cards showing both the receipt and the delivery of cars.

There was a long discussion on the self-transcribing system of interchange reports and train reports (such as that described in the *Railway Age Gazette*, December 8, page 1177). The matter was returned to the committee for further report.

The association concurred in the opinion of the committee that it is unnecessary at this time to recommend a change in form H, standard per diem summary sheet of the American Railway Association.

The Committee on Railroad Business Mail reported that the second assistant postmaster general had prohibited the carriage of letter mail by a railway acting as an intermediate carrier for other parties.

The Committee on Conducting Freight Transportation reported that in accordance with its recommendation in June, 1910, the Master Car Builders' Association has increased the rates for re-weighing and re-stenciling all cars other than stock cars to 75 cents a car and $1 a car for weighing and re-stenciling stock cars. The committee also reported that in accordance with its recommendation, the American Railway Association has modified Rule 3 (f), code of car service rules, by eliminating the words "and Per Diem." This rule provides for the short routing of empty cars under a reciprocal rate and has previously provided for the payment per diem as well as the reciprocal mileage rate by the road for which the service was performed.

The transportation rules for the handling of perishable freight presented by the committee were returned to it with the request that a circular embodying these rules be mailed to each member to afford all roads handling perishable freight an opportunity to make suggestions in connection therewith, such suggestions to be considered by the committee in preparation of a further report.

The committee advised that in accordance with its recommendation, the American Railway Association has adopted a resolution requiring that car door fastenings should be located normally 5 ft. above the top of the rail, but not less than 1 ft. above the floor of the car, this action to apply to all new cars put in service and whenever it is necessary to replace fastenings on old ones.

The association adopted the recommendation of the committee for submission to the American Railway Association, providing that the proper transportation officer of a line setting a car back to another road shall notify the proper transportation officer of the delivering road promptly of the car initial, number, date, time delivered and cause of "set back," to the end that each case may be investigated and a proper remedy applied.

The Committee on Conducting Passenger Transportation as a matter of information presented the results of operation of a passenger car propelled by electric power, generated by a storage battery in service on a branch line of light traffic, as follows:

The branch on which this car is used is 2.3 miles long, with a maximum grade of 1.78 per cent. Eighteen trains are operated between the hours of 6 a. m. and 6 p. m.

The car has single trucks and is equipped with Edison batteries (weight complete, including batteries, 13,000 lbs.), with seating capacity of 26 passengers.

The car is designed for a maximum speed of thirty miles per hour.

It was put in service April 24, 1911, since which time the schedule has been maintained without interruption, and no connections delayed.

It makes approximately forty-five miles a day; average maximum speed, 25 miles an hour.

The average cost of operation to date is as follows:

Cost of car complete, $6,550. Interest and depreciation estimated roughly at 20 per cent. per annum amounts to $1,310 per year, and it is estimated there will be a natural maintenance charge of about $300 for the first three years, after which it may be necessary to renew some of the battery elements; therefore it is estimated that the average charge per day for interest, depreciation and maintenance is approximately $4.68 per day, to which should be added the cost of train crew and power, i. e., $8.13; making a total daily cost, inclusive of maintenance, interest and depreciation, of $12.81, as compared to a daily cost of the steam service displaced of $42.68 (exclusive of maintenance, interest and depreciation). And more satisfactory service has been given.

One charging will run the car approximately 75 miles, and it takes about three hours to charge it, if charged at one charging. Electricity is being secured temporarily from a local trolley company at 4 cents per kw. hour. The trolley voltage to be available for car use is reduced by resistance grids, which is a satisfactory method where only one car is in service, but is not suitable for a number of cars on account of the resistance loss of energy. If conditions were such that power could be secured at proper voltage, the cost of current would be about 50 per cent. less than is included in the figures above presented.

This is in the nature of a preliminary report. The successful operation of the car under adverse weather conditions is yet to be demonstrated.

The committee also reported that it had been requested by

the American Railway Association to formulate a complete set of rules and blanks for the interchange of passenger equipment.

The Committee on Joint Interchange and Inspection Bureaus presented a thorough report covering the methods in use at the Union Stock Yards, Chicago, in connection with the joint inspection and interchange bureau in effect at that point. The committee also advised of the status of the inauguration of joint interchange and inspection bureaus at other points of the country where the matter is under advisement, viz., the entire Chicago switching district, Kansas City, Denver, Des Moines, Atlanta, Birmingham, Memphis, Peoria, Cincinnati and New England.

The next meeting of the association is to be held at the Hotel Champlain, Bluff Point, N. Y., June 25 and 26, 1912.

TERMINAL BRAKE TESTING.*

BY F. B. FARMER.

As we seek efficient train brakes and as the standard set by law is based on the train, it is obvious that terminal brake tests of trains must be made. Stated differently, the requirements can not be met by confining inspecting, testing and repairing to shops and repair tracks. Consideration of overtime and the sixteen-hour law, as well as expeditious train movement demand the minimum lapse of time between that for which the crew is called and the time the train departs. Hence, a train prepared for departure should require no more brake work after the engine is coupled than, at the most, stopping a few leaks in hose couplings and making the formal test. But often there are greater delays due to making other repairs, or the train proceeds with less efficient brakes than it should have. To avoid this, the repairs required must be determined with arriving trains. The incoming engineer should add to the reduction required for stopping enough to fully apply the brakes, and the brakeman should await his advice that this has been done before cutting off the engine. Car inspectors should be present to make an immediate examination and to bad order all defective brakes. Such repairs as ordinary brake pipe leaks, defective hose and wrong piston travel, which require little time, should be made, but cars requiring heavy brake repairs should be marked for the repair tracks.

Here is where judgment must be exercised, as perishable or other very important loads, as well as empties needed at once for such lading, must not be delayed. Neither should other less important cars be held in numbers far greater than the local force can repair in a day if such force is as great as the regular amount of work, including such repairs, would keep busy. The car foreman and the yard master should consult to adjust this, but when the former removes bad order marks without repairs having been made, he should fill out and apply an air brake defect card to better insure prompt repairs at the earliest practicable date. However, it does not follow that the repairing of defective brakes cannot be done without delay to cars which should go forward promptly. The Minneapolis, St. Paul & Sault Ste. Marie has largely solved this problem at an important terminal yard by assigning a short track in the yard for air brake repairs to such cars. With a few men and the necessary repair materials, such cars are often ready for the first train out, are never actually delayed, and few are allowed to go forward without repairs. This is but one detail of a very comprehensive scheme of improvement in freight brake maintenance effected by this road.

As one repair point on a large system cannot maintain all freight car brakes, it is obvious that each terminal should do its share, but this does not mean that other than the outgoing test should be made on through trains at the points with small facilities. A train well prepared will go for a long period without becoming defective, the [illegible] due to inadequate repairs. To reduce the cost of brake cleaning by leaving cylinders and auxiliary reservoirs loose on the car is to insure leaky pipes. The same result follows if the brake pipe and retaining valve pipe are not well secured. That most serious fault, brake cylinder leakage, will develop sooner than it should, sometimes immediately after the cleaning, unless a suitable lubricant is employed and packing leathers are replaced when a good inspection and a careful test would show that they should be. The practice often followed of cleaning and testing triple valves on the cars cannot insure good work. Neither is it common practice to test hose with soap suds while under maximum pressure and remove those found porous, or to examine the retaining valve weight and clean the case and small vent port. Until these and other details are given better attention in shops and on repair tracks, it will not be possible to effect the economy in time and money in terminal brake testing and the consequent repairs that will otherwise follow.

The M. C. B. requirement that cars in interchange must have retaining valves should imply the maintenance of this part and its pipe by the owning road. It is not sufficient to say that the mountain road may make needed repairs at the owners expense, as this means undue delay to traffic. However, inspections show that the average efficiency of brakes is otherwise much lower on the cars of level grade roads, a condition for which there is no warrant as that for the average mountain grade road is enough below 100 per cent. efficiency to justify making it the minimum.

That the regular terminal test of freight train brakes misses many of the defects which nullify the object sought in attaching air brakes, is conclusively demonstrated by the following: Within a few months competent parties made a test on several freight trains at the summit of a mountain grade, following a similar test by regular inspectors at the preceding division terminal, and out of which trains bound down this grade were supposed to leave with 100 per cent. efficient brakes, based on such test. The tests consisted of charging to 70 lbs., making a service reduction of 15 lbs. and rapidly examining for any brakes failing to apply or leaking off and incorrect piston travel. To show conclusively the oversights of the ordinary terminal brake test the infallible thermal brake test was made on each train at the foot of the grade. The customary plan was there followed of considering three cars with "warm" wheels equal to one with "normal" wheels; that is with a good brake. In addition to showing the results in percentage, they are given in "tons per good brake," derived by dividing the train tonnage by the number of good brakes.

The first train was a test train and had 2,501 tons. The other six were regular trains and ran from 2,252 to 2,367 tons, averaging 2,286 tons. Each train had a considerable percentage of foreign cars. No tests of or repairs to retaining valves were made.

Per Cent. Good Brakes by Test.		Tons per Good Brake by Test.		
Standing.	Thermal.	Standing.	Thermal.	Cars per Train.
[illegible]	68.8	42.6	59.5	61
91.0	75.0	45.0	54.6	56
100.0	60.0	40.7	67.6	58
98.1	53.7	42.5	77.6	54
98.1	52.8	43.8	81.5	53
[illegible]	53.5	41.7	75.0	56
[illegible]	67.2	40.[illegible]	61.2	55

The big returns from good brakes are mainly concealed, consisting of the more expeditious train movement they make possible and the avoidance of accidents, neither of which can ordinarily be shown in dollars and cents. Their observable expenses, consisting of initial cost, maintenance, flat and cracked wheels and delays to cars and trains for brake testing and repairs, are so readily seen and tabulated as to generally render even more obscure their great but intangible credit account. The pressing need is for a more accurate and practical appreciation of the fact that good brake maintenance is economy and for better directed efforts toward improved brake maintenance with a minimum increase in time and money spent. In this the active cooperation of the yard master and the superintendent will aid greatly. Too often their efforts are directed toward showing why trains cannot be held or switching done for brake work, rather than how to accomplish the desired results with the least delay to additional switching.

* [illegible] Air [illegible]

While there is no question concerning the imperative need of available air pressure in car shops and on repair tracks, it is debatable as to whether it pays to pipe yards. I believe that usually it does not. If locomotives have insufficient air compressor capacity to charge their trains without material delay, they are not prepared to handle the trains safely, economically and expeditiously between terminals. Following the plan of having the brake test on incoming trains, and subsequent disposition of cars with defective brakes, will leave little need for a yard air test plant. The only safe or available time for inspectors to work on cars in yards is for a limited period after the arrival of trains and again following attachment of the outgoing locomotive.

In seeking means for testing and repairing air brakes without loss of time in transit, extra switching, or danger to workmen the possibilities of the freight house tracks should always be investigated. Where the number of cars per day is considerable there is no doubt that the tracks should be supplied with compressed air and full advantage taken of this excellent opportunity for locating and remedying air brake defects. In line with this idea of conserving time and switching, it is recommended that all cars in shops or on repair tracks, and having cleaning dates over nine months old, should have their brakes cleaned and lubricated. Not only will the condition of the triple valve and brake cylinders fully warrant doing this work then, but it is improbable that such cars will again be so favorably located for many months, without causing delay and switching.

COMPARATIVE RAILWAY STATISTICS.*

INTRODUCTION.

As the service of the railways of a country is intimately related to the needs of the people of that country, the volume of traffic in large measure is determined at any given time by the aggregate of the population and its character. As the population may be dispersed over an extended region or concentrated in a small area, it is apparent that the extent of the railways and the characteristics of their service are related to the distribution of the population.

The serviceability of railways is to be viewed in the light of both supply and demand.

First, what is the proportion of miles of railway to the population and to the area over which that population is distributed; what are the facilities for moving traffic, the number and power of locomotives, the number and capacity of freight cars and of passenger cars?

Second, what use is made of the railways; what is the number of tons of freight they haul; what is the average number of ton miles handled per mile of line; what are the average ton miles in proportion to the population and in proportion to the area occupied by that population? What is the number of passengers they haul, what is the average number of passenger miles per mile of line, what are the passenger miles in proportion to the population and in proportion to the area occupied by that population?

A light is cast upon the economy of railway operation by the number of tons of freight hauled per freight train, and the number of passengers hauled per passenger train.

The pecuniary relation of the railways to the country they serve is revealed by their capitalization and their revenues.

The financial status of the railways is shown by the relation that their expenses for operation bear to their earnings, and by the relation of their net earnings to their capitalization.

As the population of a country increases its traffic increases, and therefore, other things equal, its railway facilities should increase. A series of comparisons indicating for certain intervals the increase in population, the increase in miles of railway and in facilities, the increase in freight traffic and in passenger traffic, may indicate roughly the growth in the industry and commerce of a country. The development of the financial status of the railways will also be indicated if this comparison include the changes in capitalization per mile and in revenues and expenses per mile.

In this bulletin an attempt is made to present for the important commercial countries the fundamental statistics which reveal the railway status, and to demonstrate thereby the comparative serviceability, physical efficiency and financial condition of the railways of these countries.

Although their areas are approximately equal, the geographical, racial, and political characteristics of the United States and of Europe are so different that a comparison of the railway facilities and railway service of the total areas would not be enlightening. The less advanced sections of the United States are naturally more prosperous and are making greater progress than the backward regions of Europe. The statistics of the whole United States are not fairly comparable with those of any of the more advanced countries of Europe because of the great difference in area, in diffusion of population, and in general development. That portion of the United States comprised in what the Interstate Commerce Commission designates as Group II, which consists approximately of the states of New York, Pennsylvania, New Jersey, Delaware and Maryland, is comparable as to area, population, and industrial and commercial development with the United Kingdom, with France, and with Prussia-Hesse, wherein are the more important railways of Germany. Therefore in this bulletin Group II is compared with each of these countries respectively and a comparison is incidentally afforded of each of these countries with the other. The comparison is also made to include the entire United States in order to show the relation, in the respects referred to, of the country as a whole to Group II and to the different foreign countries.

The latest data available for the United Kingdom and for Prussia-Hesse relate to the year 1909. For France there are no more recent returns than for 1908. These are used in the text in comparison with the data of other countries for 1909 in the belief that the results thereby obtained do not vary more than a negligible degree from those that would be secured were the French statistics for 1909 available. Because of a change in the practice of the Interstate Commerce Commission the figures throughout the bulletin that apply to the United States as a whole and to Group II are based upon returns which for the years 1900 and 1905 include those of switching and terminal companies, but, for the years 1908 and 1909 do not include those of switching and terminal companies.

It must be borne in mind that the industrial and commercial conditions of the United States and of these various countries of Europe widely differ, the channels of traffic are of different character, the volume of traffic is differently constituted and there is difference in the methods of keeping accounts. Therefore there can be no exact and absolute comparison. However, for such items as have been discussed, it is not thought that the variance from exact comparability impairs the essential accuracy of the broad and general deductions. Where close comparisons are impossible, the fact has been stated.

The statistics which appear in this bulletin were obtained from the annual reports on Statistics of Railways of the Interstate Commerce Commission, the annual compilations of the returns of the railways of the United Kingdom to the Board of Trade, the annual railway reports of the French Minister of Public Works, the voluminous abstracts of official railway returns published from time to time in the Archiv für Eisenbahnwesen, and the annual reports of the Prussian Minister of Public Works. The unit of weight is the short ton of 2,000 lbs. The compilations based upon these statistics were made by the statistical department of the Bureau of Railway Economics.

RAILWAY MILEAGE IN PROPORTION TO POPULATION AND TO AREA.

Population per square mile	In 1909	Compared with 1900
Group II.	181.8 persons	increased 21.4 per cent.
United Kingdom	370.8 "	increased 9.4 "
France	189.6 "	decreased 1.4 "
Prussia-Hesse	297.0 "	increased 14.8 "
United States	30.4 "	increased 18.9 "

The number of miles of line in a given region indicates how

*From Bulletin No. 24, Bureau Railway Economics

extensively, and the number of miles of track how intensively, it is supplied with railways.

In the comparisons of "mile of track" only main tracks are used, siding and yard tracks being excluded.

Miles of line.	In 1909.	Compared with 1900.
Group II	23,887	increased 10.0 per cent.
United Kingdom	23,280	increased 6.5 "
France	24,931	increased 5.5 "
Prussia-Hesse	23,154	increased 21.2 "
United States	235,402	increased 22.3 "

Miles of track	In 1909.	Compared with 1900.
Group II	33,558	increased 15.4 per cent.
United Kingdom	39,622	increased 10.7 "
France *a*	35,650	increased 5.9 "
Prussia-Hesse	33,133	increased 23.1 "
United States	259,975	increased 25.8 "

a First and second tracks.

Miles of line per 10,000 inhabitants.	In 1909.	Compared with 1900.
Group II	12.18	*decreased* 9.4 per cent.
United Kingdom	5.17	*decreased* 2.6 "
France	6.35	increased 4.4 "
Prussia-Hesse	5.67	increased 5.6 "
United States	26.05	increased 2.8 "

Miles of track per 10,000 inhabitants.	In 1909.	Compared with 1900
Group II	17.11	*decreased* 4.9 per cent.
United Kingdom	8.80	increased 1.1 "
France	9.08	increased 5.0 "
Prussia-Hesse	8.11	increased 7.3 "
United States	28.77	increased 5.8 "

Miles of line per 100 square miles.	In 1909.	Compared with 1900.
Group II	22.14	increased 10.0 per cent.
United Kingdom	19.18	increased 6.5 "
France	12.04	increased 4.1 "
Prussia-Hesse	16.83	increased 21.2 "
United States	7.93	increased 22.3 "

Miles of track per 100 square miles.	In 1909.	Compared with 1900.
Group II	31.11	increased 15.4 per cent.
United Kingdom	32.65	increased 10.7 "
France	17.22	increased 4.6 "
Prussia-Hesse	24.08	increased 23.1 "
United States	8.75	increased 25.8 "

Per cent. of line having two or more tracks.	In 1909.	Compared with 1900.
Group II	31.2 per cent.	27.0 per cent.
United Kingdom	55.8 "	55.6 "
France	43.0 "	42.3 "
Prussia-Hesse	42.3 "	40.5 "
United States	8.9 "	6.3 "

That one country has a greater or less number of miles of line or of track than another in proportion to population or to area cannot alone be taken as a criterion of the relative adequacy of the supply of railway facilities. In the aggregate of such facilities, the number and power of locomotives and number and capacity of cars are factors of no less importance than miles of track. The demand for transportation, and the efficiency with which railway facilities are utilized in meeting that demand, must also be considered in determining the adequacy of transportation service. It should be noted that while a greater ratio of railway mileage to population or to area ordinarily indicates greater responsiveness to transportation demands, it may not inconceivably signify a redundant and excessive supply of mileage.

MOTIVE POWER AND EQUIPMENT.

Locomotives per 1,000 miles of line.	In 1909.	Compared with 1900.
Group II	561	increased 24.9 per cent.
United Kingdom	980	increased 1.0 "
France	466	increased 8.4 "
Prussia-Hesse	838	increased 24.3 "
United States	243	increased 24.6 "

Tractive power, not number of locomotives, furnishes adequate data for comparison of motive power facility. It is obvious that a locomotive that can draw one thousand tons ought not to count the same in a comparison with the locomotive that can draw but 500 tons. Unfortunately, however, the average tractive power per locomotive or the aggregate tractive power of all locomotives is not ascertainable except for the United States. As the average freight trainload of Group II is over twice as great as that of Prussia-Hesse, it is conservative to estimate that the 561 locomotives per 1,000 miles of line of Group II are capable of greater service than the 838 of Prussia-Hesse, and that the increase of 24.9 per cent. in the number of locomotives in Group II, and of 24.6 per cent. in the United States as a whole, represents an increase in motive power capacity considerably greater than the increase of 24.3 per cent. in the number of locomotives in Prussia-Hesse. The conservatism of this estimate is supported by the respective average capacity of freight cars and average number of tons per freight train, given in following paragraphs.

Cars of all kinds per 1,000 miles of line.	In 1909.	Compared with 1900.
Group II	22,388	increased 17.4 per cent.
United Kingdom	36,060	increased .9 "
France	14,704	increased 10.2 "
Prussia-Hesse	19,607	increased 19.1 "
United States	9,423	increased 25.1 "

In Group II, the increase in miles of line for 1909 over 1900 was 10 per cent. The ratio of increase in number of cars was three-fourths greater than the increase in miles of line.

In the United Kingdom the increase in miles of line was 6.5 per cent. The ratio of increase in the number of cars was one-seventh as great.

In France the miles of line increased 5.5 per cent. between 1900 and 1908. The ratio of increase in the number of cars was nearly twice as great.

In Prussia-Hesse the increase in miles of line between 1900 and 1909 was 21.2 per cent. The ratio of increase in the number of cars was nine-tenths as great.

In the United States as a whole the miles of line increased 22.3 per cent. and the number of cars in a greater ratio by one-tenth.

Passenger and freight cars per 1,000 miles of line in 1909.	Passenger cars.	Freight cars.
Group II	375	21,128
United Kingdom	2,270	32,020
France	1,159	*12,811
Prussia-Hesse	1,609	*17,530
United States	136	8,809

*Including cars in company's service.

The average seating capacity of passenger cars for Group II, for the United Kingdom, for France and for the United States is not ascertainable. The average for the passenger cars of the Pennsylvania Railroad in 1909 was 63, and for Prussia-Hesse 49. The average seating capacity for Group II is perhaps slightly lower than for the Pennsylvania Railroad, and that for the United States as a whole still lower. It is safe to estimate that the average seating capacity of the passenger cars of the United Kingdom and of France is lower than for the United States.

The average capacity of the freight cars of France in 1908 was 13 tons; of those of Prussia-Hesse in 1909, 15.5 tons, and of those of the United States, 35 tons. There are very few, if any, freight cars in England as large as those of the United States, the freight of that country being carried in "waggons" or "trucks" holding from 4 to 8 tons each. The measure of the total freight car capacity of the respective countries is afforded by the following table:

	Total number of freight cars.	Aggregate capacity of freight cars. tons.	Freight car capacity per 10,000 inhabitants.
United States	2,071,338	73,137,546	8,093
United Kingdom	745,348	(Data not available)	
France	*319,788	4,159,565	1,059
Prussia-Hesse	*405,900	6,280,260	1,537

*Including cars in company's service.

For each inhabitant the United States provides seven and one-half times as much freight car capacity as France, and nearly five and one-half times as much as Prussia-Hesse.

It is true, however, that the canals and rivers are a large factor in the conveyance of freight in both France and Germany than they are in the United States. Such waterways carry about one-seventh of the total interior freight of Germany and about one-ninth of that of France. Therefore, the aggregate capacity of the interior watercraft should be considered in arriving at the aggregate capacity of the freight vehicles of these countries. The capacity of the inland waterway craft in France in 1907 was 4,234,794 tons, which, added to the capacity of the freight cars, gives an aggregate capacity of 8,394,359 tons, or 2,138 tons per 10,000 inhabitants. The capacity of the inland waterway craft of Germany in 1907 was 6,900,000 tons. This added

to the freight car capacity of Prussia-Hesse, gives an aggregate freight capacity of 13,180,260 tons, or 3,226 tons per 10,000 inhabitants. Therefore, it will be perceived that the freight car capacity per inhabitant of the United States is over three and three-fourths times as great as the combined capacity per inhabitant of the feright cars and boats of France, and over two and one-half times as great as the combined capacity per inhabitant of the freight cars and boats of Prussia-Hesse. The aggregate freight car capacity of the United Kingdom is not ascertainable.

The development in power of locomotives and capacity of freight cars in the United States is due to the great volume of long haul traffic.

THE UTILIZATION OF THE RAILWAYS.

Up to this point comparisons of the serviceability of railways have been based upon their facilities. Further light is thrown upon that serviceability by the extent to which these facilities are utilized. If railways readily move all of the traffic offered to them the statistics of utilization measure both the extent of the service and the demand for that service. It is widely known that there have been periods in the United States during the past decade when the railways were badly congested, when their facilities were not equal to the immediate demand. However, there is no data to show that all of the traffic offered was not moved sooner or later, and there is no means of ascertaining with approximate accuracy whether such a condition has existed in other countries. Therefore, the following comparisons measure the extent or rather the degree of intensity to which the railways have been utilized, and in the absence of qualifying information may be accepted as a measure of the demand upon them.

The performance of a railway is measured by several units. One of these is

The Train Mile.—This is constituted of the run of one train for the distance of one mile. The total number of miles run by one train counts as the total train miles for that train. The aggregate of the train miles of all trains for a given period constitutes the total number of train miles for that period. If on a railway fifty miles long, ten trains were run each day for the entire length, there would be five hundred train miles a day, or for the three hundred working days of the year a total of one hundred and fifty thousand train miles. If on a railway one hundred miles long five trains were run each day for the entire length, there would be five hundred train miles a day, or for the three hundred working days of the year a total of one hundred and fifty thousand train miles. As the aggregate train miles in these two illustrations are the same for the railway fifty miles long and for the railway one hundred miles long, it is obvious that the intensity of train performance cannot be gauged simply by train miles. If the total train miles be divided by the number of miles of line, the quotient indicates the average number of train miles run over each mile of road. In the case of the fifty-mile road the train miles per mile of line would be three thousand; in the case of the road one hundred miles long the train miles per mile of line would be fifteen hundred. An equivalent expression for train miles per mile of line is train density.

Every railway carries more or less freight for its own use and therefore without pay, and in some countries both freight and passengers are occasionally carried free on governmental or other account. As such gratuitous service does not increase the monetary receipts, it is ordinarily omitted from such statements as appear in this bulletin. Therefore, the term "revenue train miles per mile of line" indicates the train density of trains that have added to the earnings.

The following tables show the density for all trains and for freight trains and passenger trains separately:

Revenue train miles per mile of line.	In 1909.	Compared with 1900.
Group II	9,715	(Data not available)
United Kingdom	18,009	*decreased* 2.1 per cent.
France	9,317	increased 2.2 "
Prussia-Hesse	12,164	increased 19.7 "
United States	4,736	increased 2.6 "

Freight train miles per mile of line.	In 1909.	Compared with 1900.
Group II	4,930	*decreased* 5.3 per cent.
United Kingdom	6,607	*decreased* 19.8 "
France	3,203	*decreased* 3.8 "
Prussia-Hesse	4,594	increased 2.7 "
United States	2,417	*decreased* 5.5 "

Passenger train miles per mile of line.	In 1909.	Compared with 1900.
Group II	4,642	increased 11.2 per cent.
United Kingdom	11,332	increased 12.6 "
France	5,129	increased 6.9 "
Prussia-Hesse	7,570	increased 64.5 "
United States	2,150	increased 14.3 "

No difference how long a train may be or how many passengers or tons of freight it may carry, it counts a train mile for every mile it runs. Therefore, a decrease in the number of train miles does not necessarily indicate a decrease in traffic. It may indicate that a greater quantity of traffic is being carried per train, and therefore that the performance from the standpoint of the railway is more economical. Of late years the railways in many countries have given especial attention to attaining heavier loads per train.

Therefore, from the viewpoint of economical operation, the serviceability of a railway or of the railways of a country is to be judged by the "revenue train miles per mile of line" taken in connection with certain other units. One of these is:

Ton miles per mile of line.	In 1909.	Compared with 1900.
Group II	2,451,841	increased 29.0 per cent.
France	565,158	increased 18.0 "
Prussia-Hesse	1,069,743	increased 20.3 "
United States	953,986	increased 29.7 "

In Group II the density of freight traffic was nearly four and one-half times as great as in France, and over twice as great as in Prussia-Hesse. The fact that in Group II the increase of 29 per cent. in the density of freight traffic was accompanied by a decrease of 5.3 per cent. in the number of freight train miles per mile of line, and that the increase in freight density in France of 18 per cent. was accompanied by a decrease of 3.8 per cent. in freight train miles per mile of line indicates a greater intensive use of motive power and equipment in each of these countries; that is, other things equal, a greater economy in operation.

Another measure of this intensive utilization of motive power and equipment is shown by the

Average tons per freight train.	In 1909.	Compared with 1900.
Group II	479	increased 34.9 per cent.
France	177	increased 22.9 "
Prussia-Hesse	233	increased 42.9 "
United States	363	increased 34.0 "

The success of the efforts to economize in operation through heavier loading is indicated by the great increase in the average train load secured in each country. It is significant that this average train load in Group II is nearly two and three-fourths times as great as in France and over twice as great as in Prussia-Hesse. The more powerful locomotives and larger freight cars of the United States are a great factor in this efficiency.

It will be perceived that in each country which shows a decrease in the freight train miles per mile of line the decrease has been accompanied by an increase in the average tons per freight train and the average ton miles per mile of line; that is, in each of these countries a greater freight traffic has been moved with fewer freight trains.

An index to the volume of commerce in proportion to population is afforded by the

Average ton miles per inhabitant.	In 1909.	Compared with 1900.
Group II	2,950	increased 15.5 per cent.
France	359	increased 22.9 "
Prussia-Hesse	606	increased 24.7 "
United States	2,411	increased 30.0 "

For each inhabitant of Group II over eight times as many tons of freight are moved by rail as for each inhabitant of France and nearly five times as many as for each inhabitant of Prussia-Hesse.

The railways of the United States as a whole carry for each inhabitant nearly seven times as many ton miles as are carried for each inhabitant of France by its railways, and four times

as many as are carried for each inhabitant of Prussia-Hesse. This is all the more remarkable when it is reflected that the density of population in the United States is less than one-sixth of that in France and only about one-tenth of that in Prussia-Hesse.

A comparison of the passenger traffic may be made in the same manner as that of the freight; that is, with the use of analogous units.

Passenger miles per mile of line.	In 1909.	Compared with 1900.
Group II	290,023	increased 42.9 per cent.
France	398,984	increased 8.1 "
Prussia-Hesse	675,023	(Data not available)
United States	127,299	increased 52.8 per cent.

It will be perceived that in Group II and in the United States as a whole the increase in the passenger miles per mile of line was greater than the increase in the passenger train miles per mile of line. In France the increase in passenger density was slightly greater than the increase in passenger train density.

An explanation of the lower density of passenger traffic in Group II than in France or Prussia-Hesse is found in the fact that in proportion to population Group II has twice as many miles of line as France, and considerably more than twice as many miles of line as Prussia-Hesse. The significance of this is made manifest by a comparison of the

Passenger miles per inhabitant.	In 1909.	Compared with 1900.
Group II	347.5	increased 27.4 per cent.
France	253.7	increased 13.0 "
Prussia-Hesse	366.7	increased 49.8 "
United States	322.1	increased 52.7 "

The ratio is greater for Group II and for the United States than for France, and is only fractionally less for Group II than for Prussia-Hesse. In consideration of the greater ratio of passenger miles per inhabitant in Prussia-Hesse, there must not be overlooked the fact that the component parts of the great army of Germany are in frequent movement from one garrison to another and to and from the often recurring reviews and maneuvers. Moreover, the passenger traffic of the countries of Europe is constituted in no small measure by tourists from other countries, particularly from the United States, the passenger miles of this tourist traffic swelling the aggregate which is credited to the inhabitants of the respective countries.

That the number of passengers carried per train increases more rapidly in the United States than in either France or Prussia-Hesse is shown by a tabulation of the

Average passengers per train.	In 1909.	Compared with 1900.
Group II	60	increased 27.7 per cent.
France	65	increased 1.6 "
Prussia-Hesse	85	increased 6.3 "
United States	54	increased 31.7 "

The inability to take account of the ton mile and the passenger mile traffic of the United Kingdom is regretted. Such statistics are not compiled by any of the railways of Great Britain, except that the North Eastern Railway of England compiles freight statistics.

CAPITALIZATION, REVENUES AND EXPENSES.

The capitalization of the railways of the United States is the net capitalization per mile reported by the Interstate Commerce Commission. In arriving at this amount, the stocks and securities of one railway corporation that are held by another are excluded, because the stocks and securities so held are ordinarily covered by the capital issues of the holding company. This net capitalization is not ascertainable for Group II. There is probably little or no such duplication in the capital issues of the railways of foreign countries.

Capitalization per mile of line.	In 1909.	Compared with 1900.
United States	$69,189	(Data not available)
United Kingdom	74,266	increased 4.9 per cent.
France	33,201	increased 5.8 "
Prussia-Hesse	110,737	increased 1.9 "

It is noteworthy that the capitalization per mile of the railways of the United States is but little more than half that of the railways of Prussia-Hesse, considerably less than half that of the railways of France, and less than one-fourth that of the railways of the United Kingdom. The capitalization of the railways of England and Wales alone for 1909 was $328,761 per mile, over five times as great as that of the United States. In view of these figures it becomes clear, as stated by General Henry S. Haines, that the burden of proof that the railway system of the United States is not overcapitalized does not rest upon the railway corporations.

Operating revenues per mile of line.	In 1909.	Compared with 1900.
Group II	$22,021	increased 33.3 per cent.
United Kingdom	23,135	increased 5.1 "
France	13,406	increased 8.4 "
Prussia-Hesse	21,056	increased 20.7 "
United States	10,356	increased 34.1 "

These operating revenues for the different countries are not exactly comparable because they are not in all respects similarly constituted. In Prussia-Hesse, for example, certain receipts are included in revenues from operation that in the United States would be classified as "other income." These amount, however, to less than 3 per cent. of the total. However, the relative significance of these revenues cannot be fully appreciated without taking into account the volume of traffic. This factor is included in the comment upon the immediately succeeding tables.

Freight revenue per mile of line.	In 1909.	Compared with 1900.
Group II	$15,693	increased 32.4 per cent.
United Kingdom	12,433	increased 4.4 "
France	7,196	increased 8.2 "
Prussia-Hesse	13,580	increased 17.1 "
United States	7,184	increased 31.4 "

For Group II the freight revenues per mile of line are about 25 per cent. greater than for the United Kingdom.

For Group II the freight revenues per mile of line are over twice as great as for France. However, as already noted, the ton miles per mile of line are nearly four and one-half times as great, and the ton miles in proportion to population are over eight times as great.

For Group II the freight revenues per mile of line are one-sixth greater than for Prussia-Hesse. However, the ton miles per mile of line are over twice as great, and the ton miles in proportion to population nearly five times as great.

These comparisons would indicate that the average receipts per ton mile are lower in the United States than in either France or Prussia-Hesse, and this we find to be the case. For Group II the average receipts per ton per mile are .65 cents; that is, six and five-tenths mills; for France they are 1.21 cents, and for Prussia-Hesse 1.24 cents. The average receipts per ton mile for the one railway of England that compiles such statistics are 2.30 cents, but this includes collection and delivery of certain high-class traffic. Because of the varying transportation conditions in the countries compared, the average receipts per ton mile must not be accepted as an absolute proof of the relative height of freight rates in Europe and the United States.

A similar analysis of the passenger traffic and the passenger revenues shows a different condition.

Passenger revenues per mile of line.	In 1909.	Compared with 1900.
Group II	$4,884	increased 34.2 per cent.
United Kingdom	10,704	increased 5.9 "
France	4,418	increased 4.1 "
Prussia-Hesse	5,741	increased 24.3 "
United States	2,395	increased 42.5 "

For Group II the passenger revenues per mile of line are less than half of those of the United Kingdom. It should be noted, however, that the English returns of passenger revenues cover all passenger train traffic, and include receipts from baggage, mail, and the like.

For Group II the passenger revenues are about 10 per cent. greater per mile of line than for France. The passenger miles per mile of line are over one-third greater in France, while the passenger miles per inhabitant are only about two-thirds of those of Group II.

For Group II the passenger revenues per mile of line are about six-sevenths of those of Prussia-Hesse. The passenger miles per mile of line are less than one-half those of Prussia-Hesse and the passenger miles are about 5 per cent. less per inhabitant.

The average receipts per passenger mile in Group II are 1.7

cents; in France, 1.11 cents, and in Prussia-Hesse, .94 cents; in the United States as a whole, 1.93 cents.

Operating expenses per mile of line.	In 1909.	Compared with 1900.
Group II	$14,674	increased 38.0 per cent.
United Kingdom	14,833	increased 7.9 "
France	7,765	increased 15.6 "
Prussia-Hesse	14,527	increased 40.1 "
United States	6,851	increased 37.2 "

These operating expenses for the different countries are not exactly comparable because they are not in all respects similarly constituted. For example, in Prussia-Hesse rentals and certain other items are included in operating expenses that in the United States are charged to other accounts.

Although in the United Kingdom there were nearly twice as many train miles per mile of line as in Group II, the operating expenses per mile of line for Group II are only fractionally less.

Although the train miles per mile of line in France are virtually the same as in Group II, the operating expenses for Group II per mile of line are nearly twice as great.

The operating expenses per mile of line for Group II are substantially the same as for Prussia-Hesse, although the train miles per mile of line are a fifth less.

Net operating revenue per mile of line.	In 1909.	Compared with 1900.
Group II	$7,347	increased 25.0 per cent.
United Kingdom	8,302	increased .4 "
France	5,641	*decreased* .1 "
Prussia-Hesse	6,529	decreased 7.6 "
United States	3,505	increased 28.4 "

As the operating revenues and the operating expenses are not exactly comparable, it follows that the net operating revenues cannot be closely compared. The results in one country for one year are of course comparable with the results in the same country for another year.

In Group II the increase has been 25.0 per cent., while the ton miles per mile of line have increased 29 per cent. and the passenger miles per mile of line 42.9 per cent.

In France there has been a decrease of one-tenth of 1 per cent. in net revenue per mile, while the ton miles per mile of line have increased 18.0 per cent., and the passenger miles per mile of line 8.1 per cent.

In Prussia-Hesse there has been a decrease of 7.6 per cent. in net revenue per mile, while the ton miles have increased 20.3 per cent.

The revenue of the Argentine railways for 1910 was $304,697,548, but that for 1912 is estimated at $331,851,630. The expenditure for 1911 was estimated at $425,395,261, or $120,697,712 more than the estimated revenue. The expenditure for 1912 has been estimated at $379,238,540. The noticeable feature is that no new taxes are imposed and that the expenditure for public works has been reduced.

GASOLENE MOTOR CAR.

The Nevada Copper Belt Railway has recently received a type M-6 combination railway motor car from the Hall-Scott Motor Car Company of San Francisco, Cal. It is 55 ft. over the bumpers and will accommodate 70 passengers. The seats are wide enough to comfortably seat three passengers and still leave room for an aisle 18½ in. wide, the car being 10 ft. 3 in. in width. The car was given a severe test while being run from the works of the company at West Berkeley, Cal., to Mason, Nev., a distance of 337 miles. It traveled over the lines of the Southern Pacific, and had to make a long climb of 69 miles east of Sacramento, Cal., with a maximum grade of 3 per cent. and a minimum grade of 2 per cent. It did this in a satisfactory manner and would easily pick up on the grades to a speed of 15 to 20 miles an hour on the third speed. On the descent, however, the officials of the Southern Pacific not wishing to risk the car descending alone, ordered a freight engine to pilot it down to Truckee. From Truckee to Sparks, Nev., the run was made in fast time, the car attaining a speed as high as 55 miles per hour.

The gasolene consumption between Sacramento, Cal., and Sparks, Nev., over the mountain, was excessive, as the car had to run at a reduced speed and made frequent stops on account of meeting trains. One hundred gallons of gasolene were used from Oakland, Cal., to Sparks, which gave a rate of consumption of 1 gal. to every 2.3 miles. On the run from Oakland to Sacramento, and from Sparks to Mason, Nev., however, the car averaged a little better than 4 miles to a gallon. The car was taken almost directly from the shops, having had very little trying out and the only accident which occurred during the trip was due to one of the employees carelessly allowing the stem of an oil can to be caught in the magneto driving gears. This necessitated the motor being run under the other ignition system.

Gasolene Motor Car; Nevada Copper Belt.

The interior finish of the main passenger and smoking compartments is of Philippine mahogany; the ceilings are of sheet steel. The car is vestibuled at the rear end and is provided with two side doors. The engine is placed in the front part of the car, the baggage room being behind it. The passenger compartment is in the rear. The floor has a bottom course of fir and a top course of narrow maple. The car is lighted by storage batteries, which are charged by a generator direct connected to the gasolene engine. The air brake equipment consists of the Westinghouse automatic and straight air brakes of the A. M. M. type. The air compressor is driven directly from the engine and has two 4 in. x 4 in. cylinders; the pressure is maintained at 90 lbs.

The framing of the car is a combination of steel and wood. The trucks have a wheel base of 6 ft. 6 in. The axles are 5½ in. in diameter and have 4¼ in. x 8 in. journals, and 33-in. cast iron

chilled plate wheels. A 6-cylinder gasolene engine is used, which develops 150 h. p. at 600 r. p. m. It is placed above the floor, so that all its parts are accessible to the operator. It is of the four-cycle, water-cooled type, having its valves driven by individual rocker arms. The crank case is of the enclosed type and has

Passenger Compartment of Gasolene Motor Car.

three large doors on either side. The crank shaft is made of Lloyd stamped steel, the bearings being ⅜ in. in diameter. It is forged in one piece and machined to size. The connecting rods are of the same material, being connected to the piston by a hardened pin and bronze bushing. The oiling system is positive, the oil being pumped from the bottom of the crank case through

Engine Room of Gasolene Motor Car.

a sight feed to all the main bearings. The excess oil runs back through a strainer to the crank case.

The ignition system consists of an Atwater Kent unisparker connected to dry batteries, and also a Bosch magneto with connections to separate sets of Bosch plugs. The cooling water is circulated by a large centrifugal pump located in the engine room, which draws the water from a storage tank of large capacity. The radiators are carried underneath the car framing. The generator that charges the storage batteries is also used for starting the engine. The clutch is self-contained in the flywheel and is absolutely free when released, thus allowing the car to be started easily. The shaft that connects the motor to the rear truck is made in two sections; the first section is held in babbitted boxes underneath the framing, and the second is provided with a large toggle and slip joint, which allows the truck to move when rounding curves.

The transmission and driving mechanism is placed on the rear axle of the rear truck. The transmission provides 4 speeds in either direction without reversing the motor. The car is reversed by operating a single lever in the engine room, the same as on a locomotive. The gear changes are made with two levers arranged so that it is impossible to move one without having the other in the neutral position, which prevents any danger of meshing two gears at the same time. The transmission and the big bevel gears on the rear axle are machined from hand-forged steel and are hardened in bone dust and ground to size.

THE COMMERCE COMMISSION'S REPORT.

The annual report of the Interstate Commerce Commission to Congress calls attention to the greatly increased labor and authority devolving upon the commission from the amendment of the interstate commerce law of June 18, 1910, and describes the measures adopted by the commission to simplify and expedite the discharge of its duties. Decisions have been rendered in 507 formal proceedings and 145 have been dismissed on stipulation of both parties or on motion of the complainant, a total of 652 cases removed from the docket. During the year 881 formal complaints have been filed and 12 proceedings of inquiry instituted by the commission on its own motion. But the commission says that evidence in many cases pending has been taken and that the work of the commission is well in hand.

On the commission's special docket for cases in which there is no dispute as to the facts there have been filed 5,653 cases, an increase of 551 over the preceding year. Orders have been issued in 3,875 cases on this docket, an increase of 367; and reparation awarded in the total sum of $329,388, a decrease of $75,588 as compared with 1910. In addition there have been dismissed or otherwise closed 739 claims, a decrease of 624 under the preceding year.

The report discusses the application of the Mann-Elkins act to telegraph and telephone companies and makes the point that, [illegible] control over rates under the act depends chiefly upon the legal publication of rates and terms, the failure of the act specifically to require these companies to post their rates hampers the commission in any effort to regulate them. The commission says that changes in the act are necessary in order to [illegible] already applicable to telephone, telegraph and cable companies.

The commission expresses the opinion that no uniform freight classification can be permanently adopted without the force of law to require its adoption and maintenance. The commission recommends the passage of a law requiring the carriers to provide and put in force a uniform classification within a period of five years.

Of criminal prosecutions the commission says:

"Since December 1, 1910, 62 indictments for criminal violations of the act to regulate the commerce have been returned, many of which are against two or more defendants jointly. Of these, 39 are against carriers or carriers' agents, 26 against ship-

pers or passengers, and 7 against carriers and shippers jointly.

"During the past year 42 prosecutions have been concluded, in 16 of which the defendants pleaded guilty; in 13, juries rendered a verdict of guilty; in 3, juries rendered a verdict of not guilty; 6 cases were nol prossed; 2 were dismissed on motion of defendant, and 2 on demurrer. The penalties assessed ranged in amounts from $25 to $40.000, the aggregate being $214,225."

Previous to February 17, 1911, the day on which the fourth section of the act of 1910 became practically effective, 5,030 applications for relief from the effect of the long and short haul clause were filed and since that date 693 more have been added. Many of these applications the commission says are exceedingly voluminous and intricate, involving thousands of rates and many different situations. The only fourth section order "directed to a particular situation of much general significance" was that made on application of the transcontinental railways for leave to make higher rates on westbound traffic to intermediate territory than to Pacific coast terminals. Most of the applications are yet to be passed on, but cases have already been submitted or are in process of investigation which when decided will determine general principles by which the commission is to be guided. The subsequent disposal of the other applications will go rapidly. In defense of its decision in the Inter-Mountain cases, which has been reversed recently by the commerce court and is pending on appeal to the Supreme Court, the commission says in part:

"To justify their rates from coast to coast, the railways advance water competition, and to justify the same rates from interior points to Pacific coast points, they rely on market competition; under which they give lower rates from all the interior cities two-thirds of the way across the continent to the same coast cities than to inter-mountain points. This is the kind of discrimination the commission has attempted to minimize. . . .

"We have the frank admission of the railway managers that they have subsidized or bought some of the steamship lines, and terrorized others until they can make the boast that the effect of the sea has been 'neutralized.'

"A railway policy of rate-making must certainly be subject to limitations of the law, or else there is no law. To say that there is a long-and-short-haul section under which a carrier may not charge more for the shorter than for the longer haul, but that the railways may, to any extent they please, carry out a policy of blanketing the country for the benefit of the farther points and not the nearer points, is to say that a railway may, without restraint, effect a ruinous discrimination and give no justification save its own determination or whim. There can be no regulation of rates as to discrimination or preference under such an interpretation of the law.

"The commerce court intimates that the mistake of the commission is in having attempted to fix a relation of rates instead of establishing reasonable rates; but, as we have already pointed out, there is no way in which the discrimination found to exist in these tariffs can be prevented except by fixing a differential, since we have no power to establish an absolute rate or fix a minimum charge below which the carrier is not free to go.

"We feel strongly that water competition, even when the widest reasonable latitude is given to the effect of market competition, cannot by any possibility justify a higher rate from Omaha to Reno than from Omaha to San Francisco; from St. Paul to Spokane than from St. Paul to Seattle.

"Upon the other hand, it should be noted that the opening of the Panama Canal may so add to the intensity of this water competition as to call for some modification of the conclusion now reached.

"The fourth section prohibits, in general terms, the charging of more for the short than for the long haul, but provides that the commission may, upon application to it, relieve carriers from the obligation of this section by permitting the higher rate at the intermediate point. If this language were to be taken at its face value, this body would be invested with the arbitrary power of granting such relief in one case and denying it in another, although the two cases were practically identical. We have held, however, that it was not the intent of Congress to attempt to confer such arbitrary jurisdiction upon this commission, but that we must act, in passing upon these fourth-section applications, in view of the other section and provisions of the act to regulate commerce. It is our duty to inquire with respect to each application whether, if the carrier is allowed to make the higher charge at the intermediate point, it will result in rates which are unreasonable or unduly discriminatory.

"The section also authorizes the commission to prescribe the extent to which the carrier may be relieved from the rule of the section. We understand this to mean that if the commission reaches the conclusion that some higher charge might properly be imposed at the intermediate point, but that the present discrimination is too great, then it may fix the extent to which the rate at the short-distance point may exceed that at the long-distance point.

"In the opinion of the commerce court, if we find competitive conditions at the more distant point which do not obtain at the intermediate point we must grant the relief, and can only inquire whether the intermediate rate is reasonable. In the opinion of the commission we must go further, and must inquire, not only whether competitive conditions do exist at the more distant point, but also whether those conditions justify the discrimination against the intermediate point evidenced by the rates in force. If we find that those competitive conditions do exist, but do not justify a discrimination of the degree now in force, then it is our duty to prescribe the extent to which the discrimination may go, if at all.

"The commerce court refers to certain decisions of the Supreme Court of the United States, made under the act as it existed previous to the amendment of 1906, when the commission had no authority to prescribe a reasonable rate for the future, nor to determine the undueness of a particular discrimination, in support of its conclusion. It deduces from those decisions, apparently, the rule that where competition exists at the long-distance point the rate to that point can not be made the measure of a rate to the intermediate point.

"Manifestly, a compelled rate, to the extent that it is not voluntary, cannot with justice be made the measure of a reasonable rate.

"The commission desires to make plain at the outset that this principle has been fully recognized by it in passing upon applications under the amended section. Wherever the rate to the long-distance point is fixed and beyond the control of the applicant, we do not require the applicant to observe any relation between the long-distance and the intermediate rate; we have simply inquired whether the intermediate rate is reasonable.

"It sometimes happens, for example, that a state commission names a rate between two points within a state. A circuitous interstate line desires to meet this rate. Under these circumstances the commission recognizes the state rate as fixed, and if it finds that the other route is circuitous and that its intermediate rates are reasonable it permits the long line to meet the state rate without reference to its intermediate rates. If the state commission were to advance or to reduce its rate the interstate line might vary its own tariff between those points without any change whatever at the intermediate point.

"Passenger tariffs, are generally constructed upon a mileage basis. We have uniformly recognized the short line as the rate-making factor and have permitted the circuitous line to meet the rate of the short line without any reference to its intermediate points so long as the fare to those points was properly constructed.

"So, again, where a freight rate upon a particular commodity is made by a short interstate line we have permitted its circuitous competitor to meet the short-line rate without reference to its intermediate territory, provided it was clear that the short line did make the rate, that the long line simply met that rate, and

that its intermediate rates were apparently upon a proper basis. If the short line were in the future to reduce that rate the long line is allowed by the terms of our orders to meet that reduction without a corresponding reduction of intermediate territory.

"We refer to these illustrations for the purpose of making it perfectly plain that this commission has recognized from the first the injustice of making a rate over which the carrier has no control whatever the measure of its other rates, whether they be intermediate rates or whether they be upon other parts of its system. We have established a relation between these Pacific Coast terminal rates, and corresponding rates to interior territory because neither the terminal rate nor the interior rate is fixed by causes over which the carrier has no control, but both are, within certain limits, voluntary."

The commission expresses its dissatisfaction with the commerce court in part as follows:

"Out of 27 cases passed on by the commerce court, preliminary restraining orders or final decrees have been issued in favor of the railways in all but seven cases, and of these only three are of any magnitude. In saying that the court has ruled in favor of the railways, we do not mean that the ruling has been always adverse to the commission, but it has been adverse to the shippers' contention. For instance, the court decided in favor of the commission in the two Cincinnati rate cases. These were proceedings in which the shippers of Cincinnati sought to have the commission ordered to reopen a case and fix a lower scale of rates to Chattanooga than had been ordered, on the ground that the rates fixed by the commission were unreasonably high and had been based upon considerations which the commission should not have regarded, namely, competition from the East and the West. In these cases the court held that it had no right to review the findings of the commission.

"Again, in the Procter & Gamble case, involving the right of a carrier to impose demurrage on a private car standing on a private track, the commission was sustained, its view being that for which the railway also contended.

"In but three cases of any consequence where the commission and the shippers have been opposed to the railways, have the orders of the commission been sustained even temporarily by the refusal to grant a temporary restraining order. These cases were the Meeker case, the Salt Lake case and the Omaha lumber case."

The commission repeats the recommendations it made in its last previous report that government regulation of security issues be provided by law and that a valuation of the property of the railways be authorized.

General summary of monthly reports of revenues and expenses of steam roads

	Year ended June 30 1911	1910	Av. per mile of road operated. 1911.	1910.
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	$1,924,771,779	$7,932	$8,078
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Non transportation	27,909,581	26,944,043	114	112
[illegible]	[illegible]	[illegible]	11,788	11,636
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Maintenance way & structure	369,581,610	373,386,571	1,519	1,559
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Traffic	59,344,440	56,198,298	243	234
Transportation	1,000,603,053	931,062,770	4,112	3,887
General	74,046,630	68,767,531	304	287
Total, includ'g unclassified	1,935,511,581	1,846,702,779	7,957	7,711
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Outside operations	2,072,538	2,655,347	8	11
Total net operating revenue	885,341,355	942,632,183	3,639	3,936
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible] for government railway construction in Utah [illegible] for the completion of 19 branch railroads in the arid region [illegible] which $917,000 [illegible] work on 12 such roads as [illegible] is proposed to begin work during the year.

TRAIN ACCIDENTS IN NOVEMBER.[1]

Following is a list of the most notable train accidents that occurred on the railways of the United States in the month of November, 1911. This record is based on accounts published in local daily newspapers, except in the case of accidents of such magnitude that it seems proper to write to the railway manager for details or for confirmation.

Collisions.

Date.	Road.	Place.	Kind of Accident.	Kind of Train.	Kil'd.	Inj'd.
9.	Louisv. & N.	Brownsville.	rc.	P. & F.	2	0
9.	Western & A.	Dalton, Ga.	bc.	F. & F.	1	2
11.	Texas & Pac.	Rosa.	rc.	P. & F.	1	0
*13.	N. Y., C. & St. L.	Ashtabula.	rc.	F. & F.	2	1
15.	Ann Arbor	Cadillac,	bc.	P. & F.	0	12
*16.	Balt. & O.	Breese.	xc.	P. & F.	0	3
*16.	Nor. Pac.	Pipestone.	rc.	F. & F.	6	0
19.	Great Nor.	Rugby.	bc.	P. & F.	2	5
20.	Ills. Cent.	Logan.	bc.	P. & F.	2	15
21.	N. Y. Cent.	Syracuse.	xc.	P. & F.	2	7
23.	Tex. & Pac.	Shreveport.	xc.	P. & F.	0	9
24.	Southern	Scotland, Ga.	bc.	P. & F.	3	5
27.	Boston & A.	Chester.	rc.	F. & F.	1	0
30.	Erie C., C., C & St. L.	Marion.	xc.	P. & F.	3	1

Derailments.

Date.	Road.	Place.	Cause of derailmt.	Kind of Train.	Kil'd.	Inj'd.
*2.	Southern	Atlanta.	b. rail.	P.	2	9
2.	Seaboard A. L.	Merry Oaks.	unx.	P.	0	18
3.	Illinois Cent.	Clinton.	d. bridge.	F.	3	1
7.	St. Louis, I. M. & S.	Arcadia.	b. rail.	P.	1	2
9.	St. Louis & S. F.	Fort Scott.	boiler.	P.	2	0
13.	Southern	Greensboro.	unx.	P.	1	5
13.	Louisv. & N.	Murphy.	b. rail.	P.	0	7
17.	Penn.	Monmouth J.	.....	P.	2	0
21.	Midland Val.	Bixby.	unx.	P.	0	11
22.	N. Y. Cent.	Rhinebeck.	acc. obst.	F.	0	2
22.	Chi., R. I. & Tex.	Dallas.	unx.	P.	1	3
30.	Mo. Pacific	Carthage.	b. rail.	P.	0	7

The collision at Pipestone, Mont., on the 16th was between a train of empty passenger cars and a work train; and the six persons killed were a roadmaster, a section foreman, the conductor of the work train and three laborers riding in the caboose of the work train. The wreck took fire and four of the bodies of the victims were cremated. The collision is reported to have been due to a misundertsanding of flagging instructions between the work train conductor and his brakeman.

The derailment at Clinton, Ill., on the 3rd occurred on a pile trestle bridge which was temporarily supported on false work; and the engine and two freight cars fell to the ravine below. The engineman, one brakeman and a student fireman were killed. The trestle was being replaced by steel girders, resting on concrete piers, and the engine, moving at a speed of about four miles an hour, had just passed off the steel structure and had moved only about 30 ft. on the trestle.

The train derailed at Monmouth Junction, N. J., on the 17th was an express bound from Philadelphia to New York, and the derailment was due to excessive speed through a No. 8 crossover. The engineman and fireman were fatally scalded,, but no other person was seriously injured. The locomotive was overturned, but the cars (all of them of steel) remained upright, and it is said that no windows were broken, though the train was probably running at 45 miles an hour, when it entered the crossover. The engineman was a runner of 29 years' experience, and had been running passenger trains on this division 18 years. He had passed a caution and a home signal indicating that he was to take the crossover.

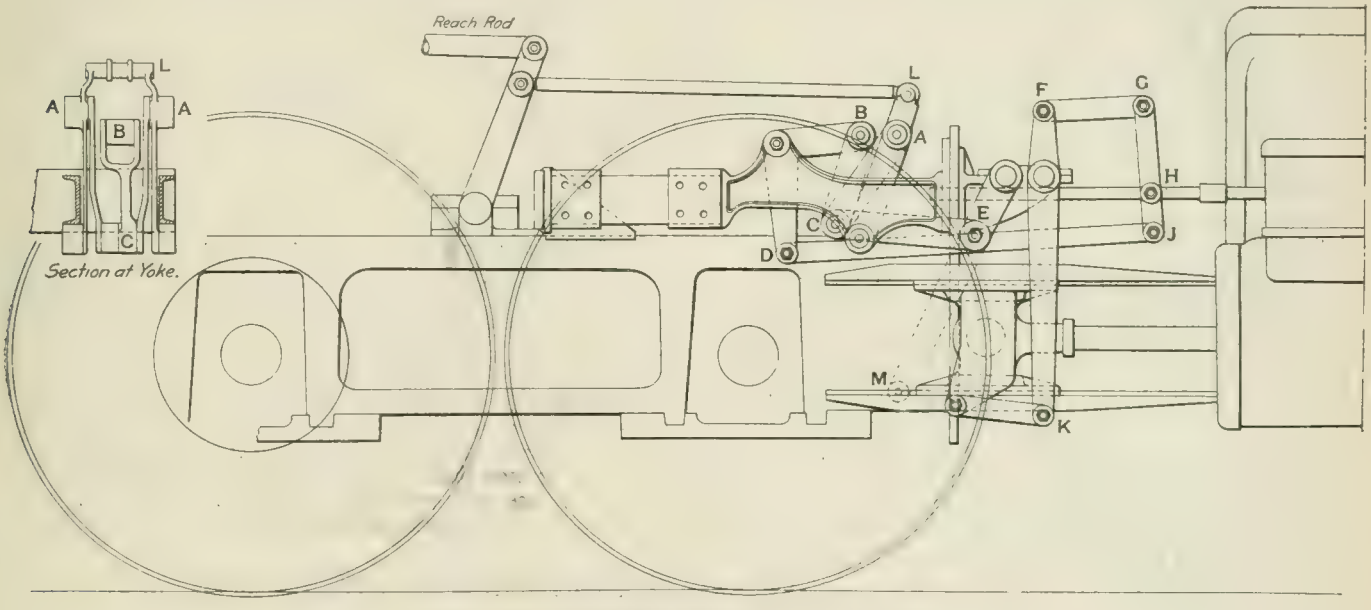
Electric Accidents.—Of the 13 accidents to electric cars reported in the newspapers as occurring in the United States in

[illegible] Other collisions——b. [illegible] unx. Unexplained. [illegible] Misplaced switch——acc. [illegible] Malicious obstruction of tracks, etc. [illegible] Cars burned while [illegible] Freight train [illegible] Wreck wholly or partly [illegible]

the month of November, two are reported as having resulted fatally; a runaway on a steep grade at Cincinnati, on the second, in which one passenger was killed and 20 were injured; and a collision at Winston-Salem, N. C., on the 13th, in which one passenger was killed and 14 were injured.

PILLIOD LOCOMOTIVE VALVE GEAR.

A new type of valve gear, known as style *B*, has been recently put on the market by the Pilliod Brothers Company, Toledo, Ohio, and is intended to replace all other styles of their gear. The general arrangement is shown in the accompanying illustration. The valve motion is obtained wholly from the crossheads. The combination lever is connected to the crosshead by a link and transmits the motion to the auxiliary combination lever by means of the link connecting points *F* and *G*. This motion controls the lap and the lead of the valve, the auxiliary combination lever being connected to the valve stem at *H*, as shown. The combination lever swings on a cross-shaft which extends through to the other side of the engine, operating the combination arm on that side. The combination arm in turn operates the motion



New Type of Pilliod Locomotive Valve Gear.

rod extending from point *E* to point *C*. This oscillates the radius yoke about point *A*, which raises and lowers the radius bar. This bar is connected at point *B* to the bell crank lever, which swings about its fixed center. The radius rod connects the points *D*, on the bell crank lever, to the point *J* at the bottom of the auxiliary combination lever. This rod gives the accelerated movement to the valve. Point *L* is connected to the reverse lever by the reach rod and its movement will cause the point *C* to move in various planes, which will control the cut-off of the valve. All parts of this valve gear, including the frames, and with the exception of the combination lever are standard for any type or class of engine, whether inside or outside admission. The men cannot make any changes in the gear, as there are no rods to lengthen or shorten; it can be applied in 48 hrs. without any modification of the engine, and requires only the ordinary engine house equipment for installation.

AN EARLY TONNAGE RATING SHEET.

The accompanying tonnage rating table was published in July, 1881, on what was then the Pittsburgh, Cincinnati & St. Louis Railway, running between Pittsburgh and Columbus, Ohio, now a part of the Pennsylvania Lines Southwest system. Previous to this time the engines were rated over the different grades on the basis of loaded cars, two empties being considered equal to one load. It soon developed that the many different kinds of loads made at times very light loading for the engines and at other times very heavy loading. To eliminate this difficulty this table was prepared, in which the different classes of loading were equated. For instance, if the rating of an engine was 40 cars, it would mean 40 cars of coal or coke. The equivalent in carloads of cattle would be 48, in double deck carloads of hogs 45, in single deck carloads of hogs 60, in double deck carloads of sheep 52, in single deck carloads of sheep 67, in eastbound merchandise 50 cars, in westbound merchandise, or what was then called "line" freight, 63 cars, and in empties 80 cars.

In making up the trains the yardmasters used this table to make a full trainload. If, for instance, the rating over the eastern end of the line was 20 loads, and a train had five cars of coal and 25 cars of westbound merchandise, it would be considered as equivalent to a trainload. An eastbound movement of 10 cars of grain and 25 cars of eastbound merchandise would make 30 loads, and so on through the table. The estimated weight of the car and its contents is shown at the top of the column, empty cars in those days averaging 18,500 lbs. each.

This is one of the earliest tonnage rating sheets made, and it would be interesting to learn if any one has any record approximating the tonnage rating of an earlier date. It is interesting to note that the general method of making up this sheet is very similar to that in use now, the principal difference being that the actual weights of the cars as loaded are now used in place of the assumed weights of this early table. Also no allowance seems to have been made in this rating for weather conditions, such as low temperatures and head or side winds.

TABLE OF TRAIN LOADS.

47,000 lbs. Coal, Coke, Rails and Grain.	39,500 lbs. Cattle or Horses.	41,500 lbs. D. D. Hogs.	31,300 lbs. S. D. Hogs.	36,000 lbs. D. D. Sheep.	28,000 lbs. S. D. Sheep.	46,000 lbs. E. B. Grain.	37,800 lbs. E. B. Misc.	29,800 lbs. W. B. Mdse. or Line Frt.	Empties.
5	6	6	8	7	8	5	6	8	10
10	12	12	15	13	17	10	11	16	20
12	14	14	18	16	20	12	15	19	24
14	17	16	21	18	24	14	17	22	28
16	19	18	24	21	27	16	20	25	32
18	21	20	27	24	30	18	22	28	36
20	24	23	30	26	34	20	25	32	40
23	26	25	33	29	37	22	27	35	44
24	29	27	36	31	40	24	30	38	48
26	31	29	39	34	44	27	32	41	52
28	33	31	42	37	47	29	35	44	56
30	36	33	45	39	50	31	37	47	60
32	38	35	48	41	54	33	40	50	64
34	40	38	51	44	57	35	42	54	68
36	43	41	54	47	60	37	45	57	72
38	45	43	57	49	64	39	47	60	76
40	48	45	60	52	67	41	50	63	80

NOTE.—Weight of empty car, 18,000 lbs.

General News Section.

The two grain elevators of the Canadian Pacific at Owen Sound, Ont., were destroyed by fire December 11, together with their contents—about a million bushels of wheat, oats and barley.

Ninety-eight new station buildings have been opened during the past year on the new line of the Grand Trunk Pacific Railway out of 150 contracted for in the spring; and 27 more are now under construction.

The Interborough Rapid Transit Company, New York City, has set aside about $40,000 to be given to its employees as Christmas presents. A five-dollar gold piece will be given to each employee whose pay is $110 a month, or less, and who has been in the service a year.

Nine locomotives were destroyed at Houlton, Me., December 20, in a fire which burned the roundhouse of the Bangor & Aroostook. Five locomotives were removed before the flames made it impossible to enter the structure. The blaze started from an unknown cause in a small office connected with the roundhouse, and both buildings were destroyed.

The Pennsylvania Lines have recently built at the Altoona shops 10 all-steel dining cars which are to be used on the Pennsylvania Special, the Manhattan Limited and other expresses between Chicago and Pittsburgh. In the construction of these cars, platforms and vestibules have been omitted, allowing room for a larger kitchen and for 36 seats instead of the usual 30.

Telegraph operators on the Cincinnati, Hamilton & Dayton have been given an advance in wages of about 5 per cent.

A committee representing the telegraph operators employed by the Chesapeake & Ohio is holding conferences with the management at Richmond, Va., concerning demands that have been presented for an increase in wages and changes in working conditions.

Several of the leading railways entering St. Louis will soon have their offices in one building. The Missouri Pacific, the St. Louis, Iron Mountain & Southern, the Missouri, Kansas & Texas, the Chicago, Burlington & Quincy, and the St. Louis Southwestern have leased space for general offices on several floors in the Monadnock building, now being put up. The building is to occupy the entire block bounded by Olive, Locust, Sixth and Seventh streets.

The *New York Journal of Commerce* annual canvass of the number of stockholders of the principal large corporations in the United States this year covers 234 railway and industrial corporations, of which 91 are railways, with a capitalization of $5,431,852,174. The number of stockholders of the railways is 389,571, the average holdings being 139½ shares. This is an increase over 1910 of 29,275 in the total number of railway stockholders, which equals 8 per cent. The increase in railway capital is $97,654,274, or about 2 per cent.

Bills for the construction of a national railway in Alaska have again been introduced in Congress. One presented by Representative Anderson of Minnesota directs the president to have a line surveyed from Seward to the Matanuska coal fields. Provision is made for the appointment of a commission of five members, two of whom must be engineers, one an officer of the army, one an officer of the navy, and the fifth a resident of Alaska familiar with mining conditions. A bill drafted by T. C. Whiteley, of Guthrie, Okla., empowers the commission which is to build the road to have coal mined.

The Delaware, Lackawanna & Western announces that on Sunday next its passenger trains will begin using the new cut-off between Lake Hopatcong, N. J., and Delaware Water Gap, 28.5 miles. With the use of this line the distance by the Lackawanna from New York to Buffalo will be 400 miles, or about ten miles shorter than by the old line, and the route by the old line was shorter than any of its competitors. The new line has but 15 curves to against 57 on the old and the ruling grade is 0.55 per cent. On the old line between the points named there are two tunnels. The new line is through mountainous country and has cost $421,000 a mile.

Rain on the Isthmus.

All records for excessive rainfall for short periods on the Isthmus of Panama were broken at Porto Bello on the night of November 28-29, when 2.46 in. of rain fell in three minutes, between 2:07 and 2:10 a. m. The highest previous records of excessive rainfall were 0.75 of an inch in five minutes at Rio Grande in July, 1908, and 1.24 in. in 10 minutes at Balboa in August, 1908. The total rainfall in the shower at Porto Bello was 7.60 in.

Noise Nuisances.

A firm of builders in New York was fined $350 by the supreme court of the state for failing to obey an order of the court to abate a noise nuisance. This is one more step in the right direction. The time will eventually come when people generally will rise up in protest against the tumult of sound that is unnecessarily raised. Noises have become the bane of life in cities and towns [and in many country places], and when the fight against them was first started the agitators were looked upon as cranks. That day has passed. Speed the day that will bring some actual relief. Two-thirds of the noises of a city could be abated if the makers thereof gave a little consideration to their fellow-men. As long as they won't do it voluntarily, let the court compel them.—*Pittsburgh Post.*

Sappers and Miners at Pittsburgh.

Because the Pittsburgh & Lake Erie Railroad has not paid its rent for the use of city property on the south side of Pittsburgh for the last eight years, the city has started to collect its bill of $18,000 by tearing up the tracks on its property. A large gang of laborers was sent to the yard at Twenty-third and Sidney streets this morning, accompanied by an escort of policemen, and at once began to tear up the tracks.

Locomotives pushed loaded cars on to the disputed tracks. The police tried to stop this, but the railway men paid no attention, and more police were sent for. Tonight about 500 policemen are on duty at the yards and the laborers are still digging away.

They have removed the earth and ties from under the cars, leaving only such ties as are weighted down by the wheels, and now the railway cannot remove its cars, for the first move will break down the rails.—*Press despatch.*

Billions of Papers.

The House Committee on Expenditures in the Post Office Department has made a report on the volume, weight and handling of the publications of the country during the last fiscal year, giving figures based on reports from 10,000 publishers. These 10,000 report an annual output of more than 6,500,000,000 copies, weighing 1,750,000,000 pounds.

The postal service handled 951,001,669 pounds, and, excluding 500,000 pounds carried free within counties, it received one cent a pound. The publishers reported that they delivered by their own carriers, newsboys, and news companies 840,466,574 pounds, part of which was carried to destination by express or otherwise by rail; by express 202,729,510 pounds, and other rail shipments 121,491,748 pounds.

The rate by express and rail varied from 2½ mills to one cent a pound, but the bulk of these shipments went at a rate of ¼ to ½ cent. Inquiry was made of all publishers, approximately 30,000, of which nearly 17,000 are weekly publications. The 10,000 returns received include probably 66 per cent. of all the tonnage of publications.

Disastrous Collision at Odessa, Minn.

In a rear collision on the Chicago, Milwaukee & St. Paul at Odessa, Minn., 173 miles west of Minneapolis, on the morning of December 18, about four o'clock, ten or more persons were killed and 12 or more injured. The eastbound express train "The Columbian," which had just stopped at Odessa, was run into at the rear by the second section of the same train, consisting only of express cars loaded with silk. The steel sleeping car at the

rear of the standing train was crushed for nearly its whole length. Most of the victims were in this car, and included among the killed were the wife and daughter of J. F. Richards, superintendent of the Chicago, Milwaukee & Puget Sound, at Mobridge. The engineman of the silk train was killed. This line is worked by the manual block system and the company says that the signal at the entrance of the block section was not put in the stop position behind the passenger train, the error having been occasioned in some way by the signal man going off duty at about the time this train passed. The flagman of the passenger train also is blamed for having failed to perform his duty. The silk train was running at very high speed and the engine tore its way almost to the middle of the sleeping car, and this car was also crushed at the front end by the steel dining car which was next ahead of it.

Increasing Safety on the North Western.

R. C. Richards, general claim agent and chairman of the Central Safety Committee of the Chicago & North Western, described the organization and operation of the safety committee system, as worked out on the North Western during the past year, in an address before the Industrial Safety Conference at St. Paul, on December 7. He said in part:

"There are now about 500 officers and men serving on these safety committees, and if Benjamin Franklin's old saying that the eyes of the master can do more work than both of his hands is true, surely 500 pairs of eyes trained to look for defective conditions and practices can do more work than the eyes of one person, and from the results that have been attained for the last eleven months (during which time the earnings of the company decreased less than 2 per cent.) this effort to bring about greater safety shows a wonderful improvement in matter of cleaning up yards, station platforms, shops and roundhouses of obstructions, cleaning windows, putting up railings at dangerous places, and covering gearing of machines, which has not only brought about greater safety of operation, but also more efficient operation, and we also show the following reductions in our accident record:

47 per cent. in trainmen killed.
40.8 per cent. in trainmen injured.
30.7 per cent. in switchmen killed.
18.5 per cent. in switchmen injured.
50 per cent. in stationmen killed.
10.5 per cent. in stationmen injured.
32 per cent. in trackmen injured.
34 per cent. in bridgemen injured.
11.4 per cent. in shop and roundhouse men injured.
85 per cent. in car repairers and inspectors killed.

Total reduction of 17 employees killed;
Total reduction of 2,144 employees injured;
or, 27.7 per cent.

70 per cent. in passengers killed.
10 per cent. in passengers injured.

"If this is an indication of what we can do in the future, it would certainly seem to show that the plan which we have adopted, in which enthusiasm and co-operation for safety is the key note, will surely result as the years go by in greater safety and regularity, which is what we all want."

Mr. Richards stated that credit for initiation of the safety committee movement should be given to the Illinois Steel Company and to Robert W. Campbell, the chairman of the central committee of safety of that company. The same safety organization as that adopted by the North Western has since been put into effect on the Delaware, Lackawanna & Western, the Elgin, Joliet & Eastern, the Baltimore & Ohio, and the Frisco system; and other roads are now considering it.

German Railways in Africa.

The Reichstag has just passed the first reading of a bill to extend the construction of the Central Railway of German East Africa to Lake Tantanyika. The German railways in Africa already authorized, including those in operation, amount to 2,585 miles, of which 733 miles are in East Africa, 322 miles in Kamerun, 201 miles in Togo and 1,318 miles in South West Africa. Of this mileage, 2,131 miles are in operation, of which 444 miles have been opened to traffic since the beginning of the year. The most important line at present under construction is the railway which begins at Dar-es-Salaam and is now within about 37 miles of Tabora, the chief trading town on the tableland south of Lake Victoria Nyanza, and will reach that town by next spring. Another railway in the same colony is the Usambara, which begins at Tanga, on the coast, and extends to the northwest through the Usambara mountains. Of this line, 218 miles are in operation. Of the Dar-es-Salaam Railway, 442 miles are in operation. To Tabora is 83 miles more, and a further extension of 254 miles to the lake is proposed. It will reach Tantanyika at Kigoma, a few miles north of Ujiji. It is intended to establish a steamer service on the lake after the completion of the railway.

Committees of Railway Signal Association, 1912.

COMMITTEES OF THE BOARD OF DIRECTORS.

Committee Work and Personnel.—B. H. Mann, chairman; C. A. Christofferson, C. E. Denney, W. H. Higgins.

The Manual.—W. J. Eck, chairman; H. S. Balliet, C. C. Rosenberg.

Places for Conventions.—G. S. Pflasterer, chairman; Geo. Boyce, E. W. Newcomb.

Convention Arrangements.—F. P. Patenall, chairman; W. J. Eck, C. C. Rosenberg, M. E. Smith, T. S. Stevens.

Co-operating Committee of the Signal Appliance Association.—Azel Ames, chairman; W. P. Hawley, L. G. Martin.

COMMITTEES OF THE ASSOCIATION.

Committee I.—Signaling Practice.—A. H. Rudd (Penn.), chairman; L. R. Clausen (C. M. & St. P.), vice-chairman; C. C. Anthony (Penn.); H. S. Balliet (N. Y. C.); C. A. Christofferson (No. Pac.); C. E. Denney (L. S. & M. S.); W. J. Eck (Southern); W. H. Elliott (N. Y. C.); G. E. Ellis (Kan C. T.); A. S. Ingalls (L. S. & M. S.); J. C. Mock (Mich. Cent.); F. P. Patenall (B. & O.); J. A. Peabody (C. & N. W.); W. B. Scott (U. P.); A. G. Shaver (C. R. I. & P.); T. S. Stevens (A. T. & S. F.); H. H. Temple (B. & O.); J. C. Young (U. P.). Outline of work: (a) Make such further report on a uniform system of signaling as may seem advisable as a result of the action of the association. (b) Investigate the applicability of the "AGA" flashlight, especially as a means of making a distinction in night signal aspects.

Committee II.—Mechanical Interlocking.—C. J. Kelloway (A. C. L.), chairman; F. C. Stuart (G. H. & S. A.), vice-chairman; L. Brown (A. T. & S. F.); G. W. Chappel (N. Y. N. H. & H.); W. H. Fenley (Panama); E. C. Graham (B. & A.); E. Hanson (G. C. & S. F.); E. J. Hawkins (N. Y. C.); Wm. Hiles (C. C., C. & St. L.); J. A. Johnson (M. K. & T.); T. A. Jones (Penn.); T. E. Kirkpatrick (L. S. & M. S.); J. B. Lamb (Southern); J. W. McClelland (P. & R.); E. E. Mack (C. & E. I.); S. Miskelly (C. R. I. & P.); W. B. Morrison (D. L. & W.); Charles Stephens (C. & O.); J. I. Vernon (N. Y. N. H. & H.); W. F. Zane (C. B. & Q.). Outline of work: (a) Prepare specifications for apparatus and materials. (b) Continue investigation of a device for power-operated home signals equivalent to a bolt-lock. (c) Prepare standard designs for cement floor and lead-out.

Committee III.—Power Interlocking.—B. H. Mann (Mo. Pac.), chairman; R. C. Johnson (N. Y. C. & H. R.), vice-chairman; Burt Anderson (A. T. & S. F.); W. H. Arkenburgh (C. R. I. & P.); E. J. Clark (Penn.); M. H Collins (Hudson & M.); J. R. Decker (Mich. Cent.); A. B. Du Bray (St. L. & S. F.); J. D. Elder (Kan. City Term.); C. B. Gray (Penn. Lines West); W. H. Harland (N. Y. O. & W.); H. H. Harman (B. & L. E.); W. N. Manuel (G. R. & I.); G. A. Motry (B. & O.); H. H. Orr (C. & E. I.); W. M Post (Penn.); I. S Raymer (P. & L. E.); D. W. Rossell (N. Y. C.); O. R. Unger (Mo. Pacific); F. B. Wiegand (L. S. & M. S.); G. A. Ziehlke (U. P.). Outline of work: (a) Prepare specifications for apparatus and materials. (b) Continue investigation of a device equivalent to a bolt-lock. (c) Continue the preparation of typical circuit plans for electric interlocking. (d) Prepare plans of wire ducts and terminal boxes. (e) Prepare specifications for protection of drawbridges. (f) Investigate the use of "battery" indication on semi-automatic power-operated signals. (g) Chairmen of Committees III., IV. and VIII. prepare a classification of voltage ranges for signal work, to be reported by Committee III.

Committee IV.—Automatic Block.—A. G. Shaver (C., R. I. & P.), chairman; J. M. FitzGerald (N. Y. C.), vice-chairman; E. L. Adams (L. S. & M. S.); T. E. Bradley (W. Md.); G. H. Dryden (B. & O.); A. R. Fugina (L. & N.); J. F. Gillmer

(Penn.); R. E. Greene (Mich. C.); W. R. Hastings (C. R. I. & P.); W. H. Higgins (C. of N. J.); B. F. Hines (N. O. & N. E.); E. W. Kolb (B. R. & P.); E. W. Newcomb (Oregon S. L.); C. W. Parker (C. P.); R. M. Phinney (C. & N. W.); H. J. Rhinehart (D. L. & W.); A. H. Rice (D. & H.); G. W. Trout (Pere Marquette). Outline of work: (a) Prepare revised specifications for direct-current relays and direct-current indicators. (b) Continue preparation of specifications for apparatus and materials. (c) Prepare typical automatic-signal circuits for single and double track.

Committee V.—Manual Block.—T. S. Stevens (A. T. & S. F.), chairman; L. R. Mann (Mo. Pacific), vice-chairman; E. T. Ambach (C. H. & D.); Hadley Baldwin (C. C. C. & St. L.); J. Beaumont (C. G. W.); J. H. Cormick (N. P.); H. J. Foale (Wabash); M. J. Fox (C. B. & Q.); G. A. Guyer (N. Y. C.); H. K. Lowry (C. M. & St. P.); G. S. Pflasterer (N. C. & St. L.). Outline of work: (a) Investigate the relative advantages and relative cost of manual block systems (manual, controlled manual and staff). (b) Prepare rules for the maintenance and operation of interlocking plants and block signals. (c) Investigate methods of handling trains by signal indications without train orders.

Committee VI.—Standard Designs.—J. C. Mock (Mich. Cent.), chairman; J. A. Peabody (C. & N. W.), vice-chairman; G. E. Ellis (K. C. Term.); F. P. Patenall (B. & O.); A. H. Rudd (P. R. R.); M. E. Smith (D. L. & W.); R. E. Trout (St. L. & S. F.); J. C. Young (U. P.). Outline of work: (a) Continue preparation of standard design. (b) Devise and use on drawings a system of symbols (preferably based on the drawing numbers) for designation of parts. (c) Prepare design of detector bar.

Committee VII.—Subjects and Definitions.—E. G. Stradling (C. I. & L.), chairman; A. D. Cloud, *The Signal Engineer;* C. G. Stecher (C. & N. W.). Outline of work: (a) Prepare definitions for technical terms. (b) Compile these definitions in the form of a signal dictionary, giving terms and definitions only, without descriptive matter.

Committee VIII.—Electric Railway and Alternating Current Signaling.—H. S. Balliet (N. Y. C.), chairman; C. H. Morrison (N. Y. N. H. & H.), vice-chairman; W. P. Allen (Penn.); W. F. Follett (N. Y. N. H. & H.); E. C. Grant (U. P.); W. F. Hudson (N. Y. C.); John Leisenring (Ill. Traction); H. A. Logue (Cumb. Valley); W. W. Morrison (N. Y. C.); C. R. Peddle (Interboro R. T.); B. H. Richards (C. R. I. & P.); John Roberts (New York, Westchester & B.); J. E. Saunders (A. T. & S. F.); E. B. Smith (N. Y. C.); W. N. Spangler (Penn.); F. S. Starratt (S. P.); F. E. Wass (N. Y. C.); J. R. Wills (O. S. L.); J. A. Beoddy (N. & W.). Outline of work: (a) Continue investigation of systems in operation. (b) Prepare requisites of apparatus and material for an a. c. automatic block signal system. (c) Prepare specifications for those items referred to in the portion of report made up by Sub-Committee B, 1911, which in the opinion of the committee cannot be covered by reference to specifications prepared by other committees.

Committee IX.—Wires and Cables.—W. H. Elliott (N. Y. C.), chairman; E. L. Adams (L. S. & M. S.), vice-chairman; W. L. Dryden (S. I. R. T.); A. B. Himes (B. & O.); J. D. Phillips (P. & R.); D. W. Richards (N. & W.); E. L. Watson (Penn.); J. V. Young (B. & M.); J. W. Young (Erie). Outline of work: (a) Continue investigation and tests with a view to improving the specifications for mineral-matter, rubber-compound, insulated signal wire. (b) Prepare specifications for copper-clad steel bond wire. (c) Prepare specifications for 30 per cent. conductivity, hard-drawn copper-clad steel line wire. (d) Prepare specifications for wire and cables for high tension circuits.

Special Committee.—Contracts.—L. R. Clausen (C. M. & St. P.), chairman; Geo. Boyce (C. St. P., M. & O.); C. A. Christofferson (N. P.); R. L. Davis (Mich. Cent.); R. L. Huntley (B. & O.); J. H. Latimer (C. M. & O.); J. B. Pyle (Penn. Lines West); L. C. Rice (C. C. C. & St. L.). Outline of work: (a) Continue preparation of forms of contracts for work performed by railroad companies. (b) Prepare table of mathematical values of operated units.

Special Committee.—Relations of Engineering Signal Officers to Operating Officers.—D. M. Currie (C. & N. W. & T. P.), vice-chairman; E. C. Hitchcock (N. Y., N. H. & H.); D. R. Morris (L. C.); W. B. Weatherbee (D. L. & W.); F. E. Williams (B. & A.); L. L. Wright (C. & St. L.). Outline of work: Continue preparation of forms and instructions for recording signal failures.

Special Committee.—Storage Battery.—R. B. Ellsworth (N. Y. C.), chairman; G. E. Beck (L. S. & M. S.); J. Fred Jacobs (C. of N. J.); T. L. Johnson (D. L. & W.); A. H. McKeen (O. W. R. & N.); A. H. Yocum (P. & R.). Outline of work: (a) In consultation with representatives of manufacturers, review adopted specifications and designs for storage batteries and recommend necessary revisions. (b) Investigate jelly electrolyte.

Central Railway Club.

The annual meeting and dinner of the Central Railway Club will be held at the Statler hotel, Buffalo, N. Y., on January 11. The executive committee will meet at the Statler hotel at 1 p. m. The features of the business session in the afternoon will be the annual reports, a paper by Prof. Edward C. Schmidt of the University of Illinois, on Tonnage Rating of Engines, and amendments of the constitution and by-laws will be voted upon. In addition to a programme of vocal and instrumental music there will be addresses by Percy R. Todd, vice-president of the Bangor & Aroostook; H. L. Joyce, manager marine department, Central of New Jersey; D. R. Macbain, superintendent of motive power, Lake Shore & Michigan Southern, and the Hon. Charles A. Pooley. W. G. Besler, vice-president and general manager of the Central of New Jersey, will be toastmaster.

Western Railway Club.

The regular monthly meeting of the Western Railway Club was held at the Auditorium hotel, Chicago, December 19. The paper of the evening was entitled Terminal Brake Testing, by F. B. Farmer, Westinghouse Air Brake Company, Pittsburgh, Pa.

American Institute of Consulting Engineers.

The annual meeting of the American Institute of Consulting Engineers will be held on January 16, at the Aldine Club, New York. Eugene W. Stern, 103 Park avenue, is secretary.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

Air Brake Association.—F. M. Nellis, 53 State St., Boston, Mass.; annual, May 7-10, Richmond, Va.

American Association of Demurrage Officers.—A. G. Thomason, Boston, Mass.

American Association of General Passenger and Ticket Agents.—W. C. Hope, New York; next convention, Seattle, Wash.

American Association of Freight Agents.—R. O. Wells, East St. Louis, Ill.; annual, June 18-21, Chicago.

American Association of Railroad Superintendents.—O. G. Fetter, Carew building, Cincinnati, Ohio; 3d Friday of March and September; annual, March 17, Chicago.

American Electric Railway Association.—H. C. Donecker, 29 W. 39th St., New York.

American Electric Railway Manufacturers' Association.—George Keegan, 165 Broadway, New York. Meetings with annual convention American Electric Railway Association.

American Railway Association.—W. F. Allen, 75 Church St., New York.

American Railway Bridge and Building Association.—C. A. Lichty, C. & N. W., Chicago. Next annual convention, third week in October, 1912, Baltimore, Md.

American Railway Engineering Association.—E. H. Fritch, Monadnock Block, Chicago; annual convention, March 19-21, 1912, Chicago.

American Railway Master Mechanics' Association.—J. W. Taylor, Old Colony building, Chicago. Annual convention, June 17-19, Atlantic City, N. J.

American Railway Tool Foremen's Association.—M. H. Bray, N. Y., N. H. & H., New Haven, Conn.

American Society for Testing Materials.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.

American Society of Civil Engineers.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

American Society of Engineering Contractors.—L. R. Wemlinger, 13 Park Row, New York; 3d Tuesday of each month, New York.

American Society of Mechanical Engineers.—Calvin W. Rice, 29 W. 39th St., New York.

American Railway Accounting Officers.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.

Association of Engineering Society Secretaries.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 22, 1912, Los Angeles, Cal.

Association of Railway Electrical Engineers.—Jos. A. Andrucetti, C. & N. W. Ry., Chicago.

Association of Railway Telegraph Superintendents.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.

Association of Railway Car Accounting Officers.—G. P. [illegible], New York.

CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.

CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

CIVIL ENGINEERS' SOCIETY OF ST. PAUL.—D. F. Jurgensen, 116 Winter St., St. Paul, Minn.; 2d Monday, except June, July and Aug., St. Paul.

ENGINEERS SOCIETY OF PENNSYLVANIA.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Richmond, Va.; annual, May 15, Buffalo, N. Y.

GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

INTERNATIONAL RAILWAY CONGRESS.—Executive Committee, rue de Louvain, 11 Brussels; 1915, Berlin.

INTERNATIONAL RAILWAY FUEL ASSOCIATION.—D. B. Sebastian, La Salle St. Station, Chicago.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—L. H. Bryan, Brown Marx building, Birmingham, Ala.

INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, Lima, Ohio. Convention, August 15, Chicago.

IOWA RAILWAY CLUB.—W. B. Harrison, Union Station, Des Moines, Ia.; 2d Friday in month, except July and August, Des Moines.

MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York; annual convention, May 14-17, Pittsburgh, Pa.

MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Old Colony buiuding, Chicago. Annual convention, June 12-14, Atlantic City, N. J.

MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOCIATION OF UNITED STATES AND CANADA.—A. P. Dane, B. & M., Reading, Mass.; next annual convention, second week in September, 1912.

NATIONAL RAILWAY APPLIANCES ASSOCIATION.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Meetings with annual convention American Railway Engineering Association.

NEW ENGLAND RAILROAD CLUB.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

NEW YORK RAILROAD CLUB.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

NORTHERN RAILWAY CLUB.—C. L. Kennedy, C., M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.

OMAHA RAILWAY CLUB.—H. H. Maulick, Barker Block, Omaha, Neb.; second Wednesday.

RAILROAD CLUB OF KANSAS CITY.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

RAILWAY BUSINESS ASSOCIATION.—Frank W. Noxon, 2 Rector St., New York.

RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOCIATION.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Railway Electrical Engineering Association.

RAILWAY INDUSTRIAL ASSOCIATION.—G. L. Stewart, St. L. S. W. Ry., St. Louis, Mo.; annual, May 12, 1912, Kansas City, Mo.

RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Bethlehem, Pa.

RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, Box C, Collinwood, Ohio.

RAILWAY SUPPLY MANUFACTURERS' ASSOCIATION.—J. D. Conway, 2135 Oliver Bldg., Pittsburgh, Pa. Meetings with annual conventions M. M. and M. C. B. association.

RAILWAY TELEGRAPH & TELEPHONE APPLIANCE ASSOCIATION.—W. E. Harkness, 284 Pearl St., New York. Meetings with Railway Telegraph Superintendents' Association.

RICHMOND RAILROAD CLUB.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—L. C. Ryan, C. & N. W., Sterling; September, 1912, Buffalo, N. Y.

ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

SIGNAL APPLIANCE ASSOCIATION.—F. W. Edmonds, 3838 Park Ave., New York. Meetings with annual convention Railway Signal Association.

SOCIETY OF RAILWAY FINANCIAL OFFICERS.—C. Nyquist, La Salle St. Station, Chicago.

SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.

SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

TOLEDO TRANSPORTATION CLUB.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

TRAFFIC CLUB OF CHICAGO.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.

TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

TRAIN DESPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.

TRANSPORTATION CLUB OF BUFFALO.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.

TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.; August, 1912.

WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

WESTERN RAILWAY CLUB.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Wednesday in month except July and August, Chicago.

WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, B. & O., Baltimore, Md.; annual, January 16-18, Chicago.

Traffic News.

The Erie is to put on a train for Wells Fargo & Co.'s express which will run from Jersey City to Chicago in 24 hours, leaving Jersey City at 8 p. m.

J. C. Lincoln has resigned as commissioner of the traffic bureau of the Merchants' Exchange of St. Louis. Mr. Lincoln was for three years president of the National Industrial Traffic League.

The Maine Central has acquired a controlling interest in the stock of the Ricker Hotel Company, owner of "Hotel Sam-O-Set," a large summer hotel at Rockland breakwater, near Rockland, Me.

The American Refrigerator Transit Company has established new weekly refrigerator service during the winter between St. Louis and Minneapolis, cars leaving St. Louis Saturday night and arriving at the Twin Cities Monday morning.

The Western Classification Committee has announced that classification No. 51 will be mailed about January 1. The docket for the semi-annual meeting to be held at the Hotel Galvez, Galveston, Tex., on January 16, will be mailed to shippers on December 28.

W. A. Schumacher, assistant traffic manager of Armour & Company at Chicago, has been appointed general traffic manager of the United Fruit Company, with headquarters in New York City. He will have jurisdiction over the traffic of the railway and steamship lines of the company.

The regular meeting of the Traffic Club of New York will be held at the Waldorf-Astoria Hotel, December 26. This will be a club night, including a discussion on the subject Our Merchant Marine. The president will make a short address, to be followed by other members. The Corinthian male quartet will render a number of popular selections. The annual dinner will be held in the Waldorf-Astoria on February 2. Speakers have already been secured.

The Winnipeg Board of Trade has decided to petition the Railway Commission of Canada to find some solution of the car shortage problem in western Canada. The board said the railways have failed to fulfill their duties as common carriers and the congestion has resulted in the detention of quantities of grain in transit.

Shippers of the Imperial valley, California, have filed a request with the state railway commission that the Southern Pacific be required to make the same freight rate on butter as that which the San Joaquin valley shippers enjoy by express. They also ask a readjustment of the rates on oil, cottonseed and cottonseed meal.

A reporter in Oklahoma City, investigating the subject of Oklahoma's greatness, finds that in his city there are 20 regularly established railway city ticket or freight offices; which number, however, includes a few electric railways. Besides these, there are 18 other (steam) roads, whose traveling agents visit Oklahoma City one, two or three times a week.

Railways in the Central Freight Association have notified the iron and steel manufacturers of the Mahoning and Shenango valleys that they have decided not to grant the petition of the manufacturers for a reduction in rates from the lakes on ore. It is said the manufacturers may file a complaint with the interstate commerce commission attacking the present rates.

The Philadelphia & Reading, beginning January 1, will increase round-trip local passenger rates to the basis of 2¼ cents a mile. Heretofore the rates for round-trip tickets have not been uniform. Following are examples of the changes made: Philadelphia to Germantown, old rate 28 cents, new 31; to Reading, old rate $2.34, new $2.61; to Harrisburg, old $4.20, new $5.04.

The probable effect of the operation of the Panama canal on the traffic relations of the country is to be one of the principal topics for consideration at the spring meeting of the National Industrial Traffic League in Chicago on March 14. A series of questions regarding the canal and its effect on commerce is to be addressed to all members of the League for the purpose of obtaining a comprehensive digest of opinions.

The Great Northern is conducting an extensive advertising campaign for the purpose of bringing before the public the advantages of Washington, Montana and Oregon as apple-growing states. During the month of December the company is conducting apple exhibits in Boston, New York, Philadelphia, Buffalo, Chicago, St. Louis, Des Moines, Milwaukee, St. Paul, Minneapolis, Sioux City, Superior, Duluth, Fargo and Winnipeg.

It is reported that the Texas Railway Commission is planning to order the dissolution of the Texas Tariff Bureau, recently organized by the railways of the state, because its intended function does not meet with the approval of the commissioners. A hearing is to be held before the commission some time in January, at which the representatives of the railways will be given an opportunity to appear and explain the proposed methods of the bureau.

The principal railways south of the Potomac and Ohio rivers and east of the Mississippi, will, on January 7, put on sale "interchangeable penny scrip books," to take the place of mileage books; and these will be honored by substantially all of the railways in the territory named. Each book will contain 2,500 coupons of the value of 1 cent each, and it will be sold, for the purchaser's own use, at $20. Coupons are to be presented at ticket offices for tickets.

Beginning January 15, the Atchison, Topeka & Santa Fe will run an agricultural demonstration train throughout its lines in New Mexico, arrangement for the lectures and demonstrations having been made with the State Agricultural College. The train will be in charge of J. D. Tinsley, the railway company's agricultural demonstrator, who will be accompanied by C. L. Seagraves, general colonization agent. One of the lecturers will be President W. E. Garrison of the Agricultural College.

The Illinois Central has announced that it will establish 15 experimental farms along its lines in Mississippi and Louisiana to encourage agricultural development by inculcating the principles of correct farming. Each farm is to consist of a 40-acre tract, to be worked by the owner under the supervision of instructors from the Agricultural College of Mississippi and the agricultural department of the University of Louisiana. Each of the tracts selected for the purpose is to be centrally located so that the farmers of the district may reach them easily. The railway proposes to enter into contracts with the owners of the land guaranteeing them against loss.

In accordance with a plan decided upon at the recent annual convention of the American Association of General Passenger and Ticket Agents, an official digest of fares and division arrangements for all railways in the United States, Canada and Mexico is to be compiled and published under the auspices of the Transcontinental Passenger Association. The work is to be under the supervision of a committee consisting of C. A. Cairns, general passenger and ticket agent of the Chicago & Northwestern (chairman); O. P. McCarthy, passenger traffic manager of the Baltimore & Ohio, and W. A. Russell, general passenger agent of the Louisville & Nashville. It is expected that copies may be ready for distribution about May 1. Heretofore for many years a similar compilation has been made and published unofficially. It has decided that better results might be obtained by having its publication undertaken under the auspices of the association.

The annual dinner of the Traffic Club of St. Louis was held on December 9 at the Mercantile Club. A. Hilton, president of the club, presided as toastmaster, and addresses were made as follows: S. O. Dunn, editor of the *Railway Age Gazette*, on [illegible]; D. R. Forgan, president of the National City Bank of Chicago, on The National Business Association of the United States; [illegible], on The Business Man and the Law; and L. J. Wortham, of Fort Worth, Tex., on The Work of Commercial Secretaries and the Business Men's Association of Texas. At the annual meeting of the club the following were elected officers for the ensuing year: President, A. Hilton, general passenger agent, St. Louis & San Francisco; vice-presidents, J. C. Lincoln, commissioner, Merchants Exchange Traffic Bureau; B. M. Flippin, freight traffic manager, Missouri Pacific Railway; J. L. Ponney, traffic manager, Ter[illegible]; A. M. Field, traffic manager [illegible]; Wrought Iron Range Company; Geo. Danner, traffic manager, Meyer Brothers Drug Company; secretary-treasurer, A. F. Versen, assistant traffic commissioner, Business Men's League of St. Louis.

Department of Agriculture Final Crop Report.

In making the final estimate of the acreage and production of crops in 1911, the bureau of statistics has used the census report of the acreages in 1909 as a basis, from which revised estimates for both 1910 and 1911 crops are made. Using these figures as a basis, the crop reporting board estimates the acreage, production and value of important farm crops of the United States in 1910 and 1911 to have been approximately as follows:

Crops.	Acreage. (000 omit'd.) Acres.	Production. (000 omit'd.) Bushels. (*)	Farm Value, December 1. Per Bu. Cents.	Farm Value, December 1. Total. (000 omit'd.) Dollars.
Corn, 1911	105,825	2,531,488	61.8	1,565,258
Corn, 1910	104,035	2,886,260	48.0	1,384,817
Corn, 1909	98,383	2,552,190	59.6	1,521,105
Winter Wheat, 1911	29,162	430,656	88.0	379,151
Winter Wheat, 1910	27,329	434,142	88.1	382,318
Spring Wheat, 1911	20,381	190,582	86.0	163,912
Spring Wheat, 1910	18,352	200,979	88.9	178,733
All Wheat, 1911	49,543	621,338	87.4	543,063
All Wheat, 1910	45,681	635,121	88.3	561,051
All Wheat, 1909	44,261	683,350	99.0	676,517
Oats, 1911	37,763	922,298	45.0	414,663
Oats, 1910	37,373	1,180,513	34.4	406,406
Oats, 1909	35,159	1,007,129	40.5	407,887
Barley, 1911	7,627	160,240	86.9	139,182
Barley, 1910	7,743	173,832	57.8	100,426
Barley, 1909	7,698	173,321	55.2	95,673
Rye, 1911	2,097	33,119	83.2	27,557
Rye, 1910	2,185	34,897	71.5	24,953
Rye, 1909	2,196	29,520	73.9	21,815
Buckwheat, 1911	833	17,549	72.6	12,735
Buckwheat, 1910	860	17,598	66.1	11,636
Buckwheat, 1909	878	14,849	69.9	10,379
Flaxseed, 1911	2,757	19,370	$1.82	35,272
Flaxseed, 1910	2,467	12,718	$2.32	29,472
Flaxseed, 1909	2,083	19,513	$1.53	29,855
Rice—Readjustment of Rice data to Census basis deferred.				
Rice, 1911	696	22,934	79.7	18,274
Rice, 1910	722	24,510	67.8	16,624
Potatoes, 1911	3,619	292,737	79.9	233,778
Potatoes, 1910	3,720	349,032	55.7	194,566
Potatoes, 1909	3,669	389,195	54.9	213,668
Hay—Readjustment of Hay data to Census basis deferred.				
Hay, 1911	43,017	†47,444	‡$14.64	694,570
Hay, 1910	45,691	†60,978	‡$12.26	747,769

* Bushels of weight. † Tons (2,000 lbs.). ‡ Per ton.

North Western-Northern Pacific Traffic Arrangement.

The "North Coast Limited" train heretofore of the Northern Pacific, made its initial trip out of Chicago over the Chicago & Northwestern (via Milwaukee and Wyeville), on Sunday, December 17. The train consists of an observation-library car with barber shop and bath, two 10-section standard drawing room and compartment cars, a 14-section standard drawing room and smoking compartment car, an 18-section tourist car, a combination coach and smoker, a dining car and a combination baggage and dynamo car. The train leaves Chicago westbound at 10 p. m., arriving at Tacoma and Seattle at 8:15 p. m. the third day. Eastbound it leaves Tacoma at 7 p. m. and arrives in Chicago at 9 p. m.

President W. A. Gardner of the Northwestern says that the installation of through service is anything that may be considered unusual or extraordinary. It is a new route for new business. The arrangement is not exclusive; it in no wise interferes with nor alters similar joint service which all the interested lines have maintained for years with other roads not parties to this particular service. The mileage via the new low-grade line is practically identical with the old, and service will be maintained on a parity over the two routes. Long-distance travel is reluctant to change cars west of Chicago and is always fearful of missing connections, and the inauguration of this through train service is in response to public necessity.

Car Surpluses and Shortages.

Arthur Hale, chairman of the committee on relations between railways of the American Railway Association in presenting statistical bulletin No. 109, giving a summary of car shortages

and surpluses by groups from August 3, 1910, to December 6, 1911, says:

"The figures reported for the period ending December 6, 1911, show a total surplus of 53,840 cars, an increase of 10,781 cars over the preceding period, or 25 per cent. The increase in surplus is reported throughout the country and most noticeable in the coal cars, that class of car increasing from 12,346 cars on November 22, 1911, to 20,662 cars on December 6, 1911, an increase of 8,316 cars. Of the 8,316 coal car increase, 4,187 cars are reported in group 2 (New York, New Jersey, Delaware, Maryland, eastern Pennsylvania) and 2,343 cars in group 3 Ohio, Indiana, Michigan, western Pennsylvania). The box car surplus increased 500 cars over the last report, and flat and miscellaneous cars increased 928 and 1,037 cars, respectively, making a total increase of 17,781 cars.

"All classes of cars, flats excepted, show decreases in car shortage. Box decreased 401 cars, coal decreased 1,267 cars and miscellaneous decreased 638 cars. Flat cars show an increase of 54 cars, making a total decrease of 2,252 cars. It will be noted that the situation with regard to car surplus is practically the same as one year ago, the total surplus being 53,915 cars for the period ending December 7, 1910. The total shortage for the same period was 11,901 cars, as against 17,697 cars for the corresponding period in 1911."

The accompanying table gives car surplus and shortage figures by groups for the last period covered in the report, and the diagrams show total bi-weekly surpluses and shortages in 1907 and 1911.

Foreign Crops.*

The 1911 wheat harvest in the northern hemisphere began in British India in March with a record crop of 372,000,000 bushels, and ended in Canada in October with another record yield of 203,000,000 bushels; in other countries, with the one important exception of Russia, yields as a whole have been satisfactory, and the total crop of the northern hemisphere, though not a record, will probably rank as one of the three largest ever produced.

During October sowing winter wheat and rye was pursued throughout all Europe with exceptional activity, the beginning of the work having been delayed in many of the countries earlier in the season by persistent drought. General rains have since put the soil almost everywhere in excellent condition, and seeding has on the whole been carried on under unusually propitious conditions and is for the most part finished. Although no statistics of acreage are yet available, the favorable seed time tends to indicate that full areas have been sown.

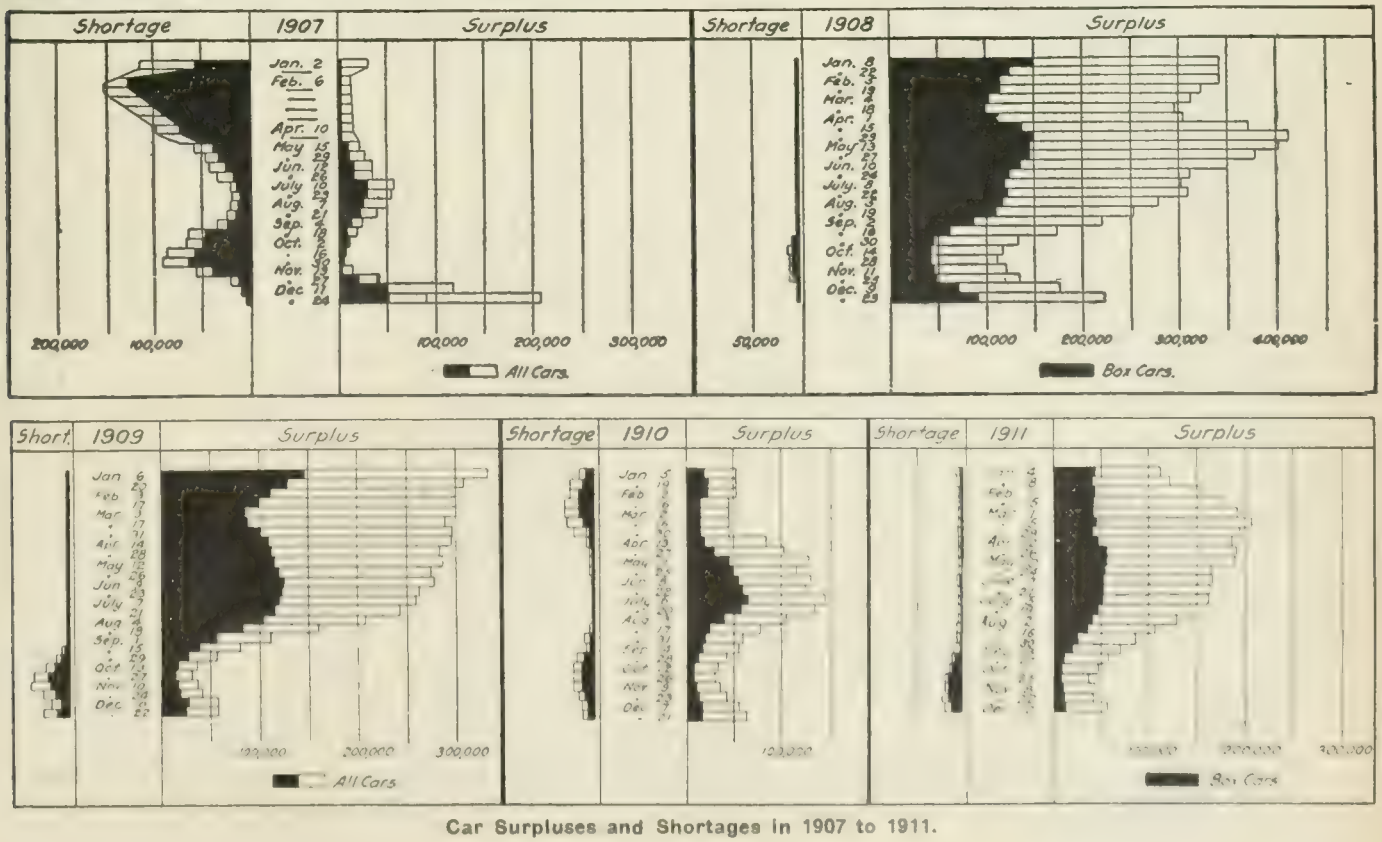
The prospect for the harvest which takes place in the southern

*Circular 25, Bureau of Statistics, U. S. Department of Agriculture.

CAR SURPLUSES AND SHORTAGES.

Date.	No. of roads.	Surpluses: Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.	Shortages: Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.
Group *1.—December 6, 1911	7	511	1,196	367	263	2,337	370	22	375	135	902
" 2.— " 6, 1911	26	1,142	129	3,768	342	5,381	9	0	0	85	94
" 3.— " 6, 1911	26	953	972	10,066	2,081	14,072	1,509	7	0	1,227	2,743
" 4.— " 6, 1911	11	277	2	319	610	1,208	1,535	102	1,375	5	3,017
" 5.— " 6, 1911	20	40	1	109	940	1,090	235	290	715	15	1,255
" 6.— " 6, 1911	22	4,499	479	2,211	4,434	11,623	413	4	216	317	950
" 7.— " 6, 1911	3	0	61	215	754	1,030	59	0	0	0	59
" 8.— " 6, 1911	19	718	359	1,881	2,061	5,019	758	40	126	10	934
" 9.— " 6, 1911	10	1,477	133	237	703	2,550	140	0	0	0	140
" 10.— " 6, 1911	20	1,414	1,050	1,489	5,116	9,069	1,053	0	6	2	1,061
" 11.— " 6, 1911	5	0	230	0	231	461	6,196	72	0	274	6,542
Total	169	11,031	4,612	20,662	17,535	53,840	12,277	537	2,813	2,070	17,697

*Group 1 is composed of New England lines; Group 2—New York, New Jersey, Delaware, Maryland, and Eastern Pennsylvania lines; Group 3—Ohio, Indiana, Michigan and Western Pennsylvania lines; Group 4—West Virginia, Virginia, North and South Carolina lines; Group 5—Kentucky, Tennessee, Mississippi, Alabama, Georgia and Florida lines; Group 6—Iowa, Illinois, Wisconsin, Minnesota and the Dakotas lines; Group 7—Montana, Wyoming and Nebraska lines; Group 8—Kansas, Colorado, Missouri, Arkansas and Oklahoma lines; Group 9—Texas, Louisiana and New Mexico lines; Group 10—Oregon, Idaho, California and Arizona lines; Group 11—Canadian lines.



Car Surpluses and Shortages in 1907 to 1911.

hemisphere from November to March has been almost universally spoken of in superlatives, the outlook in Australia being perhaps somewhat less favorable than in Argentina. Large areas in both countries, however, have very critical stages of vegetation yet to pass through, as the bulk of their crops is not cut until December and January. The largely increased area under wheat in Argentina and the favorable weather that has thus far attended its growth inspires confidence in a yield largely surpassing the 192,000,000 bushel crop of 1907-8. Weather conditions in Australia have not been altogether favorable, but late rains are believed to have effected great improvement.

CANADA.

In the October issue of the *Census and Statistics Monthly*, the Canadian department of agriculture revises its September estimate of the 1911 production of wheat, barley, and oats, and publishes a preliminary forecast of the yield of rye, flaxseed, and corn. By revision it appears that the total wheat crop of Saskatchewan had been overestimated by about 26,000,000 bushels, the production being 87,180,000 bushels instead of 112,805,000 as estimated in September. In Manitoba, Alberta and Ontario, however, revision adds 24,364,000 bushels to their total, the crop of Manitoba being 1,387,000, of Alberta 19,554,000, and of Ontario 3,433,000 bushels larger than calculated the month previous. In the other provinces there was a reduction of 386,000 bushels. The total wheat production of Canada is therefore now estimated at 202,997,000 bushels, of which 26,479,000 bushels is of the winter and 176,518,000 bushels of the spring variety, whereas a month ago the corresponding figures were 17,706,000 bushels winter and 186,928,000 bushels spring.

The barley crop, according to the revised figures, is the smallest in several years, and amounts to only 43,579,000 bushels, or 7,980,000 bushels less than formerly estimated. Oats has yielded 19,000,000 bushels less than anticipated, the total now being put at 348,774,000 bushels. The corn crop is estimated at 17,159,300 bushels against 18,726,000 bushels in 1910.

ARGENTINA.

The wheat harvest, which begins in the North in November and ends in the South in February, promises to be much larger this season than in any previous year. Throughout the growing period meteorological conditions have been exceptionally auspicious, and the surface sown, as now definitely determined by the Argentine ministry of agriculture, exceeds that of 1910-11 by over 1,500,000 acres, making over 2,500,000 acres increase in the culture of this cereal within the last two years. The 1911-12 flax average constitutes a new record by a small margin. The production of oats is a comparatively new factor in the rural economy of the country, the development of the culture being confined largely to the province of Buenos Ayres. Five years ago the entire area devoted to its cultivation amounted to only 702,000 acres, but lately the industry has become rapidly popularized, and in 1911-12 the acreage sown totaled almost 2,500,000 acres.

AUSTRALIA.

Wheat culture has received great impetus in Australia within the last few years, the area under its cultivation having been augmented by 1,323,800 acres in 1909-10 and by 774,341 acres in 1910-11. As both seasons were favorable, yields largely exceeded all previous ones, amounting to 93,263,000 bushels in 1909-10 and 98,109,000 bushels in 1910-11. The prospect is that these results may not be equaled in the harvest which begins in November. The area in New South Wales is 186,000 acres larger than last year, and although a wet seedtime in Victoria may have contracted the acreage there, increased sowings in other states, it is believed, have made the [illegible] about to be harvested a record. At various times during the growing season the plants in some localities are reported to have suffered from drought, and, on the whole, conditions have been medium and only fair returns are expected.

The production of wheat in New Zealand is officially returned as 8,934,000 bushels in 1909-10 and 8,535,000 bushels in 1910-11, [illegible] 311,000 and 321,441 acres.

United Kingdom.

In 1911 [illegible] per cent. of the total acreage of Great Britain [illegible] and potatoes, and in Ireland about 85 per cent.

In the extent of land devoted to its cultivation, oats is the leading crop both in Great Britain and in Ireland. Second in acreage in Great Britain is wheat, but in Ireland second rank is still held by the potato, although the extent of its cultivation has decreased almost 48 per cent. within the last half century. The root crops, turnips and mangold, occupy third place as to area in both Great Britain and Ireland, and barley fourth. A striking feature of the last half century in both British and Irish agriculture has been the great contraction of the surface under wheat and barley and the expansion of that under hay and grass. Low ebb in the decline in wheat culture, however, seems to have been reached seven or eight years ago, the 1,406,000 acres under wheat in the entire kingdom in 1904 having increased to 1,951,099 acres in 1911, while the 1,756,127 acres under barley in 1911 marks the lowest record in years.

The British board of agriculture and fisheries, reporting on crop conditions, October 1, stated that cereal harvest was over except in the extreme north of Scotland. Potatoes were not suited by the September weather. The yield in Great Britain is about 96 per cent. of an average crop. Turnips and swedes have suffered badly from drought; mangolds have done better and bad yields are not nearly so universal, still the crop is generally much below normal. Representing an average yield by 100, appearances on October 1 indicated yields for Great Britain represented by the following percentages: Turnips and swedes, 76; mangolds, 91.

The 1911 hop crop is officially returned as 36,738,576 pounds, compared with 33,899,600 pounds last year and 52,725,232 in 1908.

Fair breadths of wheat have already been sown in various districts throughout England, even as far north as Durham. Since the date of the report, rains have fallen everywhere, allowing seeding to proceed rapidly and greatly improving pastures.

FRANCE.

The practical completion of potato digging, grape gathering and the garnering of autumn fruit marks the close of an agricultural year fairly bounteous in cereal production, but singularly deficient, because of drought, in late cuttings of hay and in the yields of earth grown products, such as potatoes and sugar beets. General soaking rains fell opportunely in late September and throughout October, and millions of acres of ground were broken in the pink of condition, and for the most part seeded for harvest in the summer of 1912. Official estimates of late-maturing crops —potatoes, sugar beets, etc., have not yet appeared.

In 1911 the total quantity of five cereals produced was 79,212,000 bushels larger than in 1910, although the surface under their cultivation in the former year was 418,165 acres smaller; whereas, compared with 1909, the 1911 production was the smaller by 74,892,000 bushels and the acreage less by 473,900 acres.

ITALY.

The preliminary estimate of the Italian ministry of agriculture relative to the wheat, oats, barley and rye crops of 1911 appears to have been oversanguine, particularly with reference to wheat, which a recent revision reduces from 203,374,000 to 192,395,000 bushels. Corn, the second cereal in importance in Italy, covered 21,000 acres less this season than last; the yield of 93,837,000 bushels was smaller than in 1910 by 3,362,000 bushels, the deficiency having been caused partly by drought. Rice is preliminarily estimated to have yielded 1,042,798,000 pounds, 77,227,000 pounds increase over the outturn, as finally estimated, last year.

GERMANY.

Copious rains in late September and early October rendered the drought-hardened soil workable, and the delayed sowing of winter cereals, potato digging, and other autumn work have since been carried on with great activity. The encouraging weather gives rise to the belief that the usual extent of land will be sown to winter rye and wheat. The rains, however, came too late to remedy to any great extent the enormous losses from drought to potatoes, sugar beets and feeding stuffs, though their condition has in some places been [illegible]. In Prussia the preliminary official estimate of a yield of 828,547,000 bushels of potatoes against 1,238,972,000 bushels finally estimated in 1910 is reported increased by upward of 40,000,000 bushels since the drought was broken.

Hop culture in Germany has for some years been steadily declining, the area having fallen off almost 35 per cent. since 1907.

Owing more to meteorological causes, however, than to decreased acreage, the production in 1911 amounted to only 23,430,000 pounds, not quite 53 per cent. of the moderate crop of the preceding year, although over 75 per cent. in excess of the very short yield in 1909.

AUSTRIA.

Yields of the late maturing crops, potatoes, sugar beets and corn, have been greatly diminished as a result of the long drought, excepting in eastern Galicia and Bukowina, where wet weather retarded the maturing of corn, and, while keeping the foliage of potatoes green, caused rot on the heavy low lands; only in the provinces named are sugar beets said to have made good progress, their appearance in the rest of the empire being officially rated poor, or the worst of all crops. Cereal thrashings indicate satisfactory results; rye, the most important cereal, may not have given quite the yield of 1910, but wheat is probably a good average in volume and of excellent quality, while barley and oats both surpass the record of last year.

HUNGARY.

According to the October 17 report of the Hungarian ministry of agriculture, corn, the early varieties of which had been husked, promises a yield of 138,063,000 bushels, as compared with 131,174,000 bushels forecasted last month and an actual yield of 187,731,000 bushels in 1910.

The prospect for potatoes, under the influence of abundant rain in late September and early October, had somewhat improved; the ministry now estimates the output at 159,172,000 bushels; on September 5 the prospect warranted a forecast of only 145,651,000 bushels. The actual yield in 1910 was 176,974,000 bushels.

Autumn seedings have been, for the most part, completed under favorable conditions, the only complaint having been delay in starting, caused by the long drought.

RUSSIA.

Definite and comprehensive knowledge respecting the actual shortage of the 1911 cereal crops will not be obtainable until the publication of the final official estimate on the spring cereals, which will probably appear in December.

The final figures on winter wheat, which ordinarily constitutes about one-fourth of the total crop, were 188,000,000 bushels in 1911, as compared with 248,600,000 bushels in 1910, and on winter rye, which usually represents about 98 per cent. of the entire production, were 745,614,000 in 1911 as compared with 851,143,000 bushels in 1910.

Unofficial reports tend to confirm previous tentative official and unofficial estimates concerning the disastrous effects of the drought in parts of the empire.

The *Board of Trade Journal*, published by the British board of trade, states in the issue of October 12, 1911, that "the Russian head administration of indirect taxation, on the basis of reports from the superintendent of excise, places this year's crop of sugar beets at 12,998,600 tons, as compared with 10,847,740 tons in 1910, and 6,800,000 tons in 1909. The production in 1910 was a record one, and a good proportion of the sugar is still held in Russia by producers and speculators. This year's beet roots contain somewhat less sugar than last year's, but the difference is probably not large enough to bring the output of sugar this season below that of last year."

JAPAN.

The pre-harvest official estimate (August 27) of the production of rice in 1911 is 271,041,000 bushels, as compared with 238,712,000 bushels in 1910, and 268,428,000 bushels in 1909. The indications are that the 1911 crop will be the largest in a decade, and exceed the previous high record crop of 1909 by 2,513,000 bushels. The weather in the month of September, always a critical period for the Japanese rice crop, is reported to have been exceptionally favorable.

CEREAL PRODUCTION FOR 1911 IN THOUSANDS OF BUSHELS.

	Wheat.		Oats.		Barley.	
	1911.	1910.	1911.	1910.	1911.	1910.
Canada	[illegible]	[illegible]	‡348,574	[illegible]	‡43,529	[illegible]
Australia	‡98,109	‡93,963	[illegible]	[illegible]	[illegible]	[illegible]
France	‡314,197	257,667	‡304,452	290,776	‡48,812	‡43,447
Italy	[illegible]	‡151,168	440,973	28,574	‡10,882	9,483
Roumania	‡93,7[illegible]4	‡110,761	[illegible]	[illegible]	[illegible]	[illegible]

‡Revised estimate.
‡Final estimate.

INTERSTATE COMMERCE COMMISSION.

The commission has reopened the investigation of the matter of substitution of tonnage at transit points (18 I. C. C., 280), and will hold hearings beginning January 29, 1912.

Commissioner Harlan will conduct a hearing on January 24 at Duluth in the case of the Duluth Commercial Club against the railways involving complaints of discrimination in the lake and rail rates from eastern points to Duluth as compared with the rates to Minneapolis and St. Paul and other points.

The commission has formally ordered that all applications for relief under the fourth section filed on or before February 17, 1911, on which the sole ground for asking for relief for a rate made from producing point to consuming point, but not made to intermediate points is that the intermediate points are not producing or consuming points, should be denied.

Reparation Awarded.

George M. Spiegle & Co. et al. v. Southern Railway et al. Opinion by Commissioner Lane:

In 19 I. C. C., 526, the commission found that the complainant was entitled to reparation, and the complainant and defendants have now agreed on the amount of that reparation. (22 I. C. C., 82.)

Complaints Dismissed.

C. N. Dietz Lumber Co. v. Atchison, Topeka & Santa Fe et al. Opinion by the commission:

A tariff which limits reconsignment privilege under through rate to the first 48 hours after the arrival of a car at destination, is held to be a not unreasonable limitation. (22 I. C. C., 75.)

Raymond B. Scudder v. Texas & Pacific et al. Opinion by the commission:

On a shipment of sugar which required two cars, but which was only sufficient to provide 24,205 lbs. for the second car, a minimum carload weight of 33,000 lbs. was charged for, and this the commission holds to be the proper charge. (22 I. C. C., 60.)

STATE COMMISSIONS.

The North Dakota Railway commission has ordered carriers subject to its jurisdiction to restore their special rates on implements returned for repair, effective March 1, 1912.

The Indiana Railway Commission has ordered the Cleveland, Cincinnati, Chicago & St. Louis to deliver coal in carload lots to the Indianapolis Union for switching to the Terre Haute, Indianapolis & Eastern electric railway for transportation to Plainfield. The steam line is authorized to charge $2 per car for the service.

The Indiana Railway commission has ordered that the manufacturers' rate of 65 cents per ton be applied on coal delivered to the Kokomo, Marion & Western Traction Company instead of the ordinary rate of 75 cents. The commission held that the traction company is a manufacturer of electric current and is therefore entitled to the lower rate.

The Indiana State Railroad Commission has decided that a railway furnishing cars to shippers, complying with the shipper's request to weigh such cars, may charge for weighing if it does not show the stenciled weight to be more than 500 lbs. out of the way. The Citizens' Gas Company, receiving cars to be loaded with coke complained at having to pay for having them weighed.

The New York State Public Service Commission, first district (New York City), the support of which is borne by the city treasury, has made requisition for $1,367,000 to defray the expenses of the commission for the year 1912. This is a considerable increase over the sum granted for 1911. The supervision of the construction of new subways, including preliminary work and the prepartion of plans, will take 80 per cent. of the sum named.

The suit of the Indiana Railroad Commission against the Grand Trunk, as reported in the *Railway Age Gazette*, December 8, page 1184, was based on the Indiana block signal law of 1907; and although the case will probably be appealed to a higher court for the purpose of settling points of law, the actual relation of this railway to the state of Indiana in the matter of

block signals is not affected, as the recent action of the commission in the premises has been based on the stronger law, passed this present year. Under this law the Grand Trunk requested the commission to extend to January 1, 1913, the time within which compliance with the law would be required; and, the commission having done this, the road has agreed to install by the date mentioned automatic block signals throughout its line in Indiana, a distance of 83 miles.

COURT NEWS.

The supreme court of the United States has sustained the constitutionality of the full-crew law of Indiana.

The supreme court of the United States has sustained the law of Illinois, making cities and counties responsible for damage to property by mobs.

The supreme court of Indiana, in a suit where a train blocked a highway crossing beyond the time allowed by law, thereby preventing fire engines from reaching a burning building, holds that the railway company is liable to the owner of the building for the damaged sustained.

On application of the Southern Pacific the federal court at San Francisco has temporarily enjoined the California State Railway Commission from enforcing an order recently issued reducing freight rates between Los Angeles and San Pedro. The Southern Pacific calls attention to the fact that, while the reduction ordered amounts to 30 per cent., the commission has left undisturbed the rates between the same places for similar distances by the lines of other companies.

Oliver Huff, a freight train conductor of the New York, New Haven & Hartford, has secured a verdict in the United States Circuit Court at New York City for $22,500, in a suit against the road for injuries sustained in a collision of freight trains at Fairfield, Conn., last June. Huff sued under the federal employers' liability law, and the court, Judge Hough, sustained his contention that the fellow-servant rule had been abrogated by the employers' liability law. It was held that the conductor's injuries were caused by the negligence of the engineman or the signalman.

The court of criminal appeals of Texas has sustained the law of that state which provides that the conductor of a railway train shall have had a certain amount of experience as a conductor or two years' experience as a brakeman. The case was that of W. W. Smith of Gregg county, who had been fined $25 for acting as conductor contrary to law. It appears that Smith had had long experience as a locomotive engineman. This fact was duly recognized by the court, and it was even admitted that the experience of Smith as engineman may have fitted him to act as conductor, within the spirit of the law. But the judge appears to have been a strict constructionist, and so he decided against Smith. The railway company, the Texas & Gulf, will probably have the case appealed.

The demurrers interposed by the defendants in the government's suit brought against the Hamburg-American Packet Company and other transatlantic steamship lines to dissolve the so-called Atlantic Conference as repugnant to the provisions of the Sherman law have been overruled by the United States Circuit Courts. The opinion of the court is written by Judge Noyes, who says that it may be accepted without discussion that the transportation of passengers between this country and Europe forms a part of the commerce of the United States, and also that Congress clearly has the power to prohibit all contracts, combinations and conspiracies in restraint of such part of the foreign commerce of the United States. The real question, says the court, is not one of power but of interpretation, and that question may be divided into two phases; first does the agreement in question directly and materially affect foreign commerce? and, second, does such agreement with the acts stated in the petition amount to an unlawful contract, combination or conspiracy?

Elevator Charges at Omaha.

The decision of the United States Supreme Court in the case of the Union Pacific v. Updike Grain Company et al., handed down December 4, sustains the contention of the elevator men that they should be allowed compensation by the railways for elevating grain, in spite of the fact that the cars were not promptly returned to the Union Pacific, as required by the rule. The rule is held to be unreasonable. The decision is by Mr. Justice Lamar and contains a brief history of the protracted litigation concerning elevator charges at Omaha and other points on the Mississippi river. In 1899 the Union Pacific made an agreement with Mr. Peavey to build an elevator at Council Bluffs and to pay him 1.5 cents per 100 lbs. for elevating grain; and also made similar contracts with other elevators on its lines controlled by or affiliated with Peavey. The arrangement, with the allowance, was made for the purpose of securing prompt return of Union Pacific cars to the shipping points. Subsequently the road agreed to pay for similar service at elevators not erected immediately adjacent to Union Pacific tracks; but there was a condition that this payment would not be made unless the empty car got back to the Union Pacific in 48 hours. In the cases of Updike and others, it frequently happened that the cars did not get back within 48 hours. This appears to have been due, sometimes, perhaps generally, to the rule allowing the switching road to return a foreign car home by some other route; but the Union Pacific refused to pay for the unloading. The elevator men went to the Interstate Commerce Commission and got a decision in their favor. This was sustained by the court, although the road alleged that the elevators had performed the service in their own interests and not on behalf of the road, or of the public, and also claimed that its own tariff, allowing these charges, was unlawful. The Circuit Court of Appeals sustained the trial court.

Justice Lamar considers the subject under three heads. First, was the claim of the Union Pacific that this elevator service was not strictly a transportation service, and therefore was not chargeable against the carrier. But the law of June 29, 1906, amending the interstate commerce law, made the term "transportation" include elevation and transfer in transit, and all services in connection therewith; required carriers to provide and furnish such "transportation"; and recognized that the shipper himself might own the elevator performing this transportation service. The commission had before that decided that the contract with Peavey was valid, and the act of Congress must be taken as a legislative recognition of the practice of the Union Pacific, and a declaration that the incidental advantage derived by the owner of the elevator was not undue. The commission, in April, 1907, reduced the elevator allowance from 1.5 cents to 0.75 cent, this being held to be the actual cost, and no allowance was made for profit. It prohibited payment for this work to the owner of grain, but the court reversed this part of the decision, holding that Congress had expressly permitted such payment. This disposes of the Union Pacific's contention that its tariff was unlawful.

Secondly, was there a service performed for the carrier? This is answered in the affirmative, the handling of the grain by Updike and others relieving the carrier of the expense of building elevators. By sending the cars to the elevators over switching roads the carrier avoided the delay and expense of transferring the grain from one car to another by shoveling. The carrier received value for which it was bound to pay, and the elevator could not be deprived of its right because, by the operation of rules adopted by the railway companies jointly, the foreign cars were not returned to the Union Pacific.

Thirdly, the Peavey companies had received compensation, because their elevators happened to be located on the Union Pacific, and making a rule which affected the other companies differently was unreasonable discrimination. The road might load all of Peavey's grain into U. P. cars and use foreign cars for all going to the other elevators. The power thus to discriminate would prevent the enforcement of any regulation. To receive the benefit of the service by an elevator without making compensation would in effect be involuntary payment by such elevator of a rebate to the carrier. The rule might be fair on its face, but it was unfair in operation.

It appears that the Union Pacific was able to show that some 200 cars were slow in returning because of failure of the elevator men to promptly unload; and for these the elevator men accepted a ruling by the court that they were not entitled to recover.

Within the next few months an additional 180 miles of the La Plata-Mercedes-Quinto Railway, being built by the Argentine government, will be opened to traffic.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

W. G. Wheeler, attorney for Wisconsin of the Chicago & North Western at Milwaukee, Wis., has been appointed assistant general counsel, with office at Chicago. E. M. Smart succeeds Mr. Wheeler.

O. L. Clarke, land and tax commissioner of the Gulf, Colorado & Santa Fe at Galveston, Tex., has had his jurisdiction extended over that portion of the Pecos & Northern Texas between Coleman, Tex., and mile post 461.

Following a reorganization of the Ocean Shore Railroad Company on December 1, S. W. Reynolds, agent for the owners, has been elected president, with office at San Francisco, Cal., and J. W. Crosby, auditor, has been appointed secretary and treasurer.

W. W. Walker, vice-president and general manager of the Duluth, South Shore & Atlantic and the Mineral Range Railroad at Duluth, Minn., has been elected also a director and president of the Mackinac Transportation Company, succeeding W. F. Fitch, resigned.

Edward T. Platt, treasurer of the United States Express Company at New York City, has been elected vice-president and general manager. C. H. Crosby, formerly vice-president and general manager, is now second vice-president, and C. D. Martin has been appointed treasurer.

Francis I. Gowen, general solicitor of the Pennsylvania Railroad at Philadelphia, Pa., has been appointed general counsel, succeeding George V. Massey, who retires on December 31. George S. Patterson, assistant general counsel, has been appointed general solicitor, succeeding Mr. Gowen.

Arch B. Eldredge, who has been elected president and general counsel of the Duluth, South Shore & Atlantic, with office at Marquette, Mich., was born May 12, 1853, at Fond du Lac, Wis. He spent two years at Princeton College and graduated from Racine College, at Racine, Wis., with the A. B. degree in 1875. Mr. Eldredge studied law in the office of his father at Fond du Lac, and went to Ishpeming, Mich., as attorney for the Chicago & North Western in that state in 1882. He was made general attorney of the Duluth, South Shore & Atlantic at Marquette, Mich., in 1890, engaging in the general practice of law at that place, besides taking charge of the legal matters of the road. From May, 1910, until his election as president and general counsel, as above, he was vice-president and general attorney of the Duluth, South Shore & Atlantic, with office at Marquette.

A. B. Eldredge.

H. J. Horn, assistant to president of the New York, New Haven & Hartford at New Haven, Conn., who will become vice-president in charge of the operating department on January 1, as has been announced in these columns, was graduated from the Massachusetts Institute of Technology, in the civil engineering course, in 1888; prior to graduation he spent three summers in the field on location or construction, and for the first few years after graduation was in various engineering positions, such as assistant engineer on the Chicago Great Western and on the Northern Pacific, part of the time in Montana and Washington, and on the Northern Pacific in Chicago. He entered the operating department of the Northern Pacific in October, 1893, as superintendent of bridges and buildings of the Minnesota division, and on January 1, 1897, became superintendent of the Montana division. He was appointed general superintendent of the Middle district in November, 1902, at Livingston, Montana, and on February 1, 1903, became general manager of the Northwestern Improvement Company, in charge of the coal department, mining and marketing the coal mined in Montana and Washington. In April, 1904, he became general manager of the Northern Pacific at St. Paul, and left that road in October, 1907. He was then in a commercial and jobbing business until May, 1910, when he became assistant general manager of the Chicago, Burlington & Quincy, west of the Missouri river, with office at Omaha, Neb., and since December 1, 1910, was assistant to the president of the New York, New Haven & Hartford.

Operating Officers.

C. S. Cunningham, acting superintendent of the Grand Trunk at Detroit, Mich., has been appointed superintendent of the Western division, with headquarters at Detroit, Mich.

James B. Gilmer, formerly assistant general manager of the Texas Central at Waco, Tex., has been appointed general superintendent of the Missouri, Oklahoma & Gulf, with office at Muskogee, Okla.

G. A. Berry, chief engineer of the Gulf, Florida & Alabama, now under construction between Pensacola, Fla., and Local, Ala., has been appointed general manager, in charge of operation, with office at Pensacola.

F. R. Westrup, trainmaster of the National Railways of Mexico at Guadalajara, Jal, Mex., has been appointed superintendent, with office at Chihuahua, Chi., Mex., succeeding D. F. Bucher, resigned to accept service with another company.

The following officers of the Gulf, Colorado & Santa Fe have had their jurisdiction extended over that portion of the Pecos & Northern Texas between Coleman, Tex., and mile post 461: J. H. Keefe, assistant general manager; W. E. Maxson, general superintendent; J. Matthews, telegraph manager; K. S. Hull, division superintendent; E. E. Taylor, trainmaster, and A. J. Johnston, chief despatcher.

Henry Baldwin, trainmaster of the Savannah division of the Central of Georgia, at Savannah, Ga., has been appointed transportation inspector and will be assigned to duties in connection with agencies, yards and train service, reporting to G. L. Candler, superintendent of transportation, at Savannah, C. E. Scarboro, chief despatcher succeeds Mr. Baldwin and A. O. MacDonald, track despatcher, succeeds Mr. Scarboro.

Albert Wilcox, whose appointment as general superintendent of the Canadian Northern, with office at Edmonton, Alt., has been announced in these columns, was born January 2, 1865, at Kincardine, Ont., and received a public school education at Owen Sound, Ont. He began railway work in 1881 with the Toronto, Grey & Bruce Railway, now a part of the Canadian Pacific, and became an operator on the latter road at Winnipeg, Man., in September, 1883. For four years he served as operator and agent at various points, was appointed despatcher at Moose Jaw, Sask., in May, 1887, and three years later was promoted to chief despatcher. He left the Canadian Pacific in June, 1903, to become chief despatcher of the Canadian Northern at Port Arthur, Ont., and was promoted to superintendent at the same place in 1904, which latter office he was holding at the time of his appointment as above.

C. A. Searle, assistant to the third vice-president of the Chicago, Rock Island & Pacific at Chicago, has been appointed manager of mail traffic of the Rock Island Lines, effective January 1, succeeding Guy Adams, whose appointment as manager of mail traffic of all 'Frisco lines has been announced in these columns. Mr. Searle was born at Fairfax, Vt., and began railway work in 1886 in the general office of the Central Vermont Railway at St. Albans, Vt. He was appointed secretary to the freight traffic manager in 1888, and from 1893 to 1895 was chief claim clerk, resigning in the latter year to become chief clerk to the traffic manager of the Baltimore Steam Packet Company at Baltimore, Md. During 1898 he was connected with the Signal Corps of the Navy Department at Washington, D. C., and in December of that year went with the Chicago, Rock Island & Pacific as general excursion agent. In 1902 he was made assistant to John Sebastian, then passenger traffic manager of the Rock Island

Lines, and when the latter was promoted to third vice-president in charge of passenger traffic in 1910, Mr. Searle continued as his assistant.

C. H. Baltzell, who has been appointed superintendent of the St. Louis & San Francisco, with office at Thayer, Mo., as has been announced in these columns, was born at Topeka, Ill., on August 24, 1865. He attended school from 1871 to 1880 at Mason City, Ill., and in the latter year began railway work as a messenger on the Chicago & Alton. He was an operator on the same road for three years from 1881 and was then for six years with the St. Louis, Iron Mountain & Southern, having been a despatcher from 1887 to 1890. From 1890 to 1896 he was train despatcher on the Missouri, Kansas & Texas, first at Parsons, Kan., and later at Denison, Tex., and in 1896 returned to the Iron Mountain, where he remained for seven years as train despatcher. He then went with the Chicago, Rock Island & Pacific as train despatcher, was promoted to trainmaster in 1905, and from March, 1907, to September of the same year he was in New Mexico on account of illness. From September, 1907, to December 10, 1911, the date of his recent promotion, he was trainmaster and assistant superintendent of the St. Louis & San Francisco at Thayer, Mo.

C. H. Baltzell.

Traffic Officers.

C. B. Gregory has been appointed general agent of the Colorado Midland, with office at Pittsburgh, Pa., succeeding Frank M. Townsend, deceased.

W. R. Miller, traveling freight agent of the Chesapeake & Ohio at Richmond, Va., has been appointed traveling freight agent, with headquarters at St. Louis, Mo.

N. H. Hall, commercial agent of the Trinity & Brazos Valley at Galveston, Tex., has been appointed foreign freight agent of the Rock Island Lines, with headquarters at Galveston.

R. S. Fife, general eastern agent of the Missouri, Kansas & Texas in charge of freight traffic matters, with office in New York City, has had his jurisdiction extended over passsenger traffic matters.

H. E. Frost, soliciting agent of the Norfolk & Western Despatch at St. Louis, Mo., has been appointed commercial agent, with headquarters at St. Joseph, Mo., and L. E. Trowbridge succeeds Mr. Frost.

E. D. Kyle, until recently assistant general freight agent of the Seaboard Air Line at Jacksonville, Fla., is now freight traffic manager, and R. I. Cheatham, assistant general freight agent at Norfolk, Va., is now assistant freight traffic manager, both with offices at Portsmouth.

W. C. Connor, Jr., traffic manager of the New Orleans, Texas & Mexico, the Beaumont, Sour Lake & Western and the Orange & North Western, at Houston, Tex., has been appointed general eastern agent of the Frisco Lines, with office in New York City, succeeding S. S. Butler, whose appointment as assistant to the vice-president, in charge of all traffic on the Frisco Lines in Louisiana and Texas, at Houston, has been announced in these columns.

E. S. Sawyer, general freight agent of the Cleveland, Akron & Columbus at Columbus, Ohio, has been appointed assistant general freight agent of the Pennsylvania Lines West, with office at Pittsburgh, Pa. E. F. Austin, traveling freight solicitor at Toledo, Ohio, has been appointed division freight agent of the Akron division and commercial agent of the Pittsburgh, Cincinnati, Chicago & St. Louis, with office at Columbus, succeeding to the duties of F. E. Sawyer, promoted. J. C. Venning has been appointed ore and coal agent, with office at Pittsburgh, and H. H. Gray has been appointed division freight agent of the Marietta division, with office at Cambridge, Ohio, succeeding H. A. French, deceased.

C. McD. Davis, whose appointment as general freight agent of the Atlantic Coast Line, with office at Savannah, Ga., has been announced in these columns, was born on July 1, 1879, at Hickory, N. C., and was educated in the public schools. He began railway work on March 1, 1893, as a messenger in the freight office of the Wilmington & Weldon, now part of the Atlantic Coast Line, at Wilmington, N. C., and was then made delivery clerk. He held various positions, and was then appointed chief rate clerk of the freight traffic department of the Atlantic Coast Line. He was promoted to chief clerk in the traffic department, of the Atlantic Coast Line in July, 1902; and in January, 1906, was appointed assistant general freight agent in charge of tariff bureau, which position he held at the time of his recent appointment as general freight agent of the lines south of Charleston, S. C.

Robert Norfleet Nash, who has been appointed assistant general freight agent of the Atlantic Coast Line, with office at Wilmington, N. C., as has been announced in these columns, was born on February 26, 1880, at Tarboro, N. C., and was educated in the common schools. He began railway work in September, 1897, with the Atlantic Coast Line as a messenger in the freight office at Wilmington, and the following week was transferred to the general superintendent's office. In October of the following year he entered the freight traffic department as file clerk and held various positions in that department until he was made chief clerk in January, 1910, which position he held at the time of his recent appointment as assistant general freight agent of the same company.

Stewart R. Lewis, whose appointment as general freight agent of the Duluth, South Shore & Atlantic and the Mineral Range Railroad, with office at Duluth, Minn., has been announced in these columns, was born February 14, 1869, in Ontario. He received a high school education and began railway work October 7, 1886, as messenger and stenographer with the Canadian Pacific. Two years later he became a stenographer in the general freight department of the Duluth, South Shore & Atlantic, with which road he has been ever since. From May, 1890, to September 1, 1907, he was rate clerk and chief clerk, on the latter date becoming assistant general freight agent, with office at Duluth, from which position he was promoted on November 30 to general freight agent of the Duluth, South Shore & Atlantic and Mineral Range Railroad.

Stewart R. Lewis.

Robert C. Lee, whose appointment as chairman of the Western Classification Committee, with office at Chicago, has been announced in these columns, was born at Kilbourne, Scotland, in 1872. He was educated in the public schools at St. Louis, Mo., and began railway work August 1, 1890, as a mailing clerk in the general freight office of the St. Louis Southwestern at St. Louis. He held various clerical positions with that road until September 16, 1898, when he was appointed chief rate clerk in the general freight department at Tyler, Tex., and in April, 1901, was appointed chief clerk in the same department. He was promoted to assistant general freight agent on December 25 of the same year, and was assistant general passenger agent also

from September, 1905, until January 1, 1908, when he was made a member of the original Uniform Classification Committee. Later in 1908 he returned to the St. Louis Southwestern and again had the title of assistant general freight and passenger agent for a few months. In September of the same year he became a member of the present Committee on Uniform Classification, which position he held at the time of his appointment as above.

J. A. Middleton, freight traffic manager of the St. Louis & San Francisco at St. Louis, Mo., has had his jurisdiction extended over the Chicago & Eastern Illinois, and F. C. Reilly, general freight agent of both roads, has been appointed assistant freight traffic manager, with office at St. Louis. The office of general freight agent at St. Louis has been abolished. B. H. Stange, assistant general freight agent in charge of freight claims of the Chicago & Eastern Illinois at Chicago, has been appointed an assistant general freight agent of the St. Louis & San Francisco at St. Louis, succeeding E. T. Willcox, resigned, and E. S. Stephens, general agent in the freight department of both roads at Chicago, succeeds Mr. Stanage. T. O. Jennings, assistant general freight agent of the Chicago & Eastern Illinois at Chicago, has been appointed general freight agent of that road, succeeding Mr. Reilly. J. H. Doughty, commercial agent of both roads at Memphis, Tenn., succeeds Mr. Stephens as general agent in the freight department at Chicago, and R. F. Buchanan, commercial agent at Chattanooga, has been transferred to Memphis, succeeding Mr. Doughty. C. L. Marsh succeeds Mr. Buchanan, effective January 1.

R. N. Collyer, chairman of the Committee on Uniform Classification, effective January 1, has been appointed chairman of the Official Classification Committee, succeeding Frederick S. Holbrook, resigned to become general traffic manager of the Wells, Fargo & Company Express. Mr. Collyer was born October 8, 1866, at Stockton, England, and received a grammar school education at Bayonne, N. J. In August, 1881, he began railway work in New York with the "Bee Line," now part of the Cleveland, Cincinnati, Chicago & St. Louis; and remained in the passenger department of that road until 1886, when he went with the Chicago, Burlington & Quincy as a clerk in the freight traffic department. He was later consecutively, cashier, traveling freight agent and contracting freight agent at New York of the same road, and from 1889 to 1908 was with the Wabash, first as freight agent, then assistant general eastern agent, then division freight agent at Buffalo and subsequently general agent at the same place, and from 1907 assistant general freight agent at St. Louis. He resigned the last mentioned office to become a member of the Committee on Uniform Classification, being one of the representatives of the Official Classification lines, and since June, 1909, has been chairman of the Committee on Uniform Classification.

R. N. Collyer.

W. D. Skinner, general freight and passenger agent of the Oregon-Washington Railroad & Navigation Company at Seattle, Wash., has been appointed general freight agent, in charge of rates and tariffs, and his former office has been abolished, his duties in the passenger department being assumed by William McMurray, general passenger agent at Portland. F. W. Robinson, general freight agent at Portland, has been appointed general freight agent in charge of agencies and industrial development. J. R. Stein, chief clerk in the general freight department, has been appointed assistant general freight agent, and A. C. Martin, chief clerk in the general passenger department, has been appointed assistant general passenger agent; all with offices at Portland, Ore. E. E. Ellis, general agent at Seattle, has been appointed district passenger agent, and F. R. Hanlon, local freight agent at Seattle, has been appointed district freight agent at that place; both to have jurisdiction over Seattle and territory north of Tacoma, Wash. Robert Lee, general agent at Tacoma, has been appointed district passenger agent, and William Carruthers, traveling freight and passenger agent at Tacoma, has been appointed district freight agent at that place; both to have jurisdiction over Tacoma and main line points between Tacoma and Vancouver, Wash. H. P. Potter has been appointed district freight and passenger agent, with office at Aberdeen, Wash., with jurisdiction over the lines west of Centralia, Wash., succeeding J. F. Davidson, transferred.

Engineering and Rolling Stock Officers.

J. F. Sheehan has been appointed master mechanic of the Georgia & Florida, with office at Douglas, Ga.

W. C. Armstrong, terminal engineer of the Chicago & North Western at Chicago, has been appointed engineer of bridges, with office at Chicago, succeeding I. F. Stern, resigned to enter private practice.

John H. Mason has been appointed road foreman of engines of the Lehigh Valley and Susquehanna division of the Central Railroad of New Jersey, with office at Mauch Chunk, Pa., succeeding A. B. Enbody, promoted.

J. W. Small, superintendent of machinery of the Missouri Pacific at St. Louis, Mo., has been appointed superintendent of motive power of the Southern Pacific Lines in Texas, with office at Houston, Tex., succeeding J. J. Ryan, deceased.

R. F. Carley has been appointed chief operating engineer of the Illinois Traction System, with office at Peoria, Ill., succeeding W. H. Thompson, resigned to become general manager of the Des Moines Electric Company at Des Moines, Iowa.

W. W. Scott, formerly superintendent of shops, of the Cincinnati, Hamilton & Dayton at Moorefield, Indianapolis, Ind., has been appointed shop superintendent of the Pere Marquette at Saginaw, Mich., succeeding C. K. Woods, resigned.

The following officers of the Gulf, Colorado & Santa Fe have had their jurisdiction extended over that portion of the Pecos & Northern Texas between Coleman, Tex., and mile post 461: P. T. Dunlop, mechanical superintendent; F. Merritt, chief engineer; Maynard Robinson, master mechanic; S. F. Clapp, general foreman of bridges and buildings; and J. C. Whidden, roadmaster.

H. C. Needham has been appointed master mechanic of the Southwest system of the Pennsylvania Lines West, with office at Richmond, Ind., succeeding J. W. Hopkins, general foreman at that place, and the title of general foreman has been abolished. F. V. McDonnell, master mechanic of the Northwest system at Mahoningtown, Pa., has been appointed master mechanic of the Southwest system, with office at Logansport, Ind., succeeding J. J. Walsh, transferred.

Purchasing Officers.

T. O. Wood, purchasing agent of the Gulf, Colorado & Santa Fe, and E. S. Newton, general storekeeper, both at Cleburne, Tex., have had their jurisdiction extended over that portion of the Pecos & Northern Texas between Coleman, Tex., and mile post 461.

OBITUARY.

D. N. Correll, roadmaster of the Lake Erie & Western, with office at Peru, Ind., died at that place on December 12.

Captain W. P. Wright, formerly and for many years a trainmaster of the Chesapeake & Ohio, died on December 14, at his home in Bedford City, Va., at the age of 76.

F. M. McKeon, traveling freight and passenger agent of the Spokane & Inland Empire, with office at Spokane, Wash., committed suicide by inhaling illuminating gas in a hotel at San Francisco, Cal., on December 11.

J. C. Wood, general agent of the Chicago, Milwaukee & St. Paul, with headquarters at Pittsburgh, Pa., died at that place on December 13. Mr. Wood was born at Madison, Ind., 46

years ago and spent most of his life in railway work. He was for a time commercial agent of the Chicago, Indiana & Southern at Chicago and later general agent of the Chicago, Milwaukee & Puget Sound at the same place. Since July, 1910, he has been general agent of the C., M. & St. P. at Pittsburgh.

Ralph E. Lawrence, general agent, freight department, of the Wabash Railroad at Pittsburgh, Pa., died at his home in Crafton on December 14. Mr. Lawrence was born in Ohio and began railway work as a telegraph operator on the Cleveland & Pittsburg at Bridgeport. He was later chief clerk to the general agent of the Cleveland, Lorain & Wheeling, now a part of the Baltimore & Ohio, at Wheeling, W. Va., and then chief clerk to the general agent of the Wheeling & Lake Erie. About three years ago Mr. Lawrence was appointed general agent of the Wabash at Pittsburgh.

James M. Root, who died at his home in New York City this week, at the age of 67, was a hero of the forest fires in Minnesota in the summer of 1894. On August 31, Root was engineman on a passenger train on the St. Paul & Duluth running from Duluth south. The fires had wiped out Hinckley and other towns. Root's train was crowded with passengers. When he was unable to proceed farther he ran the train back seven miles through dense smoke to a small swamp where the passengers escaped the flames by submerging their bodies in the water. Root himself was badly burned and nearly suffocated.

Oswald Morley Laing, general superintendent of the Central New England, died on December 15 of typhoid fever at Hartford, Conn. Mr. Laing was born at London, Ont., on July 28, 1872, and was educated in the public schools and at the Collegiate Institute. He began railway work in 1890 as a clerk in the auditing department of the Chicago, Burlington & Northern, then went to the St. Paul & Duluth. In April, 1898, he went to the Seattle & International Railway as cashier and was also purchasing agent. He afterward was chief clerk to the superintendent of the Seattle division of the Northern Pacific, and in October, 1902, was appointed purchasing agent and general storekeeper of the Tennessee Central. In 1905 he was elected secretary of that company and of the Nashville Terminal Company. Mr. Laing went to the Central New England in 1906 as assistant superintendent and became general superintendent in January, 1909.

FOREIGN RAILWAY NOTES.

The Chilean government has aided the construction of railways by private capital by guaranteeing 5 per cent. bonds to the extent of $62,847,046, covering four lines.

The Russian council of ministers recently resolved that the Warsaw-Vienna Railway should immediately be taken over by the state, and that a bill to that effect should be introduced into the Duma. The railway is of great strategic importance, and the purchase price is estimated to be about $16,000,000.

The committee charged with the work of studying the advisability of electrifying the government railway from Valparaiso, Chile, to Santiago, with the branch to Los Andes, covering a distance of about 150 miles, has made a favorable report and placed the cost, if done by the government, at $10,888,460, while it is reported that an American electric company has offered to do the work for $5,424,400.

Negotiations are under way to open up a railway and water route through from the northern Chilean ports of Antofagasta and Arica to Viejo, a port in eastern Brazil, where steamers connect with European ports. It is claimed the journey can be made by this route within 20 days. In order to complete this route it is necessary to construct only 149 miles of road to connect Cochabamba, the second city of Bolivia, with Chimore on a branch of the Mamore river.

The London & North Western Railway has made complete arrangements for the collection and delivery of Christmas parcels in all the principal towns on its system, and all parts of Wales, Scotland and Ireland. Special parcel trains will be run and through cars will also be attached to the principal passenger trains, while additional delivery and collection services will be in operation during the Christmas week. The Midland Railway is also organizing special express trains in addition to the through cars which will be attached to long distance express trains.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Texas & Pacific is said to be preparing specifications for 10 eight-wheel locomotives and 10 consolidation locomotives. This item has not been confirmed.

The Grand Trunk is said to have ordered 25 heavy consolidation locomotives from the Canadian Locomotive Company. This item has not yet been confirmed.

The Chicago & North Western has ordered 15 switching locomotives, 15 passenger locomotives and 45 freight locomotives from the American Locomotive Company.

The Delaware & Hudson has ordered 3 Mallet locomotives from the American Locomotive Company, and will soon order 10 or 12 more locomotives, but it has not yet been decided whether they will be Mallet locomotives or heavy consolidation locomotives.

The Pacific Mills, Lawrence, Mass., have ordered 1 four-wheel locomotive from the American Locomotive Company. The dimensions of the cylinders will be 17 in. x 24 in., the diameter of the driving wheels will be 46 in., and the total weight in working order will be 102,000 lbs.

The Chicago, St. Paul, Minneapolis & Omaha has ordered 5 six-wheel switching locomotives from the American Locomotive Company. The dimensions of the cylinders will be 18 in. x 24 in., the diameter of the driving wheels will be 51 in., and the total weight in working order will be 130,000 lbs.

CAR BUILDING.

The Great Northern is making inquiries on 40 refrigerator cars.

The Canadian Pacific is asking for bids on 200 refrigerator cars.

The Lehigh Valley is in the market for 250 twenty-five-ton refrigerator cars.

The Elgin, Joliet & Eastern is figuring on 500 dump cars and 250 gondola cars.

The Atlanta, Birmingham & Atlantic is building 20 stock cars at the company's shops.

The Rock Island Lines are figuring on about 3,000 freight cars and some passenger cars.

The Illinois Central has ordered 500 box cars from the American Car & Foundry Company for the Central of Georgia.

The Chicago, St. Paul, Minneapolis & Omaha has ordered 500 box cars and 100 refrigerator cars from the American Car & Foundry Company.

The Atlanta & West Point is making arrangements to build 100 thirty-ton box cars and 10 forty-ton automobile cars at the company's shops.

The Chicago & North Western, mentioned in the *Railway Age Gazette* of December 8, as having ordered 1,250 box cars from the Pullman Company, has increased the order to 1,750.

The Pennsylvania Railroad, mentioned in the *Railway Age Gazette* of December 8 as being in the market for from 3,000 to 6,000 freight cars, is now in the market for from 1,000 to 2,000 fifty-ton all-steel, coke cars, 1,000 to 2,000 seventy-ton, all-steel, gondola cars, 1,000 to 2,000 seventy-ton, all steel, hopper cars and 1,000 to 2,000 seventy-ton, all-steel, coke cars.

IRON AND STEEL.

The Boston & Maine is in the market for 200 tons of bridge material.

The Chicago & North Western has ordered 60,000 tons of rails from the Illinois Steel Company.

General Conditions in Steel. There has been a lull in the steel industry during the past few days, owing to the postpone-

ment of large orders until after the holidays. Steel manufacturers are optimistic about the outlook. A large increase in production is expected immediately after the first of the year; and idle furnaces are now being placed in readiness for blowing in. Although no statement has been issued from the offices of the Steel Corporation bearing on the results of the meeting of the presidents of the subsidiary companies held on December 19, it is believed that prices will be advanced about $1 a ton on standard products.

SIGNALING.

W. W. Finley, president of the Southern Railway, announces that automatic block signals are being installed on that company's line between Monroe, Va., and Montview, 12 miles; and that work will at once be begun on a similar installation between Denim and Charlotte, N. C., 96 miles.

The Chicago, St. Paul, Minneapolis & Omaha is installing automatic block signals on its line between Merrillan and Wyville, Wis., 40 miles. This line is double-track, and the signals are three-position. In connection with this work an all-electric interlocking plant is being installed at the gauntlet on the bridge over Black river.

The Pittsburg & Lake Erie is to install automatic block signals on its line between Dickerson Run and Connellsville, Pa.; and also between Roscoe and East California. The aggregate length of road is nine miles. The signals will be two-position, lower quadrant. The interlocking to be done by this company in the immediate future includes one all-electric plant of 88 levers and five mechanical plants of 72 levers.

The Central of Georgia contemplates the installation of automatic block signals within the next year on its line between Atlanta, Ga., and East Point, five miles, double-track. This line is now worked by the telegraph block system. The signaling plans for the ensuing year include also three new interlocking plants (mechanical) to be operated jointly with the Southern Railway, as follows: Griffin, Ga., 64 levers; Silver Creek, 24 levers; and East Rome, 40 levers. In all of these plants the distant signals will be power operated.

The Erie Railroad is to install automatic block signals on about 40 miles of its line, as follows: On the Northern of New Jersey from Bergen to Nyack, 24 miles double-track and 3 miles single track; on the New Jersey & New York from Oradell to Spring Valley, 13.5 miles, single track. These signals will be put up by the company's forces, the material being furnished by the Union Switch & Signal Company. The signals will be three-position, upper quadrant. The Erie has also given a contract to the Union Switch & Signal Company to erect mechanical interlocking plants at Polk and Burbank, Ohio, and to the General Railway Signal Company for mechanical interlocking at Madison and Ontario, Ohio. An interlocking plant is also to be put up at South Akron, Ohio, and the plant at Corning, N. Y., is to be enlarged from 40 levers to 60.

The Boston & Albany will instal automatic block signals on 40 miles of track in the near future. This work will involve the replacement of exposed disk and electro-gas signals with three-position upper quadrant semaphores between Springfield and Westfield, and Worcester and Charlton. Two interlocking plants are to be built and two plants rebuilt. A 32-lever mechanical plant will be installed at Brookline Junction; and the mechanical machine at Newton Highlands is to be replaced by a new 16-lever machine. Tower No. 31 at Webster Junction, Mass., is to have a new machine of 36 levers; and tower No. 55, at North Adams Junction, will be reconstructed to accommodate a machine of 76 levers. An 80-lever electrical plant, controlling a station cross-over layout, and a 60-lever mechanical plant, governing a yard entrance, are to be installed at Worcester. The interlocking signals are to be upper quadrant. All of the mechanical interlocking plants are to be equipped with electric approach and route locking, and both home and distant signals at these plants will be power operated.

The Uruguayan concession, given to Caprario & Company, and sold to a German syndicate, for a railway from the port of La Paloma to Treinta y Tres has been cancelled, owing to the failure of the concessionaires to fulfill the conditions.

Supply Trade News.

The McKeen Motor Car Company, Omaha, Neb., has recently shipped two 70-ft., 200-h. p. gasolene motor cars to the Victorian Railways, Melbourne, Australia. The shipment required five flat cars for transportation to Tacoma, where it will be shipped via the Frank Waterhouse line. The two boxes containing the car bodies were 70 ft. long, 11 ft. wide and 10 ft. high. They are said to be the largest boxes ever shipped in the history of rail or water transportation. The cars are adapted to the Victorian Railways, which have a 5-ft. 3-in. gage.

J. Will Johnson, sales agent of the Pyle National Electric Headlight Company, Chicago, will be appointed general manager January 1, in charge of the sales department, with supervision of traveling representatives. Crawford P. McGinnis, air brake inspector Minneapolis, St. Paul & Sault Ste. Marie, and Robert L. Kilker, brother of general superintendent John E. Kilker, were appointed representatives. Mr. Johnson was born in Charleston, S. C., September 10, 1869. He started in January, 1886, in the freight department of the St. Louis & San Francisco, Pierce City, Mo., and was brakeman for one and a half years and fireman for two and a half years. In June, 1890, he was made locomotive engineer on the St. Louis & San Francisco, at Springfield, Mo. September 1, 1902, he entered the mechanical department of the Pyle company. In February, 1904, he was appointed special representative, and in September, 1908, he was appointed sales agent.

J. W. Johnson.

A Permanent Exhibit of Railway Supplies.

S. Karpen & Brothers, the owners of the new Karpen building, Chicago, have announced that plans have been perfected for a permanent exhibition of railway supplies, to occupy the entire twelfth floor of the Karpen building. It is proposed to make the exhibition a central headquarters for the display of appliances, used in railway operations, where railway officers may examine samples or models of new devices or improvements.

The floor contains 36,000 sq. ft. of space, of which 26,000 sq. ft., exclusive of aisles, will be devoted to exhibit booths. The space has been divided into 134 booths, and the size of allotments will be arranged in accordance with the requirements of exhibitors. Over 60 applications for space have already been received, enough to ensure the execution of the project, and it is expected that several booths will be in readiness for exhibition immediately.

The entire floor is to be free of partitions and is well lighted. In addition to the exhibit booths the plan of arrangement includes a secretary's office, a large meeting or directors' room, several smaller committee rooms and a large assembly hall seating 250 persons. This hall will be placed at the disposal of both railway and supply men's organizations for meetings free of charge.

Booth spaces are to be separated by bronze railings and the management will provide each booth with a desk, chairs, and a table, all of mahogany, also a telephone and electric light. Electricity, steam or water for the operation of models or machinery will also be provided.

It is the purpose of the management to exercise care in regard to the character of the exhibits admitted, and each visitor will be required to register. It is believed that the establishment of the permanent exhibition will fulfill an important function, enabling a railway man to inspect in a single visit the principal devices and appliances in which he is interested without the necessity of traveling to several different plants.

Railway Construction.

New Incorporations, Surveys, Etc.

Alberta Roads.—Prime Minister Sifton recommends that provision should be made at the present session of the provincial legislature for building lines in Alberta as follows: From Edmonton northwest to the Grande Prairie country. From Athabasca Landing to Peace River Landing. From Athabasca Landing to a point near Fort McMurray, with a branch to Lac la Biche. From Edmonton along the north shore of the Saskatchewan river east to Cold lake, at the eastern boundary of the province. Continuation of the line from Peace river to Edmonton in a southeasterly direction along the Strathcona-Camrose extension to the easterly boundary of the province to meet the Regina and Winnipeg lines. This will afford a short line passing through the three capitals and from Edmonton on to Grande Prairie. From Strathcona southerly to the Goose lake line to Calgary. From a point on the Stetler-Brazeau line to meet the Goose lake extension being built to Calgary. From Bruderheime on the Canadian Northern southerly between ranges 5 and 6, through to the southern boundary of the province.

Atchison, Topeka & Santa Fe.—A four-mile branch will be built, it is said, from the mouth of the San Luis Rey river, Cal., near Oceanside into the San Luis valley. H. C. Phillips, chief engineer, Los Angeles, Cal.

Canadian Northern.—Vice-president D. B. Hanna is quoted as saying that the line from Montreal, Que., to the Pacific coast will be completed by January 1, 1914. Construction work is progressing rapidly on the surveyed sections between Montreal and Port Arthur, Ont., and between a point on the western boundary of Alberta to the Pacific coast. Final plans regarding the construction of terminals at Montreal will be announced early next year, or as soon as all questions regarding the transfer of lands had been adjusted.

Canadian Pacific.—An officer writes that work is now under way on the south Ontario Pacific from Guelph Junction, Ont., to Hamilton, 16.3 miles. J. G. Sullivan, chief engineer, Winnipeg, Man.

Charlotte Harbor & Northern.—An officer writes that work is now under way from Cottman station, Fla., to Tiger Bay, nine miles. Stidham & Hughes, Limestone, are the contractors. G. S. Bruce, chief engineer, Boca Grande.

Crystal City & Uvalde.—An officer writes that surveys have been made for an extension from San Antonio, Tex., to Live Oak, 80 miles. E. Breaker, chief engineer, Crystal City, Tex.

Elk & Little Kanawha.—An officer writes that this company has completed track laying from Boggs, W. Va., west, thence north to Rosedale. J. J. Boxley & Son, Roanoke, Va., were the contractors. C. P. Peyton, chief engineer, Charleston, W. Va.

Frederick Railroad.—An officer writes that this company has projected an extension from Jefferson, Md., to Bonnsmith, eight miles. O. B. Cobleintz, chief engineer, Frederick, Md.

Grand Trunk Pacific.—An officer writes that this company now has 1,176 miles of line under construction and 627 miles under survey. B. B. Kelliher, chief engineer, Winnipeg, Man.

Great Northern.—This company has reached an agreement with the state commissioners of Washington over the right of way for the extension of the Great Northern north of Wenatchee. The company proposes to begin work on the construction of the branch within six months. The extension from Wenatchee will [illegible] a point near the Canadian border, where it will connect with another branch of the Great Northern that [illegible]. Construction work on the extension of the Oregon Electric [illegible] from Salem, Ore., south to Albany is under way and grading and bridging is expected to be completed by the first of the year. Eventually the line will be [illegible] Portland.

Gulf & Northern.—Incorporated in Mississippi with [illegible] to build from Gulfport, Miss., to Greenville. La. Hugo W. H. Ulving, Gulfport, Miss., P. A. Dolan, E. G. Bowen and G. F. Hyer, Jackson, Miss., are interested.

Ha Ha Bay Railway.—An officer writes that the Roberval-Saguenay Railway is to be built from Mathias Junction, Chicoutimi, Que., to Roberval, Lake St. John, 125 miles. J. F. Grenon, chief engineer, Chicoutimi, Que.

Illinois Traction System.—Announcment has been made that work on the northern extension from Morris, Ill., northeast to Joliet, 22 miles, has been completed, and it is understood that an extension will be built from Mackinaw southwest to La Salle, about 60 miles, next year. L. B. Martin, engineer maintenance way, Peoria, Ill.

Kittitas Railway & Power Company.—This company, with headquarters at Roslyn, Wash., is having surveys made by Brown Brothers, Seattle, for an interurban line from Roslyn into the Cle Elum mining district, about 40 miles. The plans include a hydro-electric power plant.

Montreal & Southern Counties (Electric).—An officer writes that this company has built 1.25 miles during 1911 in the province of Quebec from St. Lambert to County Club and has projected an extension from St. Lambert to Chambley, 14 miles. A. S. Going, chief engineer, Montreal.

National Railways of Mexico.—An officer writes that work has been finished changing the gage on 102 miles between Acambaro, Michoacan and Patzcuaro. Also relocating 38 miles between Acambaro and Uruapan. In addition work is now under way on the following lines: From K. 20 San Andres branch to San Andres, V. C., 33 miles; K. 20 Cerro Colorado branch to Cosomaloapan, V. C., 13 miles; from Penjamo, to Ajuno, Michoacan, 85 miles; between Durango, Durango, and Llano Grande, 60 miles; between Durango and Canitas, Zacatecas, 167 miles, and from Sombrete, Zacatecas, to Sombrete Junction, six miles. The banking house of Fomento & Bienes Raices, S. A., Mexico City, are carrying out the work. James M. Reid, chief engineer, Mexico Mex.

New Iberia, Lafayette & Northeastern.—Organized in Louisiana with $1,000,000 capital, and headquarters at New Iberia. The plans call for building from New Iberia, La., through St. Martinsville, Lafayette and Church Point to Eunice. F. M. Welch, president, H. Barousse, vice-president, Church Point; J. W. Lyons, vice-president, and E. I. Estorege, secretary and treasurer. J. P. Colombe, Lafayette, Dr. J. R. Olivier, St. Martinsville, and J. Drayfus, New Iberia, are directors.

New York, New Haven & Hartford.—President Mellen in a proposition which he has presented to the city of Springfield, Mass., regarding elevation of tracks in that city, includes a proposition for the construction of a new line from Shaker Station, Conn., to Pecowsic, Mass., about five miles, for the purpose of connecting the line which enters Springfield on the east side of the city with the main line. With the building of this connection a part of the east side line would be sold to the Springfield Street Railway Company. The main feature of the plan now presented to the city is the elevation of the present main line through the thickly settled part of the city, on its present location

New York Subways.—Bids for the construction of section 3 of the Lexington avenue subway, in the borough of Manhattan, will be opened January 11. Section 3 lies between Howard street on the south and Bleecker street on the north, under Broadway. This is the first section of the lower end of the Lexington avenue subway on which the commission had taken action since the revised plans were adopted. In October, 1910, the section now to be re-advertised under the revised plan was bid for by the Bradley Construction Company at $3,619,315; McArthur Brothers Company, $3,802,444, and Frederick L. Cranford, $3,978,901.

Oklahoma & Northwestern.—Final surveys are said to be made from Woodward, Okla., southeast to Watonga, 74 miles. The survey follows the North Fork, Canadian river. A bridge is to be built near Eagle City. E. A. Wagner, president.

Oregon Eastern.—See Southern Pacific.

Oregon Electric.—See Great Northern.

Perry County & Interurban.—Incorporated in Illinois, with office at Springfield. The plans call for building a line in Perry county, [illegible] and Duquoin. The incorporators include

G. W. McIntyre, F. A. Spitznagel, Jr., Springfield; I. Black, Duluth, Minn.; A. C. Sprague, Duboise, Ill., and W. Roessler, St. Paul, Minn.

PITTSBURGH & LAKE ERIE.—An officer writes that work is now under way from Arnold, Pa., on the Downer Run branch, to Lynn, on the Elwell Run branch, 4.35 miles, and from Fayette City to Warner at the Youghiogheny Coal Company tipple, 1.75 miles. The Robert Hill Construction Company, Connellsville, Pa., and the railway company's forces are carrying out the work. J. A. Atwood, chief engineer, Pittsburgh.

PITTSBURG RAILWAY.—Organized in California with $120,000 capital to build from Somerville, Sonoma county, Cal., to Pittsburg Landing, six miles. The directors are C. F. Allen, A. J. Frey, A. M. Garland, R. C. Thompson and W. N. Nelson; all of San Francisco.

ROBERVAL-SAGUENAY.—See Ha Ha Bay Railway.

SOUTHERN RAILWAY.—This company will ask for bids at once to build a belt line at High Point, N. C., connecting the main line with the Asheboro branch. This project has been under consideration for several years and negotiations for the right-of-way, in progress for some time, have just been concluded. The new line will be about two miles long and will leave the main line at a point opposite the Pickett cotton mills, and is to be built in a generally easterly direction to the Asheboro branch. W. H. Wells, chief engineer construction, Washington, D. C.

SOUTHERN PACIFIC.—Supplementary articles of incorporation of the Oregon Eastern, providing for the Harriman east and west line across central Oregon have been filed in Oregon. The plans provide for a line from Natron, in western Oregon, to Ontario on the eastern border, both cities are about midway between the north and south borders of the state. The capital stock of the company is increased from $100,000 to $6,000,000. Provision is also made in the supplementary articles for the line in western Oregon to run from Natron on the present Southern Pacific line south to Klamath Falls, in southwestern Oregon, and thence south to a connection with the Central Pacific at Weed, Cal. This latter is the cut-off that has been under construction for some time to give Southern Pacific's line from Portland to San Francisco a shorter and much easier route around the Cascade range. Another branch contemplated is a line from Klamath Falls, Ore., which is half way across the northern California border, east to Lakeview, Ore., just above the northeastern corner of California. From Lakeview connection will ultimately be south to the Central Pacific near Reno, Nev.

SUPERIOR & SOUTHEASTERN.—An officer writes that work is now under way from Taylor Lake, Wis., to Hunters Park, three miles. An extension is projected from Hunters Park to Meed Lake, nine miles. G. C. Clover, vice-president, New Richmond.

TEMISKAMING & NORTHERN ONTARIO.—An officer writes that surveys are being made for an extension of the main line to Elk Lake, Ont., 30 miles. S. B. Clement, chief engineer and superintendent maintenance, North Bay.

UTAH AND GRAND CANYON.—An officer writes that the plans call for building about 500 miles of railway. The first division is to be built from Lund, Utah, to St. George. Rights-of-way have been secured from Lund to a point beyond Cedar City. The plans call for construction work from Lund to Cedar City during 1911, and perhaps beyond that point. The contract will probably be given to J. G. White & Co. F. A. Dudley, president, Niagara Falls, N. Y.

VIRGINIA & KENTUCKY.—An officer writes that this company has projected an extension from Wise, Va., to the Virginia-Kentucky state line, 41 miles. N. P. Bigelow, vice-president, Chicago, Ill.

WICHITA FALLS ROUTE.—An officer writes that work is now under way between Canadian river, Okla., and Woodward, on 38 miles, and between Supply and Forgan, 70 miles. The grading work is being carried out by local contractors, and the track laying and bridge work is being carried out by the company's men. M. M. Cooke, chief engineer, Wichita Falls, Tex.

RAILWAY STRUCTURES.

BUFFALO, N. Y.—The Delaware, Lackawanna & Western has reached an agreement with the city authorities, and expects to carry out plans made some time ago for track elevation, and enlarging the terminal facilities.

CALWA, CAL.—The Atchison, Topeka & Santa Fe has given a contract to the Sharp & Fellows Contracting Company, Los Angeles, Cal., for constructing reinforced concrete roundhouses at Calwa and at Riverbank. The roundhouses are to have 15 stalls and will be so arranged that in future the capacity can be increased to 45 stalls.

CENTRALIA, WASH.—The contract has been let for a new union station for the Northern Pacific, Great Northern and Oregon-Washington Railway & Navigation Company.

CHICAGO, ILL.—Work has been started on the wrecking of buildings in the vicinity of West Twelfth and South Canal streets on the sight of the new freight terminal to be built by the Central Terminal Railway for the Minneapolis, St. Paul & Sault Ste. Marie.

CHIHUAHUA, MEX.—The Mexico & North Western is installing new shops and proposes to erect a new roundhouse.

JOHNSTOWN, PA.—The Baltimore & Ohio Railroad has given a contract to P. Farrell, Cincinnati, O., for the construction of a new freight house at Johnstown, Pa., on which work will be started at once. The improvement will cost about $25,000. The building will be 28 ft. x 300 ft., with covered platform at one end 14 ft. x 200 ft., and there will be a two-story brick office building, 28 ft. x 45 ft., with cellar.

LACOLLE, QUE.—The Grand Trunk has let the contract for the substructure of a new bridge to replace the present bridge across the Richelieu river near Lacolle Junction.

MEMPHIS, TENN.—The Chicago, Rock Island & Pacific has bought land for a new freight terminal, including freight houses and extensive yards at South Memphis, but has thus far made no plans for actual construction.

NILES, CAL.—It is reported that the Southern Pacific is planning to build a $50,000 bridge near Niles.

OMAHA, NEB.—The Chicago, Rock Island & Pacific has officially announced its intention of spending about $1,000,000 in improvements including the erection of a new freight terminal, freight houses and team tracks on property bought recently, consisting of a tract of 15 acres near the heart of the business district. The razing of the buildings now occupying the site is to be begun shortly after January 1. The Rock Island has heretofore used the Union Pacific terminals in Omaha.

PENSACOLA, FLA.—An officer of the Louisville & Nashville writes that if the company is successful in having certain ordinances enacted, closing streets, etc., it intends to construct a passenger station in the city of Pensacola. The building will be of brick construction, two stories high with waiting rooms, etc., on the first floor, and offices on the second floor. It is to be built at the corner of Wright and Alcaniz streets. The plans have not yet been completed.

RIVERBANK, CAL.—See Calwa, Cal.

SUPERIOR, WIS.—The Minneapolis, St. Paul & Sault Ste. Marie has awarded the contract for a 600-ft. addition to the ore dock on St. Louis bay. The extension will double the capacity of the present dock.

Although the Swedish state railways are those mostly heard of, two-thirds of the total railway mileage of Sweden, which amounts to 8,000 miles, are operated by private companies, there being no less than 300 lines of various gages operated by 75 different companies. Of the total mileage, more than 30 per cent. is narrow gage. Sweden is a sparsely populated country, and therefore the proportion of railway mileage to inhabitants is the highest in Europe, namely, 16 miles per 10,000 people. The Swedish railway system joins the Norwegian system at various points and is connected with the Danish system by means of steam vessels between Malmo, Sweden, and Copenhagen, Denmark, and also between Helsingborg, Sweden, and Elsinore, Denmark. The private lines carry about 32,000,000 passengers a year, about twice as many as the state lines. The freight tonnage is also in about the same proportion.

Railway Financial News.

Cincinnati, Hamilton & Dayton.—The New York Public Service Commission, Second district, has been asked by the company to permit the raising of a loan by the Cincinnati, Hamilton & Dayton, to be secured by $1,520,000 collateral trust bonds of the C. H. & D. Of the money needed, $300,000 is to help meet interest charges, and the remainder is for additions and betterments.

Connecticut River Railway.—See Vermont Valley.

Boston & Maine.—This company has finally come to an agreement with the stockholders of the Suncock Valley for a renewal of the lease which expires January 1, and under which the B. & M. had been paying 6 per cent. on the stock of the Suncock Valley. The new lease, which is for two years, provides for the payment of 3 per cent. on this stock.

Erie.—James H. Oliphant & Co., New York, have issued a carefully prepared pamphlet containing a study of Erie bonds as investments. Besides an analysis of the Erie's operating figures and future prospects for traffic and earning power, there are a set of tables showing capital expenditures, equipment trust issues, appropriations for additions and betterments, etc., over a series of years beginning with 1900.

Fitchburg Railroad.—This company has asked the New York Public Service Commission, Second district, for permission to issue $1,200,000 bonds to reimburse the Boston & Maine for additions and improvements, including the electrification of the Hoosic tunnel.

Gulf, Florida & Alabama.—W. W. Jennings, F. B. Irwin and T. A. Jennings have been elected additional directors.

Iowa Central.—A circular signed by Newman Erb, president of the Iowa Central, and Edwin Hawley, chairman of the board of the Minneapolis & St. Louis, gives the final details of the merger of these two properties. The Iowa Central pays the Minneapolis & St. Louis $2,500,000, and receives $1,917,500 M. & St. L. preferred, $9,370,200 M. & St. L. common and $2,500,000 refunding and extension mortgage bonds. The securities received by the Iowa Central are distributed to its stockholders as follows: One share of preferred stock and nine shares of M. & St. L. common will be given for each ten shares of Iowa Central preferred, and one share of M. & St. L. common will be given for two shares of Iowa Central common. The circular says in part: "The Iowa Central has considerable value as a feeder to the Minneapolis road, and logically should be a part of a through line from the Missouri river to the Canadian border. While the records of the two companies show that without the tonnage concentrated on its lines from the Minneapolis company the Iowa Central would be unable to properly sustain itself, its value to the Minneapolis road as a link in the connection which it is contemplated will be made with railways at the Canadian border makes it desirable that they should be united."

Stockholders of the Iowa Central have approved the merger.

[illegible]

Minneapolis & St. Louis.—See Iowa Central.

[illegible]

sold at not less than 90, and $30,000,000 4½ per cent. 3-year notes, to be sold at not less than 98½. The notes are to be used only if the debentures cannot be disposed of to advantage, and at no time are there to be more than $35,000,000 outstanding debentures and notes.

Northern & Tombigbee Valley.—This company has bought the Vradenburgh railway, 20 miles long, that is operating in Choctaw and Marengo counties in Alabama.

Ocean Shore Railroad.—A new corporation has been formed to take over this property, and has issued $5,000,000 stock to be exchanged for the securities of the old company, and in addition $700,000 6 per cent. bonds are to be sold, it is understood, to pay off floating indebtedness and to provide working capital.

Pecos Valley Southern.—A press despatch from Alpine, Tex., says that the Pecos Valley Southern has been, or is to be, bought by the Southern Pacific. The road runs from Pecos, Tex., to Balmorhea, 36 miles.

Southern Railway.—The company has sold to Drexel & Co., Philadelphia, $1,500,000 4½ per cent. equipment trust certificates.

Suncock Valley.—See Boston & Maine.

Toledo, St. Louis & Western.—This company has passed, it is understood, the quarterly dividend of 1 per cent. usually declared in December. Heretofore the annual dividend rate has been 4 per cent.

Vandalia.—A quarterly dividend of ¾ of 1 per cent. has been declared on the $14,649,000 outstanding stock. The Pennsylvania owns $11,633,400 of this stock.

Vermont Valley.—The Connecticut River Railway has asked the Massachusetts legislature for authority to merge with the Vermont Valley.

Wabash.—Judge Adams, of the United States Circuit Court at St. Louis, has appointed F. A. Delano, president of the Wabash; E. B. Pryor, vice-president of the Wabash, and William K. Bixby, chairman of the board of directors of the American Car & Foundry Co., receivers of the Wabash. The receivership was in answer to a petition filed by the Westinghouse Air Brake Company for a claim for $18,000. A committee consisting of Robert Goelet, Edwin Hawley, Thomas H. Hubbard, Alvin W. Krech, Robert Fleming, with Winslow S. Pierce as chairman and H. R. Winthrop, secretary, has been formed to protect the interests of the first refunding and extension mortgage bonds, and asks the deposit of these bonds with the Equitable Trust Co., New York.

A committee consisting of J. Horace Harding, chairman; Franklin Q. Brown, Charles H. Keep, Frank B. Keech, Philip Lehman, Frank K. Sturgis, with Pemberton Berman, secretary, has been formed to protect the interests of preferred and common stockholders, and asks the deposit of stock with the Knickerbocker Trust Co., New York.

A second committee to represent the first refunding 4 per cent. bonds, consisting of James N. Wallace, chairman; Henry R. Carse, John J. Mitchell, Robert I. Montgomery, H. A. Pomroy, William A. Read, J. Herndon Smith, Alexander M. White and Albert A. Wiggin, has been formed and asks the deposit of first refunding and extension mortgage bonds with the Central Trust Co., New York.

Interest on outstanding securities and equipment trust certificates maturing January 1 amounts to $1,205,000. Arrangements have been made by the Pierce committee to pay the interest on the first and refunding extension mortgage bonds deposited with it in case the company fails to pay this interest.

Judge Ward in the U. S. Circuit Court has appointed F. A. Delano and George W. Alder as ancillary receivers for the Wabash Railroad for all the property in New York state. The receivers are appointed on application of the Westinghouse Electric Company, and the appointment of these receivers is concurred in by the Wabash directors.

The Chilean railway authorities have made a study of the use of briquets made from Chilean coal waste and are convinced they can be economically used. They have asked for bids for a five-year supply.

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E. A. SIMMONS, *President.*
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GENERAL NEWS SECTION 1347

IT is axiomatic to anyone who takes the trouble to investigate the effect of bureaucratic government that much government means many rules, and that rules mean standardization of practice. Anyone who has ever tried to exercise the authority involved in even a small administrative position realizes how difficult and nerve wearing is the attempt to decide each issue on its merits as it arises, and how easy and comfortable becomes one's lot as soon as the multitude of details have been merged in the form of a standardized practice and all questions can be answered by reference to page and number of the rules. The application of this general observation to the railway situation is obvious, and its effect from the standpoint both of commercial business and of the railways is one that deserves most serious consideration. The Interstate Commerce Commission is rapidly developing into a bureaucracy, and, according to the lexicographers, a bureaucracy tends "to official interference in the private affairs of life, and to the inefficient and obstructive performance of duty through minute subdivision of functions, inflexible formality, and pride of place." That this general tendency is present becomes clear if one studies the decisions of the commission since the passage of the Hepburn act in 1906. The commission is insisting more and more upon its administrative privileges, and upon the fact that it occupies a position of final and unassailable authority so long as it remains within the powers granted to it by the law of its creation, and does not violate the principles of the federal constitution. This contention of the commission is believed by many to have been recognized, and its position strengthened by the decision of the Supreme Court in the Illinois Central car distribution case.

WHAT are to be the effects if this contention of the commission is permanently established as good law, and this body becomes a full-fledged bureaucracy? Obviously, it will find it to its interest, both from the standpoint of labor saving and as the easiest method of securing an apparent justice and equality between all citizens, to base rates more nearly on distance and with steadily less regard to the desire of all shippers to be present in every market. It is so much simpler to determine whether a rate is fair by the use of a measuring stick than by the application of mental energy to the nice adjustments of commercial forces, and it is so much easier to justify the result in the eyes of an unthinking public. A straw which points the direction of this wind is the recent long-and-short haul decision in the trans-continental rate cases, just set temporarily aside by the Commerce Court. It is a considerable step in the way of applying distance to rate making. If carried too far, this will result in the provincializing of industry, the narrowing of industrial competition, the stifling of that nation-wide spirit of business emulation which has so stimulated our industrial life. Such a result may have serious consequences for the railways, but consequences far more serious for the manufacturers and the shippers. But the shippers have another possibility to contemplate as the outcome of the enlarged powers conferred upon the commission last year. It suspends proposed rates, and in the words of Commissioner Lane requires that the railways shall "satisfy our minds" of the fact that proposed new and increased rates are reasonable. Moreover, Mr. Lane declares that the commission was created to repress the upward tendency in rates. Now to "satisfy the minds" of a commission sitting tight in Washington and clothed with the sacred duty of repressing upward tendencies in rates, is almost beyond the power and plausibility of even railway counsel. We shall apparently soon be in the position of the English roads, where existing schedules are converted by law into maximum schedules and where all changes must be downward and never upward. There can be but one outcome—a rigidity of rates such as the country has never before experienced. It has been railway practice to reduce rates voluntarily as matters of experiment. If the rates developed traffic, they remained. If traffic failed to respond to the more favorable rates, the old rates were restored. But a difficulty amounting almost to an impossibility in attempts to increase rates will have a dampening effect upon the enthusiasm of railways toward voluntary reductions. If the commission and the shippers propose to fix our rates, the railways may well say, "Let them take the whole job. A system under which we do all the lowering and the commission does all the raising is the game of heads you win, tails we lose." And well may the shipper give serious consideration to the effect of abandonment altogether of that flex-

ibility of rates which has been more responsible than any other single factor for the extraordinary industrial progress of the United States.

THE passenger efficiency inspector of the Lehigh Valley will be "watched with interest," not only by officers of that company, as stated in our news item (December 15, page 1239), but also by the officers of other roads, insofar as they can inform themselves of what he is doing, for the idea of intimate and independent inspection is being better appreciated than formerly. Assuming that this inspector has the proper gifts of acute perception, persistency and the spirit of fair dealing, the only question about the economy of keeping him in service is whether he can be in enough places every day to really know the true state of the discipline and behavior of the men, as concerns the comfort and satisfaction of passengers? One objection to the employment of inspectors independent of the division superintendent is based on the idea that multiplication of offices should be strenuously avoided. This idea must be kept in mind constantly, of course; but there is another idea, fully as important and fundamental; and that is that an intricate task, requiring time, persistency, courage and diplomacy, is never well done unless some one person makes the doing of it his main business.

THE question whether tolls shall be levied on vessels passing through the Panama canal probably will be decided at this session of Congress. The canal was built by the taxpayers of the entire country. If the taxpayers are to get any direct return from their investment it can only be in the form of tolls. Viewing the matter from a purely transportation standpoint, if the traffic cannot bear tolls sufficient to defray the cost of maintenance of the canal and the interest on the investment, this will show that its construction was not justified; for these items will be as strictly parts of the cost of transportation on it as the rates shippers will pay to the boats. On the other hand, if the traffic will bear reasonable tolls, why should they not be charged? Why should all the benefits of the canal's construction go, directly at least, to the comparatively few who will use the new route, either as operators of steamship lines, or as shippers? If no tolls are charged this will work to the benefit of the people of the two coasts, giving them a competitive advantage over those of the interior, although the latter contributed their share toward building the canal. Finally, would not the railways have some right to protest against the government unfairly fostering competition against them by giving to the owners of the steamship lines large subsidies which, in effect, is what would be done if the government should refrain from collecting reasonable tolls? Upon what principle could the giving of subsidies to steamship lines to enable them to compete more effectively against railways be better justified than could the giving of subsidies to one railway to enable it to compete against another, or than could the giving of subsidies to railways to enable them to compete more effectively against water lines?

REVIEW OF 1911 AND OUTLOOK FOR 1912

RAILWAY men will see 1911 pass into history without any regret. They will feel that nothing in its life became it like the leaving off. It has been in many respects one of the worst twelve months in the annals of the railways of the United States. All through it permanent improvements on most lines were restricted and as for new construction it was almost the [illegible] itself. It is necessary to go back fourteen years—to 1897—in the records kept by this paper to find a time in which the amount of new construction was so small, either absolutely or as a proportion to existing mileage. Only a few years ago important lines were being constructed in many parts of the country, particularly in the West. In 1906 the mileage built was 5,623 miles; in 1907 it was 5,212 miles. Now one looks in vain to find a single large piece of construction that is under way, excepting the Kansas City, Mexico & Orient, which is making progress slowly and under adverse conditions. Even the recent competitive building of the Hill and Harriman lines in Central Oregon has stopped.

The halt in railway development has been largely due to business conditions in general. Those who are reluctant to admit that the special conditions which have been affecting the railway business for about five years have anything to do with the present situation naturally attribute it entirely to general business conditions. But the fact is that special conditions have been affecting the railway business, and that they must have had some effect on it. It is further a fact that the developments of railway facilities during the year has not kept pace with what Daniel Willard, in his recent speech at Baltimore, called "the general growth of industrial capacity." In other words, there is reason to believe that the productive capacity of mines, farms and factories has increased faster than the carrying capacity of the railways. It can hardly be said, in view of these circumstances, that the state of public opinion regarding railways and the sort of regulation that they have been receiving at the hands of the state legislatures and Congress and of the state and interstate commissions have tended to stimulate railway development. The only rational conclusion is that they have had some effect, and that that effect has been to retard improvement and retard new construction.

It is true, indeed, that railways have been able to borrow money at reasonable rates, as compared with other industries, but the fact remains that the railways have not been spending as much on improvements and additions and new construction as the welfare of the country requires. Their managements have felt they would not be justified in spending money on extensions and improvements which, because of the hampering influences mentioned above, would not bring enough return to defray even the reasonably small increase in fixed charges. This applies to existing strong companies. Existing weaker roads have, as shown in our statistics on another page, borrowed more freely, evidently for urgent needs and because bankers were willing to finance them at reasonable terms, the bigger roads having provided for urgent requirements previously. But as to new railway companies without the backing of an old and well entrenched company, it certainly seems as if conditions have affected the mind of the investor directly.

If capitalists regarded the railway business as an attractive one in which to invest, they would be investing in it as much in proportion as they have been investing in other lines of enterprise. That they have not been doing so shows that they do not consider it a desirable line of business in which to invest, and that they do not so regard it must be due to the conditions surrounding the railway business, one of the most important of which has been and is regulation which the owners and managers of the roads consider to be to a large extent unwise and ill-advised.

And, naturally, the opinion of investors regarding this matter, and not the opinions of lawmakers or commissions, decides how much capital shall be invested in the railway business; for, while public authorities may regulate, and are regulating, the capital already *in* the railway business, they cannot regulate any capital *into* the railway business. This situation would help explain the falling off in new mileage this year, when it is also noted that the existing companies who could raise money for new construction can now find hardly any place on the railway map where a long extension would be profitable. The big extensions of the Gould lines and the St. Paul to the Pacific coast have been completed.

Further evidence of the force of special conditions affecting railroading more than other industries may be afforded by the recent figures regarding earnings and expenses. The total operating revenues per mile during the fiscal year ending June 30, 1911, were $11,588, as compared with $11,636 in 1910, a decrease of $48. Total operating expenses were $7,957 per mile, as compared with $7,711 in 1910, an increase of $246, and net operating revenue per mile was $3,631, as compared with $3,925 in 1910, a

decrease of $294, or 7½ per cent. The net operating revenue was larger than in any previous year except 1910 and 1907. It must be borne in mind, however, that it had to be spread over properties in which more money had been invested than in any past year. Furthermore, this result was gained only after the hardest struggle with operating expenses which, in spite of the efforts made to keep them down, were larger than in any previous year; and in spite of their amount many roads were not maintained as well as their officers would have liked to have maintained them. The estimated total operating revenues for the calendar year 1911 are $11,530 per mile; operating expenses, $7,900; net operating revenues, $3,630.

Past experience has shown the impossibility of predicting with any approach to accuracy the results of a railway year just being entered. We publish in another column expressions of opinion from a number of railway officers regarding the outlook. While they are not pessimistic, at the same time they are not distinctly optimistic. Most of them seem to think that business in general is apt to be somewhat better in 1912 than in 1911. Toward the close of the present year several roads have placed large orders for equipment. These will keep the equipment makers busy well into the calendar year, and that in itself is apt to stimulate general business and also that of the railways. While there is no prospect of a revival of new construction, it seems probable that on the whole orders placed by the railways in 1912 will be larger than in 1911. The roads have been to a large extent out of the market so long that it would seem they must begin buying on a greater scale if they are to keep the properties in good, and place them in better, condition, as their managements would like to do. How large their purchases will be this year, however, will depend on the condition of the money market and on the attitude of the regulating authorities; and the condition of the money market, so far as the railways are concerned, undoubtedly will itself depend greatly on the future policy of regulation followed by the state and national governments. If some of the unwise measures already passed should be repealed, if no more unwise ones should be passed, and if the regulating authorities should adopt a more constructive and less destructive policy, there is little doubt that there would be an improvement in the situation. And there seems room for hope for increased wisdom in regulation; for, undoubtedly, public opinion regarding the railways has become more intelligent and more friendly within the past year.

The most important event affecting railways during the year probably was the decision of the Interstate Commerce Commission in the so-called "rate advance cases." The commission entirely denied the application of both the eastern and western roads for higher rates. Basing its opinion chiefly on the large earnings of 1910, it held that they did not need more revenue—that earnings already were large enough to attract investment. Subsequent developments, already referred to, do not indicate that capitalists agree with the commission, and capitalists—not the commission—determine what shall be invested.

The commission also rendered important decisions during the year in the cases involving the rates of the transcontinental railways from the east to intermediate western points such as Salt Lake City and Spokane. It applied the amended fourth section in these cases and ordered the roads not to make their rates from the east to the intermediate points more than certain percentages higher than their rates to the Pacific coast. The railways in September appealed to the Commerce Court, which held that in attempting to force the roads to base their rates to intermediate points on their rates to the coast the commission had exceeded its powers. It was common talk among shippers and railway men that if the court issued the injunction the commission would begin a warfare against it, and the commission in its annual report, which was made public last week, fulfilled these expectations. As a result of the action of the court in these cases a movement has been started by members of Congress from the intermediate western states to abolish it, and the comments of the commission on the court's decision are adapted, whether purposely or not, to help the work along.

The courts have rendered during the year several important decisions affecting railways. The one which attracted the most attention was that of Judge Sanborn of the United States circuit court, holding unconstitutional the passenger and freight rates fixed by the legislature and the railway commission of Minnesota, on the grounds that they interfered with interstate commerce by making it impracticable for the railways to maintain their interstate rates, and that they were confiscatory in that they would reduce the return of the railways below 7 per cent. The case has been appealed to the United States Supreme Court. In the case of the Atlantic Coast Line versus Riverside Mills, the Supreme Court upheld the provision of the Interstate Commerce act making the initial carrier responsible for loss of or damage to goods occurring on a connecting line. The Supreme Court also, in a unanimous decision, upheld the constitutionality of the corporation tax law.

In the Willamette Valley lumber rate case it annulled an order of the Interstate Commerce Commission reducing the rates on rough lumber from points in Oregon south of Portland to San Francisco. The main issue involved was as to the conditions on which the Interstate Commerce Commission may base a decision determining the reasonableness of a rate. The court said that the commission's opinion indicated that its order was based on its belief that it had the right under the law to protect the lumber interests of the Willamette Valley from the consequences which it was deemed would arise from a change of the rate, even if that change was from an unreasonably low rate; and the court held that the commission had no power to fix rates on any such basis. In effect, the contention of the commission which the court overruled was that the commission was the final judge of the facts. The courts, it would seem, under this interpretation of the law, will not necessarily in all cases accept the commission's findings of fact and merely ascertain if it has applied the law correctly to them, but will also determine if its findings of fact are correct. The Supreme Court also rendered a decision upholding the validity of the federal hours of service law.

Railway men took great interest in the decisions of the Supreme Court of the United States in the Standard Oil and American Tobacco Company cases. The court held that the Sherman law prohibits only combinations in unreasonable restraint of trade. The decision was at first hailed as an interpretation that would enable business men to know whether they were or were not violating it, but subsequent consideration has led many of them to believe that it is impossible for anyone to anticipate what criterion the court will use in any given case to determine what is reasonable. Railway men, for example, do not know whether under the court's "rule of reason" traffic associations, such as it condemned in the Trans-Missouri Freight Association and the Joint-Traffic Association cases, would now be held legal or not.

The Railroad Securities Commission completed its investigation of the question of regulation of railway securities by the federal government, and made a report opposing most of the radical suggestions that had been advanced on this subject. In a general way, its report advocated steps that will secure full publicity regarding the value of railway property, the purpose for which railway securities are issued, the use made of the proceeds, etc.

Railway managements have shown increased activity during the year in formulating and adopting means for promoting the economy and safety of operation. The attack made on railway efficiency by counsel for the shippers in the rate advance cases caused the managers to look around sharply to find out how much justification there was for it, and while no one familiar with railway affairs believes that the sweeping criticisms made were justifiable, the managers have found a good many ways to effect economies without impairing the service. On the other hand, they have found that the attitude of the labor unions and public regulation in many cases are great obstacles to the adoption of more efficient methods. One of the interesting developments during the year was the following by several roads of the example set last year by the Chicago & North Western in organizing "safety committees" composed of both officers and

employees. Among the roads which have done so are the Baltimore & Ohio, the Delaware, Lackawanna & Western and the St. Louis & San Francisco.

Several railways have had serious controversies with their employees, particularly with shop men, regarding wages and conditions of employment. The shop men of a number of western roads organized federations which demanded recognition from the managers and substantial increases in wages, reductions in hours of work, the abolition of piece work, etc. The refusal of the Harriman Lines and the Illinois Central to yield to their demands resulted in a serious strike, which, however, the railways won. The white firemen on the Queen & Crescent struck because the company refused to accede to their demand that all negroes employed as firemen should be discharged within 90 days and that thereafter no negroes should be employed as firemen. Mediation by Judge Knapp resulted in the ending of this strike under an agreement by which the company limits the number of negro firemen employed on all parts of the road and will not employ them at all on certain parts of it.

MOTIVE POWER AND ROLLING STOCK IN 1911.

THE statistics for locomotive and car orders placed by the railways in 1911 indicate how severely the roads held down expenditures during the greater part of the year. The number of locomotives ordered was 2,850. We began keeping this record in 1901 and this is the smallest number ordered in any year since then, except 1904 and 1908. The number of passenger cars ordered was 2,623, which has been exceeded in 6 of the 10 years since and including 1901. The number of freight cars ordered in 1911 was 133,117, which is the smallest number ordered in any year since 1901, except 1903 and 1908. When it is considered that the orders for equipment have been relatively small for several years the showing for the year is unsatisfactory, especially as regards freight cars. The railways have apparently been buying a very inadequate amount of such equipment and when a sharp revival of business occurs they may find themselves incapable of satisfactorily handling the traffic. A large proportion of the orders for equipment, and especially for freight cars, has been placed within the last 60 days. The orders during the early part of the year were extraordinarily small.

The development in locomotive design and construction during the last 12 months has been truly remarkable. There has been a tendency toward a development in size and power to a higher limit, and also a marked tendency toward increasing the capacity of the locomotive without materially increasing its weight. More careful attention has been given to the selection of correct proportions, based on data derived from exhaustive investigations and reduced to standard practice; also in the modification and improvement in the design and construction of details to secure greater economy both in the cost of operation and maintenance.

The development in size and power has resulted in new wheel types in order that excessive wheel and journal loads might be avoided. This is particularly noticeable in the "mountain type" passenger locomotives which were introduced on the Chesapeake & Ohio (*Railway Age Gazette*, September 22, 1911, page 555) and the Santa Fe 2-10-10-2 Mallets (*Railway Age Gazette*, August 25, 1911, page 379). Service tests during the year have demonstrated the value of the high capacity locomotives under certain conditions for not only greatly reducing the cost of operation but

Increasing the capacity of a locomotive without materially in-

given locomotive can be increased 20 per cent. in this way, it will

to any expense for changing the track or bridges and with only a nominal expenditure for increasing the length of sidings.

Too little attention has been given in the past to designing locomotives for the special conditions under which they were to be used, but a distinct step in this direction has been taken during the past year. An important example of this tendency is the "mountain type" passenger locomotives built for the Chesapeake & Ohio by the American Locomotive Company. The maximum sustained horse power of this locomotive was developed in hauling a train of 4,200 tons over a continuous grade of 15 ft. per mile at an average speed of 23½ miles per hour. With a resistance of 3 lbs. per ton for the cars, the calculated horse power was 2,480, a record which is claimed to be the highest ever attained by a steam locomotive. To secure this large capacity the firebox was equipped with a brick arch and an automatic stoker, and the boiler had a combustion chamber and a superheater. A screw reverse gear was also used. This locomotive was specially designed for use under certain conditions on mountain grades and the type of wheel base would be unsatisfactory for passenger service under other conditions, although it is possible that under certain circumstances it might be used in freight service.

For freight service the Mikado and the Mallet types have come into greater prominence. The Mikado has given good results on divisions where there are no heavy grades and where the conditions are such that it is advisable to have an extra large boiler capacity. The extra pair of wheels on the trailing truck gives this type of locomotive an important advantage over the consolidation locomotive in boiler capacity, as it is possible to make the firebox larger and to increase the length of the boiler. Before going to these newer types of locomotives, however, it is necessary to study the special conditions under which they are to be used, and also to determine whether the standard types of locomotives cannot be sufficiently increased in capacity for the service in which they are to be used by either modifying the design or by adding such features as the superheater and brick arch.

The Mallet locomotive has given splendid results in mountain service and on heavy grades, 500 of them now being in service on the different railways in the United States, Canada and Mexico. Their economical operation compared with other engines on grades of 1 per cent. and over has been repeatedly demonstrated and they have been improved in various ways, as defects of design have developed in service. While they were originally designed for use in pushing service they have been adapted to road service on several roads with very good results, it being of course necessary to modify the design to suit these conditions.

The development of the automatic stoker has made important progress and a considerable number are now in use on large engines on fast schedules, or where an unusual amount of coal is burned per hour. Undoubtedly, however, the increased capacity for the same fuel consumption made possible by improved locomotive design and the use of the superheater, brick arch and other auxiliaries has to a certain extent reduced the demand for the stoker for the present. Material progress has been made in the development of locomotives for burning lignite coal. Oil burning locomotives are being used in greater numbers, both in the districts adjacent to the oil fields and in certain places where the cost of oil is not prohibitive and it is desired to reduce the possibility of fires along the right of way.

There has been little improvement or radical change in the general design of steel freight cars during the year. The most interesting departure is the new design of the Pennsylvania Railroad for the 52 ft. steel gondolas with a maximum capacity of 80 tons. It is understood that 200 of these will be ordered as a trial lot. If cars of this size can be used in service where it is possible to load them to their capacity they will probably greatly reduce the cost of conducting transportation. However, several problems must be worked out in connection with the design of the details, and notably of the wheels, as commented on in the *Railway Age Gazette* of December 22, 1911.

The steel tank car has been generally improved and enlarged in recent years, and those lately built have tanks 9 ft. in diameter

with a capacity of 14,650 gal., or 56 tons, which is 72 per cent. of the total weight of the loaded car. The important feature of the design is that the large tank is so shaped that it can be placed low on the frame with center of gravity only 7 ft. above the top of the rail, which is as low as that with the older and smaller cars of 8,000 gal. capacity. The low price of steel plates has enabled builders to offer standard steel cars at such a low figure that it has been the principal cause of the large number ordered in the last months of the year.

While the freight car shops were not very busy during most of the year, the passenger car shops were well occupied in building steel equipment. Steel passenger cars are being used in large numbers. Several of the different designs have been in service for a sufficient time to indicate that certain changes will be necessary to improve the design. A number of troublesome problems have come up in connection with the design and construction of these cars, but they are gradually being overcome and will undoubtedly be fully solved, although it may take some time to work them out satisfactorily.

CARS AND LOCOMOTIVES BUILT IN 1911.

IN no data regarding railway activity are the general depression and uncertainty of the past year more strongly indicated than in our figures showing the new equipment ordered and built during 1911. As shown elsewhere in this issue, the number of freight cars, passenger cars and locomotives *ordered* has been not only smaller than in 1910 but has been small as contrasted with the amount ordered on the average during the past decade. Moreover, statistics compiled by the *Railway Age Gazette* show that the number of cars and locomotives actually *built* during the year is smaller than the average for the past ten or twelve years, and in the case of freight cars is actually less than for any year during which we have made these compilations.

We have received reports from the principal car and locomotive builders in the United States and Canada and our investigation indicates that the total number of freight cars built during 1911 has been 72,161; passenger cars, 4,246, and locomotives, 3,530. The figures for 1910 were: Freight cars, 180,945; passenger cars, 4,412; and locomotives, 4,755.

While the number of orders placed during the year, including both those for equipment to be constructed in the railways' own shops, and those given to outside builders, is substantially below that for 1910, the number of freight cars *built* is less than one-third of that for last year.

It is well known that there has been a strong tendency toward curtailment of expenditures in nearly all departments during the year. In addition, the remarkable falling off in the showing for cars built as compared with orders placed may be explained by the fact that during the first half of 1910 orders were very heavy, while comparatively few were placed during the latter half of the year. Therefore the shops were busy during the last six months of 1910 in filling orders received earlier in the year or during the latter part of 1909 and had very few unfilled orders at the close of the year. In 1911 an exactly contrary condition prevailed. During the first nine months or so the railways were very chary of undertaking large expenditures even for equipment really needed, and it has only been during the past three months that the imperative demands of traffic have impelled the placing of large orders. The showing of new equipment orders for the entire year has been rendered possible by large orders placed within the past few weeks. On these orders deliveries have not yet been made; and in consequence the year's record shows an almost unprecedentedly low total for cars built which will not be materially affected by some lack of completeness in our figures.

Judging by present inquiries, it seems fair to predict that the coming year will show a favorable record both for equipment built and equipment ordered. Many manufacturers who have done less than half the business this year that they did in 1910 have on hand unfilled orders over twice as large as those on their books at the close of 1910.

Of the freight cars built in the past year 68,961 were for domestic service and 3,200 for export. Of the passenger cars 3,938 were for domestic service and 308 for export. Of the freight cars 52,592, or approximately two-thirds, were of all-steel construction or had steel underframes, and of the passenger cars 2,930, a slightly higher proportion, were of all steel construction or had steel underframes. Of the passenger cars, 415 were electric railway cars. The following table shows the cars built in the past 13 years:

Year.	Freight.	Passenger.	Total.
1899	119,886	1,305	121,191
1900	115,631	1,636	117,267
1901	136,950	2,055	139,005
1902	162,599	1,948	164,547
1903	153,195	2,007	155,202
1904	60,806	2,144	62,950
1905*	165,155	2,551	168,006
1906*	240,503	3,167	243,670
1907*	284,188	5,457	289,645
1908*	76,555	1,716	78,271
1909*	93,570	2,849	96,419
1910*	180,945	4,412	185,357
1911*	55,931	3,566	59,507

*Includes Canadian output.

Returns from locomotive builders show that 3,530 were built during the year, of which 3,143 were for domestic service and 387 for export. Two hundred and twenty-five were compound and 133 were electric locomotives, a large part of which have been used for industrial switching service and similar uses.

Year.	No. Built.	Year.	No. Built.	Year.	No. Built.
1893	2,011	1900	3,153	1906*	6,952
1894	695	1901	3,384	1907*	7,362
1895	1,101	1902	4,070	1908*	2,342
1896	1,175	1903	5,152	1909*	2,887
1897	1,251	1904	3,441	1910*	4,755
1898	1,875	1905*	5,491	1911*	3,530
1899	2,475				

*Includes Canadian output.

NEW CONSTRUCTION IN 1911.

RETURNS from nearly all of the railways, supplemented by our own records and figures furnished by railway commissions, show that 3,066 miles of new main line was built in the United States during the calendar year 1911, as compared with 4,122 miles the previous year. This is the smallest figure since 1897, when 2,109 miles was added. The average number of miles added each year is 3,885, since we began keeping this record in 1893. The 1910 record was 374 miles more than the preceding year. These figures do not include new second, third or fourth track, sidings or electric lines, nor do they include relocated lines on which work was carried out by the following companies: Maine Central relocated 6.36 miles in Maine; the Kansas City Southern built a new line, 29.45 miles long, in Oklahoma, Arkansas and Louisiana, replacing 21.3 miles, and in addition reduced the grade on present alinement on five stretches, aggregating 15.3 miles. The Mississippi Central completed work on two miles of relocated track on the main line in Mississippi.

Of the mileage added this year, the Chicago & North Western laid a total of 173 miles, including the new cut-off from Lindwurm, Wis., to Necedah, 130.55, which was the longest single stretch of line reported this year. The Kansas City, Mexico & Orient laid the second longest stretch of single track, 117 miles, from Tankersly, Tex., to Granada. The Harriman Lines built a total of about 320 miles, and the Santa Fe lines, a total of 195 miles, the latter including a section of the cut-off between Texico, N. M., and Coleman, Tex.

In Canada the Grand Trunk Pacific built 271 miles in the provinces of Saskatchewan, Alberta and British Columbia, and the National Transcontinental, which is building the eastern end, built 280 miles. On the western end work is under way on 1,167 miles, and surveys are being made on 627 miles, while on the eastern end work is now under way on a total of 490 miles. The Canadian Pacific built a total of 487 miles, and has work under way on a total of 368 miles on the western lines. The Canadian Northern Ontario built 47 miles; has 73 miles located and 944 miles under construction, in the province of Ontario, and in addition has under construction 38 miles in the province of Quebec. The Canadian Northern lines in the western provinces added 456

miles during 1911, and rapid progress is being made on the western end on the transcontinental line in British Columbia. Over 20 miles of track has been laid, and 80 miles graded, between Port Mann and Hope, and work is under way on an additional 160 miles. The line from this point to the Alberta boundary, near Yellow Head Pass, is under contract, and it is expected that this work will be finished in about two years.

In Mexico the National Railways of Mexico built a total of 161 miles; the Mexico North Western built 131 miles, and the Southern Pacific of Mexico built 36 miles. The figures for Mexico do not include a change of gage on the line of the National Railways of Mexico, between Acambaro, Michoacan and Uruapam, 102 miles, and the relocation of 38 miles between these places.

The new main track mileage is reported under 43 states and territories, including Alaska, where 47 miles of new line was built. Texas, which was first in 1909, and 1910, is first this year, with 414 miles; this is 343 less than was built in this state in 1910. Oregon is next with 224 miles, North Dakota and Wisconsin each built over 200 miles. Colorado, Idaho, Kentucky, Georgia, California and Florida, follow in that order, each building over 100 miles of main line in 1911. No new mileage was reported in Connecticut, Delaware, District of Columbia, Maine, Massachusetts, New Hampshire, New Mexico, Rhode Island or Vermont. In Canada 1,898 miles was reported, as compared with 1,844 miles in 1910. In Mexico 351 miles was reported, as compared with 138 miles the previous year, an increase of 213 miles.

Particulars of new mileage are given elsewhere in this issue. The following table shows our figures for mileage built in the United States during the last nineteen years:

1893.....3,024	1900.....4,894	1906.....5,623
1894.....1,769	1901.....5,368	1907.....5,212
1895.....1,428	1902.....6,026	1908.....3,214
1896.....1,692	1903.....5,652	1909.....3,738
1897.....2,109	1904.....3,832	1910.....4,122
1898.....3,265	1905.....4,388	1911.....3,066
1899.....4,569		

PROGRESS IN RAILWAY SIGNALING.

TWENTY THOUSAND, an easy figure to remember, now represents the mileage of railways in the United States equipped with automatic block signals, an increase of over 60 per cent. in three years. We are unable to give complete and exact figures for January 1, 1912, because of the difficulty of getting responses from some of the railways; but our table gives a pretty fair idea of the situation, nevertheless. The great bulk of the more important railway mileage of the country now has the block system in one form or another, and the yearly increase in the manual system is small or negative. On some roads there is a decrease, automatics having been substituted for the manual system. One road reduces the total of our table 250 miles by withdrawing erroneous figures furnished a year ago. The use of automatics on single track continues to spread, and the mileage is again nearly as large as that on double track. The Union and Southern Pacific, taken together, continue to furnish the largest item, these two, with their controlled lines, now reporting (including a considerable amount of double track) over 5,500 miles of road equipped with automatic signals. The Boston & Maine and its controlled line the Main Central; the Chicago, Milwaukee & Puget Sound, the Illinois Traction Electric Line, and the St. Louis & San Francisco each report a large automatic single-track mileage; and this use of automatic signals seems [illegible] that the adoption of the idea [illegible] looked upon as assured.

While the progress shown by the foregoing figures is not so great as could have been hoped for, still much has occurred in the field of work of the signal engineer which shows considerable development. The use of automatic signals on single track, as here noted, the use of green lights for the proceed indication and the introduction of upper quadrant signaling, have progressed steadily, and the use of power-operated signals at mechanical interlocking plants has made this type of interlocking available for a greater variety of conditions.

The Pennsylvania Terminal in New York, and the North-Western Terminal in Chicago, both representing highly intensive handling of terminal operations, exemplify also the most intensive application of power interlocking. In these plants the switches and signals and their operations—which now constitute a vital element in all large stations—seem, from the standpoint of safety, to have been brought well-nigh to the highest attainable perfection.

The engineering side of signaling has witnessed some notable developments, particularly in alternating current apparatus; and the application of this to certain operating conditions has in turn shown economies in maintenance which have attracted considerable attention.

Two or three automatic train stops have been tested during the year, and railway officers are perhaps more favorably inclined toward this device; but progress is slow and any appreciable activity on the part of the railways in this field is still in the future.

As to the enforcement of the block system by legislation, Indiana has strengthened its law, and two or three other states, having statutes on this subject, have been watching Indiana, though no important action has been taken. Considerable public attention has been attracted toward the means which railways use to secure safety in travel, and the Interstate Commerce Commission has repeated its recommendation for a federal law, but there is no sign that Congress intends to take any action. The Indiana Commission, acting under its new law, has negotiated with the roads on a basis generally reasonable, and in some cases the roads have agreed to put in automatic signals when the law would have been satisfied with a less complete system. A few electric interurban lines now have automatic track circuit block signals, and the successful use of lights as signals, in place of semaphores, under favorable conditions, seem likely to make for substantial progress.

Rapid developments in the application of alternating current have contributed greatly to the solution of the problem of signaling on electric railways and more specific data is being worked up by a committee of the Electric Railway Association.

The importance of signaling in the most intensive situations, in which all other methods of improvement have been exhausted, has a notable example in the signaling of the Interborough subway in New York. The "time-speed" signaling which has been brought to its completion during the year in the subway has made possible the running of trains closer together—at intervals even shorter than the length of the station platform—which has resulted in an increase of 17 per cent. in the number of passengers carried. As these average in the busy season over a million a day the magnitude of the increase brought about by the signal system affords a remarkable tribute to the signal engineer.

The art of signaling suffers not only from the drawbacks inseparable from a comparatively new and a rapidly growing science or industry, but also from the fact that it makes heavy demands on the railway treasuries; while its problems have to be dealt with by two departments (besides the financial). Nevertheless, the signal engineers as a body have met all demands most creditably.

RECEIVERSHIPS AND FORECLOSURE SALES IN 1911.

THE sale of railway properties under foreclosure were quite unimportant in 1911, with the single exception of the sale of the International & Great Northern. Few roads went into the hands of receivers in either 1909 or 1910, and the roads that went into the hands of receivers in 1908 were mostly sold under foreclosure in 1909, although the International & Great Northern foreclosure sale is a consequence of the 1908 receivership. The total mileage of roads sold under foreclosure in 1911 was 1,386, of which 1,160 is accounted for by the sale of the International & Great Northern.

The most interesting point about the sale of the International & Great Northern and its problems of reorganization is due to the fact that this reorganization had to be carried out despite the laws of Texas and the attitude of the Texas railway commission. The reorganization provided for the sale of the property and the exchange of old International & Great Northern

securities for securities in the new company, a scaling down of interest charges and the raising of funds to pay floating debt, receivership certificates and similar claims by the sale of $11,000,000 notes. Apparently the way the difficulties interposed by the Texas laws and railway commission have been overcome is by the formation of an International & Great Northern holding company, which was formed in Virginia, and it is supposed will issue its own securities in exchange for the deposit of new International & Great Northern of Texas securities. In this way stockholders of the old I. & G. N. and other security holders will be enabled to receive some form of security which will represent their equity in the property and the present sacrifice which they are making in its reorganization.

The following table shows the foreclosure sales in 1911:

Foreclosure Sales in 1911 of Steam Roads.

	Railway mileage.	Funded debt.	Stock.
Atlantic Northern & Southern	17	$111,500	$178,400
Bartlett-Florence	11	78,000	25,000
Cincinnati, Bluffton & Chicago	53	1,000,000	1,125,000
Dardanelle, Ola & Southern	15	160,000	.....
Eagles Mere Railroad	10	83,500	50,000
Delaware & Eastern	46	942,000	120,000
Ferdinand Railway	7	57,000	50,000
International & Great Northern	1,160	24,917,053	9,775,000
Macomb & Western Illinois	20	*	25,000
Pittsburgh, Binghamton & Eastern	6	†75,000	.....
Placerville & Lake Tahoe	27	240,000	810,000
Virginia Anthracite Coal and Railway	9	80,000	100,000
Wilmington, New Castle & Southern	‡5	400,000	330,000
Total	1,386	$28,153,053	$12,588,400

*On June 30 Poor's Manual said that no bonds were issued.
†This is the price at which the road was sold. The par value of outstanding securities could not be ascertained.
‡See text.

The other roads sold were unimportant short lines.

The Atlantic Northern & Southern was bought in by the president of the Omaha & Iowa for $402,000.

The Bartlett-Florence was bought by J. L. Bailey for $41,000.

The Cincinnati, Bluffton & Chicago was sold in March.

The Eagles Mere Railroad was bought by its bondholders' committee for $20,000.

The Delaware & Eastern was sold to representatives of the bondholders.

The Ferdinand Railway was sold for $20,000.

The Macomb & Western Illinois was sold for $500,000.

The Virginia Anthracite Coal & Railway was bought by the Norfolk & Western for $100,000.

The Pittsburgh, Binghamton & Eastern was sold in February.

The Placerville & Lake Tahoe was sold to C. D. Danaher for $450,000. This price included the assets of the Eldorado Lumber Co.

The Wilmington, New Castle & Southern was not sold as a whole. The five-mile section between Wilmington, Del., and New Castle was sold separately, and our table giving mileage shows only the mileage actually sold.

There were only four other unimportant roads beside the Wabash put into the hands of receivers in 1911, and if it were not for the Wabash, only 91 miles of railway would have been put in receivers' hands. Of course, it is not possible to say that these are all of the railways that were put in the hands of receivers in 1911, because some roads may have passed into friendly secret receiverships. The Wabash, however, brings the total mileage up to 2,606, and the total funded debt of roads going into the hands of receivers up to $116,351,496.

The following table shows the receiverships established in 1911:

Receiverships Established in 1911.

	Railway mileage.	Funded debt.	Stock.
Atlantic Northern & Southern	17	$111,500	$178,400
Eagles Mere Railroad	10	83,500	50,000
Jamestown, Chautauqua & Lake Erie	37	750,000	750,000
Jamestown & Chautauqua	27	250,000	475,000
Wabash Railroad	2,515	115,156,496	92,801,986
Total	2,606	$116,351,496	$94,255,386

The Wabash receivership was established in December, was said to be a friendly receivership, and had probably been inevitable ever since the Wabash-Pittsburgh Terminal and the Wheeling & Lake Erie went into the hands of receivers. The reorganization will not be under the undivided control of the Goulds, probably, but will be carried on in connection with Kuhn, Loeb & Company and various re-organization committees which have already been formed to protect the various classes of security holders. It is probable that the reorganization will be considerably complicated by the fact that the Wabash guarantees $8,000,000 notes of the Wheeling & Lake Erie that have been defaulted since 1908, which notes are held by Kuhn, Loeb & Company; while on the other hand the Missouri Pacific owns common and preferred stock of the Wabash, so that it is itself in a not very strong financial position; and the effect on the Missouri Pacific of an assessment on the common and preferred stock of the Wabash will have to be carefully considered.

The following is the record taken from our files of roads put into the hands of receivers since 1875:

Summary of Foreclosure Sales in 36 Years.

Year.	No. of roads.	Miles.	Bonds and stocks.
1876	30	3,840	$217,848,000
1877	54	3,875	198,984,000
1878	48	3,906	311,631,000
1879	65	4,909	243,288,000
1880	31	3,775	263,882,000
1881	29	2,617	137,923,000
1882	16	867	65,426,000
1883	18	1,354	47,100,000
1884	15	710	23,504,000
1885	22	3,156	278,394,000
1886	45	7,687	374,109,000
1887	31	5,478	328,181,000
1888	19	1,596	64,555,000
1889	25	2,930	137,815,000
1890	29	3,825	182,495,000
1891	21	3,223	169,069,000
1892	28	1,922	95,898,000
1893	25	1,613	79,924,000
1894	42	5,643	318,999,000
1895	52	12,831	761,791,000
1896	58	13,730	1,150,377,000
1897	42	6,675	517,680,000
1898	47	6,054	252,910,000
1899	32	4,294	267,534,000
1900	24	3,477	190,374,000
1901	17	1,139	85,808,000
1902	10	693	39,788,000
1903	13	555	15,885,000
1904	13	524	28,266,000
1905	6	679	20,307,000
1906	8	262	10,400,000
1907	6	114	13,777,000
1908	3	138	2,547,000
1909	12	2,629	250,033,000
1910	17	1,100	93,660,109
1911	13	1,386	40,741,453
Total, 36 years	976	119,206	$7,280,903,562

Summary of Receiverships for 36 Years.

Year.	No. of roads	Miles.	Bonds and Stocks.
1876	42	6,662	$467,000,000
1877	38	3,637	220,294,000
1878	27	2,320	92,385,000
1879	12	1,102	39,367,000
1880	13	885	140,265,000
1881	5	110	3,742,000
1882	12	912	39,074,000
1883	11	1,990	108,470,000
1884	37	11,038	714,755,000
1885	44	8,836	385,460,000
1886	13	1,799	70,346,000
1887	9	1,046	90,318,000
1888	22	3,270	186,814,000
1889	22	3,803	99,664,000
1890	26	2,963	105,007,000
1891	26	2,159	84,479,000
1892	36	10,508	357,692,000
1893	74	29,340	1,781,046,000
1894	38	7,025	395,791,000
1895	31	4,089	369,075,000
1896	34	5,441	275,597,000
1897	18	1,537	92,909,000
1898	18	2,069	138,701,000
1899	10	1,019	52,285,000
1900	16	1,165	78,234,000
1901	4	73	1,627,000
1902	5	278	5,835,000
1903	9	229	18,873,000
1904	8	744	36,069,000
1905	10	3,593	176,371,000
1906	6	204	55,042,000
1907	7	317	13,585,000
1908	24	8,009	596,359,000
1909	5	859	78,095,000
1910	7	735	51,427,500
1911	5	2,606	210,606,882
Total, 36 years	724	131,839	$7,632,560,382

Letters to the Editor.

"ABOLISH THE PRESENT GIVING."

St. Louis, Mo., December 21, 1911.

To the Editor of the Railway Age Gazette:

The discussion of this question in your columns should result in benefit to all concerned, and it is to be hoped that something practical will be attained before another excuse for the practice comes around next year.

The evil features are so manifest that reliance should not be placed on publicity alone, and consideration should now, it seems to the writer, be directed to a cessation of the practice; and this should not be a matter of great difficulty if the railway executives will endeavor to relieve their subordinate officers of the embarrassment imposed by the present widespread abuse.

The writer is under the impression that matters of criticism in connection with railway conventions in the past have been remedied at the suggestion of the railway executives, and perhaps an intimation by them to the supply men through the Railroad Supply Men's Association or otherwise would bring about the needed reform. The various railway officers affected would then, without the appearance of offensiveness, be in a position to return any "gifts" that might be sent regardless of such a "hint" from their executives.

A discussion of this feature will, no doubt, bring forth the best method for dealing with the subject. PURCHASING AGENT.

Cleveland, O., December 19, 1911.

To the Editor of the Railway Age Gazette:

Your editorial at the top of page 1199 of the issue of December 15 should be printed in red and sent broadcast throughout the land. I would emphasize particularly the following line, "If it is not actually grafting it is the vestibule to it."

This practice of giving and accepting gifts from parties from whom as agents we purchase thousands of dollars' worth of supplies has for many years been a most potent force in undermining the character of the men engaged in it. That the New York *Times* should manifest surprise to learn of the existence of this practice is positively funny, and shows that in the eager search for the latest news the metropolitan papers can sometimes overlook matters of first importance that are close at hand.

The giving of presents in this manner is a practice of considerable antiquity. The railways are concerned in it only because of the large amount of business which they do. It is a very healthy sign of the times that the matter is receiving attention and condemnation by both the technical and secular press. The newspapers frequently boast of their great service to mankind as molders of public opinion. In this particular line they may well have reason to be proud of that distinction.

ALBERT J. HIMES.

BLOCK SIGNALS AND FUEL ECONOMY.

Chicago, December 3, 1911.

To the Editor of the Railway Age Gazette:

Referring to the paper on "Opportunities for Economy on Railways" by L. C. Fritch in your issue of November 24, there is a way in which the use of automatic block signals can contribute to fuel economy in no small degree. Suppose there are two trains to meet on a single track line equipped with automatic block signals working in three positions. If the inferior train arrives first, pulls into the siding and finds the outgoing signal in the clear position, the fireman can safely bank his fire and wait until the signal assumes the 45 deg. position, when he should have just about enough time to fire up and be ready to pull out when the opposing train arrives. The reason for this is that the clear signal will show that there is no train within two blocks of the station; the 45 deg. position of the signal after it has been clear shows that a train has entered the second block in advance of the station.

Provided the blocks are not too short, the same results may be obtained on double track by the use of switch indicators. In this case, if a train enters a passing track to be passed and finds the outgoing indicator clear, the fires may be banked as before until the indicator announces the approach of a train. Local conditions enter into both cases; for example, switching operations might give misleading indications, but the crews are usually sufficiently familiar with the road to take such things into consideration. It can be easily seen that such a method of handling fires will result in a marked saving in coal over the usual method of keeping up a full head of steam while waiting beyond the appointed time for the arrival of another train. This system has the exceptional quality of being self enforcing, when understood, as it not only saves coal for the company, but saves the fireman's back as well. This method of utilizing the block system was discovered, I am told, by an engineman on a western road, and the results have been very gratifying. The scheme can be worked with two position signals, also, provided the outgoing signal has two arms, home and distant; then the vertical position of the distant is the signal to fire up. It has been assumed in the foregoing that the signals were normal clear. If they are normal danger the clearing of the signal to 45 deg. or of the top arm if two arm two position would be the signal to fire up.

W. H. ARKENBURGH.

THE RAIL SITUATION ON THE HARRIMAN LINES.

Chicago, Ill., December 22, 1911.

To the Editor of the Railway Age Gazette:

Referring to your article: "What are the Railways Going to do About Rails?" in your issue of December 15, I desire to comment thereon as follows:

While not specifically so stated, the impression left on my mind by this article, and I think on that of most readers, is that the broken rail situation on the railways of the United States is in a very serious, not to say desperate, condition.

The matter of broken rails first began to receive serious attention in 1906 and 1907, when a change to heavier sections was being made by various railways in the United States. The new and heavier rails developed an alarming number of breaks and after much conference on the part of the railway organizations and manufacturers, a great deal was done in the way of change of sections, chemical composition, improved tests and inspection, and mill practice, to improve conditions, which at that time were really serious. Omitting details leading up to this, the result has been, so far as the Harriman system is concerned, a marked improvement in the quality and a diminution in breakage of rails in the last three years. The number of rails breaking during the first year of service, which is their critical period under traffic, has fallen in that time from about one rail in 370 to one in 3,670, with an increase of tonnage, and but for an unfortunate manufacturing error, which was very soon discovered and corrected, it would have approximated one rail in 7,000. This appears to be really a not unreasonable proportion obtained in an article manufactured in large quantities, and it certainly shows that the above efforts on the part of this railway system, together with the efforts of the mill people to improve their mill practice, have resulted in a good output.

I hardly think that any manufactured article will show a very much higher qualtity than this. Of course, we are not satisfied short of perfection, we want no rail failures at all and are striving honestly, as I believe the manufacturers are, to obtain this result. I do not think it fair, therefore, to attack rail manufacturers or the railways on the ground that the best possible is not being done. It would be as fair to attack manufacturers of automobiles or the purchasers thereof, if an accident should occur from the failure of an axle or steering gear of one automobile in 7,000 manufactured and used.

In presenting the above figures there will naturally occur to you a question as to their accuracy and as to our methods of obtaining them, and it may not be out of place for me to describe the system on the Harriman Lines in this connection.

There are two opportunities of error in all such reports: First, in the information supplied; second, in the compilation.

The former is the more apt to be incorrect. Anticipating this trouble from the beginning, the Harriman Lines' officials have taken particular pains to personally instruct all section foremen and roadmasters, who are in immediate contact with rail conditions, in the details of inspection of broken rails, and we require their immediate superiors to check their reports. We have seen that the results of their reports get back to them individually, so that they may understand and appreciate the use and importance thereof. They have been individually instructed in case of doubt as to the nature and cause of a break always to place it in the unknown class, so that the causes specifically stated are undoubtedly correct. The large number of intelligent inquiries we have had from these men lead us to believe that their reports are carefully and conscientiously made. The results are worked up by the different general managers having jurisdiction and sent to the Chicago office, where they are again checked and compilation made and gone over, so that I may state with confidence that I believe the figures above given may be relied upon, and I further believe that the specifications of the Harriman Lines, if rigidly lived up to by the manufacturers, followed up by a proper inspection, give us as good rail as it is possible to produce under the present state of the art.

JOHN D. ISAACS,
Consulting Engineer, Harriman Lines.

CLASSIFICATION SIGNALS.

ROSEVILLE, CAL., November 10, 1911.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

In your issue of October 13, "D. A. D." maintains that it is an insufficient safeguard to require classification signals on no trains except a train with a section following or an extra train. His argument is that some sort of signals should be carried by an "only section," to give positive indication of no section following.

This suggestion is a good one as far as it goes. It could be augmented by requiring that classification signals should be carried on the rear as well as the head end of a train. Often at a station the train crew may be busy cooling a hot journal, or perhaps they are inside a box car unloading freight. They are anxious to gain every possible minute, and consequently do not see the engine of a passing train until too late to note the signals carried. In such a case, if classification signals were carried also on the rear of the train they would be observed. There seems to be no logical reason why classification signals, like indicators, should not be shown at both ends. Such an arrangement would also benefit station and yard employees and trackmen. The latter, on the approach of a train, are usually busily engaged tamping the last tie or driving a final spike. But while they may not closely observe the engine, they always look at the rear car to see whether the roadmaster is on board.

The use of positive classification signals for "only sections" would give other advantages. The danger of careless mistakes on the part of conductors while checking the train register would be lessened. In the "signals" column of the train register, conductors either write "white," "green," or "none." Occasionally "none" is written instead of "green." If "only sections" carried signals, yellow for instance, the conductor would write "yellow" instead of "none," again something positive.

Operating officers would have more opportunity than at present to test the observance of classification signals, for the signals of an "only section" could be removed without risk of causing a collision, in order to note whether their absence is observed by train and enginemen. At present the removal of green signals from an engine for a test would be foolhardy; and, in the case of an engine of a regular train without signals, there is no way of telling whether or not proper observance has been made.

Granting that signals denoting "only section" are desirable, the next question is the proper selection of colors. If we strictly conform to the meaning of the various colors, yellow, being a caution signal, should mean "section following," and green, being proceed, should mean "only section." The objections to this are threefold. First, the new order would change the long established meaning of green lights on an engine. Second, it would be necessary to revise the book of rules, particularly the artistically colored prints of "Engine running forward by day," etc. Third, there would be danger of yellow classification lamps being mistaken for the white lamps of an extra, perhaps with disastrous results. On the other hand, if, as at present, we use green for section following, and then add yellow for only section, no previous rule would be altered. All that would be necessary would be to issue a paster supplement to the book of rules, showing the additional signals. Also, if the yellow lights of an only section happened to be mistaken for the white lights of an extra, the risk of collision would be but slight, and in such a case the indicators should verify the signals.

The bull's-eye lantern, which would be the rear classification signal by night, should be so designed that different colored lenses could be interchanged in it, thus reducing the amount of equipment necessary.

M. B. WHITNEY,
Student in Railroad Operation, Southern Pacific Company.

[We will venture one or two suggestions. To partly excuse trainmen for not seeing the engine will be as bad as wholly excusing them; and to allow two chances to see the classification signals might be less satisfactory than to concentrate effort and attention on one chance. Do not be afraid of disturbing long established usage, when that usage, as is the case at present with green lights on the front of engines, perpetuates an inconsistency. Do not be afraid of disturbing the artistic illustrations of the rule book. A revised book once in a while may be useful on general principles. At all events, it is our observation that nearly every road makes a revision occasionally. Finally, do not be afraid of being radical. The *Railway Age Gazette's* remedy for the faults of classification signals is to use the block system and do away with such signals entirely.—EDITOR.]

GOOD STYLE IN RAILWAY PUBLICATIONS.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

The success of your prize competitions suggests the propriety of offering prizes in other departments—as, for example, in the literary shop. You have reprinted a number of circulars addressed by railway managers to their employees on the subject of courtesy, and it must be that these circulars have produced good results. The last word has not been said, however. There is room for variety in this feature of the business, and it will be a good thing if other managers, not resting satisfied with what has been done by the pioneers, try their own hands at lecturing—lecturing by circular, I mean. (Such amateur productions should of course be submitted to a severe committee before being promulgated.) As a contribution, I submit as an excellent example of good sense, brevity and refined taste the circular issued by the Postal Telegraph Company (see below). This is signed by Edward J. Nally, vice-president of that company, and therefore the prize does not go to your correspondent.

ANON, LITERARY AGENT OF THE X, Y & Z.

"THE EMPLOYEE IS THE COMPANY."

"It is a fact that the public regards the representatives it meets and with whom it transacts business as the company itself. We know this from our personal experience in stores, for instance. If we are well treated by the clerks, if they are pleasant and affable, if they impress us by their alertness and their knowledge of their business, our trade naturally gravitates toward that store. We like to go there; we are glad to tell our friends about it and to influence their patronage in that direction. So it is with the representatives of the Postal Telegraph. The public receives its idea of the company largely through you. You are the ones they meet and from whom, as a rule, they form their impression of the company itself. Hence it behooves all to be efficient, alert, honest and obliging, since in so doing we not only build character for ourselves, but we likewise give character and reputation to the company we serve."

RAILWAY OFFICERS ON THE SITUATION AND OUTLOOK

In accordance with its annual custom, the *Railway Age Gazette* has sent out to a number of railway executive officers inquiries regarding their views on the present railway situation and the outlook. A number have responded to our inquiries, and our questions and their answers are given below.

QUESTION 1.—DO YOU FEEL THAT THERE HAS BEEN ANY CHANGE IN THE ATTITUDE OF THE PUBLIC, AND PARTICULARLY IN THAT OF THE SHIPPERS, IN YOUR SECTION TOWARD THE RAILWAYS SINCE THE "RATE ADVANCE" DECISIONS WERE RENDERED BY THE INTERSTATE COMMERCE COMMISSION, AND, IF SO, WHAT IS THE NATURE OF THE CHANGE AND TO WHAT DO YOU ATTRIBUTE IT? WHAT, IN BRIEF, IS YOUR ROAD DOING TO IMPROVE ITS RELATIONS WITH THE PUBLIC?

ERIE RAILROAD.—I do not think there has been a change in the attitude of the public towards railways; and, in this, I differentiate from the public, the shipper. The portion of the public which is clamoring for the persecution of railways is to be differentiated from that portion who may be designated as shippers. The shipper as I know him has the best of feeling towards the railways as a whole. The Erie Railroad is doing nothing to improve its relations with the general public, beside promulgating, from time to time, various documents, which, if read, would enlighten it on the situation.—*Frederick D. Underwood, President.*

ROCK ISLAND LINES.—I feel that there has been a change in the attitudes of public and the shippers. Since the rate advance decisions were rendered by the Interstate Commerce Commission there is decidedly more tolerant spirit and I attribute it, first, to the fact that many people have been led to give the matter some personal investigation by reason of the publicity of the matter, and, second, the inability of the railway to spend money for improvements and equipment has resulted in reducing the business of shippers, which has led them to investigate, and they have ascertained that their business is more largely affected by the inability of the roads to spend money than they had ever before known. As to what this road is doing to improve its relations with the public: First, we are giving them the best service possible; second, we are giving more attention to the matter of publicity.—*H. U. Mudge, President.*

DELAWARE & HUDSON.—I think there has been a marked change in the feeling of the public toward the transportation companies, brought about by a greater effort on the part of the transportation companies to make clear to the public, or explain to the public, various complicated matters; also, the large industries, other than the railway industry, have felt it desirable to use their influence with the public on behalf of the railways.—*C. S. Sims, Second Vice-President and General Manager.*

KANSAS CITY SOUTHERN.—The public is possibly coming to understand that a general advance in rates would be negligible in its relieving effect, but the shipper is the protester, and I think is unchanged in his determination not to permit it. We are [illegible] endeavoring to bring before the public the facts as they exist, and by [illegible] to make our relations with the public one of mutual benefit.—*J. A. Edson, President.*

[illegible] I do not know that there has been any change in the attitude of the public, or the shippers, in our section since the "rate advance" decisions were rendered by the Interstate Commerce Commission. I believe the change in attitude of the citizens in favor of seeing that the railways are given proper treatment, which sentiment started a year or two ago, continues. Our road is doing everything possible to improve its relations with the public.—*J. Ross Clark, Second Vice-President.*

ROAD A (SOUTHWESTERN).—In my opinion there has been no particular change of sentiment one way or the other since the "rate advance" decisions were rendered by the Interstate Commerce Commisison. I have not personally been able to find anyone whose views have undergone any decided change since that time. Many of the larger individual shippers have for a long time past been against restriction in the matter of changes of rates, and have only insisted that no discrimination be created. The volume of the rates in themselves has not been a matter of concern so long as the rates were equitably adjusted. I do not believe that the great mass of the people have changed their views, and I think that to a great degree they are antagonistic to the railways. Our principal effort to improve our relations with the public is in reasonable and proper demands and by close association through official representatives.—*Vice-President and Traffic Manager.*

ROAD B (WESTERN).—I think there has been some change in the attitude of the public and of shippers towards the general business of railroading. I think shippers are beginning to feel more than they did a few years ago that the railways are not as black as they are painted, and that the general business of the country will be advanced if the railways are allowed to make fair returns on their property. Our road is doing the following kinds of work in connection with the public: Our local men everywhere are requested verbally to keep in close touch with all patrons of the road; to discuss complaints freely and try to remedy them at once; to know personally editors and others connected with the daily newspapers, and to have friendly relations with them. We endeavor to settle claims very promptly and to meet the views of the public, so far as we can, with service. This latter question is a most difficult one, because in a very proper effort to have low operating costs and efficiency in railway service we run counter to the demands of the public for more expensive passenger stations, more expensive passenger trains, fast freight trains, frequent switching, etc. From my office we send out to all of the newspapers such literature as we can obtain that gives the railway side of the general discussion that has been going on during the last few years. I think we have now a list of something like 50,000 names, to whom we send more or less stuff from time to time. We send out a good many of Slason Thompson's pamphlets, material prepared by the Bureau of Railway Economics, and I have made a good many public addresses during the past year, some of which have been printed, and those we distribute. Whenever we make inspection trips on the road, we try to stop at some point of more or less importance in the evening and attend a meeting with the citizens at the Commercial Club, or other social hall.—*President.*

ROAD C (EASTERN).—I do not think conditions have substantially improved. We are trying to sit still and saw wood.—*President.*

ROAD D (SOUTHEASTERN).—There has been a change for the better in the attitude of the public toward the railways. The roads I represent are doing only what has been practiced for a number of years—keeping in touch with the local conditions and remedying abuses when discovered.—*President.*

ROAD E (WESTERN).—I have found a very decided change in the attitude of the shipping as well as the general public toward railways, but I do not date any of it from the "rate advance" decisions of the Interstate Commerce Commission. The general attitude of thinking business men is that the railways have been punished instead of regulated, and that the reflex has been disastrous to general business. I find also the feeling becoming

daily more general that the railways are honestly and conscientiously endeavoring to occupy a correct relation with the public, and that this effort should be sympathetically met. This company is systematically extending the acquaintance of its general officers with the public; co-operating with every public instrumentality; in fact, doing everything possible to secure recognition as a constituent part of the business world, entitled to the same consideration given to other business interests, and asking no more.—*President.*

ROAD F (SOUTHWESTERN).—There has undoubtedly been some change in the attitude of the public, particularly shippers, in the past year. I think a part of this is due to the publicity given the railway's side of the question. We are making an effort to meet the wishes of the public where possible, and where such requirements are reasonable. If unable to meet them, we endeavor to explain the situation and show our side of the question.—*Vice-President and General Manager.*

ROAD G (CENTRAL).—There has been a slight change for the better. The swing of the pendulum of public opinion is slow, but very sure. It is important that there is a slight improvement. We must bear in mind that large bodies move slowly. The only thing we are doing to improve our relations with the public is to do the best we can in the direction of fair treatment and frank and straightforward dealing.—*President.*

ROAD H (WESTERN).—The attitude of the public in the territory traversed by this road is quite friendly, markedly so compared with several years ago. I do not feel that the "rate advance" decisions of the Interstate Commerce Commission had any bearing. We have our differences with shippers as to rates and facilities, such as necessarily arise and will continue to arise in all business enterprises, but in the majority of cases the differences are amicably adjusted without engendering much, if any, ill will. Our officials have constantly endeavored to improve their relations with the public. First, by efficient service and by the development of the property. In the second place, by dealing frankly with the public on all questions of public interest. We have had the assistance of our employees in all branches of the service, who are considerate of the rights of the public, and courteous in the treatment of shippers and passengers. Frequently the officials visit towns and cities located along the line, by invitation attending public meetings, banquets, conventions, and gatherings, where the officials and the public mingle with each other in a business and social way.—*President.*

ROAD I. (EASTERN).—There has been a marked change in the attitude of the public generally and of shippers in our section toward the railways during the last year; their sentiment toward the carriers is markedly more friendly. The change is due to several causes. Many persons, including not a few shippers, felt that the railways were entitled to some increase in rates, and believed that they were hardly dealt with when the Interstate Commerce Commission refused to permit any advances. The change in the attitude of the public toward the railways has also been largely due to the change in the attitude of many railway men toward the public. We are coming to realize better than we ever did before, and frankly to concede, that we are servants of the public as well as servants of our stockholders, and this attitude on the part of railway men naturally impresses the public favorably. Five years ago out of 100 articles having reference to railways, taken from as many newspapers, at least 65 would have been hostile to the roads, and the remaining 35 would have been indifferent or lukewarm in their support. Out of the same number of articles now 90 per cent. would be distinctly favorable to the roads and practically none would be distinctly hostile. Our road is trying to better its relations with the public by making extensive improvements, giving better service, and through its officers frankly discussing with the shippers and the public the different matters in which we are mutually concerned.—*President.*

ROAD L (SOUTHEASTERN).—In a general way, I believe that the feeling of the public (always excepting the "noisy politician") towards the railways is slowly growing better, because of the conservative and co-operative spirit exhibited by the roads, but that the selfish hostility of shippers to increases in rates is still being manifested by the almost universal suspension by the Interstate Commerce Commission of all tariffs filed making advances in rates.—*President.*

QUESTION 2.—DO YOU FAVOR REGULATIONS OF THE ISSUANCE OF RAILWAY SECURITIES? IF SO, BY THE FEDERAL, OR THE STATE, AUTHORITIES? WHAT, IN A GENERAL WAY, ARE THE REASONS FOR YOUR ATTITUDE TOWARD THIS SUBJECT?

ERIE RAILROAD.—I am in favor of the regulation of the issuance of railway securities by a federal authority, for the reason that such regulation will bring about a better market for them.—*Frederick D. Underwood, President.*

ROCK ISLAND LINES.—I do not favor regulation of the insurance railway securities by either federal or state authorities at this time, but it must be evident that if this is done it can only be effectively done by the federal authorities. My objection to having the matter tampered with at present is that it will affect present value of securities already in existence and which the public has purchased in good faith, and will make the condition of those roads that are already highly capitalized worse than at present.—*H. U. Mudge, President.*

DELAWARE & HUDSON.—It would be a mistake for the state authorities to attempt the regulation of railway securities, and as most states are now attempting such regulations, it would be very much better to have it done by the national government.—*C. S. Sims, Second Vice-President and General Manager.*

KANSAS CITY SOUTHERN.—The investing public is entitled to know that securities purchased are backed by substantial values, and reasonable regulation would seem to me not to be improper. I would favor federal authority, insuring uniformity, as against conflicting and varying regulations by the different states.—*J. A. Edson, President.*

SAN PEDRO, LOS ANGELES & SALT LAKE.—I believe the day of regulations for the issuance of railway securities is coming. Such regulation should be by the federal government; state regulations would be disastrous. While the railways at this time may take the same view of the regulation of securities as they first took of any governmental regulations, I believe the railways would have nothing to fear and that they, as well as the public, would be benefited thereby.—*J. Ross Clark, Second Vice-President.*

ROAD C (EASTERN).—I do not. It has always been very hard for the railways to raise money, and the interference of commissions makes a hard matter harder.—*President.*

ROAD D (SOUTHEASTERN).—I have not formed decided views respecting this matter.—*President*

ROAD E (WESTERN).—I am a firm believer in federal regulation, believing state control to be destructive, while federal control can be constructive. Believing in this, I could not consistently argue against regulation of securities, and therefore favor it.—*President.*

ROAD F (SOUTHWESTERN).—Am not adverse to the regulation of the issuance of railway securities. Most of the states through which we operate already do so.—*Vice-President and General Manager.*

ROAD G (CENTRAL).—I think we should go very slowly in imposing any new regulations. We have a lot of undigested regulations still weighing uncomfortably upon our stomachs. This does not mean that I am against regulation, but against adopting regulations more rapidly than they can be absorbed into the system.—*President.*

ROAD H (WESTERN).—We are not in favor of regulating the issuance of railway securities. It is a matter which will take care of itself if left alone. The control by different states is conflicting, and creates difficulties in preventing extensions and development, which the public desire, as the development in one state may be well up to its necessity, while in another state

much remains to be done in the way of new extensions. This only harasses and embarrasses the development of the country and the development of the transportation lines, and makes the securities less desirable to investors, so that the money is invested elsewhere, or in other countries.—*President.*

Road I (Eastern).—I am in sympathy with the views regarding regulation of railway securities expressed by the Hadley Railroad Securities Commission in its reports, which was sent to Congress by President Taft on December 11.—*President.*

Road L (Southeastern).—Inasmuch as corporations are creatures of government—that is, they have no right to exist except under general or specific authority of the body politic—it seems clear that the latter should have full and explicit information or the issuance of railway securities. As one most important function in government is the protection of its subjects against the self-seeking and designing, whether at home or abroad, it is reasonable that the government should be fully advised and be in a position to exercise its influence in favor of the reasonableness and soundness or corporate security issues. I, therefore, do not favor regulation of the issuance of railway securities either by federal or state authorities.—*President.*

QUESTION 3.—DO YOU FAVOR NATIONAL LEGISLATION FOR THE FEDERAL INCORPORATION OF CORPORATIONS DOING AN INTERSTATE BUSINESS, OR ANY OTHER LEGISLATION BY CONGRESS THAT WILL TEND TO REDUCE REGULATION BY THE STATES, AND TO CONCENTRATE IT IN THE HANDS OF THE FEDERAL GOVERNMENT?

Erie Railroad.—While I am not in favor of any further legislation in relation to corporations, federal is preferable to state legislation. It is perhaps time to again call attention to the present ridiculous and impossible situation—forty-six state railway commissions and a federal commission, all seeking to regulate railway corporations.—*Frederick D. Underwood, President.*

Rock Island Lines.—I favor action that will concentrate railway legislation in the hands of the federal government and take away all such authority from the states, except such as is necessary for police regulation.—*H. U. Mudge, President.*

Delaware & Hudson.—The situation, where the several states attempt regulation, is almost intolerable. Regulation has come to stay, and it should, therefore, be in the hands of the national, and not the state, government.—*C. S. Sims, Second Vice-President and General Manager.*

Kansas City Southern.—Am in favor of anything that will concentrate and simplify such regulations as may be proper, and this would seem to be possible only through national control, to the entire exclusion of state authority.—*J. A. Edson, President.*

San Pedro, Los Angeles & Salt Lake.—I strongly favor national legislation for incorporation of corporations doing an interstate business that will have a tendency to reduce state [illegible] *Vice-President.*

Rock Island Lines.—It is essential that the regulation of interstate carriers be concentrated in the federal government rather than subjected to the diverse views of forty-nine different governments. This is so clear that no argument is required. Can this be done best by means of legislation specifying federal incorporation or by other methods? I do not know but that the [illegible] practices and the commitment of the Interstate Commerce Com[illegible] *Vice-President.*

[illegible] & Texas Pacific.—While I have not been able to give detailed consideration to the matter, my first impression is that federal incorporation of corporations doing an interstate business would be advisable.—*T. C. Powell, Vice-President.*

[illegible] Central.—It would seem essential to a clear understanding as to just what corporations are empowered to do, and what they are prohibited from doing, that the regulations should come from one source, which would necessarily be the federal government.—*W. L. Park, Vice-President and General Manager.*

Road A (Southwestern).—I think that legislation that would tend to reduce regulation by the states and to concentrate it in the hands of the federal government would be in our interest in that such regulation would be uniform and would not subject us to varying rules in sections separated only by state lines, and it would remove the ever-present contest between the various states as to adjustments within their borders, each seeking advantages as to rates and regulations over other sections. The fact that the state commissions are as a rule elected serves to make them political bodies, and so long as the members are subject to re-election their views must be influenced by prevailing public sentiment without regard to the inherent merits of many cases presented for their consideration.—*Vice-President and Traffic Manager.*

Road B (Western).—I have been rather opposed to extending the federal power over so many details of local business, but I am drifting to the conclusion that the complications are so great now that probably federal incorporation and federal supervision will be better than so much half-baked legislation and regulation from the states.—*President.*

Road C (Eastern).—Yes.—*President.*

Road D (Southeastern).—Federal incorporation and responsibility of interstate railways to a federal commission only.—*President.*

Road E (Western).—I am not clear as to what legislation is needed or proper to bring about federal and eliminate state control. I have firmly believed that when the Supreme Court finally speaks on this much-mooted question it will be a practical elimination of the state, and that further legislation would be unnecessary. If I am mistaken in this and if the Supreme Court stops short of such a decision and the same can be secured through legislation, then naturally I favor the latter.—*President.*

Road F (Southwestern).—Am in favor of so-called "federal incorporation," particularly so far as interstate carriers are concerned.—*Vice-President and General Manager.*

Road G (Central).—I am inclined to think that federal incorporation is the best way to settle the trust question. Slow and intelligent progress is better than rapid and unintelligent work, which either has to be undone or done over again.—*President.*

Road H (Western).—The courts should be able to handle the situation without further legislation. If the laws of the various states interfere, as they do, with the handling of interstate commerce, it is entirely within the province of the Supreme Court to so declare, and any relief which the railways are to obtain by reason of conflict of jurisdiction of state and federal authorities, must come through the courts.—*President.*

Road I (Eastern).—I question if any further regulation of railways is desirable at this time, unless it should be an amendment of the Sherman anti-trust law which would permit the railways freely to take reasonable concerted action regarding rates and services, and some such legislation as that recommended by the Railroad Securities Commission. It would be impossible for them to take anything but reasonable concerted action, if the Sherman law were amended, because if they attempted to do otherwise the Interstate Commerce Commission has power to prevent them.—*President.*

Road J (Southeastern).—I am in favor of national legislation that will place in the hands of the Interstate Commerce Commission the full control of railway operation, eliminating the frequent clashes between state and federal authorities.—*Vice-President and General Manager.*

Road K (Eastern).—Yes. The various laws that have been passed by the different states on matters affecting railway operation are not uniform. If the present process of law making by the states continues, in a short time there will be as many different laws on the same subject as there are states. For example, there are five regulations issued by as many states—all different—as to the kind of highway crossing sign to be erected at highways. The commissioners of Indiana have ordered a horizon-

tal board in addition to the ordinary conspicuous sign with the word "danger" in red, and they have the assurance to specify in their annual report that there has been a great reduction in the number of accidents at highways by reason of this sign. The best experts in block signaling have concluded a long time ago that overlap signals were dangerous, because engineers quickly discover where the overlap is, and in approaching a stop signal have in mind the possibility of over running the signal and not being detected by reason of the overlap, and yet, an inspector of the commission in one of the largest states in the Union is urging that the railways adopt the overlap. It goes without saying that none of the executive bodies, either federal or state, have any valuable knowledge of railway operation. Their knowledge is that of the layman. Their views are absorbed from their inspectors. As the federal government under Mr. Moseley insisted that the necessary qualification of an inspector of safety appliances was that he should be a member of a labor union, it is quite evident that the recommendations of such men, who are largely brakemen, baggagemen and conductors, cannot be of an impartial character; therefore, the railways are not fairly treated in the matter. The inspectors employed by the state commissions are largely railway employees who have either not succeeded or have succeeded partially in the profession of railroading, and their knowledge is not good. If the state regulation of transportation could be eliminated and concentrated in the Interstate Commerce Commission and that body included some competent operating men, many of the difficulties to which the railways are subjected would be removed and greater difficulties which are to come would be postponed altogether. There seems to be no reason why a full crew bill specifying 25 cars is ideal in one state and one of 50 cars in another; they cannot both be right.—*Vice-President.*

Road L (Southeastern).—I am not yet prepared to speak positively for or against federal incorporation for interstate corporations. I would recommend that nothing be done in this connection until other uncertainties are cleared up and a better judgment can be formed as to the favorable and unfavorable aspect of federal incorporation. I incline to believe, however, that popular opinion will favor it.—*President.*

QUESTION 4.—WHAT LEGISLATION BY CONGRESS, IF ANY, DO YOU THINK JUSTIFIABLE OR DESIRABLE WITH A VIEW PARTICULARLY TO MAKING THE RENDERING OF THE TRANSPORTATION SERVICE OF THE COUNTRY SAFER, MORE ECONOMICAL OR BETTER?

Erie Railroad.—No legislation is necessary or justifiable with a view to improving the transportation service, making it safer or more economical. Competition between lines will take care of that far better than statute.—*Frederick D. Underwood, President.*

Rock Island Lines.—I think no legislation by congress is necessary at this time to render the transportation service in the country safer, more economical or better. The roads are apparently applying block signal protection as fast as their finances will permit.—*H. U. Mudge, President.*

Delaware & Hudson.—The present powers of the Interstate Commerce Commission are very great. They have inspectors overlooking telegraph train orders, signals, safety appliances, etc., etc., etc. For the present, I think, no additional legislation is necessary.—*C. S. Sims, Second Vice-President and General Manager.*

Kansas City Southern.—I see no necessity for any further legislation to make transportation service safer, more economical or better in any way; the railways themselves will work it out as conditions demand and opportunities permit.—*J. A. Edson, President.*

San Pedro, Los Angeles & Salt Lake.—I favor no further legislation by Congress for the next two or three years, so as to give the railways a breathing spell and a chance to line up and get working under the laws that have already been passed.—*J. Ross Clark, Second Vice-President.*

Rock Island Lines.—Let us defer further legislation until the present and existing laws are intelligently administered by government officers. The ability of the Interstate Commerce Commission to administer our present multitude of laws has yet to be demonstrated.—*F. O. Melcher, Second Vice-President.*

Illinois Central.—I think very little regulation by Congress, other than that which will provide sufficient revenues, is necessary in rendering the transportation service of the companies safer and more economical. The managers are ready to spend money available in the direction which, from their knowledge of the property, will give the best result. On some railways it may be ballasting and heavier rail; on others, the question of bridges may be paramount; on others, block signals. Some of the laws so far passed, under the pretext of adding to the safety of the public and employees, such as a great many features of the safety appliance act, standardization of equipment, full crews, etc., have caused and will cause an enormous and unnecessary expenditure without commensurate returns to the public, and must necessarily retard the doing of those things that from the experience of the managers acquainted with the property in their charge they well know to be of greater importance, for the reason that a large part of the above expenditure is waste.—*W. L. Park, Vice-President and General Manager.*

Road A (Southwestern).—It seems to me that legislation is unnecessary to make the transportation service of the country safer, better or more economical, as competition between the railways prompts each to make its service as safe and satisfactory as possible. I have never known any legislation which looked to greater economy in operation. I would regard a bill authorizing pooling as a measure in this direction in that under an agreed division of revenue much service that is now rendered, and which under the present stress of competition it is necessary to maintain could be eliminated without injury to the public interest.—*Vice-President and Traffic Manager.*

Road B (Western).—In due time public opinion, or legislation, or both, will have to bring about a condition in this country so that the arbitrary stoppage of safe, regular and adeqate transportation by strikes will be impossible. Just how this can be done, I am not prepared to say. I have a feeling, however, that the time will come when a man who engages in the railway business will be under the same sort of moral, and possibly under the same sort of legal, obligations that a man is who enters the army; that he will have no more right to desert the railway than he has to desert the army; that he can only leave it under certain prescribed rules, and that if he leaves it or deserts it some sort of punishment will be meted out to him. The complications of modern industrial life are such that society sooner or later will have to invent some plan so that all business will not be dislocated and great suffering brought to innocent people because of the arbitrary actions of large bodies of men upon whose daily work depends the general life of the community.

Another place where public opinion should introduce some corrections is the wild demand for high speed, both freight and passenger, Apparently the railways cannot resist this demand, and it may be that some law limiting speed would be helpful in producing safer, more economical and better transportation service. Every now and then we have some bad accident, due in part to the mania for speed, and in part to poor work done by human hands at some point in the mechanical or operating process of the railway.—*President.*

Road C (Eastern).—Neither Congress nor the commissions ever originate any improvement. They find out what the roads are trying out and then order it used and claim all the credit. In so doing they usually fail to allow for variations in the conditions pertaining to different localities and companies, and by insisting upon uniformity of treatment where there is no uniformity of needs, they often bring about more serious evils than those they attempt to remedy.—*President.*

Road D (Southeastern).—Apparently no additional legislation necessary.—*President.*

Road E (Western).—I have no suggestion to make at this time about legislation favoring the transportation service. I believe that with the possible exception of automatic signaling, which will come gradually, there is nothing particularly needed if the federal statutes only could be applied and the conflicting state regulations eleminated.—*President.*

Road F (Southwestern).—I do not want to be quoted as favoring additional legislation, either state or national. We have had entirely too much as it is. What the carriers need is legislative rest and an opportunity to adjust themselves to present conditions.—*Vice-President and General Manager.*

Road G (Central).—The railways will take care of this, as a matter of self-interest, very rapidly, if their credit is restored. Unsafe operation is very costly operation, as every railway manager knows. A greater spread between gross and net earnings will do more towards securing safer operation than all the laws that could be framed.—*President.*

Road H (Western).—No additional legislation by Congress is necessary. We have plenty of it now. More than can be or is enforced. Problems ought to be worked out along existing lines and changes adopted as they are found impracticable. The railways should be permitted to go on and develop their business and the business of the country without being constantly terrorized by the fear of new legislation changing continuously the methods of transacting railway business.—*President.*

Road I (Eastern.)—As I said in my answer to question 3, I do not think any further federal legislation regarding railways is desirable at this time, with the possible exceptions mentioned.—*President.*

Road J (Southeastern).—The most important legislation to the commercial world as well as the railways at present, to my mind, is an amendment to the Erdman Act making arbitration compulsory, to avoid the possibility of tying up the commerce of the country on a pretext because of unsatisfied greed or disgruntled labor organizations.—*Vice-President and General Manager.*

Road K (Eastern).—In my opinion, what is needed is an intelligent joint investigation by railway officers and the Interstate Commerce Commission of accidents; the allowance to the roads of sufficient revenue to meet the necessary requirements; the elimination of the expenditure of money that is now spent foolishly and largely for the political benefit of the labor organization as a result of crew laws and other similar legislation.—*Vice-President.*

Road L (Southeastern).—No legislation by Congress is justifiable or desirable with a view particularly to making the rendering of transportation service of the country safer, more economical or better. It can safely be left with the managers of the railways of this country to render the transportation service safer, more economical and better if the public will withdraw its position against a moderate advance in both freight and passenger rates, and enable the railway companies to earn a sufficient [illegible] to pay for labor and material and to increase efficiency of their properties without unreasonably increasing their fixed charges, being mindful that the owners of the property are entitled to a reasonable return on their investment.—[illegible]

QUESTION 5.—THERE CAN BE NO DOUBT THAT THE CONTINUANCE OF BUSINESS DEPRESSION DURING THE PAST YEAR HAS BEEN LARGELY DUE TO THE FACT THAT IT HAS BEEN A YEAR OF RETRENCHMENT BY THE RAILWAYS. TOWARD THE CLOSE OF THE YEAR 1911 THERE HAS BEEN A SUBSTANTIAL INCREASE IN PURCHASES OF EQUIPMENT AND SUPPLIES. DO YOU THINK THE RAILWAYS WILL SPEND MORE OR LESS MONEY ON MAINTENANCE, IMPROVEMENTS AND ADDITIONS AND NEW CONSTRUCTION NEXT YEAR, AND WHY? HOW, IN A GENERAL WAY, DO YOU REGARD THE BUSINESS OUTLOOK FOR 1912?

Erie Railroad.—The expenditures to be made by railways are not within my information. Railways will continue to spend as little as possible on maintenance and improvements and to refrain from additions or new construction until there is a better market for securities. The causes of the depression in the security market are so well known as to require no discussion.—*Frederick D. Underwood, President.*

Rock Island Lines.—The railways must purchase an average amount of equipment, first, to provide for replacement of obsolete and destroyed equipment, and second, to take care of the natural increase in traffic that we know must come. The large purchases made recently are due to the very low prices, the reduction in the price on freight cars from that purchased last year being equal to about five years' interest on the money. With this in view, it is easily seen why the railways feel that they can afford to borrow money and purchase equipment, even though it is not needed at present. I do not think the railways will spend more money on maintenance, improvements, additions or on construction next year, because it does not appear that conditions will be sufficiently settled to enable financing to be done for this purpose. I do not regard the business outlook for 1912 as being very encouraging. I think we may possibly get through without further serious decreases in earnings, but I can see no reason to expect any increases.—*H. W. Mudge, President.*

Delaware & Hudson.—The railways are still retrenching. The year 1912 is apt to carry with it a great deal of politics, and politics have never been known to help business. I am inclined to feel the railway retrenchment will continue until the political situation has been cleaned up.—*C. S. Sims, Second Vice-President and General Manager.*

Kansas City Southern.—The dissolution of large business interests and the general attitude of federal and state governments have tended toward depreciating securities, rendering capital expenditures inopportune, and this very condition depressing business in general has so reduced railway earnings that maintenance expenditures have been held within strict limits. Expenditures by railways will no doubt conform to these conditions for 1912 as in the past. The action of federal authorities and public declarations of men in political power having in the past few months indicated a tendency toward sane control of corporate interests may restore confidence to business interests in general. Large purchases by railways of equipment, as reported within the last 90 days, will stimulate business, and a brighter outlook seems dimmed only by the customary depression of a presidential campaign.—*J. A. Edson, President.*

San Pedro, Los Angeles & Salt Lake.—I regard the business outlook for 1912 in a general way as good, but it being a presidential election year the tendency may be to curtail some [illegible] *Kas Clark, Second Vice President.*

Road B (Western).—I think the railways are apt to spend a little more money on maintenance, improvements and additions in 1912 than in 1911, but I am doubtful about new construction. There is not much incentive for capital to go into large [illegible] enterprises when the Commerce Commission's general attitude is to reduce rates steadily, the tax powers' attitude is to raise taxes steadily and the labor union organizations to increase wages steadily. I think the volume of business for 1912 in our territory will be about the same as for 1911, possibly a little better. People are inclined to be more economical and save their pennies more than they did a year ago, and I believe this tendency will continue until after the presidential election. [illegible] has a decided effect on passenger travel and on some classes of freight business.—*President.*

[illegible] I do not think earnings for the fiscal year 1912 are likely to be any better than for 1911. I do not expect much improvement during the next year.—*President.*

[illegible] The business outlook for 1912 seems favorable. In my opinion, however, no extensive pur-

chases will be made by the railway companies. They will purchase only what is absolutely necessary.—*President.*

ROAD E (WESTERN).—I believe that the expenditures for improvements, additions and new construction in 1912 will not exceed the year now closing, for the reason that I do not in a general way regard the business outlook for the next year as more encouraging than the present year. It is a mistake, I believe, to construe the recent increase in purchases of equipment and supplies to presage a general resumption of prosperous conditions. It is, in my opinion, brought about by the fact that these purchases were enforced through depletion of stocks and simply to replace obsolete or destroyed equipment. Experience has shown that whenever Congress tackles the tariff question business marks time until they are through.—*President.*

ROAD F (SOUTHWESTERN).—The business outlook for 1912, in our section of the country, is favorable, although I do not look for any great improvement over 1911. So far as this company is concerned, we do not anticipate purchasing any great quantity of equipment and supplies during the coming year.—*Vice-President and General Manager.*

ROAD G (CENTRAL).—I do not look for any considerable improvement during the year 1912. I think we will not much more than hold our own with 1911.—*President.*

ROAD H (WESTERN).—With the proposed tariff legislation and the Presidential question, which has never failed so far to depress business, and with the large business interests apprehensive as to just what law means, we can see no marked improvement ahead of us of any considerable volume until after the next Presidential election, and not then if a candidate is elected who desires to further disturb the present business methods of the country. We have no intentions of making any great improvements and additions in 1912 except such as are required from a practical standpoint and business requirements.—*President.*

ROAD I (EASTERN).—I should assume that the railways of the country as a whole will find it necessary to spend substantially more for additions, improvements and new equipment in the calendar year 1912 than they have in the calendar year 1911, because there can be little question that during the past two years they have not been spending enough in proportion to the requirements that will be imposed on them when prosperity returns. As to new construction, I do not look for any considerable revival of it. Regarding the general business outlook for 1912, I think it is fairly good. That is to say, I do not expect to see any further shrinkage. The large orders for equipment that the railways recently have placed will keep many manufacturers of railway equipment busy for some months, and, indirectly, the effects of this will be felt throughout the country. However, in a presidential election year, and especially in one when there is so much agitation regarding regulation of business, it seems doubtful if there will be any great revival of business.—*President.*

ROAD L (SOUTHEASTERN).—In reply to this inquiry I can only speak in reference to the railway that I represent. It is not our purpose to spend more money on maintenance, improvements, additions and new construction next year, for the reason that we have maintained our property and made a reasonable amount of improvements, additions and such new construction as were necessary during the last and previous years. In a general way, the business outlook for 1912 is favorable to this company.—*President.*

QUESTION 6.—THERE HAS BEEN MUCH TALK RECENTLY OF RAILWAY "ECONOMY" AND "EFFICIENCY." WHERE DO YOU THINK THERE ARE THE GREATEST POSSIBILITIES OF INCREASES IN ECONOMY AND EFFICIENCY WITHOUT IMPAIRMENT OF THE SERVICE RENDERED THE PUBLIC?

ERIE RAILROAD.—Talk about "economy" and "efficiency" is largely by those ignorant of the subject, who are therefore prolific in discussion of it. No man can say where the greatest general possibilities for increases in economy and efficiency lie, as they are largely local to each railway.—*Frederick D. Underwood, President.*

ROCK ISLAND LINES.—I can only see one possibility for a very material increase in economy, and that is by reducing the running time of both freight and passenger trains. There has been a considerable saving made on the western lines in this way, but the tendency of some lines to break away makes it doubtful whether it can be maintained. I do not think this results in impairment of the service rendered to the public. I believe slower time freight trains with regular service is better than fast time with a percentage of trains off time.—*H. U. Mudge, President.*

DELAWARE & HUDSON.—Great economy can be brought about at many points in this country by doing away with unnecessary competition. In other words, cut out all unnecessary service. All over the country the income of passenger trains is generally less than the average train mile costs, showing too much passenger service, and yet if the railway officers attempt to take off a single train, regardless of whether it is profitable or unprofitable, there is a great public outcry and the matter is taken to the various commissions. The elimination of the state commissions and control by the national commission would protect such a situation.—*C. S. Sims, Second Vice-President and General Manager.*

KANSAS CITY SOUTHERN.—The greatest possibility of increase in economy and efficiency without impairing service lies, in my judgment, in the employees taking a proprietary interest in the operation and welfare of the roads, showing greater loyalty and industry, care to prevent accidents, handling freight and equipment with the least possibility of breakage and damage, stopping leaks and waste and utilizing to its fullest value every article used in conducting business; by general co-operation and "teamwork" in all departments.—*J. A. Edson, President.*

SAN PEDRO, LOS ANGELES & SALT LAKE.—Considering their enormous size and the territory they cover, I consider the railways of the United States today the most economically operated of any of the great enterprizes of the country. Considering the constant tendency to increase wages of all kinds without a corresponding increase in efficiency. I do not see any chance for further economy in operating expenses without impairment of the service rendered the public.—*J. Ross Clark, Second Vice-President.*

ROCK ISLAND LINES.—The greatest economy lies in the possibility of a reduction in the present prices of material. Under the present circumstances, the cost of labor cannot be reduced nor can the quality of material be lowered; in fact, it may have to be improved. If an investigation should develop that no reductions can be made in prices, we shall have to depend upon our present methods of introducing economies in all ways, each small but, in the sum total, great; we shall continue the course followed by the railways for many years which has enabled them to keep their operating costs at such low figure in spite of the increases in materials and labor.—*F. O. Melcher, Second Vice-President.*

ILLINOIS CENTRAL.—It is absolutely necessary that there shall be a better understanding with labor in order to effect shop efficiency. With the support of the public there are unquestionably opportunities of economizing on our railways in many directions. So long as every movement of this character is met with opposition by employees, who are able to control to a large extent local public sentiment sympathetically, almost insurmountable difficulties will be encountered. Large capital expenditures are necessary to make effective many economies not so controlled. A restoration of confidence could be brought about by according the railways fair treatment as to revenues, to the extent that the dividends may be assured, and reasonable surpluses created which will enable them to borrow money for the improvement of such facilities as will promote economy and efficiency; at the same time adding to the comfort of the public and bettering the service rendered to them.—*W. L. Park, Vice-President and General Manager.*

ROAD B (WESTERN).—The greatest possibility for increasing efficiency and economies lies, first, in giving up fast, elaborate and fancy passenger train service, and having substantial comfortable service. It makes little difference, really and truly,

whether a man goes between Chicago and New York in eighteen hours, or in twenty-four hours, or between Chicago and the Pacific Coast in seventy-two hours or in eighty hours, but the shortening of time means greater expenses in countless directions. The other point lies in getting a better quantity and quality of work out of every man employed. This probably cannot be accomplished until public opinion forces the labor unions to see that their real duty to society is to encourage increased output and loyalty to the enterprise paying the wages, rather than to encourage the reverse position.—*President.*

Road C (Eastern).—By getting rid of the parasites, like the "full-crew" and other wastes forced on the roads by legislation.—*President.*

Road D (Southeastern).—There are constantly railway economies being put into effect that result in improved efficiency as well as economy. I don't believe any economies are being put into effect that will result in impairment of service.—*President.*

Road E (Western).—I have very little sympathy with the blanket attack on railway "economy and efficiency" and I do not believe that there are any glaring instances of neglect in this direction. I think any management will admit frankly that it is not coming up to its own reasonable expectations, but it would be a rare exception where the limiting conditions are not appreciated and where relief is not being earnestly sought. The most potent influence, of course, against correct economical measures is the attitude of organized labor, in the face of which railways are generally more helpless than any other employer, because of their widely separated operations.—*President.*

Road F (Southwestern).—There has been entirely too much "talk" recently of railway "economy" and "efficiency." It is almost impossible to accomplish either without impairment of the service rendered the public. Competition between the carriers, as well as the several communities served, is keen.—*Vice-President and General Manager.*

Road G (Central).—Competition between railways has caused a good deal of duplication of service and a good many economic wastes which could be greatly reduced if railways were permitted to get together. Duplication of train service, both passenger and freight, unnecessarily high speed, duplication of ticket offices in big cities, economic waste in interchange facilities of both carload and L. C. L. freight in big cities, are all items in which much could be accomplished. If railways were free to act and were not hampered by federal legislation, much could be accomplished along these lines without any injury whatever to the general public. Dire necessity may compel the railways to make some of these economies, anyway.—*President.*

Road H (Western).—This is a large question. Economy and efficiency, especially the former, are constantly affected by increased legislation, increased labor demands, shortening of the hours of work, penalizing the transportation lines for safety devices, the nine-hour law, the 16-hour law, the 28-hour law, and surrounding them with conflicting laws in the states. So that the only thing that we can do is to operate as economically as the conditions permit, for which we have trained and experienced men, who are making a constant life study of this question, as the foundation and the success of the official staff is economical and safe operation, meeting competition, and providing the necessary facilities for the public.—*President.*

Road I (Eastern).—Probably the greatest opportunity for increasing the economy and efficiency of railway operation without impairing the service rendered to the public are to be found in increases of the average train load. This can be accomplished without any impairment of the service if, on the one hand, [illegible] and that which does not permit such movement as to [illegible]. On the other hand, very substantial economies could be effected without injury to [illegible] by reducing the speed of many freight and passenger trains if only the railways and their patrons would properly and effectively co-operate to this end. Unfortunately, under present laws and under present conditions it is difficult for the railways to so act together as to get the best results for all concerned.—*President.*

Road J (Southeastern).—A great deal of economy without the loss of efficiency is possible to railway operation if only facilities necessary are demanded by the traveling public and ordered by the state corporation commissions instead of so many improved luxurious passenger coaches and passenger stations not justified by the density of traffic. At the present date the traveling public, backed by the corporation commissions of the various states, is demanded from railways accommodations which they do not receive at home and for which they do not pay.—*Vice-President and General Manager.*

Road K (Eastern).—Eliminate the useless expense entailed by the railways in preparing certain reports for the various public bodies; eliminate the useless expense of extra men required by state and federal enactments; permit the railways to earn a sufficient amount of money to eliminate single track where double track is needed and to properly block signal their lines and maintain higher efficiency.—*Vice-President.*

Road L (Southwestern).—Eternal vigil and constant scrutiny of increased costs in any department of the railway are unquestionably the only ways in which we can get full efficiency.—*President.*

QUESTION 7.—ARE YOUR RELATIONS WITH YOUR EMPLOYEES BECOMING MORE OR LESS SATISFACTORY? WE HAVE IN MIND PARTICULARLY THREE PHASES OF THE SUBJECT: FIRST, CO-OPERATION BY THEM WITH YOU TO PREVENT LEGISLATION THAT WILL IMPAIR THE REVENUES OF THE ROADS; SECOND, INCREASING OR DECREASING EFFICIENCY OF LABOR; THIRD, INCREASING OR DECREASING REASONABLENESS OF EMPLOYEES IN DEMANDS REGARDING WAGES AND CONDITIONS OF EMPLOYMENT.

Erie Railroad.—The relations of the Erie Company with its employees may be said to be at a standstill. There has been no movement towards co-operation of its employees with the company leading to the prevention of legislation tending to impair revenue. The fact is, wages have been increased in the face of hostile legislation; hence, its mischievous effect has not come home to the employee, and it will not until wages are lowered. When their pocket nerve is touched they will be found on the company's side and against the reformers.—*Frederick D. Underwood, President.*

Rock Island Lines.—I do not see any material change in our relations with our employes. The more intelligent classes are co-operating to prevent unfair legislation. There is a tendency in mechanical trades towards reducing efficiency of labor.—*H. U. Mudge, President.*

Delaware & Hudson.—The relations of this company and its employees are quite satisfactory. They would co-operate to prevent adverse legislation, except in cases where it was "labor" legislation. The efficiency of labor is decreasing. The demands of labor are more reasonable today than two years ago.—*C. S. Sims, Second Vice-President and General Manager.*

Kansas City Southern.—Our relations with our employees continue to be satisfactory, and we are striving at all times to imbue the spirit that will bring about results mentioned in my answer to my question 6.—*J. A. Edson, President.*

San Pedro, Los Angeles & Salt Lake.—Our relations with our employees continue satisfactory. Organized labor still continues to make demands for higher wages.—*J. Ross Clark, Second Vice-President.*

Rock Island Lines.—First, as a general proposition, we find our employees apparently anxious to co-operate to prevent legislation that will impair the revenues of the railways. In doing this they have no unselfish motive, but are moved to such a course in the belief that it will assist them in securing increased wages. Second, there has been no increased efficiency on the part of labor of late years except as developed by improved machinery installed at the cost of the employer. Third, the

attitude of the employees with regard to demands for wage increases is not more reasonable than heretofore. Labor is learning by sad experiences that there are proper times for applying for increased rates and changes in working conditions.—*F. O. Melcher, Second Vice-President.*

Illinois Central.—Labor conditions are not satisfactory. If it were not for the intervention of professional labor agitators, who seem to be creating turmoil for ulterior purposes, there would not be any great difficulty in obtaining the co-operation of employees to prevent adverse legislation impairing the revenues of the roads. There is strong opposition in the rank and file to efficiency methods, such as piece work, increased train tonnage and decreasing of cost units. This is partially due to socialistic tendencies and the exploiting and exaggeration of so-called "efficiency methods" by labor leaders who well know their local unpopularity and use it to accomplish their purposes in other directions. There seems to be no diminution of employees demands in regard to wages and conditions of employment except that they are now controlled temporarily by adverse public sentiment. If the public could be made a party to such increases, through increased rates, such matters would not be in every case decided by public opinion or by arbitration through governmental agencies against the railways.—*W. L. Park, Vice-President and General Manager.*

Road B (Western).—Our relations with our employees are very good, and just about the same as for the last few years. Some of them are co-operating to a much greater extent about legislation than ever before. There is, however, not a great deal of co-operation about increasing the efficiency of labor, nor are there any signs of a let-up in regard to demands for increased compensation and easier conditions of employment. There is also a growing tendency for payments of one kind or another, either by law or otherwise, for disabilities caused by accidents or old age, which in the aggregate mean a great burden upon the revenues of the railway companies.—*President.*

Road C (Eastern).—I do not see any change in the relations of the roads and their employees, as long as we have professional mothers-in-law in the form of interested grievance breeders. The managers of these properties are perfectly competent to produce economical methods if they were freed from the politician and labor agitator.—*President.*

Road D (Southeastern).—Relations with our employees are quite amicable.—*President.*

Road E (Western).—While the employees on this particular property are reasonably disposed with respect to all three of the phases mentioned by you, it is not by observation that the relations with employees generally has undergone any remarkable change. Co-operation to prevent legislation is rarely other than by individual employees. The labor organizations are so busy advocating this or that measure in which they are interested, and which is antagonistic to the railways, that they cannot be prevailed upon to appear as an advocate of the companies, and when they do their influence is usually nil. Individual employees, however, very frequently do efficient work in this respect. There has been a very noticeable increase in the efficiency of labor during the last two years, but one would be simply deceiving himself who did not attribute the greater portion of this to the fact that there has been a surplus of labor, and that greater efficiency is always obtained under such circumstances. I have not been able to convince myself that the employees are any more or less reasonable with respect to demanding increases in wages and betterment of working conditions. Candidly, I have never felt that they could be classed among the radicals in this respect. They usually come up for increases when business is good, and in the large organizations in the transportation department there have been about four-year intervals between their demands. I do not believe we need anticipate any demands at the present time, but they will certainly be forthcoming if the business of the country again picks up, and if there is no reduction in the living costs.—*President.*

Road F (Southwestern).—Our relations with our employees have always been satisfactory. They have co-operated with us in many instances to prevent legislation that would impair earnings, but I cannot say there has been any increase in the efficiency of labor, nor has there been much change in the reasonableness of demands regarding wages and conditions of employment. These matters are mostly regulated by the action of our competitors.—*Vice-President and General Manager.*

Road G (Central).—I cannot see that the relations with employees have improved. I wish I could say they have.—*President.*

Road H (Western).—In reply to the first point, on the whole our men co-operate with us, and are interested in preventing adverse legislation that impairs their revenue and ours and curtails development. The increasing or decreasing of efficiency of labor is considerably controlled by laws and regulations by labor unions preventing the increasing of efficiency of labor, and by public support showing an indifferent feeling, but rather encouraging the labor side of the question. Relative to the increasing or decreasing reasonableness of employees in demands regarding wages and conditions of employment. This question is argued from two different angles. I think the men feel that the laws and the public demands are quite unfair and unjust, but this does not prevent many of them from making their own demands, so that the transportation lines are constantly "between the devil and the deep sea." The transportation lines, as they are public servants, as now construed, must have something near the same protection and treatment as other business interests have. You cannot continuously go on curtailing the power and the development of a transportation company without impairing its efficiency and curtailing its investment, as their being such a large factor in the purchase of manufactures and material in the country, it is difficult to understand how you can depress the earnings of the transportation lines and have the public prosper.—*President.*

Road I (Eastern).—I doubt if the relations between the railways as a whole and their employees are becoming much more satisfactory in any of the ways suggested by your question. The problem of bringing about better relations between railway employers and employees so as to get better results, not only for them but also for the public, is one of the most difficult and at the same time one of the most important problems that confronts us.—*President.*

Road J (Southeastern).—Our relations with our employees are becoming less satisfactory. First, we have no co-operation from them to prevent legislation to impair the revenues of the road; second, we have decidedly decreasing efficiency of labor, with the strength of the union which they depend upon to protect them against indifferent service; third, decided increasing unreasonableness of the employees in demands regarding wages and conditions of employment; their first duty is to the union, and they look to it to protect them against everything, right or wrong; and they usually receive such protection, regardless of the equity.—*Vice-President and General Manager.*

Road K (Eastern).—The relations with the employees are satisfactory. Referring to the three phases of the subject: 1. The employees are not successful in preventing legislation that will impair the revenue of the road. They are more concerned in getting their wages increased. When they approach congressmen, they do not desire to waste their ammunition in helping the railways when it is needed in influencing legislation to increase the force, reduce the hours of labor and secure increased wages by reason of mediation and arbitration through the government body selected for that purpose. 2. They are all concerned in lessening the amount of work to be performed and increasing the wages, so by that process there is a decreased efficiency of labor. 3. The leaders of all labor organizations are vitally interested in retaining their positions, and it is essential that they maintain interest on the part of the rank and file; and the way to do it is to eternally demand more pay and less

work either through a presentation of the subject to the employers or through the medium of legislation. As wages are higher today than ever before, there is not so much agitation on the part of the employees; and, to maintain their prestige, the labor leaders are energetic in developing new ideas and plans the accomplishment of which will decrease the work and increase the wages and thereby keep themselves prominently before the men by whom they are employed.—*Vice-President.*

Road L (Southeastern).—First. The relations with our employees have always been more or less satisfactory. I have seen no particular demonstration on the part of employees toward cooperation with us to prevent legislation that would impair the revenues of the roads. On the contrary, they have been active in assisting legislation to impair the revenues of the roads. Second. There is certainly no increase in the efficiency of labor. If anything, it is decreasing, due to the influence of labor organizations as a rule. Third. No reasonableness on the part of the employees has been apparent as yet regarding their demands for increases of wages and improvement of conditions of employment.—*President.*

RAILWAY BUILT IN 1911.

The record of new mileage added during the calendar year 1911 in the United States, Canada and Mexico, details of which are given in the following tables, was compiled from official reports from the railways, supplemented by our own records, and from figures furnished by the state railway commissions. This total does not include second, third or fourth track, sidings, or relocated lines. It does not include electric lines, except the New York, Westchester & Boston, which added 12 miles this year. This subsidiary of the New York, New Haven & Hartford, is a four-track line, built to high standards, and will be operated with equipment similar to that in use on the electrified portion of the New Haven's main line.

United States.

	No. of Cos. building.	1911.	No. of Cos. building.	1910.
		25.00	5	[illegible]
Alaska ...	1	[illegible]	2	61.00
Arizona ..	1	[illegible]	3	100.82
[illegible]		[illegible]	3	41.79
[illegible]	10	118.38	15	191.61
Colorado .	[illegible]	181.79	3	76.08
Florida ...	6	115.02	6	84.38
Georgia ..	8	122.40	6	65.07
Idaho	[illegible]	163.96	10	276.71
Illinois ...		4.61	3	64.89
Indiana ..	1	30.12		
[illegible]		18.32	3	46.17
Kansas ...		52.00	1	15.00
[illegible]		125.45	4	41.00
		53.00	[illegible]	71.45
Maine ...			2	32.75
[illegible]		[illegible]		
Michigan .		27.45	3	28.88
[illegible]		[illegible]		244.53
[illegible]		19.20	3	21.65
[illegible]	1	11.70	4	24.20
[illegible]	[illegible]	[illegible]	4	115.47
[illegible]	1	30.64		
[illegible]		9.00	1	12.25
[illegible]		[illegible]	1	6.90
[illegible]		[illegible]	1	6.00
[illegible]		17.22		5.99
[illegible]	[illegible]	46.31	4	105.97
[illegible]	[illegible]	[illegible]	4	300.96
[illegible]		5.75	[illegible]	
[illegible]	[illegible]	[illegible]	4	171.00
Oregon ..	[illegible]	224.21	16	244.09
[illegible]	[illegible]	92.99	4	28.26
[illegible]	[illegible]	32.50	[illegible]	[illegible]
[illegible]	[illegible]	21.87	4	205.58
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	18	413.78	28	756.35
[illegible]	[illegible]	34.30	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	369.50
[illegible]	[illegible]	[illegible]	6	52.90
[illegible]	[illegible]	[illegible]	[illegible]	90.63
[illegible]	[illegible]	13.40	[illegible]	0.48
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Mexico ..	[illegible]	[illegible]	[illegible]	138.27

[illegible]

[illegible]

[illegible]

	Miles.
ARIZONA.	
Arizona & Eastern.—Chandler Junction to Bowen	11.60
ARKANSAS.	
Kansas City & Memphis—Cave Springs to Litteral	14.00
Memphis, Dallas & Gulf—Shawmut to Standing	12.00
Thornton & Alexandria—Rock Island Junction to Tinsman	2.00
	28.00
CALIFORNIA.	
California Western Railroad & Navigation Co.—Soda Spring to Willets	10.00
Kings River (A. T. & S. F. C. L.)—Watoka to Piedra	10.70
Mountain Quarry—Quarries to Flint	7.00
Nevada-California-Oregon—From Surprise to New Pine creek	31.44
Northwestern Pacific—Between Willits and Shively	18.00
Pacific Coast—Sisquoc to Palmer	3.80
Porterville Northwestern—Between Porterville and Springville	15.90
Sacramento Southern (So. Pac.)—From near Freeport to Walnut Grove	14.29
San Diego & Arizona—Seeley to Dixie	5.00
Sunset Railroad (So. Pac. and A. T. & S. F.)—Fellows to Shale	2.25
	118.38
COLORADO.	
Colorado Railroad (C. & S.)—Wellington to Colorado-Wyoming state line, 19.72 miles; Pueblo to Walsenburg, 46.48 miles; total	66.20
Denver & Rio Grande—Southern Junction to Walsenburg Junction	46.50
The Colorado & Southern and the Denver & Rio Grande each built a single-track line between Pueblo and Walsenburg. These lines will be operated jointly by the two companies as a double-track line.	
Laramie, Hahn's Peak & Pacific—Between Wyoming-Colorado state line and Coalmont	44.00
Union Pacific—Dent to Fort Collins	25.09
	181.79
FLORIDA.	
Charlotte Harbor & Northern—Pierce to Mulberry	3.00
Florida East Coast—Knights Key to Key West, 40 miles; Maytown to Chuluota, 20 miles; total	60.00
Jacksonville Terminal—At Jacksonville	2.50
Ocala Northern—Ft. McCoy to Palatka	33.00
Seaboard Air Line—Hernando to Inverness	8.52
Tampa & Jacksonville—Fairfield to Blickton	8.00
	115.02
GEORGIA.	
Atlantic, Waycross & Northern—Between St. Marys and Atlantic	10.00
[illegible] Railway—Millhaven to Waynesboro	18.00
Georgia & Florida—Ellenton to Kingwood	9.80
Gulf Line—Bridgeboro to Camille	20.00
Hawkinsville & Western—Hawkinsville to Grovania	14.00
Ocilla Southern—Alapaha to Nashville, 13 miles; Fitzgerald to Abba, 7 miles; total	20.00
Savannah, Augusta & Northern (Sav. & Statesboro).—Garfield to Stover Crossing	13.60
Savannah & Southern—Norden to Willie, 13 miles; Letford to Spurs, 4 miles; total	17.00
	122.40
IDAHO.	
Central Idaho (O. S. L.)—Richfield to Wood river	19.30
Coeur d' Alene & Pend d' Oreille (Spok. Int.)—Coeur d' Alene Junction to Coeur d' Alene, 9.34 miles; Corbin Junction to Bayview, 12.42 miles; total	21.76
[illegible] & Western—[illegible] M. & P. S.)—McGuires to Coeur d' Alene	10.50
Idaho Northern Railway—Emmett to Plaza	5.00
Oregon Short Line—Montpelier to Paris, 8.52 miles; between Burley and Oakley, 21.40 miles; between Rupert and Bliss, 37.85 miles; Caldwell to Wilder, 11.32 miles; Ashton to Judkins, [illegible] total	100.09
Pacific & Idaho Northern—Between Lamoth and New Meadows	7.10
Salt Lake & Idaho (O. S. L.)—At Burley	0.21
	163.96
ILLINOIS.	
[illegible] & Southern—Not specified	0.32
Cleveland, Cincinnati, Chicago & St. Louis—From 1.93 miles south of Mt. Carmel to Wabash river	2.38
[illegible] Main to Kellogg	1.91
	4.61
INDIANA.	
Cleveland, Cincinnati, Chicago & St. Louis—Wabash river to Evansville	30.12
IOWA.	
[illegible] Western—At Marble Rock, 0.28 miles, at Charles [illegible] total	3.32
Chicago, Anamosa & Northern—Between Coggon and Quasqueton	15.00
	18.32
KANSAS.	
[illegible] T. & S. F.—South City to Winona	8.00
KENTUCKY.	
Chicago, Memphis & Gulf—Tennessee-Kentucky state line to Hickman	10.50
[illegible] N.—Melville to Versailles	7.92
[illegible] Straight creek to [illegible], Mertons to Arklon, [illegible]	1.78
[illegible] Louis—Hickman to East Hickman	1.25
[illegible] North Fulton river	13.00
Sandy Valley & Elkhorn—Shelby Junction to Consolidated Coal Co. [illegible]	40.00
[illegible] & S.—Cody to Beckam, Baxter [illegible] Perry and Amyx, total	40.00
	125.45

	Miles.
LOUISIANA.	
Athens & Southeastern—Providence to Fords Spur	7.30
New Orleans, Texas & Mexico (St. L. & S. F.)—Knapp to Mix	7.00
North Louisiana & Gulf—Hodge to Bienville	25.70
Ouachita & Northwestern—Newport to T. & G. Junction	10.00
Southern Railway & Navigation Co.—Not specified	3.00
	53.00
MARYLAND.	
Frederick Railroad—From Frederick City	3.00
Georges' Creek & Cumberland (W. Md.)—Cumberland to Maryland-Pennsylvania state line	18.49
	21.49
MICHIGAN.	
Duluth, South Shore & Atlantic—Soo Junction to Hunter's Mill, 4.72 miles; Trout Creek to Woods, 5.50 miles; Pasco to Woods, 1.33 miles; Ewen to Jensen's Mills, 0.92 miles; Deranson to Woods extension, 0.13 miles; total	12.60
Detroit & Mackinac—From near Posen to Calsite	12.00
Lake Superior & Ishpeming—Not specified	2.85
	27.45
MINNESOTA.	
Duluth & Northern Minnesota—Mile Post 62 to Mile Post 68	6.00
Minneapolis, St. Paul & Sault Ste. Marie—Through Pine county	30.28
Northern Pacific—Deerwood to Ore Lands	3.80
	40.08
MISSISSIPPI.	
Batesville Southwestern—Batesville to Tige	17.00
Liberty White—New Holmesville to Ada, 1.00 mile; Ada to Kaigler, 1.20 miles; total	2.20
	19.20
MISSOURI.	
Deering Southwestern—Between Deering and Caruthersville, 3.70 miles; Converse to Hornellsville Junction, 5.90 miles; Hickory Landing Road to Converse, 2.10 miles; total	11.70
MONTANA.	
Big Blackfoot (C. M. & P. S.)—Bonner to Blackfoot Junction	12.00
Chicago, Milwaukee & Puget Sound—Lewistown to Hilger	18.00
Chicago, Burlington & Quincy—Fromberg Junction to Scribner Junction	29.92
Northern Pacific—Glendive to Savage	34.50
	94.42
NEBRASKA.	
Union Pacific—Northcut to Gering	30.64
NEVADA.	
Nevada Copper Belt—Hudson to Ludwig	9.00
NEW JERSEY.	
Delaware, Lackawanna & Western—Hopatcong Junction to New Jersey-Pennsylvania state line	27.44
New Jersey Shore Line (N. Y. C. & H. R.)—West New York to Shadyside	1.02
	28.46
NEW YORK.	
New York Central & Hudson River (R. W. & O.)—Watertown Junction to Detour	5.22
New York, Westchester & Boston—Between New York City and Mount Vernon 5.50 miles; between Mount Vernon and New Rochelle 0.50 miles; between Mount Vernon and White Plains 6.00 miles; total	12.00
	17.22
NORTH CAROLINA.	
Madison County—Stackhouse to Belva, 7 miles; Stackhouse to Allenstand, 10 miles; total	17.00
Maxton, Alma & Southbound—Midway south	4.00
Norfolk & Western, Winston-Salem district to connection with Winston-Salem Southbound	0.31
Randolph & Cumberland—Hallison to McConnell	3.00
Rockingham Railroad—Rockingham to Gibson	22.00
	46.31
NORTH DAKOTA.	
Great Northern—Stanley to Wildrose	50.75
Midland Continental—Edgeley to Jamestown	50.00
Northern Pacific—Between Pingree and Wilton, 92.37 miles; Sanger to Deapolis, 16.22 miles; total	108.59
	209.34
OHIO.	
Akron, Canton & Youngstown—Mogadore to Brittain, 3.25 miles; Brittain to Robinson No. 9, 1.50 miles; total	4.75
Kanawha & Michigan—Kanonga north	1.00
	5.75
OKLAHOMA.	
Missouri, Oklahoma & Gulf—Bromide Junction to Bromide, 4.00 miles; Coalton to Deepfork, 4.00 miles; total	8.00
Webber Falls, Shawnee & Western—Warner to Webber Falls	11.00
Wichita Falls Route—Hammon north to Canadian river, 27.00 miles; Woodward northeast beyond Supply, 25 miles; total	52.00
	71.00
OREGON.	
Central of Oregon—Deer to Hot Lake	8.00
Nevada Cal[illegible]—Denio to New Pine creek to Lakeview	13.87
Oregon Short Line—At Nyssa	0.74
Oregon Trunk—North to Bend	81.10
Oregon-Washington Railroad & Navigation Co.—South Junction to Metolius, 23.10 miles; Woodlawn to Troutdale, 11.9 miles; Megler Junction to Kenton, 1.75 miles; total	36.75
Oregon Eastern (So. Pac.)—Klamath Falls end from near Lyla north, 25.49 miles; from near Hills south to Oakridge, 29.31 miles; total	54.80
Pacific Railway & Navigation Co. (So. Pac.)—Between mile post 34, Washington county, and Mohler, Tillamook county	32.00
	224.21
PENNSYLVANIA.	
Baltimore & Ohio—Between Acosta and Somerset	9.50
Beech Creek (N. Y. C. & H. R.)—Boardman to Carnwath	2.76
Chesnut Ride—To C. R. R. of N. J. at Palmerton	2.00
Connellsville & State Line (W. Md.)—Maryland-Pennsylvania state line to Connellsville	68.49
Delaware, Lackawanna & Western—Pennsylvania-New Jersey state line to Stateford Junction	1.09
Hickory Valley—Pine Camp to Summit	1.34
Ironton Railroad—Not specified	0.30
Pennsylvania Railroad—New Florence to terminus, 4.30 miles; west of Export, 0.64 miles; north of Coal Run Junction, 1.51 miles; extension of Radebaugh branch, 0.06 miles; total	6.51
Pittsburgh & Susquehanna—Philipsburg to East Moshannonton	1.00
	92.99
SOUTH CAROLINA.	
Bennettsville & Cheraw—Brownsville to Sellers	10.50
South Carolina Western—Hartsville to Florence	22.00
	32.50
SOUTH DAKOTA.	
Chicago & North Western—Colome to Winner	10.97
Chicago, Burlington & Quincy—East of Este	10.90
	21.87
TENNESSEE.	
Birmingham & North Western—Jackson to Dyersburg	48.00
Middle Tennessee—Leatherwood Junction to Mt. Pleasant	18.00
	66.00
TEXAS.	
Angelina & Neches River—Naclina to Chireno	10.70
Atchison, Topeka & Santa Fe—Sweetwater to Augustus	60.00
Crystal City & Uvalde—Gardendale to Fowlerton	27.00
Fort Worth & Rio Grande (St. L. & S. F.)—Brownwood north to May	18.00
Gulf, Colorado & Santa Fe (A. T. & S. F.)—Between Lometa and Eden	72.19
Houston Belt & Terminal—Around Houston	9.74
Jefferson & Northwestern—Towards Naples, 1 mile; Lanies to Linden, 5 miles; total	6.00
Kansas City, Mexico & Orient—Tankersley to Granada	117.00
Port Bolivar Iron Ore—Longview to Ore City	30.00
Stephenville, North & South Texas (St. L. S. W.)—Gatesville Junction to Hamilton, 31.90 miles; Edson to Comanche, 31.25 miles; total	63.15
	413.78
UTAH.	
Bingham & Garfield—Between Bingham and Garfield	21.00
Uintah Railway—Dragon Junction to Watson, 9.4 miles; Rainbow Junction to Rainbow, 3.9 miles; total	13.30
	34.30
VIRGINIA.	
Big Sandy & Cumberland—Matney to Rife	2.00
Interstate Railroad—Pardee to Roaring Fork mine, 2.88 miles; Argo Junction to Argo Saw Mill, 1.00 mile; total	3.88
Norfolk & Western—Petersburg Belt, Poe to Addison, 10.56 miles; Big Creek branch, above Richlands, 0.22 miles; total	10.78
	16.66
WASHINGTON.	
Chicago, Milwaukee & Puget Sound—Moncton to Everett	55.00
Chehalis & Cowlitz River—Chehalis southeast to Newaukum prairie	7.25
Northern Pacific—Ocosta to Bay City	2.73
Oregon-Washington Railroad & Navigation Co.—Argo to Seattle, 3.26 miles; South Aberdeen to Hoquiam, 3.93 miles; North River Junction to Primo, 12.02 miles; North Yakima to Attalia, 15.20 miles; total	34.41
	99.39
WEST VIRGINIA.	
Coal & Coke—Roaring Creek Junction to Elkins	6.90
Chesapeake & Ohio—Raleigh & Southwestern, 14.60 miles; Coal river branch, 11.20 miles; Guyandotte Valley branch, 12.40 miles; Buffalo Creek branch, 11.50 miles; not specified, 2.55 miles; total	52.25
Elk & Little Kanawha—Between Boggs and Rosedale	22.00
Norfolk & Western—Sycamore branch from a point 2.8 miles east of Williamson, 2.69 miles; Wayne branch from East Lynn, 0.62 miles; total	3.31
	84.46
WISCONSIN.	
Chicago & North Western—On S. M. & N. W. from a point 2.7 miles north of Lindwurm to Necedah, 130.55 miles; between Wyeville and Sparta, 23.02 miles; West Allis to Butler, 8.14 miles; total	161.71
Minneapolis, St. Paul & Sault Ste. Marie—Between Frederic and Superior	33.42
Superior & Southeastern—Weeg to Taylor Lake, 5 miles; Taylor Lake to Namekagon Lake, 3 miles; total	8.00
Wisconsin Northwestern—Logging branches	6.00
	209.13
WYOMING.	
Chicago, Burlington & Quincy—Thermopolis south	18.00
Colorado Railroad (C. & S.)—Colorado-Wyoming state line to Cheyenne	13.40
Laramie, Hahn's Peak & Pacific—Between Lespark and Wyoming-Colorado state line	12.00
	42.40
CANADA.	
Algoma Central & Hudson Bay—In District of Algoma, Ont., between Mile 94 and Mile 81.500 poles, between Mile 150 and Mile 1.0, 30 miles, between Hawk Lake Junction and Hobon, 23.84 miles; Magpie branch, 3.50 miles; total	69.34

	Miles.
Atlantic, Quebec & Western—Between Grand River and Gaspe	48.00
Canada & Gulf Terminal—St. Flavie, Que., to Matáne	36.00
Canadian Northern—In Manitoba, 26 miles; in Saskatchewan, 256 miles; in Alberta, 154 miles; in British Columbia, 20 miles; total	456.00
Canadian Northern Ontario—In Province of Ontario—Not specified	47.00
Canadian Pacific—Ontario, Georgian Bay & Seaboard, Coldwater Junction to Bethamy Junction, 76.37 miles; South Ontario & Pacific, Guelph Junction south, 5.00 miles; Saskatchewan-Moose Jaw south, 35 miles; Swift Current southeast, 45 miles; Swift Current northwest, 35 miles; Wilkie northwest, 32 miles; Imperial-Valeport, 59 miles; Bulyea south, 7 miles; Weyburn west, 23.80 miles; Moose Jaw northwest, 53 miles; Alberta-Lethbridge-Alderoyde, 56.80 miles; Castor Coronation, 21 miles; Irricana easterly, 17.50 miles; British Columbia-Jukeson-Fort Steele, 9.20 miles; Galloway-Waldo, 11 miles; total	486.67
Esquimalt & Nanaimo (Can. Pac.)—Cameron Lake, B. C., to Port Alberni	27.00
Grand Trunk—Birch, Ont., to Tay	8.90
Grand Trunk Pacific—In Saskatchewan, 102 miles; in Alberta, 144 miles; in British Columbia, 25 miles; total	271.00
Ha Ha Bay—In Province of Quebec	10.00
Intercolonial—Chatham division, 8.00 miles; Elmira division, 6.00 miles; total	14.00
Kettle Valley Lines—Midland, B. C., to Carmi, 45 miles; Merritt to Otter Summit, 30 miles; total	75.00
National Transcontinental Ry. (Grand Trunk Pacific)—New Brunswick—Between Moncton and Quebec and Ontario boundary, 0.73 miles; Quebec—Between New Brunswick-Quebec boundary and Quebec-Ontario boundary, 155.31 miles; Ontario—Between Quebec-Ontario boundary and Ontario-Manitoba boundary, 124.21 miles; total	280.25
Quebec & Saguenay—Province of Quebec	7.00
Quebec Central—St. Justine to St. Sabine	1.44
Quebec Railway, Light & Power Co.—Beaport, Que., to Kent House Park	3.25
Vancouver, Victoria & Eastern (Gr. Nor.)—Princeton, B. C., to Coalmont, 12 miles; Abbotsford to Kilgord, 6 miles; total	18.00
Sydney & Louisberg—Morien, N. S., to Birch Grove Colliery	2.50
Temiskaming & Northern Ontario—Iroquois Falls, Ont., to Timmins, 33.71 miles; North Bay Junction to Nipissing Junction, 3.53 miles; total	37.24
	1,898.59

MEXICO.

Interoceanic (N. Ry. of M.)—Metepic, Pueblo to San Lorenzo	26.00
Mexican Southern (N. Ry. of M.)—Oaxaca, Oaxaca to Tlacolula	21.00
Mexican Union—La Pay, Sonoro to Santa Rosalia	16.00
Mexico North Western—Terrazas to Madera, 116.00 miles; San Antonio to Cusihuiriachic, 15.00 miles; total	131.00
National Railways of Mexico—Penjamo-Ajuno line, Penjamo, Guanajuato to kilometer 40, 25.00 miles; Durango-Llano Grande line, Durango, Durango to Rio Chico, 36.00 miles; Durango-Canitas line, Durango to kilometer 28, 16.00 miles; total	77.00
San Diego & Arizona—Edwards, Lower California to Valle Redondo	7.00
Southern Pacific of Mexico—Between Santiago river and Tepic	36.00
Vera Cruz & Isthmus (N. Ry. of M.)—Sierra Colorado, Vera Cruz to Cosomoloapan, 20.00 miles; San Juan river to San Andres river, 17.69 mile; total	37.00
	351.00

EXPERIMENTAL PACIFIC TYPE LOCOMOTIVE.

A Pacific type locomotive which has developed 2,216 h. p.—1 h. p. to each 121.4 lbs. total weight—continuously in actual service, has been designed and built by the American Locomotive Company at its own expense for the purpose of securing information as to the maximum possibilities in economy and capacity per unit of weight with a locomotive of standard wheel arrangement. Compared with one of equal weight and conventional design this locomotive has shown an economy in fuel exceeding 25 per cent. Thoroughly appreciating the need of greater sustained capacity to meet the maximum requirements of modern passenger service, the builders embodied in this design the latest knowledge of general proportion, the most recent development in materials and improvements in the design of details, combined with the best use of approved fuel-saving devices to secure the utmost possible economy of the locomotive as a whole from the operating standpoint. The improvements over long accepted conventional practice in the design and construction of many of the principal details introduced in this locomotive have since been adopted as standard practice by the builders and widely applied to a large number of other locomotives with marked success. For these reasons, this locomotive (No. 50,000, as it is called by the builders) marks as distinct and definite an advance in locomotive engineering as did the Mountain type of the Chesapeake & Ohio built by the same company.

To accomplish the purpose of the design—the maximum capacity per pound of weight—the largest boiler capacity within the pre-determined wheel loads was the essential feature. This end was obtained by eliminating every pound of weight in all the parts that was not necessary to strength or durability, and by utilizing the weight thus saved to provide a larger boiler, and by increasing the capacity of the boiler thus secured by combining in one design all the most approved fuel-saving devices. The design and construction of the boiler are shown in the accompanying illustrations.

The accompanying comparison of locomotive No. 50,000 with other leading examples of Pacific type locomotives of approxi-

	50,000	A.	B.	C.	D.
Total weight of locomotive	269,000 lbs.	269,000 lbs.	271,000 lbs.	270,000 lbs.	266,500 lbs.
Type of boiler	Conical connection.	Conical connection.	Conical connection.	Straight	Conical connection.
Outside diameter at front end	76⅜ in.	72 in.	72 in.	79¾ in.	72 in.
Largest diameter	87 in.	83 in.	83 in.	83¼ in.	83 in.
Length, center	114 in.	108⅛ in.	108⅛ in.	111 in.	108⅛ in.
Length, over all	75¼ in.	75¼ in.	75¼ in.	80¼ in.	75¼ in.
Tubes, number	207	175	242	343	382
Flues, number	36	32	28	...	...
Flues, diameter	2¼ in.	2¼ in.	2 in.	2¼ in.	2 in.
Flues, diameter	5½ in.	5½ in.	5⅜ in.	...	...
Tubes, length	22 ft.	21 ft. 6 in.	21 ft. 6 in.	21 ft.	20 ft.
Heating surface, tubes	4,01[illegible] sq. ft.	3,424 sq. ft.	3,784 sq. ft.	4,427 sq. ft.	4,210 sq. ft.
Heating surface, flues	[illegible] sq. ft.	765 sq. ft.	705 sq. ft.	...	...
Grate area	59.75 sq. ft.	56.5 sq. ft.	56.5 sq. ft.	61.8 sq. ft.	56.5 sq. ft.

mately equal weight shows strikingly the larger boiler provided in proportion to its total weight.

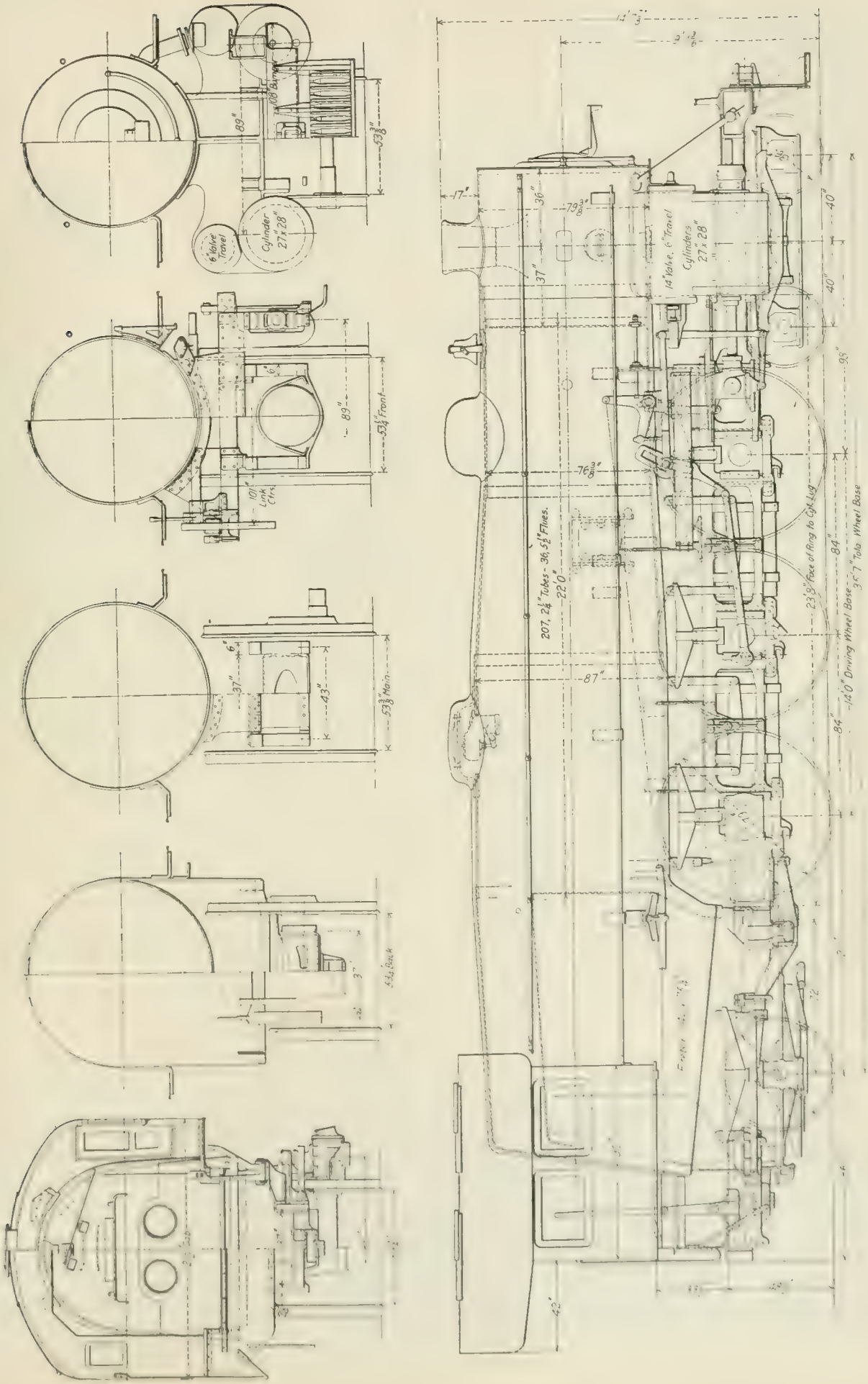
It will be seen that the boiler of locomotive No. 50,000 has 624 and 264 more square feet of evaporative heating surface, combined with 132 and 192 more square feet of superheating surface, than the other two superheater locomotives respectively, both of which are of equal or greater weight. Compared with the two locomotives not equipped with superheaters, locomotive 50,000 has at the most only 379 sq. ft. of evaporating heating surface less, which is undoubtedly 3 or 4 times offset by the economy secured with the 897 sq. ft. of superheating surface. This is the largest amount of superheating surface ever provided in an American passenger locomotive, and results in realizing greater economy in operation from this feature, due to the greater degree of superheat attained.

Compared with another locomotive of equal weight, also equipped with a superheater, but of less superheating surface and giving an average of 63 deg. less superheat, the locomotive here illustrated showed in service tests an average of 13 per cent. greater economy in fuel and 14 per cent. in water consumption

FOREIGN RAILWAY NOTES.

The Russian ministry of finance has permitted the transportation of foreign goods over the western frontier for direct connection with the Trans-Baikal Railway. The inspection of such goods will be made by the custom house authorities at Irkutsk, Siberia. The success of direct transportation of goods between Warsaw and Siberia, which has reduced the time in covering the [illegible] miles from 24 days to eight days, led indeed the board of the Vistula Railroad to introduce [illegible] road railway communication between Moscow and Odessa.

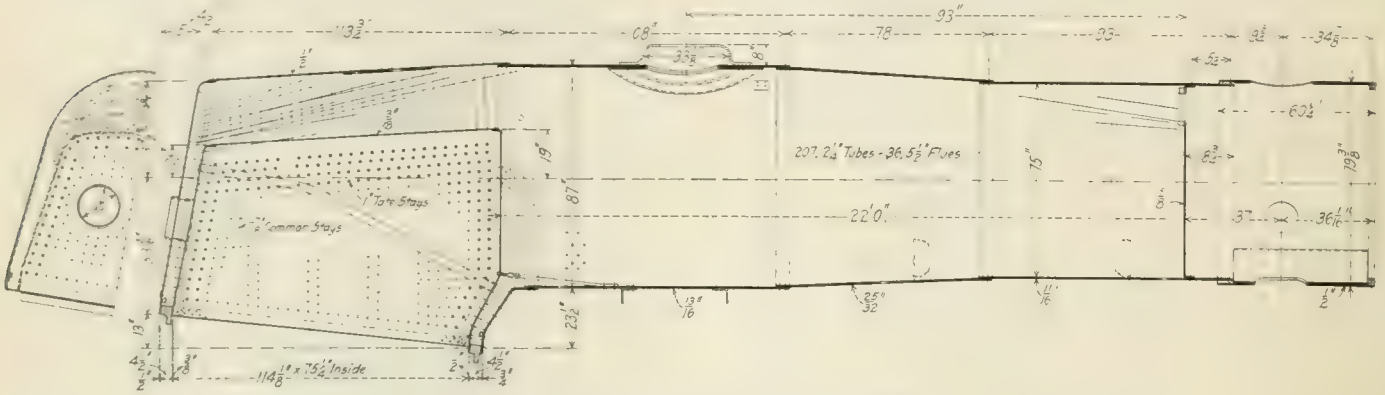
The proposed Dnieper-Don Canal, Russia, will measure about 250 miles, beginning at Mereplei and ending, after passing through considerable industrial areas and crossing the Dnieper river, at Cherson, where it will join the Cherson-Nikopoff line. The object of the line is that it will bring Central Russia with its markets into immediate communication with Cherson. The cost is estimated at $26,940,000, which it is proposed to raise by an issue of [illegible] and government guaranteed bonds.



Experimental Pacific Type Locomotive, No. 50,000, Built by the American Locomotive Company.

per indicated horse power per hour. In these tests, locomotive 50,000 reached a maximum superheat of 341 deg., with an average of 276 deg., which is believed to be the highest record for any American locomotive. The superheater is of the type "A" with top header and 36 double looped superheater units.

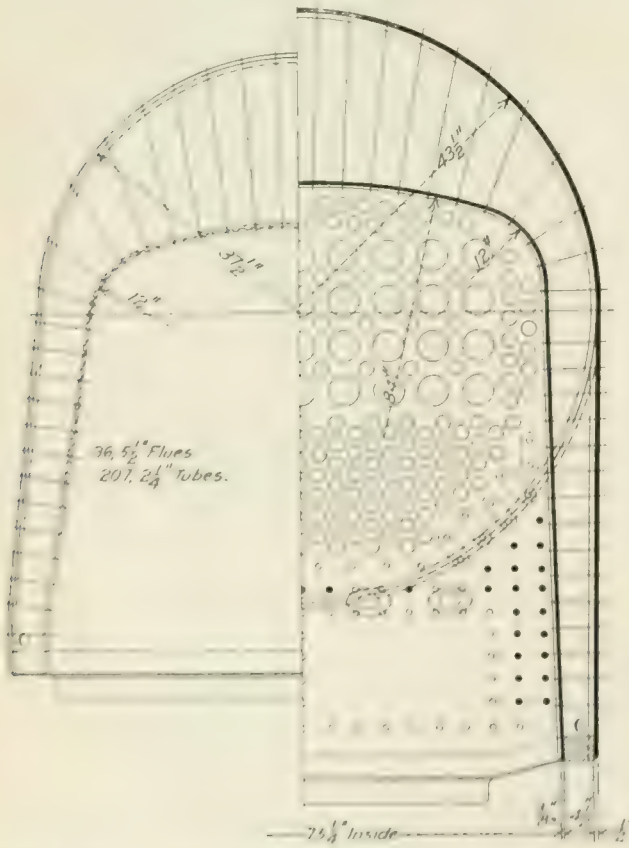
To further increase the boiler capacity through improved boiler economy, the firebox is equipped with a Security sectional brick arch. Aside from this large boiler capacity, the number of new features introduced in this design with a view both of saving weight and securing improved economy in operation make this locomotive one of the most interesting of recent construction. Among these, the following deserve particular notice: Cast



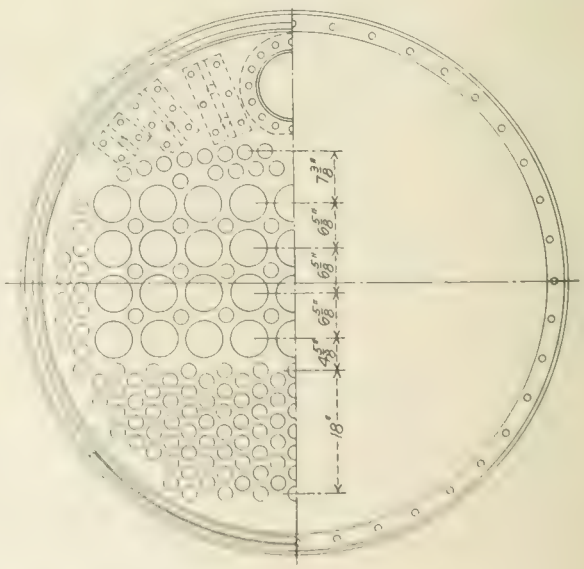
Longitudinal Section Through Boiler of Experimental Pacific Type Locomotive.

cylinders of this construction in American locomotive practice, and constitutes probably the most radical of the departures from conventional practice in this design. This construction was adopted in order to save weight. As a result, the 27 in. x 28 in. cylinders with which the locomotive is equipped weigh 2,660 lbs. less than 22 in. x 28 in. cast iron cylinders of ordinary construction. Cast iron cylinders of this size arranged for inside steam pipes would have weighed approximately 4,000 lbs. more.

Outside Steam Pipes.—This arrangement was really necessitated because of the application of cast steel cylinders, as it is the only practical method of construction with cylinders of that material because of the resulting simplification of the castings.



Half-Sections and End Elevations of Boiler for Experimental Pacific Type Locomotive.



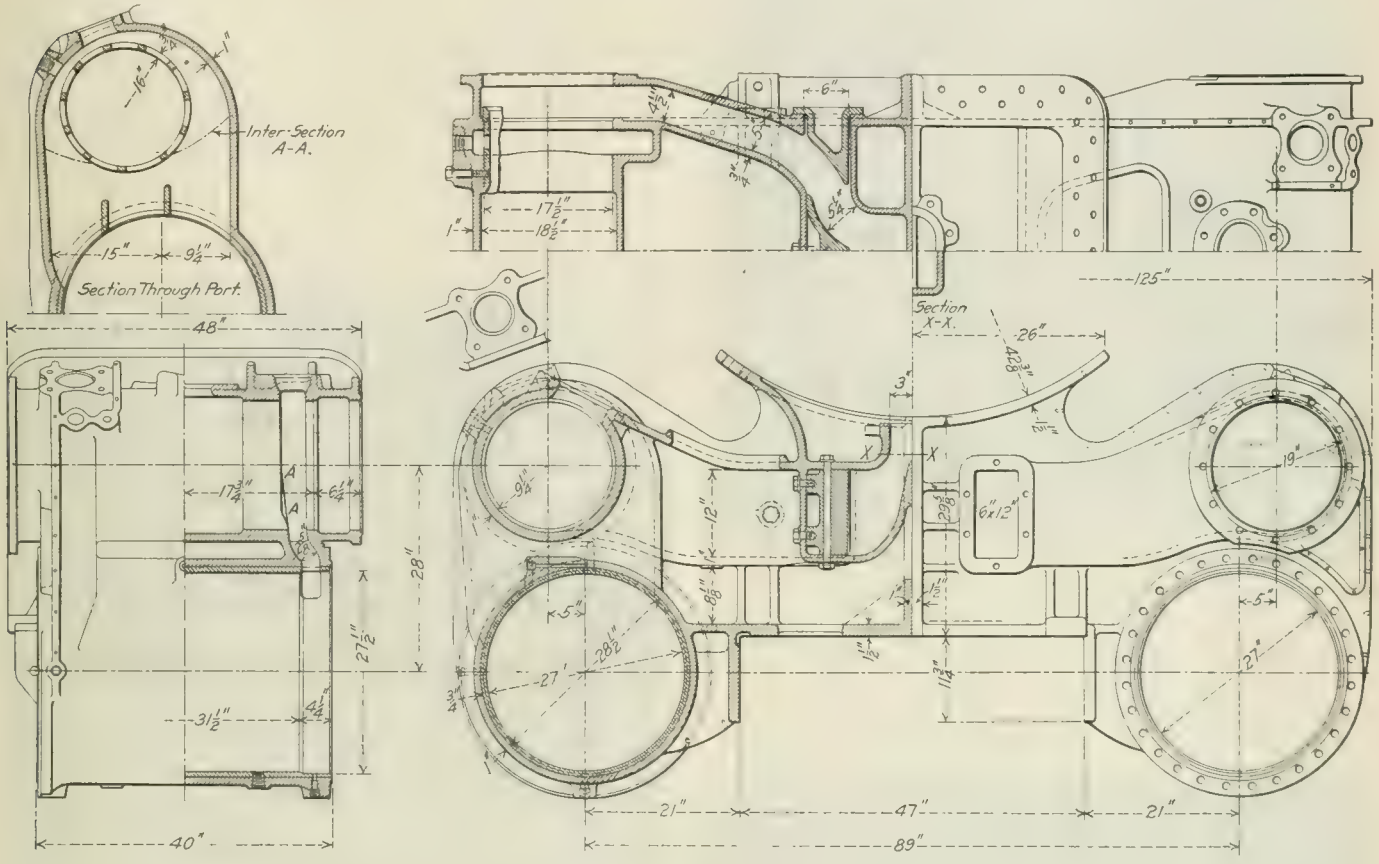
Because of its many advantages the outside steam pipe construction first introduced into the country on the locomotive here illustrated, has been very favorably received by American railway men. It greatly improves the steaming capacity of the boiler, because it removes much of the obstruction to draft in the smokebox, which is present with the steam pipes of conventional design. It is also probable that the elimination of the live steam passages in the cylinder saddle will tend to minimize the loss of cylinders from cracking in service.

Screw Reverse Gear.—By the use of the screw reverse gear, instead of the ordinary lever, locomotive 50,000 introduces what promises to be a most important and beneficial change in American locomotive practice, both from the standpoint of economy in operation and the ease and comfort of the engineer. (The view showing the side elevation of the locomotive is incorrect, in that it shows an ordinary type of reverse lever.) In the large locomotives of the day it is becoming more difficult every year to handle the reverse lever easily. As a result, considerable loss in

economy and efficiency in operation ensues from the fact that steam is not used expansively with the full throttle and the cut-off arranged at the most economical point. This is due to the fact that when any speed is attained it is often a risk to change the reverse lever because of the liability of the lever getting out of the hands of the engineer.

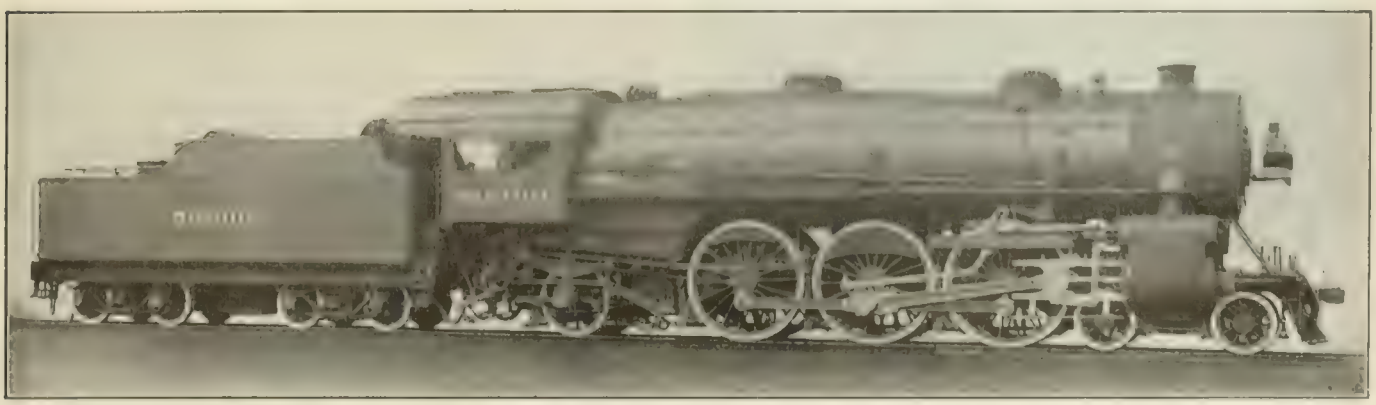
For engines other than the Mallet type on which the power reverse gear is used the screw reverse gear offers a means of solving the present difficulties. It gives about 11 times the leverage obtained with the reverse lever as usually proportioned. The reversing wheel can be spun around very rapidly so that only from 4 to 6 seconds is required to completely reverse the gear, which is probably faster than can be done with the ordinary reverse lever, because of the time consumed by the engineer in getting into position and well braced before he can exert sufficient muscular force to throw the reverse lever. As may be seen in the illustration of the inside view of the cab, it can be located in a most convenient position for the engineer.

The screw reverse gear is not new, but has been for years the standard arrangement in use abroad. The American Locomotive Company's design of this device, however, embodies important changes from the common foreign practice. It provides a straight line pull without offsets and a screw inside of tubular connections and on the same longitudinal axis as the reach rod, thereby better adapting it to the greater weights of the valve motion parts of the American locomotive. By using the straight pull the gear and reach rod are not subjected to bending strains, but to tension or compression only.



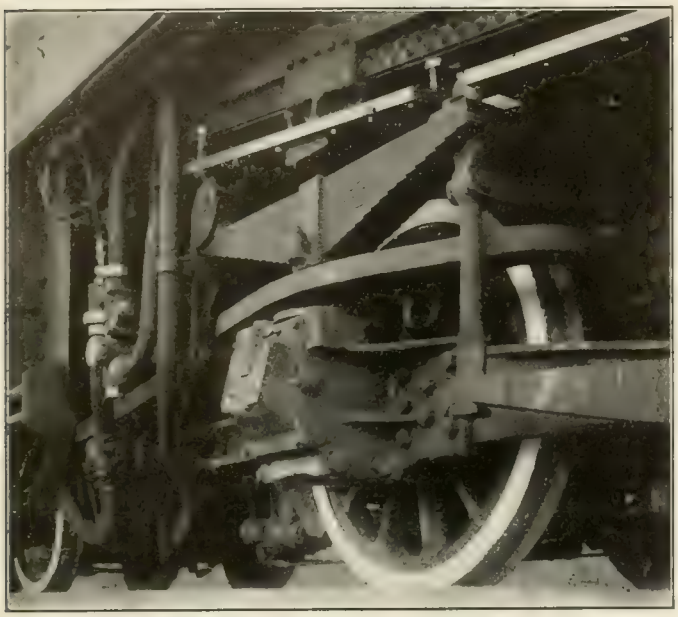
Vanadium Cast Steel Cylinders on Experimental Pacific Type Locomotive.

Valve Stem Guide.—Another important improvement in detail design introduced in the locomotive here illustrated, with which railway men are now familiar because of its extensive application to other locomotives recently built by the American Locomotive Company, is the self-centering design of guide for the valve stem. The chief advantages of this arrangement are that it can be erected, taken down and replaced without any lining up, at the same time insuring that the valve stem guide is absolutely in line with the piston valve chamber. This saves all the time that is spent in lining up the valve stem guide of the ordinary



Experimental Pacific Type Locomotive, Built by the American Locomotive Company.

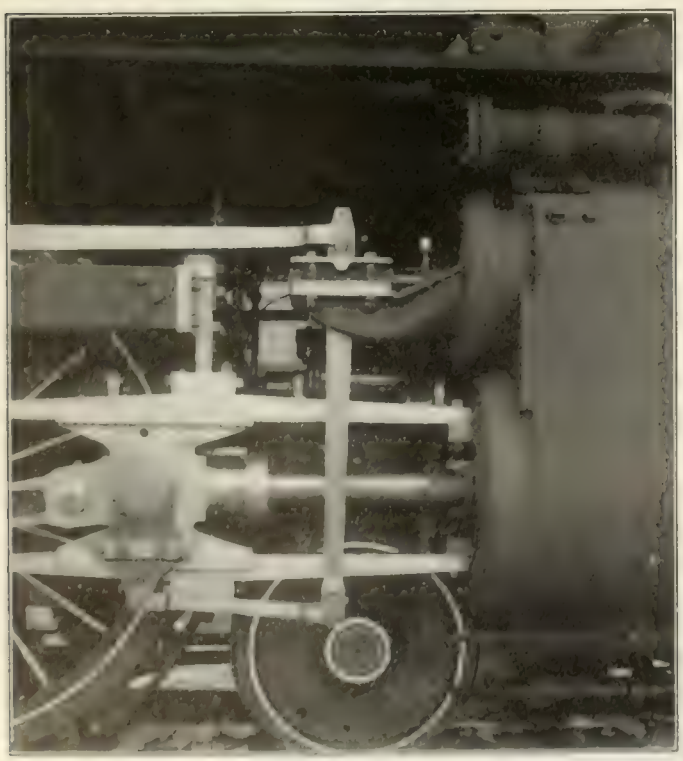
construction employed with the Walschaert valve gear when it is necessary to take down the valve motion. This arrangement is self-supporting, so that no bracing from the guides or any other source than the cylinder is required. It permits the use of a straight design of combination lever without forks,



Improved Outside Bearing Trailer Truck.

which is connected to the valve stem crosshead by a pin passing through its wings, thus affording greater lateral stability than is obtained in other designs.

Extended Piston Rod Guide.—The builder's new standard design of guide for the extended piston rod, which, in view of the



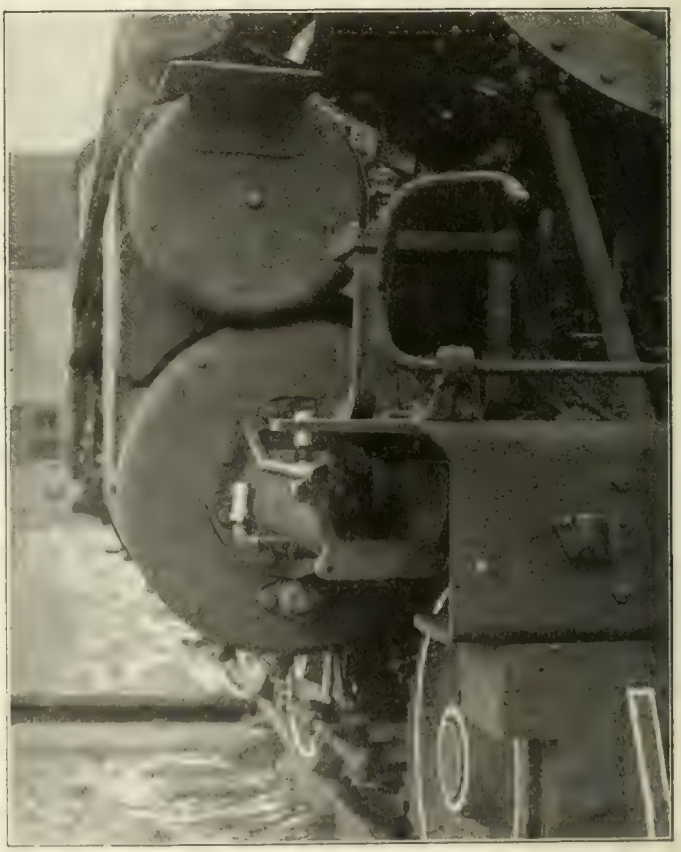
Self-Centering Valve Stem Guide.

general adoption in this practice on locomotives equipped with superheaters, has been applied on this locomotive. This guide has the valve stem guide, self-centering and can be removed and replaced without losing up and at the same time exactly maintain with the longitudinal axis of the cylinder.

Trailer Truck.—A saving in weight of from 2,500 to 3,000 lbs. was effected by the application of an improved design of outside bearing radial truck in place of the former type which entailed the use of outside supplementary frames secured to the slab rear portion of the main frames by heavy and strong cast steel filling pieces.

This type of truck had been successfully applied before and has since become the builder's standard design for Pacific and Mikado type locomotives. It provides for a universal adjustment of the springs to the rise and fall of the engine and a resistance to transverse motion through the combined action of the spring-centering device and the inclined friction plates which operate to restore the truck to its normal central position on entering a tangent after passing over a curve. As a result, experience proves that it greatly improves the riding qualities of the locomotive.

Bumper and Pilot.—Further evidence of the refinement in de-



Self-Centering Extended Piston Rod Guide and Steel Bumper Beam.

tail carried out in this locomotive to keep the weight of every part down to a minimum consistent with strength is furnished by the use of a pressed steel bumper and pilot, a construction which has been very successfully employed on the Lake Shore & Michigan Southern. Compared with an ordinary design of cast steel bumper the pressed steel type here employed weighs approximately 1,200 lbs. less, while as between the pressed steel and wooden pilot there is a difference of 350 lbs., a total saving of some 1,500 lbs. being effected in these two details alone.

Vanadium Steel.—Additional strength without increased weight is secured by the liberal use throughout the design of vanadium steel for many of the principal parts. Some of the parts constructed of this steel are: driving wheel centers, frames, rods, piston rods, valve motion work, springs and crankpins. Vanadium steel is also used in the cast steel cylinders and in the cast iron cylinder and valve chest bushings.

Locomotive 0,000 sets a new high mark for the capacity and economy attainable within the limitations of conservative wheel

loads in a modern passenger locomotive designed for sustained high speed service with heavy loads. It has also pointed a way by which present commonly accepted practice may be greatly improved by better proportion of boiler to engine capacity, greater refinement in the design of details and modifications of present standards, the best use of fuel-saving devices, the value of which has been tried and proved in service and the latest developments in material.

There is not another instance in the history of American locomotive development in which locomotive builders on their own initiative and at their own expense have constructed a locomotive —not to introduce a new principle; but to secure information as to the maximum possibilities in economy and capacity inherent in already adopted principles with the view of the advancement of locomotive design. For these reasons, this locomotive merits investigation and the most careful study of all the details of its

Screw Reverse Gear on Locomotive 50,000.

design on the part of all railway officials interested in locomotive operation. Its performance on the Erie Railroad on which it is running, and of which a full account will be given in a later issue, should be closely watched. The general dimensions, weights and ratios are given in the following table:

General Data.

Gage	4 ft. 8½ in.
Service	Passenger
Fuel	Bit. coal
Tractive effort	40,300 lbs.
Weight in working order	269,000 lbs.
Weight on drivers	172,500 lbs.
Weight of engine and tender in working order	430,500 lbs.
Wheel base, driving	14 ft.
Wheel base, total	35 ft. 7 in.
Wheel base, engine and tender	68 ft. 2½ in.

Ratios.

Weight on drivers ÷ tractive effort	4.26
Total weight ÷ tractive effort	6.68
Tractive effort × diam. drivers ÷ heating surface*	596.00
Total heating surface* ÷ grate area	90.50
Firebox heating surface ÷ total heating surface* per cent.	4.60
Weight on drivers ÷ total heating surface*	32.00
Total weight ÷ total heating surface*	49.60
Volume both cylinders	18.60
Total heating surface ÷ vol. cylinders	290.00
Grate area ÷ vol. cylinders	3.20

Cylinders.

Kind	Simple
Diameter and stroke	27 in. x 28 in.

Valves.

Kind	Piston
Diameter	16 in.
Greatest travel	6½ in.
Outside lap	1¼ in.
Inside clearance	¼ in.
Lead in full gear	Forward, ⅛ in.; Backward, ½ in.

Wheels.

Driving, diameter over tires	79 in.
Driving, thickness of tires	3½ in.
Driving journals, main, diameter and length	11 in. x 12 in.
Driving journals, others, diameter and length	10½ in. x 12 in.
Engine truck wheels, diameter	36 in.
Engine truck, journals	6½ in. x 12 in.
Trailing truck wheels, diameter	50¼ in.
Trailing truck, journals	8 in. x 14 in.

Boiler.

Style	Conical
Working pressure	185 lbs.
Outside diameter of first ring	76⅜ in.
Firebox, length and width	114⅛ in. x 75¼ in.
Firebox plates, thickness	⅜ in. x ½ in.
Firebox, water space	4½ in.
Tubes, number and outside diameter	207—2¼ in.
Tubes, superheater	36 —5½ in.
Tubes, length	22 ft.
Heating surface, tubes	3,800 sq. ft.
Heating surface, firebox	248 sq. ft.
Heating surface, total	4,048 sq. ft.
Superheater heating surface	897 sq. ft.
Grate area	59.75 sq. ft.
Smokestack, diameter	18 in.
Smokestack, height above rail	14 ft. 7⅞ in.
Center of boiler above rail	9 ft. 11 5/16 in.

Tender.

Tank	Water bottom
Frame	13 in. channels
Wheels, diameter	36 in.
Journals, diameter and length	5½ in. x 10 in.
Water capacity	8,000 gals.
Coal capacity	14 tons

*Equivalent heating surface equals 5,394 sq. ft.

It now seems probable that in a very few years there will be a transcontinental line entirely across Africa from the Indian ocean to the mouth of the Congo river, though it is unlikely that there will be any appreciable through traffic over it, at least for a long time to come. This line will be made up of the Congo river and the railways around its rapids and the line planned from the upper waters to Lake Tanganyika, and of the German-African Midland Railway, which, if a bill now before the Imperial Diet becomes a law, will be extended westward to Lake Tanganyika by 1915. The extension of this latter line heretofore authorized will be completed to Tabora next February, in advance of the time prescribed. Thence to the lake a route has been examined, and it is found that the most favorable lake terminus is Kigoma, three miles north of the better known Ujiji, and 256 miles nearly due west from Tabora. In connection with this extension three steamers are to be provided for the navigation of this lake, which is more than 400 miles long from north to south, but generally less than 40 miles wide. This will give the German railway something like the position of the British Uganda Railway, whose ocean terminus is 200 miles further north. One of the reasons given for haste in reaching Lake Tanganyika is to anticipate the new lines of the Congo Free State. It will be interesting to watch the competition of two such lines for the traffic of the country on a lake in the heart of Africa, which for many years must be inconsiderable. From and to Europe the German route has the drawback of the Suez Canal and a much longer rail line; while the Congo route involves long river navigation and two or three transfers from rail to river. In an air line the distance from the lake to the mouth of the Congo is about 75 per cent. longer than from the lake to Dar-es-Salaam, the ocean terminus of the German line; but the actual route down the Congo is more than three times the length of the German railway. The cost of the extension from Tabora to the lake is estimated at about $10,000,000, with nearly $1,100,000 more for steamers and docks on the lake. It is noticeable that the part of the road first built already requires rebuilding, having been made too light even for the light traffic it now has.

CARS AND LOCOMOTIVES ORDERED IN 1911.

In the following tables are presented, in accordance with the annual custom of the *Railway Age Gazette*, a detailed statement of the new freight cars, passenger cars and locomotives ordered by North American railways in the year 1911. Although the compilation of figures from such numerous sources is necessarily subject to some slight omissions, the results are sufficiently accurate to meet the general purpose for which these statistics have been prepared, viz., to show the extent of equipment purchases by the railways of the United States, Canada and Mexico as compared with previous years.

Practically all of the data is derived from official sources, but in a few instances where no replies have been made to our inquiries figures taken from our regular weekly records have been used. The following statements refer to cars and locomotives *ordered* during 1911; statistics of equipment *built* are given elsewhere in this issue. The falling off in orders both for new cars and for new locomotives is marked, both as compared with last year and with several preceding years, although the figures are in each instance approximately twice as large as those for 1908. However, there has been a material and encouraging increase in orders placed during the closing weeks of the year and the new business on the books of the manufacturers is far better than at this time last year.

The tables show that during the year there were ordered 133,117 freight cars, 2,623 passenger cars, and 2,850 locomotives. Of the freight cars, 28,418 are all wood; 54,605 have steel underframes, and 50,094 are all steel. Of the passenger cars 1,010 are all wood, 619 have steel underframes and 909 are all steel. Of the locomotives, 2,625 are simple and 225 are compound; of the latter, 109 are Mallet. Of the freight cars 42,465 are equipped with friction draft gear, and of the passenger cars 1,061 are electric lighted. Of the locomotives, 908 are equipped with superheaters, 48 with feedwater heaters, and 37 with reheaters; 133 are electric locomotives.

The figures of orders for cars and locomotives during the past eleven years, as compiled by this paper, are as follows:

Year.	Locomotives.	Cars—Passenger.	Cars—Freight.
1901	4,340	2,879	193,439
1902	4,665	3,459	195,248
1903	3,853	2,310	108,936
1904	2,538	1,913	136,561
1905	6,265	3,289	341,315
1906	5,642	3,402	310,315
1907	3,482	1,791	151,711
1908	1,182	1,319	62,669
1909	3,350	4,514	189,360
1910	3,787	3,881	141,204
1911	2,850	2,623	133,117

FREIGHT CARS ORDERED IN 1911.

Purchaser.	No.	Kind.	Capacity.	Builder.
Acadia Coal Co.	e‡50	Hopper...	60,000	Can. Car & Fdy.
Ak. Cant. & Y.		Gondola	100,000	Am. Car. & Fdy.
		Box	80,000	Am. Car. & Fdy.
		Flat	100,000	Am. Car. & Fdy.
Algoma C. & Hudson		Flat	80,000	Can. Car. & Fdy.
		Ore	100,000	Hart-Otis.
	†75	Ore	100,000	Hart-Otis.
		Box	80,000	Can. Car. & Fdy.
		Caboose..	.....	Company shops.
	125	.....	80,000	Company shops.
		Ballast...	80,000	Hart-Otis.
		Flat	80,000	Canadian.
		Coke	60,000	Canadian Car & Fdy.
Allis Chalmers Bullock.		Unloader.	.....	Can. Car & Fdy.
		Logging.	80,000	Can. Car & Fdy.
		Flat	60,000	Can. Car & Fdy.
Am. Beet Sugar Co.	†15	Flat	80,000	Am. Car & Fdy.
		Tank	80,000	Am. Car & Fdy.
Am. Refrig. Transit Co.		Refrig.	60,000	Am. Car & Fdy.
		Hopper...	100,000	Am. Car & Fdy.
	155	.....	80,000	Standard Steel.
		Refrig. ..	80,000	Standard Steel.
		Box	80,000	West. Car & Fdy.
		Logging	80,000	Am. Car & Fdy.
		Caboose	.....	Company shops.
Arms P. Horse Car Co..		Box	60,000	Pullman.
	††3	Horse	60,000	Pullman.
		Box	60,000	Pullman.
Ashland C. & Iron Co..	*‡5	Gondola..	100,000	Pressed Steel
A. T. & S. F.	*‡50	Ore	100,000	Am. Car. & Fdy.
			.....	Am. Car. & Fdy.
Atl. & W. Point.	100	Flat	60,000	Am. Car & Fdy.
			80,000	Am. Car. & Fdy.
	100	Box	60,000	Company shops.
	10	Auto	80,000	Company shops.
Atl. Birm. & AT..	e‡20	Stock		Company shops.
Atl. Coast Line ..	††1,400	Box	80,000	Am. Car & Fdy.
			80,000	Standard Steel.
	$‡900	Box	60,000	Standard Steel.
	$‡100	Flat	60,000	Standard Steel.
			100,000	Rodger Bal.
				Company shops.
	$*1	Derrick.	100,000	Standard Steel
			60,000	Haskell & Barker.
	*10	Tank	80,000	Am. Car & Fdy.
	††2,000	Box	80,000	Standard Steel.
	††500	Box	80,000	Mt Vernon Car
			100,000	Cambria Steel.
				Company shops.
			100,000	Pressed Steel.
	*‡5	Well ..	135,000	Cambria Steel.
Bangor & Aroostook				Am. Car & Fdy.
				Am. Car & Fdy.
Bangor Ry. & Elect. Co..	*‡1		40,000	Simplex Self Clear. Car.
				Am. Car & Fdy.
	*20	Tank		Am. Car & Fdy.
	e6	Logging..		Am. Car & Fdy.
				Company shops.
	*2	Tank	80,000	Am. Car & Fdy.
	10	Flat	80,000	Pressed Steel.
	$400	Coal		Company shops.
Bethlehem Steel Co.				Am. Car & Fdy.
Bingham & Garfield.				Pressed Steel.
				Pressed Steel.
				Pressed Steel.
				Pressed Steel.
			100,000	Pressed Steel
	e1	Plow		Pressed Steel.
Boston & Me.				Company shops.
				Russell Car & Snow Plow Co.
				Russell Car & Snow Plow Co.
				Russell Car & Snow Plow Co.

Purchaser.	No.	Kind.	Capacity.	Builder.
Benson	e‡55	Box	60,000	Am. Car. & Fdy.
Brompton Pulp & Paper Co.	†18	Flat	50,000	
Brown Store Co.	e6	Logging..	30,000	Am. Car & Fdy.
Buf. Cr. & Gaul.	*§100	Hopper	100,000	Pressed Steel.
Buf. R. & Pittsb.	*§500	Hopper	100,000	Pressed Steel.
	*‡500	Hopper	100,000	Standard Steel.
	*‡500	Hopper	100,000	Cambria Steel.
Caddo Riv. Lumb. Co..	e1	Caboose...	.....	Am. Car & Fdy.
Camacha, Rold. & Van S.	e12	Box	30,000	Am. Car & Fdy.
Camb. & Ind.	600	Hopper	100,000	Cambria Steel.
Canadian Bldg. Co.	*‡2	Flat	80,000	Can. Car & Fdy.
Canadian Collieries Co...	*‡100	Hopper.	100,000	Can. Car & Fdy.
Canadian Expl. Co.	e‡2	Flat	60,000	Can. Car & Fdy.
Canadian No.	††55	Flat	80,000	Can. Car & Fdy.
	e‡1,557	Box	60,000	Can. Car & Fdy.
	e 1,250	Box	60,000	Nova Scotia Car.
	e‡250	Hart ball.	80,000	Hart-Otis Car.
	e 20	Ore	60,000	Hart-Otis Car.
	e‡200	Stock	60,000	Crossen Car.
	e‡100	Refrig. ..	60,000	Crossen Car.
	e‡21	Caboose..	.....	Crossen Car.
Canadian Pacific	*‡2,500	Box	80,000	Can. Car & Fdy.
	d ‡2,000	Box	80,000	Can. Car & Fdy.
	*‡938	Flat	80,000	Can. Car & Fdy.
	* 500	Box	80,000	Pressed Steel.
	*‡430	Gondola..	100,000	Pressed Steel.
	* 1,500	Box	80,000	Am. Car & Fdy.
	e‡2,007	Box	60,000	Company shops.
	1,000	Box	80,000	West St. Car & Fdy.
	*‡41	Flat	80,000	
	*‡5	Coal	100,000	
	a‡15	Ballast	100,000	Can. Car & Fdy.
	a‡52	Ballast	100,000	Can. Car & Fdy.
	e‡18	Refrig. ..	60,000	Company shops.
	e‡592	Stock	60,000	Company shops.
	e 84	Van	.....	Company shops.
	‡§90	Tank	10,000 g.	Am. Car & Fdy.
& Cont.				
Supl. Co.	e‡15	Dump	60,000	Can. Car & Fdy.
Co.	10	.....	.....	Company shops.
	†500	Box	80,000	Am Car & Fdy.
Cent. of N. J.	1,000	Ice	80,000	Standard Steel.
	*‡1	Scale test.	80,000	Company shops.
Champion Lum. Co.	50	Flat	80,000	Am Car & Fdy.
&	500	Flat	80,000	Am. Car & Fdy.
go & East. Illinois.	†1,000	Refrig. ..	60,000	Am. Car & Fdy.
W.	†§1,750	Box	80,000	Pullman.
	e§1,250	Box	80,000	Am. Car & Fdy.
	††600	Auto	80,000	West St Car & Fdy.
	†100	Flat	100,000	Standard Steel.
	†450	Refrig. ..	80,000	American.
Burl. & Quincy.	500	Gondola	100,000	Am. Car & Fdy.
	1,000	Gondola.		Pressed Steel.
	*§107	Tank ..	10,000 g.	Am Car & Fdy.
	b‡2,500	Box	80,000	Haskell & Barker.
	500	Refrig. .	60,000	Am Car & Fdy
	1,500	Gondola..	.....	Am. Car & Fdy.
	b‡200	Box	80,000	Company shops.
	e‡250	Stock	60,000	Company shops.
	b‡700	Stock	60,000	Company shops.
		Wk		Company shops.
	*‡1	Scale test		Pressed steel.
Gt. Western.	*‡100	Hopper	100,000	Pressed steel.
III		Caboose		Central Loco
Chic., Ind. & So.		Box	80,000	Company shops

c Indicates composite-body cars.
d Indicates steel frame cars.
e Indicates all wood cars
b Indicates spring draft gear.
§ Indicates friction draft gear.

Purchaser.	No.	Kind.	Capacity.	Builder.
*Chic., Indianap. & L...	†‡200	Flat	80,000	Haskell & Barker.
	†‡100	Auto ...	80,000	Haskell & Barker.
	*‡1,000	Coal	100,000	Am. Car & Fdy.
Chic., Memp. & Gulf....	c‡50	Flat	60,000	Central Loco.
	c‡50	Box	60,000	Central Loco.
	c‡1	Caboose...	.....	Central Loco.
Chic., Mil. & P. S.....	e§30	Package..	80,000	Company shops.
	§‡470	Furn. ...	80,000	Company shops.
Chic., N. Y. & Bos. Refrig.	500	Refrig. ..	.....	Whipple Car.
Chic., R. I. & Pac.....	450	Furn. ...	80,000	West. St. Car & Fdy.
	250	Flat	100,000	West. St. Car & Fdy.
	c 25	Caboose..	.....	West. St. Car & Fdy.
	†300	Ballast ..	100,000	Rodger Ballast.
	15	Caboose..	.....	Mt. Vernon Car.
	500	Furn. ...	.....	Pullman.
	2,500	Box	80,000	Pullman.
	500	Hart cv...	.....	Rodger Ballast.
Chic., St. P., M. & O...	†§500	Box	80,000	Am. Car & Fdy.
	§ 500	Refrig. ..	60,000	Am. Car & Fdy.
Chic., T. H. & S. E....	b*1,000	Coal	100,000	Haskell & Barker.
Clapp Ammonia Co.....	*2	Tank	60,000	Am. Car & Fdy.
C. C. C. & St. L.....	†§1,500	Box	80,000	Am. Car & Fdy.
Columbia Chem. Co....	e2	Dump ...	80,000	Am. Car & Fdy.
Columbia & Puget S...	[illegible]	Dump ...	60,000	Kilbourne & J.
Consumers' Gas C...	[illegible]	Tank	100,000	Am. Car & Fdy.
Dairy Ship. Desp....	§100	Refrig. ..	60,000	Mt. Vernon Car.
Del., Lack. & West	[illegible]1	Scale test.	80,000	Company shops.
Detroit & Mack.....	c4	Refrig. ..	60,000	Rodger Ballast.
Dolese Bros.....	c40	Quarry ..	40,000	Am. Car & Fdy.
Dom. Iron & Steel Co...	25	Flat	.....	Can. Car & Fdy.
	5	Gondola..	.....	Can. Car & Fdy.
	6	Ore	.....	Can. Car & Fdy.
Dominion Bldg. C	c25	Flat	60,000	Can. Car & Fdy.
Dominion Eq. & Supl. Co.	5	Unloaders	.....	Can. Car & Fdy.
Dul., Wm. & Pac	c 50	Box	60,000	Mt. Vernon Car.
	c 150	Flat	60,000	Mt. Vernon Car.
	e‡20	Stock	60,000	Mt. Vernon Car.
	c 10	Refrig. ..	60,000	Mt. Vernon Car.
Dupont Co., E. O.	6	Box	40,000	Am. Car & Fdy.
Durham & Co.	e‡13	Flat	60,000	Company shops.
East Br. T. R. R. & C. Co.	e1	Coal	40,000	Company shops.
Eastman, Gardiner & Co.	75	Flat	80,000	Am. Car & Fdy.
Edgar Lumb. Co ...	e10	Logging...	40,000	Am. Car & Fdy.
E. Tenn. & W. N. C....	c 5	Hopper...	60,000	Company shops.
Elk. & Allegh.	e2	Box	60,000	Ga. Car Co.
	e2	Flat	60,000	Ga. Car Co.
Elk & Lit. Kan.....	e6	Box	40,000	Am. Car & Fdy.
	e6	Hopper ..	40,000	Am. Car & Fdy.
England & Cl. L.....	1	Caboose...	.....	Central Loco.
Erie	§‡10	Auto	80,000	Am. Car & Fdy.
	†§1,000	Box	80,000	Am. Car & Fdy.
	§[illegible]00	Hop.-gon.	100,000	Standard Steel.
	†§1,000	Gondola..	100,000	Pressed Steel.
	†§500	Flat	100,000	Company shops.
	§[illegible]00	Refrig....	60,000	Pullman.
	§[illegible]00	Refrig....	60,000	West. St. Car & Fdy.
Escanaba & L. Superior..	e‡15	Flat	80,000	Natl. Ry. Equip.
Esquimalt & Nanaimo ...	[illegible]25	Ballast....	80,000	Hart-Otis.
	e‡60	Flat	80,000	Hart-Otis.
Evansv. Sub. & N.....	c[illegible]	Gondola..	60,000	
F. H. Hopkins & Co....	c 4	Unloaders	.....	Can. Car & Fdy.
	c 1	Sn. plow.	.....	Can. Car & Fdy.
Fla. East. Coast	150	Gondola..	80,000	Pressed Steel.
	50	Flat	80,000	Pressed Steel.
Florida & Alabama....	e10	Flat	60,000	Central Loco.
Fonda, Johnst. & Glovers.	e1	Flat	60,000	Am. Car & Fdy.
Fordyce & Prin.	c 2	Box	40,000	
	†‡10	Log.	60,000	
Fouche River Valley....	e15	Logging..	40,000	Am. Car & Fdy.
Frost-Johnson Lumb. Co.	e48	Logging..	60,000	Am. Car & Fdy.
Ft. Worth & Denver City	*§100	Tank ...	10,000 g.	American.
G. Amsinck & Co.	c6	Box	40,000	Am. Car & Fdy.
Ga., Fla. & Alabama	e21	Caboose..	.....	Company shops.
General Chem. Co.....	10	Refrig....	.....	German-Amer.
Georgia	50	Box	60,000	Pullman.
Gideon & No. Is.....	c	Caboose..	.....	Company shops.
	c20	Logging..	60,000	Company shops.
Goodyear Lumber Co....	e2	Skidder...	.....	Am. Car & Fdy.
Grand Rapids & Ind....	*§50	Flat	100,000	Pressed Steel.
Grand Trunk	1,000	Box	.....	Can. Car. & Fdy.
	2,000	Box	.....	Pressed Steel.
	1,000	Hopper...	.....	Pressed Steel.
Great Northern	400	Hopper...	100,000	Haskell & Barker.
	75	Logg.	.....	Pressed Steel
	*[illegible]0	Refrig. ..	.....	Haskell & Barker.
	1,000	Box	.....	Haskell & Barker.
Guffy Refining Co.....	*80	Box	80,000	Am. Car & Fdy.
Heald & Co.....	*4	Tank	100,000	Rodger Ballast.
Henderson Lumber Co...	c10	Logging..	80,000	Am. Car & Fdy.
Hill, Price & Hill.....	10	Logging..	20,000	Am. Car & Fdy.
Hocking Valley	10	Caboose..	.....	Company shops.
Howe Lumber Co.....	c6	Logging..	40,000	Am. Car & Fdy.
Illinois Central	c[illegible]	Logging..	80,000	Company shops.
	c[illegible]	Refrig. ..	60,000	Company shops.
Intercolonial	[illegible]4	Box	60,000	Can. Car & Fdy.
	[illegible]1	Dump ...	100,000	Can. Car & Fdy.
	[illegible]0	Box	80,000	Am. Car & Fdy.
	[illegible]1	Refrig. ..	60,000	Can. Car & Fdy.
	[illegible]0	Flat	80,000	Nova Scotia Car.
	[illegible]0	Flat	80,000	Nova Scotia Car.
	[illegible]	Stock	60,000	Nova Scotia Car.
	[illegible]6	Box	60,000	Can. Car & Fdy.
	[illegible]0	Box	60,000	Rathbun Co.
	[illegible]5	Dump ...	100,000	Can. Car & Fdy.
	[illegible]1	Caboose..	.....	Company shops.
Independ. Oil Co.	*[illegible]	Tank ...	8,000 g.	Warren Fdry. Co.
Indian Refining Co.....	69	Flat	[illegible]	Am. Car & Fdy.
Jones Co. Lumber Co...	e[illegible]	Logging..	40,000	Am. Car & Fdy.
Jones[illegible] Lake C. & East	c[illegible]5	Box	60,000	Am. Car & Fdy.
Kansas City Terminal ..	c†‡24	Dump ...	40,000	West. Wheeled Scraper.
Keith Car Co.	*19	Tank	100,000	Am. Car & Fdy.
Kentucky Lumber Co....	c4	Logging..	30,000	Am. Car & Fdy.
L. S. & M. S.....	§10	Box	80,000	Company shops.
	§‡1,000	Box	80,000	Am. Car & Fdy.
Lange Soap Co.....	*14	Tank ...	8,000 g.	Am. Car & Fdy.
Lantz Bros. Co.	*1	Lock	80,000	Am. Car & Fdy.
Laramie H. P. & P	*[illegible]5	Flat	100,000	Bettendorf.

Purchaser.	No.	Kind.	Capacity.	Builder.
Laurel R. Lumber Co....	e12	Logging...	80,000	Am. Car & Fdy.
Lehigh & New England..	*§500	Hopper...	100,000	Cambria.
	†‡300	Box	60,000	Am. Car & Fdy.
Lehigh & Hudson.....	†‡6	Flat	80,000	Standard Steel.
Lehigh Coal & N. Co....	25	Mine	100,000	Rodger Ballast.
Lehigh Valley R. R.....	*25	.....	100,000	Rodger Ballast.
Lehigh Valley	†250	.....	60,000	Am. Car & Fdy.
Live Oak P. & G.....	*‡25	Logging..	60,000	Am. Car & Fdy.
Live Poultry T.....	†§318	Poultry...	40,000	Am. Car & Fdy.
La. & Ark..... ..	*†4	Flat	80,000	Am. Car & Fdy.
	*†3	Flat	80,000	Mt. Vernon Car.
La. & Pine Bl.....	40	Logging..	.....	Am. Car & Fdy.
Louisville, Hend. & St. L.	e‡10	Gondola..	80,000	Rodger Ballast.
	†15	Flat	80,000	Mt. Vernon Car.
Louisville & Nashville..	†1,000	.....	100,000	Mt. Vernon Car.
Louisville & Nashville...	†§500	Hopper...	100,000	Company shops.
	†‡900	Box	80,000	Company shops.
	e‡20	Caboose..	.....	Company shops.
	†‡500	Gondola..	100,000	Company shops.
	†‡500	Hopper...	100,000	Company shops.
	†‡100	Beer	80,000	Company shops.
Magnolia Petroleum Co...	*50	Tank	80,000	Am. Car & Fdy.
	*25	Tank	100,000	Am. Car & Fdy.
McAlpine Mining Co....	*50	Ore	.....	Pressed Steel.
McCloud River	e‡40	Flat	60,000	Company shops.
	b‡3	Water ...	100,000	Company shops.
Merchants Des. Tr. Co..	†§1,000	Refrig. ..	80,000	Company shops.
Mexico N. W.....	*†500	Logging..	80,000	Bettendorf.
Mich. Cent.....	†‡1,500	Box	80,000	Pullman.
	†§1,000	Box	80,000	Am. Car & Fdy.
Mich. Sugar Co.	*2	Tank	100,000	Am. Car & Fdy.
Midl. Pa. R. R.....	†3	Box	60,000	Am. Car & Fdy.
McCann Sugar Ref. Co...	*4	Tank	80,000	Am. Car & Fdy.
Missouri Pacific	*‡500	Flat	80,000	Am. Car & Fdy.
	e‡400	Stock	80,000	Am. Car & Fdy.
Missouri, Okla. & Gulf..	*1	Tank	80,000	Am. Car & Fdy.
M., St. P. & S. S. M....	e‡35	Caboose..	.....	Am. Car & Fdy.
	c‡50	Box	.....	Am. Car & Fdy.
Minn., Dak. & W.....	e‡100	Flat	80,000	Haskell & Barker.
Mo., Kan. & Tex.....	c‡249	Box	60,000	Company shops.
	e‡17	Refrig. ..	60,000	Am. Car & Fdy.
	†‡39	Gondola..	100,000	Am. Car & Fdy.
	†‡34	Flat	100,000	Am. Car & Fdy.
	e‡18	Caboose..	.....	Mt. Vernon Car.
Mo. Okla. & Gulf	e500	Gondola..	80,000	Am. Car & Fdy.
	e12	Caboose..	.....	Sheffield Car & Fdy.
Mo. Pac.....	c†‡2,000	Gondola..	100,000	Am. Car & Fdy.
	†‡500	Flat	80,000	Am. Car & Fdy.
	c†‡400	Stock ...	80,000	Am. Car & Fdy.
	c†‡500	Stock ...	80,000	Mt. Vernon Car.
	500	Box	.....	Standard Steel.
	†‡500	Box	80,000	Am. Car & Fdy.
	†‡500	Furn. ...	80,000	Am. Car & Fdy.
	†‡500	Auto	80,000	Am. Car & Fdy.
Muskogee Lumber Co. ..	*8	Tank	60,000	Mann-McCann Co.
	e2	Spreader..	60,000	Am. Car & Fdy.
National Ammonia Co....	*13	.....	.....	Am. Car & Fdy.
National Lime Store Co..	†30	Skip	70,000	Am. Car & Fdy.
North & South Car.....	2	Caboose..	.....	Pressed Steel.
N. C. & St. L.....	†§200	Box	80,000	Am. Car & Fdy.
National Rys. of Mex...	*§200	Tank	100,000	Am. Car & Fdy.
	†‡200	Flat	80,000	Am. Car & Fdy.
Nev. Copper Belt.....	*‡45	Ore	100,000	Pressed Steel.
New Orl., Mobile & Chic.	e‡6	Caboose..	.....	Ga. Car & Loco.
N. Y. C. & H. R	*§5	Pit	120,000	Standard Steel.
	†§500	Box	80,000	Am. Car & Fdy.
	§†1,500	Box	80,000	Pullman.
	*2,500	Hopper...	100,000	Am. Car & Fdy.
	§*500	Flat	100,000	Pullman.
	§*350	Gondola..	100,000	Standard Steel.
	§c†150	Ballast....	100,000	Rodger Ballast.
	10	Flat	.....	
	†1,000	Box	80,000	Haskell & Barker.
N. Y. N. H. & H.....	§†1,200	Box	60,000	Keith Car & M.
	§*300	Hopper...	100,000	Keith Car & M.
N. Y. O. & Western....	§†15	Flat	80,000	Am. Car & Fdy.
	§†450	Gondola..	80,000	Am. Car & Fdy.
N. Y. Susq. & Western.	§*1,000	Hopper...	100,000	Standard Steel.
Norf. So.	†§500	Box	60,000	Am. Car & Fdy.
Norfolk & Western..	*§1,000	Hopper...	115,000	Company shops.
	*500	Gondola..	115,000	Am. Car & Fdy.
Oil Seeds Co.	*[illegible]	Tank	80,000	Company shops.
Opel. Gulf & N. E.....	e‡7	Box	80,000	Am. Car & Fdy.
Ouachita & N. W.....	e‡20	Logging..	50,000	Am. Car & Fdy.
Pacific Coast	e‡20	Flat	40,000	Company shops.
	e‡10	Box	40,000	Company shops.
Pac. & Id. No.....	e3	Ballast ...	80,000	Rodger Ballast.
Peerless Port. Cement Co.	e4	Hopper...	80,000	Am. Car & Fdy.
Penna. Lines West....	[illegible]00	Box	[illegible]	Pressed Steel
	[illegible]50	Flat	[illegible]	Pressed Steel
	*500	Gondola..	100,000	Am. Car & Fdy.
Pennsylvania Railroad.	*150	Hopper ..	100,000	Am. Car & Fdy.
	*§900	Hopper ..	100,000	Cambria.
	*250	Hopper ..	.....	Pressed Steel.
	[illegible]00	Hopper ..	[illegible]	Company shops.
	*850	Gondola..	100,000	Cambria Steel.
Philadelphia & Reading.	[illegible]0	Caboose..	[illegible]	Company shops.
Philadelphia Quartz Co..	*7	Tank	100,000	Am. Car & Fdy.
Pittsburgh & L. Erie...	*‡1,000	Gondola..	100,000	Pressed Steel.
	*‡1,000	Coke	80,000	Am. Car & Fdy.
	*‡3,000	Box	80,000	Pressed Steel.
Pittsburgh & Shawmut ..	*§1,500	Hopper...	100,000	Am. Car & Fdy.
	§*500	Gondola..	100,000	Pressed Steel.
	*[illegible]	Hopper...	80,000	Pressed Steel
	§[illegible]	Box	60,000	Am. Car & Fdy.
	[illegible]8	Caboose..	[illegible]	Am. Car & Fdy.
Polar Wave Ice & Fuel Co.	c[illegible]5	Ice	80,000	Am. Car & Fdy.
Pittsb. Al. & M. K. R.	*[illegible]1	Gondola..	[illegible]	Pressed Steel
Postl. Cross & L.	[illegible]5	Flat	40,000	Wilson Mfg. Co.

* Indicates [illegible]
† Indicates [illegible]
a Indicates [illegible]
b Indicates composite underframe cars.
c Indicates composite-body cars.
d Indicates steel frame cars.
e Indicates all-wood cars.
‡ Indicates spring draft gear.
§ Indicates friction draft gear.

Purchaser.	No.	Kind.	Capacity.	Builder.
Portland Ry. L. & P. Co.	e20	Ballast ...	80,000	Rodger Ballast.
Prescott & No. West...	e20	Flat	60,000	
Prince Edw. Island.....	e215	Hart conv.	60,000	Company shops.
	1	Tank	3,134 g.	Company shops.
Que. Ry. Light & Power.	e [illegible]	Gondola..	60,000	Hunt. & B. Top Mt.R.R.
	e [illegible]	Box	60,000	Central Loco.
	e [illegible]	Box	60,000	Atlantic Equip. Co.
Quebec Central	e250	Rack	60,000	Company shops.
Queen & Crescent.	*‡200	Hopper...	100,000	Standard Steel.
Richmond, Fred. & Pot..	50	Box	80,000	Standard Steel.
	*‡50	Gondola..	100,000	Standard Steel.
Ried-Newfoundland	50	Box	.....	Company shops.
Roaring Fork	1	Box	60,000	Natl. Ry. Equip.
Robinson Co., Wm. A...	*1	Tank	60,000	Am. Car & Fdy.
Swift & Co.	‡150	.....	.....	Am. Car & Fdy.
St. Louis Refrig. Car Co.	†30	.....	30,000	Am. Car & Fdy.
Southwestern Ref. Co. ..	*1	Tank	60,000	Am. Car & Fdy.
	*4	Tank	80,000	Am. Car & Fdy.
	*1	Tank	100,000	Am. Car & Fdy.
	e1	Flat	60,000	Natl. Ry. Equip.
	e4	Gondola..	65,000	Buffalo Car Co.
St. Louis & Han.....	e [illegible]	.....	60,000	Mather Live Stock Tr.
St. Louis & San F.....	e [illegible]	Refrig. ..	60,000	Am. Car & Fdy.
	*‡50	Flat	100,000	Am. Car & Fdy.
St. Louis S. W.....	e‡1,620	Box	60,000	Am. Car & Fdy.
	e 500	Auto	60,000	Am. Car & Fdy.
	e‡500	Refrig. ..	60,000	Am. Car & Fdy.
	*‡40	Flat	80,000	Am. Car & Fdy.
Salem, F. C. & W.....	e [illegible]	Flat	60,000	
San Ant. & Ar. P.....	[illegible] 4	Fruit ...	60,000	Mt. Vernon.
	[illegible]	Stock ...	60,000	Mt. Vernon.
	[illegible] 4	Fruit ...	60,000	American.
	[illegible]	Stock ...	60,000	American.
	[illegible]	Refrig. ..	60,000	Am. Car & Fdy.
	[illegible] 5	Tank ...	80,000	Am. Car & Fdy.
San Antonio & Aran. P.	[illegible]	Fruit	60,000	Mt. Vernon Car.
	[illegible]	Stock ...	80,000	Mt. Vernon Car.
San Antonio & Aran. P..	[illegible]	Tank	80,000	Rodger Ballast.
San D. & Ariz.	[illegible]	Tank ...	12,500 g.	Pressed Steel.
San D., El P. & St. L...	[illegible]	Box	60,000	Cent. Loco. & Car.
	e10	Gondola..	60,000	Cent. Loco. & Car.
	[illegible] 10	Stock ...	60,000	Cent. Loco. & Car.
	e1	Caboose..	.....	Cent. Loco. & Car.
San Diego Southern....	[illegible]	Flat	80,000	Company shops.
Seaboard Air Line.....	*‡1,000	Box	60,000	Pressed Steel.
	[illegible] 00	Phosp. ..	100,000	Pressed Steel.
	[illegible] 0	Caboose..	.....	Pressed Steel.
Seaboard Ref. Co.	*1	Tank	80,000	Am. Car & Fdy.
Southwest. Mechan. Co..	[illegible] 0	....	60,000	Am. Car & Fdy.
Steinhardt & Co.	[illegible]	.....	80,000	Am. Car & Fdy.
Solvay Process Co.....	[illegible] 5	Tank	100,000	German-Amer.
Southern Ry.	[illegible] 1,000	Gondola..	100,000	Pressed Steel.
	*‡513	Gondola..	100,000	Mt. Vernon Car.
	[illegible] 1,000	Box	60,000	Lenoir Car.
	[illegible]	Flat	100,000	Standard Steel.
Stan. Mer. & Ph.....	e‡55	Flat	60,000	Fitz-hugh-Luther.
[illegible]	[illegible] 10	Ballast ...	80,000	Rodger Ballast.
[illegible]	[illegible] 17	Flat	80,000	Can. Car & Fdy.
	[illegible]	Gondola..	20,000	Can. Car & Fdy.
	*‡50	Ore	100,000	Can. Car & Fdy.
	[illegible]	Coal	100,000	Can. Car & Fdy.

Purchaser.	No.	Kind.	Capacity.	Builder.
Swift Ref. Tr. Co.....	†§200	Refrig. ..	60,000	Company shops.
	*§50	Tank	80,000	Pressed Steel.
Tampa Elec. Co.	e2	Flat	40,000	Am. Car & Fdy.
Temiscouta	e‡6	Box	60,000	Company shops.
	e‡1	Flat	60,000	Company shops.
Tex. & Pac. Coal Co....	*100	Gondola..	100,000	Pressed Steel.
Texas City Trans.....	e‡10	Flat	80,000	Haskell & Barker.
Texas Co.	*§140	Tank	80,000	Am. Car & Fdy.
	†§70	Tank	60,000	Am. Car & Fdy.
Texas Midland	†§80	.....	80,000	Am. Car & Fdy
	†§20	.....	60,000	Am. Car & Fdy.
Thomas Iron Co.....	*‡10	Hopper...	100,000	Cambria Steel.
Thompson Bros. Lum. Co.	e15	Logging..	50,000	Am. Car & Fdy.
Terrell Cotton Oil Co....	*5	Tank	80,000	Am. Car & Fdy.
Tidewater & West.....	e‡5	Box	30,000	Company shops.
	e‡5	Flat	40,000	Company shops.
Toledo & Ohio Cen.....	†‡100	Ballast ..	100,000	Rodger Ballast.
Toledo & Ohio Central..	e‡100	Ballast ...	100,000	Rodger Ballast.
Trinidad & Br. Valley..	e‡4	Box	60,000	Pullman.
Twin. Met. & Pot.....	†1	Flat	50,000	Am. Car & Fdy.
	†7	Box	50,000	Am. Car & Fdy.
	†10	Gondola..	50,000	Am. Car & Fdy.
Twin Mt. & Pot.....	e2	Ballast ...	40,000	Rodger Ballast.
Uintah Ry.	e‡9	Box	40,000	Company shops.
	e‡8	Flat	40,000	Company shops.
	e‡5	Stock ...	40,000	Company shops.
	e‡1	Caboose..	.....	Company shops.
Unadilla Valley.....	e2	Box	60,000	Central Loco.
Union Refr. Tr.....	†150	Refrig. ..	60,000	Am. Car & Fdy.
Union Tank Line.....	300	Tank	.....	Company shops.
	*500	Tank	.....	Pressed Steel.
United Fruit Co.....	†‡25	Flat	20,000	Magor Car Co.
	†‡25	Flat	50,000	Youngstown Car.
	†‡50	Fruit	40,000	Magor Car Co.
Universal Supply Co. ...	*1	Coal	100,000	Am. Car & Fdy.
Urania Lumber Co.....	e5	Logging..	60,000	Am. Car & Fdy.
Union Petroleum Co....	†1	.....	.....	Am. Car & Fdy.
Van Sant Lumber Co....	e3	Logging..	20,000	Am. Car & Fdy.
Vandalia	‡§147	Box	100,000	Pressed Steel.
	e‡5	Caboose..	.....	Company shops.
Virginia & S. W.....	*‡600	Gondola..	100,000	Pressed Steel.
	†‡65	Box	60,000	Lenoir Car.
Virginian	*1,000	Hopper ..	100,000	Pressed Steel.
W. D. Gardner Co.....	*5	Tank	60,000	Am. Car & Fdy.
Wabash-Pittsburgh T....	*‡500	Hopper ..	100,000	Pressed Steel.
	*500	Hopper ..	100,000	Standard Steel.
West. Maryland	*‡500	Hopper ..	100,000	Standard Steel.
	e‡35	Cabin ...	.....	Company shops.
W. P. McNeil & Co....	e‡1	Flat	60,000	Can. Car & Fdy.
Woodward Iron	100	Freight ..	.....	Pressed Steel.
John R. Walsh.....	*1	Tank	60,000	Am. Car & Fdy.
Walter Brew. Co.....	e2	Refrig. ..	60,000	Am. Car & Fdy.
W. Va. Pulp & Paper Co.	*10	Tank	100,000	Am. Car & Fdy.
Wasau So. Lumber Co..	e45	Logging..	60,000	Am. Car & Fdy.

* Indicates all-steel cars.
† Indicates steel underframe cars.
a Indicates all composite cars.
b Indicates composite underframe cars.
c Indicates composite-body cars.
d Indicates steel frame cars.
e Indicates all-wood cars.
‡ Indicates spring draft gear.
§ Indicates friction draft gear.

PASSENGER CARS ORDERED IN 1911.

Purchaser.	No.	Kind.	Builder.
[illegible]	‡6	First class.....	Canadian Car & Fdy.
	‡2	Bagg. & exp.....	Canadian Car & Fdy.
	‡4	Second class.....	Preston Car & Co.
[illegible]	*5	Motor	McKeen Motor Car Co.
	[illegible]	[illegible] ...	Pullman
	[illegible]	[illegible]	Pullman
[illegible]	[illegible]	[illegible] ...	Pullman
	[illegible]	[illegible]	Am. Car & Fdy.
	[illegible]	[illegible] ...	Pullman.
	†‡3	Buffet chair.....	Pullman.
	†‡4	Buffet baggage...	Pullman.
	[illegible]	[illegible] & smkg..	Pullman.
	[illegible]	[illegible]	Pullman
[illegible]	1	Coach	Central Loco. & Car.
	1	Mail & bagg.	Central Loco. & Car.
Atlanta & W. P.	*4	Postal	American
	*2	Coach	American
Atlantic C. L...	[illegible]	Coach	Pullman
	[illegible]	Pass. & bag ...	Pullman
	[illegible]	Express ..	Barney & Smith.
	[illegible]	Combination ...	Barney & Smith.
	*[illegible]	Postal	Pressed Steel Car.
Balt. & Ohio.	*[illegible]	[illegible]	Pullman
	[illegible]	[illegible]	Pullman
	*‡[illegible]	Baggage	Barney & Smith.
Bangor Ry. & Electric .	51	Electric	J. G. Brill
Bangham & Carf	3	Coach	Central Loco. & Car.
Boston & Maine	‡10	Coach	Bradley Car.
	[illegible]	[illegible]	Bradley Car.
	‡8	Coach	Laconia Car.
	*10	[illegible]	Laconia Car.
	[illegible]	Coach	Laconia Car.
	[illegible]	[illegible]	Laconia Car.
	[illegible]	Baggage	Laconia Car.
	*‡[illegible]	Postal	Laconia Car.
	‡31	Smoking & bag....	Wason.
	[illegible]	Bag. & mail ..	Wason.
	[illegible]	Mail	Laconia Car.
Boston Elevated	*‡40	[illegible]	Cleveland Steel
	*‡ [illegible]	[illegible]	Pressed Steel
	‡ [illegible]	[illegible]	St. Louis Car.
	‡ [illegible]	[illegible]	Osgood Bradley.
Boston, Pro. Beach & L	[illegible]	[illegible]	Laconia Car.
	[illegible]	[illegible]	Laconia Car.
Brockton Ry.	[illegible]	[illegible]	Am. Car & Fdy.
	[illegible]	[illegible] & Exp.	Am. Car & Fdy.
Buf., Lock. & P.	[illegible]	[illegible]	Pullman
Calgary Mun.	*[illegible]	[illegible]	Preston Car.
[illegible]	*[illegible]	[illegible]	Preston Car.
	*[illegible]	[illegible]	Preston Car.

Purchaser.	No.	Kind.	Builder.
Cambria & Ind.	1	Pass. & bagg.....	Am. Car & Fdy.
Camacho, Rold. & Van S.	6	Coaches	Am. Car & Fdy.
Canadian No.	‡20	1st class.....	Canadian Car & Fdy.
	[illegible]	Dining	Canadian Car & Fdy.
	‡8	2d class.....	Canadian Car & Fdy.
	10	Baggage	Canadian Car & Fdy.
	[illegible]	Sleeping	Canadian Car & Fdy.
	§6	Sleeping	Canadian Car & Fdy.
	[illegible] 10	2d class.....	Crossen Car.
	‡6	2d class & bagg...	Preston Car & Coach.
	b2	Baggage & mail...	Preston Car & Coach.
	‡2	Cafe-parlor	Canadian Car & Fdy.
Canadian Pacific	§6	Comp. sleeping....	Company shops.
	§16	Sleeping	Company shops.
	§10	Sleeping	Barney & Smith.
	§6	Observation	Company shops.
	§3	Cafe parlor	Company shops.
	§10	Dining	Company shops.
	*11	1st class.....	Company shops.
	‡35	1st class.....	Company shops.
	‡15	1st class & smkg..	Company shops.
	‡25	Suburban	Company shops.
	16	2d class.....	Company shops.
	‡18	1st class.....	Company shops.
	‡31	Colonist	Company shops.
	‡32	Baggage & exp...	Company shops.
	12	Baggage & smkg.	Company shops.
	‡2	Mail & express..	Company shops.
	3	Business	Company shops.
Cath. Church Exten. Soc.	‡11	Chapel car	Barney & Smith.
Central of Ga.	*14	Coach	Pullman.
	*14	Parlor	Pullman.
	*15	Baggage and mail.	Pullman.
Central of N. J....	*10	Coach	Harlan & Holl.
	*16	Combination	Harlan & Holl.
	††3	Obser. parlor	Company shops.
	13	Baggage	Company shops.
Chesapeake & Ohio	*‡15	Coach	Pullman.
	*21	Dining	Pullman.
	*34	Coach	Standard Steel.
	*34	Pass. & bagg.	Standard Steel.
	*14	Pass. & bagg.	Standard Steel.
	*5	Postal	Pressed Steel.

* Indicates all-steel cars.
† Indicates steel underframe cars.
a Indicates composite body cars.
b Indicates composite underframe cars.
‡ Indicates gas lighting.
§ Indicates electric lighting.
a Indicates acetylene lighting.
b Indicates oil lighting.
* Indicates wood and steel underframe cars.

Purchaser.	No.	Kind.	Builder.
	†§10	Express	Company shops.
Chesapeake West.	1	Coach	Central Loco. & Car.
Chicago & East. Ill.	*7	Mail	Am. Car & Fdy.
	*4	Coach	Am. Car & Fdy.
	*2	Chair	Am. Car & Fdy.
	*3	Baggage	Am. Car & Fdy.
	*§2	Lounging	Pullman.
Chicago, Bur. & Quincy.	*§5	Postal	Standard Steel.
Chi., Indianapolis & L.	†§2	Combination	Barney & Smith.
	†§3	Coach	Barney & Smith.
	†§2	Parlor	Barney & Smith.
	†§1	Dining	Barney & Smith.
Chicago, Memphis & Ga.	b1	Coach	Central Loco. & Car.
Chi., Mil., & St. Paul.	*§4	Mail	Am. Car & Fdy.
Chicago, Mil. & P. S.	*§4	Baggage	Am. Car & Fdy.
	20	Exp. refrig.	Company shops.
Chi. & North Western.	*‡15	Postal	Pullman.
Chi., Rock Island & Pac.	*§11	Bagg. & mail	Pullman.
	*§30	Postal	Pullman.
Chi., St. P., Minn. & O.	*‡4	Baggage	Pullman.
	*‡4	Postal	Pullman.
Cleve., Cin., Chi. & St. L.	*§10	Postal	Pressed Steel.
Coppell, Herbert	*§1	Private	Pullman.
Cuba R. R.	12	Coach	Am. Car & Fdy.
	4	Sleeping	Am. Car & Fdy.
	3	Bagg. & mail	Am. Car & Fdy.
Delaware & Hudson	*§1	Gas-elect. motor	General Electric.
Del. Lack. & Western.	*‡3	Coach & smkg.	Barney & Smith.
	†§2	Dining	Barney & Smith.
	†12	Milk	Company shops.
Dom. Atlantic	¶*2	1st class	Can. Pac. Ry.
Duluth, Missabe & N.	*§6	Coach	Am. Car & Fdy.
	*§2	Bagg. & mail	Am. Car & Fdy.
Dul. So. Sh. & At.	*§1	Baggage	Am. Car & Fdy.
Durh. & So.	†b1	Baggage	Am. Car & Fdy.
	7	Mail	Am. Car & Fdy.
Edmonton Radial	¶4	Closed	Preston Car.
El Paso & S. W.	*§2	Postal	Pullman.
	*§3	Baggage	Pullman.
	*§4	Coach	Pullman.
	*§2	Chair	Pullman.
Erie	†§10	Coach	Barney & Smith.
	†§5	Combination	Pullman.
	†§25	Suburban	Pullman.
	†§25	Express	Barney & Smith.
Fairch. & N. E.	1	Coach	Central Loco. & Car.
Florida Central	1	Combination	Central Loco. & Car.
Florida East Coast	*§7	Coach	Pullman.
	*§4	Express	Pullman.
	*§3	Postal	Pullman.
Ft. Dodge Des M. & So.	†1	Coach	Company shops.
Frederick	§2	Combination	J. G. Brill.
Georgia	b4	Passenger	Company shops.
Georgia & Florida	4	Coach	Central Loco. & Car.
	1	Mail & exp.	Central Loco. & Car.
	2	Sleeping	Central Loco. & Car.
Georgia Northern	2	Coach	Central Loco. & Car.
	1	Combination	Central Loco. & Car.
Grand Trunk	††25	Coach	Pullman.
	25	Coach	Am. Car & Fdy.
	25	Bagg. & exp.	Am. Car & Fdy.
Great Northern	§15	Baggage	Barney & Smith.
	§10	Mail, bagg. & exp.	Barney & Smith.
	§10	Postal	Barney & Smith.
Guelph Radial	¶2	1st class	Preston Car.
Hamilton	¶6	1st class	Preston Car.
Harriman Lines	*‡5	Postal	Pullman.
	2	Private	Pullman.
	*‡§53	Bagg. & mail	Pullman.
	*‡§6	Coach & postal	Pullman.
Hawley, Edwin H.	*§1	Private	Pullman.
Hocking Valley	†§10	Coach	Pullman.
	†‡5	Baggage	Company shops.
Illinois Central	*§10	Bagg. & exp.	Pullman.
	*‡6	Postal	Pullman.
	*§8	Coach	Pullman.
	*§15	Coach	Pullman.
	*§3	Observ.-club	Pullman.
	*§2	Dining	Pullman.
Intercolonial	‡2	Baggage	Canadian Car & Fdy.
	‡2	Postal	Nova Scotia Car.
	‡3	1st class	Preston Car & Coach.
	‡2	1st class	Canadian Car & Fdy.
	‡3	Colonist	Canadian Car & Fdy.
	‡1	Milk	Company shops.
Kanawha & Michigan	‡3	Coach	Pullman.
	1	Bagg., mail & exp.	Pullman.
	1	Baggage	Pullman.
Kan. C., Ft. Scott & M.	*7	Mail	Am. Car & Fdy.
Kansas City So.	††§8	Chair	Am. Car & Fdy.
	††§5	Bagg. & exp.	Am. Car & Fdy.
	††§3	Mail, bagg. & exp.	Am. Car & Fdy.
	5	Chair	Am. Car & Fdy.
	5	Bagg. & exp.	Am. Car & Fdy.
Kentwood & East.	b1	Passenger	Central Loco. & Car.
	b7	Baggage	Central Loco. & Car.
Lake Shore & Mich. So.	*§8	Coach	Pressed Steel.
	*§10	Postal	Am. Car & Fdy.
	*§7	Coach	Am. Car & Fdy.
	*§3	Dining	Barney & Smith.
Lehigh Valley	*‡5	Milk	Standard Steel.
	†§5	Postal	Standard Steel.
	*‡7	Baggage	Standard Steel.
	*§10	Pass. & baggage	Pullman.
	*§15	Baggage & mail	Standard Steel.
	*§30	Coach	Pullman.
	*§30	Smoking	Pullman.
	*§7	Dining	Pullman.
Long Island	*§70	Motor coach	Am. Car & Fdy.
	*§15	Coach	Am. Car & Fdy.
	*5	Pass. & baggage	Am. Car & Fdy.
Louisiana & Arkansas	‡1	Mail & baggage	Am. Car & Fdy.
	‡2	Coach	Barney & Smith.
Louisville & Nashville	‡§6	Postal & baggage	Company shops.
	‡b2	Baggage	Company shops.
	†§4	Coach	Company shops.
	†b12	Coach	Company shops.
Louisiana & No. W.	b1	Mail & baggage	Am. Car & Fdy.
Louisv., Hend. & St. L.	†§2	Mail, bagg. & exp.	Company shops.
Louisiana Ry. & Nav.	2	Chair	Second-hand.
Maine Central	††8	Coach	Laconia Car.
	†‡1	Mail	Laconia Car.
	††3	Mail & baggage	Laconia Car.
Maryland & Penna.	1	Coach	Am. Car & Fdy.
Michigan Central	*§10	Postal	Pressed Steel.
Midland Valley	b7	Coach	Am. Car & Fdy.
	b2	Baggage	Am. Car & Fdy.
	§1	Business	Company shops.
	b1	Baggage	Company shops.
Minn., St. P. & S. S. M.	‡b§3	Parlor	Barney & Smith.
	‡b§2	Cafe-observ.	Barney & Smith.
	*§14	Coach	Barney & Smith.
	*5	Coach	Am. Car & Fdy.
	*4	Baggage & mail	Am. Car & Fdy.
	††§1	Dining	Barney & Smith.
	‡†§6	Sleeping	Barney & Smith.
Missouri, Kan. & Texas.	1	Mail	Am. Car & Fdy.
Missouri Pacific	†§15	Baggage	Am. Car & Fdy.
	*‡14	Mail	Am. Car & Fdy.
	†§11	Chair	Pullman.
	†§8	Coach	Pullman.
	†§2	Combination	Pullman.
Mobile & Ohio	††2	Mail & baggage	Am. Car & Fdy.
	††5	Express	Am. Car & Fdy.
Monmouth Macomb & So.	*1	Pas., sm. & bag. mo.	McKeen Motor Car.
Nash. Chat. & St. L.	†§1	Dining	Am. Car & Fdy.
Nevada Copper Belt.	†§1	Pas. & bag. motor	Hall-Scott Mot. Car Co.
New Orl. Mob. & Chic.	b3	Buffet-parlor	Ga. Car.
N. Y. Cent. & H. R.	10	Milk	Company shops.
	*§15	Postal	Am. Car & Fdy.
	*§3	Dining	Barney & Smith.
N. Y., N. H. & Hartford.	§14	Sleeping	Barney & Smith.
Norfolk & Western.	6	Baggage & mail	Cent. Loco. & Car.
North Coast	1	Motor	McKeen Motor Car.
Northern Pacific	4	Baggage & mail	Am. Car & Fdy.
	3	Baggage	Am. Car & Fdy.
Northwestern Pacific	‡3	Baggage	Am. Car & Fdy.
	‡2	Pass. & baggage	Am. Car & Fdy.
Oregon Electric	†§10	Coach	Am. Car Co.
	†§6	Motor	Am. Car Co.
Oregon Short Line	*4	Pas., bag. & motor.	McKeen Motor Car.
Ore.-Wash. Ry. & Nav.	*2	Pas., sm. & bag. mot.	McKeen Motor Car.
Pennsylvania Railroad	*76	Coach	Am. Car & Fdy.
	*20	Baggage	Am. Car & Fdy.
	*41	Coach	Pressed Steel Car.
	*65	Combination	Pressed Steel Car.
	50	Suburban	Company shops.
	9	Dining	Company shops.
	7	Mail	Company shops.
	*§1	Private	Pullman.
People's Electric Ry.	*2	Pas., sm. & bag. mo.	McKeen Motor Car.
Pere Marq.	§12	Coach	Pullman.
	§2	Combination	Pullman.
Philadelphia & Reading.	*§2	Dining	Harlan & Hollingsworth.
	*‡8	Baggage	Harlan & Hollingsworth.
	*1	Baggage & mail	Harlan & Hollingsworth.
	†1	Baggage	Company shops.
Pineville, Warm Springs & Portland City	*3	Motor	McKeen Motor Car.
Pt. Arthur & Ft. Wm.	¶4	1st class	Preston Car.
Portland & So. E.	1	Combination	Central Loco. & Car.
Pearson & Son, S.	b1	Passenger & bagg.	Barney & Smith.
Queen & Crescent	‡†§15	Coaches	Harlan & Holl.
	‡†§6	Mail	Am. Car & Fdy.
	‡†§1	Bagg. & mail	Am. Car & Fdy.
	‡†§5	Combination	St. Louis Car.
Regina	†1	Snow sweep.	Preston Car.
Regina Municipal	¶6	1st class	Preston Car.
Richmond, Fredericksburg & Potomac	†§4	Coach	Am. Car & Fdy.
Ried-Newfoundland	3	Coach	Company shops.
	3	Sleeping	Company shops.
	1	Dining	Company shops.
Rutland	²‡2	Bagg. & mail	Pullman.
	1	Postal	Laconia Car.
St. Louis & San Fran.	*12	Mail	Am. Car & Fdy.
	*2	Baggage	Am. Car & Fdy.
	*3	Mail & bagg.	Am. Car & Fdy.
	*15	Coach	Am. Car & Fdy.
	*10	Chair	Am. Car & Fdy.
	*5	Dining	Am. Car & Fdy.
	*3	Cafe-club	Am. Car & Fdy.
	*1	Cafe-coach	Am. Car & Fdy.
	*4	Buffet-club	Pullman.
	11	Gasoline motor	General Electric.
St. Louis, Ken., & S. E.	1	Coach	Central Loco. & Car.
San Ant. & Ar. Pass.	††2	Pass. & mail	Am. Car & Fdy.
	2	Pass. & mail	Central Loco. & Car.
San Diego, El P. & St. L.	2	Coach	Central Loco. & Car.
	1	Combination	Central Loco. & Car.
San Fr., Oakl. & San Jose	25	Motor coach	St. Louis Car.
Sand Springs Int.	*1	Pas. smkg. & bag. motor	McKeen Motor Car.
Seaboard Air Line	††§10	Coach	Pullman.
	††§1	Pass. & bagg.	Pullman.
	††§6	Postal	Pullman.
	*§3	Express	Pullman.
Southern	²†§3	Coach	Harlan & Holl.
	²†§10	Pass. & bagg.	St. Louis Car.
	²†§0	Postal	Am. Car & Fdy.
	²†§4	Dining	Barney & Smith.
Southern Georgia	1	Coach	Central Loco. & Car.
Spokane, Portl. & Seattle.	‡§4	Bagg. & mail	Am. Car & Fdy.
	§3	Dining-buffet	Am. Car & Fdy.

* Indicates all-steel cars.
† Indicates steel underframe cars.
‡ Indicates composite body cars.
² Indicates composite underframe cars.
§ Indicates gas lighting.
¶ Indicates electric lighting.
b Indicates acetylene lighting.
* Indicates oil lighting.
* Indicates wood and steel underframe cars.

Purchaser.	No.	Kind.	Builder.
Sydney & Louisb.....	1	1st class	Pullman.
Texas So. East	1	Coach	Am. Car & Fdy.
Texas Traction	2	Trailer	Am. Car & Fdy.
Tol. Peoria & W.....	b4	Mail & bagg.	Pullman.
Toronto & York Rad...	*2	Express	Preston Car.
	¶6	1st class	Preston Car.
Tremont & Gulf	2	Coach	Central Loco. & Car.
United Fruit Co.	†1	Observation	Wason Mfg.
	†1	1st class	Wason Mfg.
	†1	2d class	Wason Mfg.
	†3	Pass. & bagg.	Wason Mfg.
	†1	Baggage	Wason Mfg.
Wabash	*8	Parlor	Am. Car & Fdy.
Western Maryland	‡15	Coach	Barney & Smith.
	††2	Combination	Barney & Smith.
	††2	Baggage	Barney & Smith.
	††4	Mail & exp.	Barney & Smith.
	††§1	Official	Barney & Smith.
Wind. Essex & L. Shore.	¶1	Express	Preston Car.
Windsor St. Ry.	¶6	1st class	Preston Car.
Woodstock & Syc. Trac..	*1	Pass. smkg. & bag. motor	McKeen Motor Car.

* Indicates all-steel cars.
† Indicates steel underframe cars.
‡ Indicates composite body cars.
²Indicates composite underframe cars.
‡ Indicates gas lighting.
§ Indicates electric lighting.
a Indicates acetylene lighting.
b. Indicates oil lighting
¶ Indicates wood and steel underframe cars.

LOCOMOTIVES ORDERED IN 1911

Purchaser.	No.	Cylinders.	Total Weight, Engine Only.	Type.	Builder.
Abilene & S.....	1	18x24	90,000	2-6-0	Central Lo. & C.
Adirondack & St. L.....	§1	18x24	118,500	2-6-0	Baldwin.
Ann Arbor & Youngst.	5	19x26	135,000	0-6-0	Lima Loco.
	5	20x26	159,000	0-6-0	Lima Loco.
Algoma, C. & Hud. Bay.	†10	22½x28	194,000	2-8-0	Montreal Loco.
	5	22x28	197,000	2-8-0	Canadian Loco.
	5	20½x28	190,000	4-6-0	Canadian Loco.
Algoma Steel	5	19x24	123,000	0-6-0	Montreal Loco.
	2	16x24	132,000	0-6-0	Montreal Loco.
Alleghany R. Mining Co.	5	20x26	196,000	2-8-0	Baldwin.
	2	22x28	228,000	2-8-2	Baldwin.
Am. Smelter Securities..	1	23x28	230,500	2-8-2	Baldwin.
Am. Br. Shoe & Fdy. Co.	1	16x24	86,000	0-4-0	American.
Amazon Rubber	5	20x30	187,000	2-8-0	Baldwin.
Arcadia & B.....	1	17x24	108,000	0-10-0	Central Loco.
Ascens'n Red Cypress Co.	1	12x18	60,000	0-4-4	Davenport Loc.
Ashbel-Hubbard Co.....	1	11x16	40,000	2-6-0	Davenport Loc.
A., T. & S. F.....*†‡	24	24&38x28	370,000	2-6-6-2	Baldwin.
	29	20x26	154,000	Switch	Baldwin.
	23	17½&29x28	276,000	4-6-2	Baldwin.
	*‡5	17½&29x28	276,000	4-6-2	Baldwin.
Atlantic Coast Line.....	20	22x30	230,400	2-8-2	Baldwin.
	15	22x28	220,850	4-6-2	Baldwin.
Baker, P. & Siskiyou...	1	15x18	69,000	0-4-0	Davenport Loc.
Baltimore & Ohio.....	10	21x26	164,250	2-6-0	Baldwin.
	*‡10	26&41x32	461,000	0-8-8-0	American.
	10	24x32	271,040	4-6-2	Baldwin.
	50	24x32	277,190	4-6-2	Baldwin.
	140	24x32	276 050	2-8-2	Baldwin.
	†10	24x32	282,200	2-8-2	Baldwin.
	110	24x32	282,200	2-8-2	Baldwin.
Bangor & Aroostook.....	6	20x26	160,000	4-6-0	American.
Barnes & Tucker	1	19x15	160,000	Shay	Lima Loco.
Bessemer & L. Erie.....	30	22x30	205,000	2-8-0	American.
	2	22x32	248,700	2-8-0	Baldwin.
	4	20x26	127,800	0-6-0	Baldwin.
Binghamton & Garf.....	2	21x26	155,000	0-6-0	Baldwin.
	10	.....	.....		H. K. Porter.
	*5	29x31x28	454,000	0-8-8-0	American.
	*‡1	29&33x28	450,000	0-8-8-0	American.
Black Rock	1	16x24	92,500	2-8-0	Davenport.
Bonnyville Tower Co.	1	11x16	40,000	0-4-0	Davenport.
Boston & Maine	40	22x26	233,000	4-6-2	American.
	20	19x26	140,000	0-6-0	American.
Boston, Rev. B. & L....	2	14x18	91,000	0-4-4	American.
Boston Coastal	1	16x18	84,000	Shay	Lima Loco.
Bradley Contr. Co.....	2	13x18	60,000	0-4-0	Davenport.
Brandon	3	19x24	130,600	4-6-0	Baldwin.
Brassard Pulp & P. Co.	1	14x20	50,000	0-4-4	Montreal.
Bruce Copper Co.	1	16x24	140,000	Shay	Lima Loco.
Buffalo Cr.	1	20x24	144,000	0-6-0	American.
Buffalo, Cr. & Gaul.....	1	20x24	137,000	2-8-0	Baldwin.
Buffalo, Rock & P.....	7	22x30	282,000	2-8-2	American.
	10	21x26	258,000	4-6-2	American.
Canada Iron Corp.	5	19x24	124,000	0-6-0	Montreal Loco.
Canadian Northern	10	19x26	123,000	0-6-0	Canadian.
	†20	22x26	172,000	4-6-0	Montreal Loco.
	20	19x26	124,400	0-6-0	Montreal Loco.
Canadian Pacific	†34	21x28	198,000	4-6-0	Comp. shops.
	†15	21x28	198,000	4-6-0	Comp. shops.
	5	21x28	219,000	4-6-2	Comp. shops.
	5	21x28	217,000	4-6-2	Comp. shops.
	†25	23½x32	223,000	2-8-0	Montreal Loco.
	5	19x26	137,000	0-6-0	Comp. shops.
	5	19x24	127,000	4-6-0	Comp. shops.
	†4	19x24	127,000	4-6-0	Montreal Loco.
	5	20x24	236,000	4-6-4	Comp. shops.
	5	20x24	236,000	0-6-4	Comp. shops.
Canadian & Pacific ...	1	19x24	100,000	4-6-0	Montreal Loco.
Cananea	1	16x24	60,000	4-0-0	Vulcan.
Central of New Jersey..	†3	22x28	206,000	4-4-2	P. & R. Ry.
	5	19x24	147,500	0-6-0	Comp. shops.
Central Power	1	19x24	204,000	2-8-2	Baldwin.
	1	19x24	183,000	2-8-0	Baldwin.
	1	19x24	144,000	Switch	Baldwin.
	*5	24x30	394,000	2-8-0	Baldwin.
	*1	24x30	320,000	2-6-0	Baldwin.
	1	19x24	100,000	4-4-0	Baldwin.
Chamberlain & Hoel ...	1	19x24	261,050	2-8-2	Baldwin.
Chase, Hall & Co.	1	19x24	114,000	Switch	Baldwin.
Chase, Sayre & Co.	1	19x24	114,000	0-6-0	Baldwin.
	4	21x28	171,000	4-6-0	Baldwin.
Chesapeake & O.	5	22x30	215,000	4-6-2	American.
	5	22x30	215,000	4-6-2	American.
	5	22x30	215,000	4-8-2	American.
	10	24x30	320,000	2-8-8-2	American.
	10	24x30	330,600	Mallet	American.
	*10	24x30	400,000	2-6-6-2	American.
Chicago & Eastern Ill.	10	24x30	260,000	4-6-2	Baldwin.
Chicago & North West..	15	25x28	250,500	4-6-2	American.
	10	27x30	266,500	2-8-2	Baldwin.
	†25	.....	.....	.....	Baldwin.
	6	20x24	122,500	Switch	Comp. shops.
	*§1	26&40x32	448,000	2-8-8-2	Baldwin.
Chic. & Wilm. Coal Co..	1	18x22	80,000	0-6-0	Central Loco.
Chic., Indianapolis & L..	7	22x30	209,000	2-8-0	American.
	3	22x28	215,000	4-6-2	American.
	†9	27x30	276,000	2-8-2	American.
Chic., Memphis & Ga....	1	19x24	124,000	2-6-0	Baldwin.
	1	15x24	80,000	4-4-0	Baldwin.
Chic., Milw. & Ga.	8	21x28	174,000	2-8-0	Baldwin.
Chic., Milw & P. S.....	†15	25x28	250,000	4-6-2	Comp. shops.
	†5	24x30	217,000	2-8-0	Comp. shops.
Chic., St. P., Minn. & O.	20	18x24	124,000	0-6-0	American
	†6	23x26	179,000	2-8-0	American
	†2	23x28	212,000	4-6-2	American
	5	18x24	130,500	0-6-0	American
	†10	23x26	179,000	2-8-0	.....
City & County Cont. Co.	1	.....	160,000	Electric	Westinghouse.
C. C. C. & St. L.....	†30	25x30	244,000	2-8-0	American.
Cleveland-Cliffs Iron Co.	1	11x12	100,000	Shay	Lima Loco.
Col., Newb. & Laur.....	2	19x26	132,000	4-6-0	Baldwin.
Corrigan, McKinney & Co.	2	19x26	123,000	0-6-0	American.
Coudersp. & Pt. Allegh..	1	17x24	104,000	4-4-0	Baldwin.
Crystal C. & Uvalde....	11	18x24	122,000	2-6-0	American.
Cuba R. R.	5	18x24	127,000	0-10-0	American.
Cuban Am. Sugar	4	15x20	140,000	2-6-0	Lima Loco.
Cumb. & Penna.	3	21x26	174,500	2-8-0	Comp. shops.
Czarnikow Rionda	2	8x14	25,000	0-6-0	American.
Del., Lack. & Western...	15	26x30	233,000	2-8-0	American.
	7	20½x26	171,000	2-6-0	American.
	7	19x24	133,000	0-6-0	American.
	6	21x26	156,000	4-4-0	American.
Delaware & Hudson.....	5	21x26	193,000	4-6-0	American.
	5	24x30	211,000	2-8-0	American.
	*14	26&41x28	457,000	0-8-8-0	American.
	1	28x26	199,000	4-6-0	American.
Detroit & Tol. Sh. Line..	4	20x26	162,000	2-6-0	American.
I. A. Dewar Co.....	1	12x18	56,000	0-4-0	Davenport Loc.
Dixie	1	.....	80,000	Shay	Lima.
Dul. Winnipeg & P.....	§5	23x26	188,000	2-8-0	American.
	§5	22x26	169,500	4-6-0	Baldwin.
Durh. & So. Car.....	1	18x26	116,500	4-6-0	Baldwin.
East Br. Top. R. R. & Coal	1	17x24	112,000	2-8-2	Baldwin.
E. Tenn. & W. No. Car..	§1	15x22	90,000	4-6-0	Baldwin.
Edwardsburg Starch Co...	1	13x18	56,000	0-4-0	Montreal.
Elbon & Allegh	1	20x24	146,000	2-8-0	Baldwin.
Erie	†20	28x32	315,000	2-8-2	Baldwin.
	†15	28x32	315,000	2-8-2	American.
	5	20x26	148,500	0-6-0	Company shops.
	5	20x26	148,500	0-6-0	Lima Loco.
	20	20x26	148,500	0-6-0	Company shops.
Escanaba & L. Sup.	1	19x26	137,750	4-6-0	Baldwin.
Esquimalt & Nanaimo...	2	14x22	80,000	2-4-2	Montreal.
Fauquier, E. F. & G. E..	2	18x24	109,000	4-6-0	Montreal.
Flint Coal Co.	15	20x26	196,000	4-6-2	American.
	†5	22x26	203,500	4-6-2	American.
Ft. Dodge, Des Moines & Southern	7	.....	90,000	Electric	Am. & Gen. Elec.
Fort Smith & W. R. R.	2	.....	.....	Electric	Baldwin.
Galv. Har. & San A.....	6	22x28	203,000	4-6-0	Baldwin.
	2	19x26	143,000	Switch	Baldwin.
Georgia	6	20x24	173,000	4-6-0	Baldwin.
	2	20x24	118,000	0-6-0	Baldwin.
Gr. Nor.	5	19x24	112,000	4-6-0	Central Loco.
Grand Rapids & Ind.	1	.....	100,000	2-6-0	Baldwin.
Grand Rapids & Ind.	3	20x24	144,100	0-6-0	Company shops.
Grand Trunk	*1	21½&32x32	209,000	2-8-0	American.
	*10	22½&35x32	212,000	2-8-0	American.
	10	20x26	227,000	0-6-0	Lima Loco.
Grand Trunk Pac.	11	22x28	220,000	4-6-2	American.
	20	21x30	205,000	2-8-0	American.
	10	20x26	160,000	0-6-0	American.
		23x30	211,200	2-8-0	Canadian Loco.
Great Northern	†20	28x32	287,000	2-8-2	Baldwin.
Great N. & N. West'n	5	19x26	144,000	2-6-0	American.
Great S. of Cuba	1	6x12	14,000	0-4-0	American.
Great Lake Dredge Dock Co.	1	14x20	60,000	2-6-0	Davenport.
Hocking Valley	10	23x30	237,000	2-8-0	American.
Hocking Pass.	1	18x24	90,000	0-6-0	Central Loco.
Hudson Bay Co.	5	8x12	40,000	Shay	Lima Loco.
Hudson Bay Logging Co. of Maine	6	11x16	40,000	0-4-0	Davenport Loc.
	3	16x24	31,000	0-4-0	Davenport.
	7	16x24	37,000	0-4-0	Davenport.

* Indicates compound.
† Indicates superheater.
‡ Indicates schenter.
§ Indicates feed water heater.

Purchaser.	No.	Cylinders	Total Weight, Engine Only.	Type.	Builder.
Hydraulic Engine Co. of Maine	1	16x24	72,000	0-4-0	Davenport.
Idaho & Washington N.	2	22x30	200,000	2-8-0	Baldwin.
Illinois Central	†40	27x30	280,000	2-8-2	Baldwin.
	†5	25x26	239,000	4-6-2	American.
	†10	27x30	280,000	2-8-2	Baldwin.
	†10	25x26	239,000	4-6-2	American.
	†40	27x30	280,000	2-8-2	Baldwin.
	†10	25x26	239,000	4-6-2	American.
	†10	27x30	280,000	2-8-2	Baldwin.
Ill. Midland Coal Co.	1	13x18	56,000	0-4-0	American.
Illinois No.	1	22x26	145,000	0-6-0	Baldwin.
Illinois Terminal	†1	20x24	150,000	2-6-0	Baldwin.
Independent Coal & Coke.	1	14½x15	180,000	Shay	Lima.
Indian Cr. Vy.	1	20x24	143,900	2-8-0	Baldwin.
Inland St. Co.	1	17x24	94,000	0-6-0	American.
Intercolonial	4	20x26	137,000	0-6-0	Canadian Loco.
	3	20x26	155,000	4-6-0	Canadian Loco.
	5	21x26	198,000	4-6-0	Canadian Loco.
International & Gt. N.	9	20x28	174,000	0-10-0	Baldwin.
Island Creek	1	21x28	173,000	0-8-0	American.
Jacksonville Term.	1	19x28	119,000	0-6-0	Baldwin.
Kanawha & Michigan	8	23x30	237,000	2-8-0	American.
	2	20x26	130,000	0-6-0	American.
Kanawha Gl. J. & East.	1			2-8-2	Baldwin.
Kansas City & Mem.	1	18x26	134,000	4-6-0	American.
Kansas City Southern	*12	22&35x32	353,000	2-8-8-0	American.
	*8	24x28	250,000	4-6-2	American.
Kelley Isl. Lime & Tran. Co.	2	8x12	40,000	Shay	Lima Loco.
Kentucky & Ind. Term.	2	21x26	159,000	0-6-0	Baldwin.
Kentucky & Tennessee	§8	20x24	110,000	2-6-2	Baldwin.
Kewaunee, Gr. Bay & W.	37	19x26	135,000	2-6-0	American.
L. Super. Term. & Tr. Co.	1	20x26	143,550	0-8-0	Baldwin.
Lake Term. Co.	*1	24&37x32	340,000	0-6-6-0	Baldwin.
Lar. Hahns P. & Pac.	4	20x28	181,500	2-8-2	Baldwin.
Laurinb. & So.	1	18x26	128,450	4-6-0	Baldwin.
Lehigh & New Eng.	2	23½x26	228,000	2-8-0	Baldwin.
	2	19x26	145,000	2-8-0	Baldwin.
Long Island	4	21x26	178,200	4-6-0	American.
	2	19x26	134,000	0-6-0	Baldwin.
Louisiana & Arkansas	2	18x24	124,500	0-8-0	Baldwin.
Louisiana	1	16x24	108,000	2-6-2	Baldwin.
Louisiana & Northwest	3	18x26	130,500	4-6-0	Baldwin.
Louisiana & Pine Bluff	§1	17x24	103,000	2-6-0	Baldwin.
Louisville & Nashville	25	23x30	220,000	2-8-0	Comp. shops.
	†8	23½x29	222,000	2-8-0	Comp. shops.
	†5	21½x28	210,000	4-6-2	Comp. shops.
Louisv. Hend. & St. L.	1	20x26	100,000	0-6-0	Baldwin.
Lyall & Sons, P.	1	13x18	56,000	0-4-0	Montreal Loco.
McCloud River	2	14½x15	180,000	Shay	Lima Loco.
MacDonnel & O'Brien	3	19x26	130,000	2-6-0	Montreal Loco.
Mapimi Ry.	1	12x16	47,000	2-6-2	Baldwin.
Marion & Rye V.	1	21x24	147,000	2-8-0	American.
Mexico Northwestern	*2	18½&29x26	366,000	2-8-8-0	American.
	6	19x26	148,000	2-6-2	American.
Midl. Pennsylvania	1	18x24	113,000	4-4-0	Baldwin.
Miller & Son, R.	3	11x16	39,000	0-4-0	Montreal Loco.
Mo. Kan. & Texas	9	19x26	141,200	0-6-0	Baldwin.
	†7	24x28	235,000	4-6-2	American.
Mo. Okla. & Gulf	6	20x26	165,000	2-8-0	Baldwin.
Missouri Pacific	†50	27x30	275,000	2-8-2	American.
	†15	26x26	252,000	4-6-2	American.
	*1	23&36x32		2-8-8-0	Baldwin.
Mobile & Ohio	†4	27x30	272,940	2-8-2	Baldwin.
	8	20x26	145,000	0-6-0	Lima Loco.
Morgan's La. & T.	2	19x26	143,000	0-6-0	Baldwin.
Mt. Hood & Power Co.	2	10x16	37,000	0-4-0	
Nashv. Chatt. & St. L.	3	23x28	253,000	4-6-2	Baldwin.
Nev., Cal., Oregon	†2	16x20	88,000	2-6-0	Baldwin.
Nevada Copper Belt	1	18x24	130,000	2-8-0	Lima Loco.
New Orleans & N. E.	2	21x28	180,000	4-6-0	Baldwin.
	1	20x24	112,000	0-6-0	Baldwin.
	2	21x26	135,500	0-6-0	Baldwin.
New Orleans, Gt. Nor.	2	20x26	167,000	4-6-0	American.
New Bruns. Coal & Ry.	§6		100,000		Montreal Loco.
N. Y. & Penna.	1	18x24	100,000	4-4-0	Baldwin.
N. Y. Cent. & H. R.	†30	26x26	266,000	4-6-2	American.
	†30	26x26	269,000	4-6-2	Baldwin.
	†20	23½x26	269,000	4-6-2	Baldwin.
N. Y. Chic. & St. L.	6	19x28	172,000	2-8-0	American.
	9	19x24	145,000	4-6-0	American.
N. Y. New Hav. & H.	15		160,000	Electric	Westinghouse.
	12		232,000	Electric	Westinghouse.
	3		280,000	Electric	Westinghouse.
N. Y. Ont. & Western	4	20x26	178,000	4-6-0	American.
	4	20½x26	150,000	0-6-0	American.
	12	21x32	201,500	4-6-0	American.
Niquero Sugar Co.	1	12x18	85,000	0-6-0	Lima.
Norfolk Southern	5	20x28	165,500	4-6-0	Baldwin.
Norfolk & Western	16	24x30	262,000	4-8-0	Comp. shops.
	†5	22½x28	247,000	4-6-2	Comp. shops.
Nova Scotia S. & C. Co.	1	19x26	124,000	0-6-0	Montreal Loco.
O'Brien, McD. & O'G.	1	19x26	130,000	2-6-0	Montreal Loco.
	3	18x24	108,000	4-6-0	Montreal Loco.
O'Brien, Fowler & McD.	7	19x26	130,000	2-6-0	Montreal Loco.
Oregon & California	10	23½x30	262,000	2-8-2	Baldwin.
	2	19x26	143,000	0-6-0	Baldwin.
Oregon Electric	4		120,000	Electric	Am. & Gen. El.
	4		100,000	Electric	Am. & Gen. El.
Penna. Lines West	1	19x26	139,000	0-6-0	American.
Pennsylvania	3			0-8-0	Baldwin.
	†1	27x28		4-6-2	American.
	†1	27x28		2-8-8-2-s	American.
	20			Electric	Comp. shops.
	77				Comp. shops.
	15			4-6-2	Comp. shops.
	10			2-8-2	Comp. shops.
	10			0-6-0	Comp. shops.
Pennsylvania So.	1	20x26	162,000	2-8-0	American.
Pere Marquette	10	23x30	215,000	2-8-0	American.
	†25	25x30	229,000	2-8-0	American.
	10	20x26	136,000	0-6-0	American.
	†5	22x28	215,000	4-6-2	American.
Poinsett Lbr. & Mfg.	1	11x16	46,000	0-4-4	Davenport Loc.
Portland S. E. Ry.	1	11x16	44,000	0-4-2	Davenport.
Portland Terminal	4		147,000	0-6-0	American.
North & South Car.	2	18x26	128,450	4-6-0	Baldwin.
Oregon Short Line	15	23¾x30	262,000	2-8-2	Baldwin.
Ore.-Wash. R.R. & Nav.	40	23¾x30	262,000	2-8-0	Baldwin.
	10	19x26	143,000	0-6-0	Baldwin.
	2	25x28	170,000	4-6-2	Baldwin.
Paris & Mt. P. L.	1	16x24	98,000	4-6-0	Baldwin.
Peoria & Pekin Union	5	21x28	161,000	0-6-0	American.
Northwestern of So. Car.	1	17x24	108,000	4-6-0	Central Loco.
Philadelphia & Reading	10	20x24	164,000	4-4-0	Comp. shops.
	5	22x24	189,000	4-6-0	Comp. shops.
	†1	19x24	210,000	4-6-0	Comp. shops.
	†1	22x26	208,000	4-6-0	Comp. shops.
	†1	19x24	208,000	4-4-2	Comp. shops.
	†2	22x26	204,000	4-4-2	Comp. shops.
	†3	20½x26	191,000	4-4-2	Comp. shops.
	†5	20x28	150,000	0-6-0	Comp. shops.
	†5	18x24	106,000	0-4-0	Comp. shops.
Pittsburg & Shawmut	20	22x28	196,000	2-8-0	Baldwin.
	2	22x28	226,000	2-8-2	Baldwin.
Pittsb. Al. & McK. Rks.	2	16x24	100,000	0-4-0	H. K. Porter.
	3	18x24	135,000	0-6-0	H. K. Porter.
Porter Bros.	2	17x24	100,000	0-6-0	Baldwin.
Portl. Gray & Lewiston.	1		70,000	Electric	Westinghouse.
Public Belt	2	19x24	120,000	0-6-0	Baldwin.
Quanah Acme & P.	1	19x26	122,000	0-6-0	Baldwin.
Quebec Central	2	20x26	141,000	2-6-0	Canadian Loco.
Queen & Crescent	5	22x28	218,000	4-6-2	Baldwin.
	†5	24x28	224,300	4-6-2	American.
	10	22x30	204,350	2-8-0	Baldwin.
	†25	27x30	269,000	2-8-2	Baldwin.
Raleigh & S. W.	1	20x24	144,000	2-8-0	Baldwin.
Richm., Fredericksb. & P.	2	20x26	145,075	0-6-0	Baldwin.
	4	22x28	235,000	4-6-2	American.
Ried-Newfoundland	8				Comp. shops.
Roaring Fork	1	21x26	150,000	2-8-0	Baldwin.
Rockingham	1	19x26	149,900	4-6-0	Baldwin.
Rutland	2	22x30	213,000	2-8-0	American.
St. Louis & San Fran.	†12	20½x26	154,000	0-6-0	Baldwin.
	20	26x28	258,000	4-6-2	American.
St. L. Natl. Stock Yards.	2	19x24	121,000	0-6-0	American.
Salt Lake & Ogden	1		60,000	Electric	McGuire-Cummings.
San Antonio & Ar. P.	3	19x26	150,000	2-6-0	Baldwin.
	1	19x26	150,000	2-6-0	Lima Loco.
San Diego & Ar.	1	20x24	137,000	2-8-0	Baldwin.
San Diego El P. & St. L.	2	17x24	108,000	4-6-0	Central Loco.
San Ped. Los A. & S. L.	6	25x28	265,400	4-6-2	American.
San Rafael & Atl.	1	17x20	99,000	4-6-0	American.
Seaboard Air Line	9	23x40	212,000	2-8-0	Baldwin.
	†1	25x30	214,700	2-8-0	Baldwin.
	5	12x28	144,280	0-6-0	Baldwin.
	9	22x28	212,000	4-6-2	American.
	†1	23x28	214,700	4-6-2	American.
Sewell Vy.	1	18x24	207,000	2-6-0	Lima Loco.
Schoenhofen Br. Co.	1	16x24	98,000	0-4-0	Davenport Loc.
Shelby County	1	16x24	85,000	4-4-0	Davenport
Sioux City Terminal	1	19x24	114,000	4-6-0	American.
Solvay Process	1	19x24	122,000	0-6-0	American.
So. Dakota Cent.	3	19x24	94,000	2-6-0	American.
South. Georgia	1	18x26	128,450	4-6-0	Baldwin.
Southern	†33	27x30	269,000	2-8-2	Baldwin.
	13	22x28	224,000	4-6-2	American.
	†2	24x28	224,000	4-6-2	American.
	15	20x26	145,000	0-6-0	Lima Loco.
So. Manchester	1	17x24	150,300	2-2-4	Baldwin.
Southern Pacific	3	20x26	146,000	4-4-0	Baldwin.
	6	19x26	143,000	0-6-0	Baldwin.
Spokane & Inl. Emp.	1		100,000	Electric	West. & Bald.
Spokane, Port. & Seattle.	†2	22x26	160,000	4-6-0	Baldwin.
Steel Corp. of Canada	1	17x24	88,000	0-4-0	American.
Sydney & Louisb.	1	19x26	129,000	2-6-0	Montreal Loco.
	1	21x26	178,000	2-8-0	Montreal.
Temiskaming & N. Ont.	†4	23x40	206,000	2-8-0	Canadian Loco.
Tenn. Coal, Iron & R.R.	3		36,000	Electric	General Elec.
Texas & N. Orleans	2	19x26	143,000	0-6-0	Baldwin.
Texas City Tr. Co.	1	17x24	94,000	2-6-0	American.
	2	17x24	100,000	2-8-0	Baldwin.
Texas So. East.	3	18x26	134,000	4-6-0	Baldwin.
Thorton & Alex.	1	16x24	100,000	2-8-0	Baldwin.
Tompkins Cove Stove Co.	1	11x12	100,000	Shay	Lima Loco.
Toronto, Hamilt. & Buf.	†2	23x28	203,000	2-8-0	American.
Uintah Ry.	1	19x22	146,000	2-8-2	Baldwin.
Union Pacific	30	23¾x30	262,000	2-8-2	Baldwin.
	10	26x28	210,000	2-8-2	Baldwin.
	10	19x26	143,000	0-6-0	Baldwin.
Union Stock Yards	1	19x24	120,000	0-6-0	Baldwin.
United Fruit Co.	1	10x14			H. K. Porter.
Vandalia	4	24x26	256,000	4-6-2	American.
	4	23x24	169,050	0-6-0	Company shops.
	10	24x28	233,766	2-8-0	Company shops.
Vera Cruz	4		70,000	2-8-0	Baldwin.
Virgina & S. W.	†5	27x30	269,000	2-8-2	Baldwin.
	2	27x30	269,000	2-8-2	Baldwin.
Wabash	15	28x30	264,000	2-8-2	American.
	10	24x36	241,000	4-6-2	American.
Wabash, Chi & W.	1	18x26	170,000	2-6-0	Baldwin.
	1	17x24	100,000	4-4-0	Baldwin.
Western Maryland	30	24x30	237,100	2-8-0	American.
	5	22x28	188,800	4-6-2	Baldwin.
	*3	28&35x32	354,000	Mallet	Baldwin.
Wichita Falls	1	18x26	124,000	4-6-0	Baldwin.
	1	20x26	148,000	2-8-0	Baldwin.
Woodstock & Thornt. Gore Ry.	1	11x12	100,000	Shay	Lima Loco.
Wrightsv. & Tennille	1	18x26	128,800	4-6-0	Baldwin.

* Indicates compound.
† Indicates superheater.
‡ Indicates vestibuled.
§ Indicates feed-water heater.

CHANGES IN OWNERSHIP AND CONTROL.

If the Goulds have definitely lost control of the Wabash Railroad, and if such control is now in the hands of the bankers, who, it is supposed, have undertaken to finance the reorganization of the company, this change in control deserves to rank as the most important of any during the year. It can hardly be mentioned, however, as anything more than a possibility; it remains to be seen in the plans of reorganization how large a voice the Goulds still have in the management of the property.

The merger of the various lines going to make up the New York Central system is, of course, not a change in ownership or control, except insofar as the New York Central buys from former owners stocks of companies such as the New York & Harlem, which roads it has heretofore leased but the stock of which it has not owned. The acquisition, however, of a half interest in the operation of the Boston & Albany by the New York, New Haven & Hartford, and the assumption by the New Haven of half of the B. & A. deficit, all of which has been borne heretofore by the New York Central & Hudson River, is an important change in control of the road. The Boston & Albany had been operated by the New York Central & Hudson River. It now has a separate management, operating it from Boston in the interests of both the New Haven and the New York Central.

The New Haven also bought from the New York Central & Hudson River the majority stock of the Rutland Railroad. The Rutland had, a number of years ago, been sold to the New York Central & Hudson River by a member of the Vanderbilt family, and has been operated at a loss. The New York Central has also had trouble in the courts with the minority holders of the preferred stock, dividends on which are cumulative. The New Haven wanted the Rutland for an entrance into Montreal and for a weapon in its fight against the Grand Trunk's invasion of New England. The New York, New Haven & Hartford sold to the New York Central & Hudson River its controlling stock of the New York, Ontario & Western. Thus in 1911 there were very important shifts in the relations of the New England roads.

The formation during the year of the International & Great Northern Holding Company, with Frank Gould as president, to hold the securities of the International & Great Northern, presumably does not mean any change in control of this property.

The merging of the Minneapolis & St. Louis and the Iowa Central is not exactly a change in either ownership or control, the Hawley interests having owned both roads previously, but it does show a bringing together of the interests associated with Newman Erb and the Hawley interests, and these interests presumably have some plans for a further extension and possibly for taking over other roads.

The two important controlled companies of the St. Louis & San Francisco—the Evansville & Terre Haute and the Chicago & Eastern Illinois—were merged during the year, but the relation of the new company to the St. Louis & San Francisco remains the same as that of the Chicago & Eastern Illinois.

The Cincinnati, Hamilton & Dayton, which had before the beginning of the present calendar year been taken by the Baltimore & Ohio, sold its 110,000 shares of common stock (a controlling interest) of the Pere Marquette to J. P. Morgan & Company, and there have been frequent rumors of a resale by the bankers, but nothing definite has been announced as yet.

Another important development which is taking place and which has been effected by changes in ownership and control this year is the expansion of the Norfolk Southern. This company during the past year has bought the Raleigh & Southport, running from Raleigh, N. C., to Fayetteville, 64 miles; the Durham & Charlotte, running from Troy to Colon, 50 miles, and the Aberdeen & Ashboro, running from Aberdeen to Ash-[illegible] 7 miles.

The principal changes that have taken place and which are given in the following list are not all actual changes of control, some of them are simply changes of names of railways.

The Georgia & Florida bought the Savannah, Augusta & Northern and the Savannah & Statesboro.

The name of the Algoma Central & Hudson Bay was changed to the Algoma Eastern.

The Asheville & East Tennessee was bought by John H. Carter.

The line from Needles, Cal., to Majave, which has been heretofore owned by the Southern Pacific but leased to the Atchison, Topeka & Santa Fe, was bought by the Santa Fe. This line forms part of the Santa Fe's main transcontinental line.

The Oregon & Eureka, which was formerly owned by the Hammond Lumber Company, was taken over by the Atchison, Topeka & Santa Fe. The road runs from Eureka, Cal., to Trinidad, 39 miles.

The Baltimore & Ohio bought the Big Level & Kinzua, which is less than a mile long.

The Boston & Maine bought from the Sortwell Estate the Montpelier & Wells River, the Barre Bridge Railroad and the Barre Railroad. The B. & M. also bought outright the Worcester, Nashua & Rochester, which it had leased since 1886.

The Maine Central bought the Somerset & Washington County and the Sebasticook & Moose Head.

The name of the Union Springs & Northern was changed to the Birmingham & Southeastern.

The Bruce Mines & Algoma, a 17-mile road, was bought by G. P. McCallum and H. Appleton, both of Sault Ste. Marie, Mich. The Canadian Pacific leased the Quebec Central, guaranteeing interest on the income bonds and debenture stock. The Quebec Central runs from Levis, opposite Quebec, to Sherbrooke, 143 miles. The Canadian Pacific bought the Saint Maurice Valley, 84 miles, and the New Brunswick & Southern, 7 miles.

It was said that the Central Railway of Canada bought the Carrollton & Greenville.

The Chicago Great Western took over the property and franchises of the De Kalb & Great Western, a subsidiary.

The Chicago, Milwaukee & St. Paul and the Chicago & North Western bought from the Lake Shore & Michigan Southern and the Michigan Central $2,450,000 stock of the Indiana Harbor Belt. The St. Paul also bought the controlling stock of the Duluth, St. Cloud, Glencove & Mankato, which runs from Albert Lea, Minn., to St. Clair, 39 miles.

The Chicago, Rock Island & Pacific bought the 24 miles of track of the Little Rock, Hot Springs & Western from Little Rock, Ark., to Benton. This track had heretofore been leased by the Rock Island. The Rock Island also bought the St. Paul & Des Moines, and changed the name to the St. Paul & Kansas City Short Line. The Rock Island also, it is said, bought the Dardanelle, Ola & Southern, and changed its name to the Rock Island & Dardanelle.

The Cincinnati, Georgetown & Portsmouth and the High River & Columbus have been consolidated, making a total of 72 miles.

The Cleveland, Akron & Cincinnati was the new name of a company which took over the Cleveland, Akron & Columbus and the Cincinnati & Muskegon Valley. Both of these roads were Pennsylvania subsidiaries operated independently.

The Midland Terminal, a subsidiary of the Colorado Short Line, has leased the Cripple Creek Short Line.

The Corvallis & Alsea River was merged with the Portland, Eugene & Eastern.

The Delaware, Lackawanna & Western leased the Syracuse, Birmingham & New York, the majority of whose stock is owned by the D. L. & W., but which had been operated independently heretofore.

The Illinois Central, which had previously controlled the Indianapolis Southern, bought this property at a receivership's sale.

The Canadian government bought 13 railways as branch lines of the Intercolonial. These railways are the Valery property of the Arcadian Coal Company, the Quebec Oriental Railway, the Hampton & St. Martin's, the Albert Railway, the Moncton & Buchtouche, the Carequet & Gulf Shore Railway, the York &

Carleton, the International, the Temiscouata, the New Brunswick & Prince Edward Island, the Elgin & Havelock, and the Kent Northern.

The Kansas City & Memphis took over the operation of the Arkansas, Oklahoma & Western and the Monte Ne.

The Louisville & Nashville bought the Athens & Tellico, 24 miles.

The Sandy River & Rangeley Lakes, a subsidiary of the Maine Central, bought the narrow gage Eustis Railroad, 16 miles.

The Maxton, Alma & Southbound took over in May the operation of the Alma Railroad.

The Missouri, Kansas & Texas bought the Wichita Falls & Northwestern and the Wichita Falls & Southern. The M. K. & T. also bought control of the Denison, Bonham & New Orleans.

The Missouri Pacific, which had been operating the Booneville, St. Louis & Southern under a 99-year lease, bought the property. The Munising Marquette & Southeastern took over the operation of the Marquette & Southeastern and the Munising Railway. Heretofore the two roads were operated jointly but had separate corporate existences.

The New York, New Haven & Hartford, through its subsidiary the Rhode Island Company, bought the Narragansett Pier Railroad.

The Oregon Short Line took over the Yellowstone Railroad, 70 miles; the St. Anthony Railway, 53 miles; the Salmon River Railroad, 86 miles; the Wyoming Western, 23 miles; the Minidoka & Southwestern, 74 miles; the Boise City Railway & Terminal, 8 miles.

The Pennsylvania Railroad bought the Ridgeway & Clearfield Railway. The Pennsylvania also bought during the year nearly all of the minority stock of the Cleveland, Akron & Columbus. The Pennsylvania also made arrangements during the year for the renewal of the lease of the Northern Central.

The New York Central & Hudson River bought the Pittsburgh, Binghamton & Eastern under foreclosure sale.

The Portland Terminal Company was formed to take over all of the terminal facilities at Portland, Me., of the Boston & Maine, the Maine Central and the Portland Union Railway Station Company.

The St. Louis & San Francisco made arrangements with the Quanah, Acme & Pacific for closer operating relations, but did not take over the actual operation of the property. The St. L. & S. F. also made arrangements with the New Orleans, Mobile & Chicago, by which the Frisco has much closer traffic relations and probably a controlling voice in the management. The Frisco bought outright the Pascagoula Northern, 42 miles. The Frisco leased the Louisiana Southern, running from New Orleans south to Belair, 30 miles.

The St. Louis, Iron Mountain & Southern bought, from the independent company which built it, the Cairo & Thebes, 25 miles.

The Sierra & Mohawk has taken over the Sierra Valleys Railway.

The Spokane, Portland & Seattle took over the operation of the Astoria & Columbia River.

The Tennessee, Alabama & Georgia took over the Chattanooga & Atlanta, the Chattanooga Southern and the Gadsden & Birmingham.

RAILWAY SECURITIES ISSUED IN 1911 AND DIVIDEND CHANGES DURING THE YEAR.

Two things are at once noticeable about the table that we publish herewith showing the railways which have issued and sold, or made arrangements for the sale of, new securities in the calendar year 1911. In the first place, the table is very much longer than the corresponding one for 1910; in the second place, a very large proportion of the securities issued were presumably to pay for additions and betterments, since they were not for refunding purposes.

The fact that the list is a long one shows that smaller or weaker roads were better able last year to sell their securities

Name of company.	Kind of security issued.	Amount sold.	Amount of refunding covered.	Month in which sold.
Algoma Eastern	5 per cent. 1st mtge. bonds, 1911-1961	$2,568,000	.....	August
Ann Arbor Co.	Stock	7,250,000	[1]	January
Ann Arbor Railroad	First lien 5 per cent. equipment notes, Series B	600,000	None	January
Ann Arbor Railroad	2-year 5 per cent. notes	600,000	None	April
Arizona & New Mexico	Stock	800,000	None	February
Atchison, Topeka & Santa Fe	Preferred stock	[2] 10,800,000	None	November
Atlanta, Birmingham & Southern	Receiver's 1-year certificates	[3] 3,250,000	$3,250,000	June
Atlantic, Waycross & Northern	Bonds	4,800,000	.....	.....
Atlantic Coast Line	Series B 4½ per cent. equipment trust bonds	2,500,000	None	December
Atlantic Coast Line	Unified 4 per cent. bonds, 1909-1959	3,000,000	None	May
Baltimore & Ohio	Secured 4½ per cent. notes of 1910-1913	10,000,000	None	February
Belt Railroad & Stock Yards (Indianapolis)	1st refunding mtge. 4 per cent. bonds of 1909-1939	[4] 1,000,000	$1,000,000	April
Birmingham & Southeastern	1st mtge. 6 per cent. bonds, 1911-1961	3,000,000	.....	June
Boonville, St. L. & So.	1st mtge. 5 per cent. bonds, 1911-1951	500,000	$400,000	July
Boston & Maine	1-year 4 per cent. notes	5,000,000	[5]	June
Boston R. R. Holding Co.	4 per cent. preferred stock	7,042,400	$6,334,500 [6]	February
Boston Terminal Co.	3½ per cent. bonds of 1897-1947	500,000	None	October
Buffalo & Susquehanna	5 per cent. receiver's certificates, 1911-1912	500,000	$511,000	July
Buffalo Creek	1st refunding mtge. 5 per cent. bonds of 1911-1961	2,021,000	1,000,000	March
Canadian Northern	3½ per cent. 50-year guaranteed debenture bonds	35,000,000	None	December
Canadian Northern	Guaranteed 1st mtge. debenture stock—3½ per cent.	1,794,440	.....	March
Canadian Northern (Canadian Northern Alberta)	1st mtge. debenture stock—3½ per cent.	3,236,300	.....	March
Canadian Northern	Equipment mtge. 4½ per cent. bonds, Series A 1	3,500,000	None	April
Canadian Pacific	Consolidated 4 per cent. debenture stock	6,161,000	None	June
Canadian Pacific	Common stock	[7] 18,000,000	None	December
Cent. New England	50-year 5 per cent. mtge. bonds	12,317,000	$12,200,000	January
Chesapeake & Ohio	Secured 4½ per cent. notes	16,000,000	None	April
Chicago & E. Illinois	4 per cent. refund. and imp. mtge. bonds, 1905-1955	864,000	.....	September
Chicago & E. Illinois	Preferred stock	5,000,000	.....	July
Chicago & North Weste	General mtge. 4 per cent. bonds	7,500,000	None	May
Chicago & Western Indi	General lien 4 per cent. bonds	1,800,000	None	December
Chicago, Burlington & Qu	General mtge. 4 per cent. bonds	8,000,000	.....	February
Chi. Hts. Term. Transfer	Mtge. 6 per cent. bonds of 1911-1913	1,000,000	None	February
Chicago, Indianapolis & L uisville	Refund. mtge. 4 per cent. bonds, 1897-1947, Series C.	2,300,000	$2,300,000	April
Chi., Mil. & St. Paul (Chi., Mil. & Puget Sound)	1st mtge. guar. 4 per cent. bonds, 1909-1949	25,000,000	.....	.....
Chicago, Milwaukee & Puget Sound	1st mtge. 4 per cent. bonds of 1909-1949	[8] 5,000,000	None	May
Chicago, Rock Island & Pacific	1st and refunding 4 per cent. bonds of 1904-1934	1,494,000	$1,494,000	April
Chicago, Rock Island & Pacific	St. Paul & Kansas City Short Line 1st mtge 4½ per cent. bonds of 1911-1941	£1,000,000 (sold $5,000,000)	[9]	March
Chicago, Rock Island & Pacific	Rock Island Improvement Co. 4½ per cent. Series B guaranteed equipment trust certificates	$2,240,000	None	October
Chicago, Rock Island & Pacific	Rock Island Improvement Co. 4½ per cent. guaranteed equipment trust certificate s	1,575,000	None	October
Chicago, St. Paul, Minneapolis & Omaha	Superior Short Line 1st mtge. 5 per cent., 1895-1930	1,500,000	None	April
Cincinnati, New Orleans & Texas Pacific	10-year equip. trust 4½ per cent. certificates, Series C.	1,000,000	None	April
Cincinnati, New Orleans & Texas Pacific	City of Cincinnati 3½ per cent. bonds	500,000	None	May
Cleveland & Pittsburgh	Stock	[10] 18,000,000	None	June
Cleveland & Pittsburgh	Stock	1,073,950	[11]	December
Cleveland, Cincinnati, Chicago & St. Louis	20-year 4½ per cent. debentures	10,000,000	$5,000,000	June
Cleveland Short Line	Stock	3,625,000	None	April

Name of company.	Kind of security issued.	Amount sold.	Amount of refunding covered.	Month in which sold.
Colorado & Southern	Refunding and extension 4½ per cent. bonds	$1,400,000	None	January
Concord & Montreal	Stock	400,000	[12]	October
Delaware & Hudson	1st and refund mtge. 4 per cent. bonds of 1908-1943	7,000,000	None	Jan. and Feb.
Delaware, Lackawanna & Western	Oswego & Syracuse bonds	438,000	$438,000	November
Detroit, Toledo & Ironton	Receiver's certificates	250,000	None	Feb. and Mar.
Detroit, Toledo & Ironton	Receiver's certificates	780,780	None	June
Erie	Equipment trust 4½ per cent. notes, 1911	4,600,000	None	July
Erie	Collateral 6 per cent. notes, 1911-1914	4,556,000	None	October
Fitchburg R. R.	4½ per cent. bonds	1,200,000	[15] $100,000	December
Fort Dodge, Des Moines & Southern	Receiver's certificates	720,000	$500,000	May
Grand Trunk	Guaranteed mtge. bonds	30,000,000	None	April
Grand Trunk Pacific	4 per cent. debenture bonds	3,000,000	.....	September
Great Northern	1st and refund. mtge. 4¼ per cent. bonds of 1911-1966	35,000,000	None	June
Gulf & Ship Island	Gen. and refund. mtge. 6 per cent. bonds of 1911-1917	500,000	$500,000	February
Gulf, Florida & Alabama	1st mtge. 5 per cent. bonds, 1911-1961	1,000,000	.....	July
Gulf, Texas & Western	Stock	250,000	.....	July
Gulf, Texas & Western	1st mtge. 5 per cent. bonds	522,000	None	April
Hocking Valley	2-year 4½ per cent. notes	4,000,000	$3,250,000	October
Houston Belt & Terminal	1st mtge. 5 per cent. bonds, 1907-1937	2,106,000	None	September
Illinois Central	Refunding mtge. 4 per cent. bonds of 1908-1955	780,780	None	June
Illinois Central	Refunding 4 per cent. bonds	4,600,000	None	July
Kansas City & Memphis	New 5 per cent. mtge. bonds of 1911 1961	540,000	None	April
Kansas City, Ft. Scott & Memphis	Refunding mtge. 4 per cent. bonds	2,688,000	$2,055,300	July
Kansas City, Mexico & Orient*	.....	.....	.....	.....
Kansas City Southern	Refunding and improve. mtge. 5 per cent. bonds of 1909-1950	5,000,000	None	February
Kentucky & Indiana Terminal	1st mtge. 4½ per cent. bonds	£1,231,000 ($5,990,785)	$2,069,000	January
Lake Erie & Pittsburgh	Stock	5,900,000	None	April
Lake Erie & Pittsburgh	1st. mtge. bonds, 4½ per cent., 1911 1961	7,500,000	.....	.....
Lake Shore & Michigan Southern	Mtge. 4 per cent. bonds of 1906-1931	15,000,000	.....	January
Lake Superior & Ishpeming (Cleveland Cliffs Iron Co.)	Notes, 1911-1912	12,000,000	$8,800,000	March
Lehigh & Hudson River	1st mtge. 6 per cent. bonds, 1911	994,000	.....	.....
Long Island	General mtge. 5 per cent. bonds	945,000	$945,000	June
Long Island	[16] Refunding mtge. 4 per cent. bonds of 1903-1949	600,000	600,000	April
Louisiana & Northeastern	10-year 4 per cent. bonds	4,000,000	[17]	October
Louisiana Southern	Collateral trust notes	1,860,000	None	November
Louisville & Nashville	1st mtge. refunding 4½ per cent. bonds	1,000,000	None	June
Maine Central	Atlanta, Knoxville & Cin. Division 4 per cent. bonds.	10,000,000	None	April
Maine Central	4½ per cent. notes, April 1, 1911-1912	5,000,000	.....	April
Marshall & E. Texas	Consolidated refunding mtge. 4 per cent. bonds of 1911-1961	12,000,000 }		
Marshall & E. Texas	Stock	5,000,000 }	$15,484,000	.....
Memphis Union & Station	1st mtge. 5 per cent. bonds, 1911 1931	1,154,000	$1,154,000	.....
Michigan Central	2-year [18] guaranteed 5 per cent. notes	2,100,000	$1,500,000	October
Minneapolis, St. Paul & Sault Ste. Marie	Detroit River Tunnel 4½ per cent. bonds of 1911-1961	16,000,000	None	June
Minneapolis, St. Paul & Sault Ste. Marie	Equipment trust certificates	1,190,000	None	March
Minneapolis, St. Paul & Sault Ste. Marie	Chicago Terminal 4 per cent. bonds of 1911-1941	6,000,000	None	November
Minneapolis, St. Paul & Sault Ste. Marie	Preferred stock	2,189,400	None	October
Minneapolis, St. Paul & Sault Ste. Marie	Common stock	4,374,800	None	October
Mississippi River & Bonne Terre	1st mtge. sinking fund 5 per cent. bonds of 1911-1931.	2,500,000	None	October
Missouri, Kansas & Texas	5 per cent. 2 year notes	12,500,000	$10,000,000	March
Missouri, Kansas & Texas	Consolidated mtge. 5 per cent. bonds of 1910-1940	100,000,000 francs ($20,000,000)	None	June
Missouri Pacific	Equipment trust notes	5,300,000	None	November
Missouri Pacific	3-year collateral notes	20,000,000	$5,000,000	May
National Railways of Mexico	2-year 4½ per cent. notes	10,000,000	3,708,548	May
National Railways of Mexico	Loan	13,000,000	5,000,000	November
New Orleans, Ft. Jackson & Grand Isle	Bonds	5,000,000	.....	.....
New Orleans, Mobile & Chicago	1st and refunding mtge. 5 per cent. bonds	12,046,500	.....	November
New Orleans Terminal Co.	1st mtge. 4 per cent. bonds of 1903-1953	4,000,000	None	March
New York Central & Hudson River	Secured 4½ per cent. notes of 1911-1914	30,000,000	None	February
New York, New Haven & Hartford	B. R. Holding Co. pref. stock 4 per cent.	5,003,000	[21]	January
New York, New Haven & Hartford	N. Y., Westchester & Boston 1st mtge, 4½ per cent. bonds, July 1, 1911-1946	17,200,000	.....	July
New York, New Haven & Hartford	1-year 4½ per cent. notes	2,000,000	.....	January
New York, New Haven & Hartford	1-year 4½ per cent. notes	10,000,000	.....	January
New York, Ontario & Western	General mtge. 4 per cent. bonds	2,702,000	None	February
New York, Susquehanna & Western	Car Trust 4½ per cent. certificates	800,000	None	July
Norfolk & Western Ry.	1st and refunding mtge. 4 per cent. bonds of 1911 1961.	5,837,000	.....	May
Northern Pacific Ry.	1st mtge. 4 per cent. bonds of 1911-1961	1,000,000	None	March
Oregon Short Line R. R.	Stock	800,000	[22]	March
Oregon Short Line R. R. Co.	1st and refunding mtge. 4 per cent. bonds of 1911 1961.	6,500,000	[23]	November
Oregon Short Line R. R. Co.	1st and refunding mtge. 4 per cent. bonds of 1911 1961.	[20] 25,000,000	None	June
Oregon Short Line R. R. Co.	1st and general mtge. 4 per cent. bonds of 1910-1960.	24,000,000	None	May
Pennsylvania R. R.	Phila., Balt. & Wash. 4 per cent. bonds due 1943.	4,500,000	.....	.....
Pennsylvania R. R.	Stock	11,761,900	$15,237,500	April
Pennsylvania R. R.	Collateral trust 6 per cent. notes of 1911-1916.	8,000,000		February
Pere Marquette R. R.	Equipment trust notes	870,000	None	June
Pere Marquette R. R.	1st and ref. mtge. 4 per cent. bonds, Dec. 1, 1911 1941	3,250,000		July
Pere Marquette R. R.	1st mtge. 5 per cent. sinking fund bonds			January
Pere Marquette R. R.	Stock	25,000,000		February
Pere Marquette R. R.	Stock	4,200,000	None	March
Pere Marquette R. R.	Collateral notes	3,328,300		
Pittsburg & Lake Erie R. R. Co.	Equip. trust 4½ per cent. notes, 1911-1921	875,000	.....	February
Pittsburg Coal Co.	General mtge. 5 per cent. bonds, 1911	18,811,000	$18,811,000	March
Pittsburgh, Cincinnati, Chicago & St. Louis	General mtge. 4 per cent. bonds	7,000,000	$5,443,000	April
Pittsburgh, Cincinnati, Chicago & St. Louis	New Orleans, Texas & Mexico Division 1st mtge. 6 per cent. bonds	5,000,000	None	April
Pittsburgh, Cincinnati, Chicago & St. Louis	New Orleans, Texas & Mexico Division 1st mtge. 6 per cent. bonds	5,000,000	None	April
Pittsburgh, Cincinnati, Chicago & St. Louis	Pittsburgh, Cincinnati, Chicago & St. Louis 4 per cent. bonds	2,500,000	None	May
Pittsburgh, Cincinnati, Chicago & St. Louis	Pittsburgh, Cincinnati, Chicago & St. Louis 4 per cent. bonds	3,000,000	.....	.....
Pittsburgh, Cincinnati, Chicago & St. Louis	Pittsburgh, Cincinnati, Chicago & St. Louis 4 per cent. bonds	2,000,000	$2,055,300	March
Pittsburgh, Cincinnati, Chicago & St. Louis	General mtge. 4 per cent. bonds	2,553,000	None	December
Pittsburgh, Cincinnati, Chicago & St. Louis	Pittsburgh, Cincinnati, Chicago & St. Louis 4 per cent. bonds	500,000	None	March
Pittsburgh, Cincinnati, Chicago & St. Louis	Pittsburgh, Cincinnati, Chicago & St. Louis 4 per cent. bonds	1,620,000	None	January
Pittsburgh, Cincinnati, Chicago & St. Louis	Pittsburgh, Cincinnati, Chicago & St. Louis 4 per cent. bonds	12,000,000	[24]	April
Pittsburgh, Cincinnati, Chicago & St. Louis	Pittsburgh, Cincinnati, Chicago & St. Louis 4 per cent. bonds	1,000,000	None	April
Pittsburgh, Cincinnati, Chicago & St. Louis	Pittsburgh, Cincinnati, Chicago & St. Louis 4 per cent. bonds	6,000,000	[25]	November
Pittsburgh, Cincinnati, Chicago & St. Louis	Pittsburgh, Cincinnati, Chicago & St. Louis 4 per cent. bonds	1,000,000		August
Pittsburgh, Cincinnati, Chicago & St. Louis	Pittsburgh, Cincinnati, Chicago & St. Louis 4 per cent. bonds, 1941	1,500,000	1,580,000	March
Pittsburgh, Cincinnati, Chicago & St. Louis	Pittsburgh, Cincinnati, Chicago & St. Louis 4 per cent. bonds	12,000,000 ($50,000,000)	.....	February
Pittsburgh, Shawmut & Northern	5 per cent. guaranteed bonds	2,000,000	None	April

Name of company.	Kind of security issued.	Amount sold.	Amount of refunding covered.	Month in which sold.
Temiskaming & No. Ontario	Loan by the Province of Ontario	$1,512,324	.....	March
Valdosta, Moultrie & Western	1st mtge. bonds	630,000	300,000	July
Wabash	5 per cent. equipment notes	1,000,000	.....	September
Wabash-Pittsburgh Terminal	Receiver's certificates	1,000,000	None	February
Wabash-Pittsburgh Terminal	Receiver's certificates	433,771	$433,771	April
Western Maryland	1st mtge. 4 per cent. bonds	4,114,000	3,900,000	July and Aug.
Wheeling & Lake Erie	5 per cent. notes	8,000,000	8,000,000 [30]	February
Wichita Union Terminal	50 year 4½ per cent. gold bonds	2,500,000	.....	September
Winston Salem Southbound	1st mtge. 4 per cent. bonds of 1910-1960 [31]	5,000,000	None	February

Note.—Issues of less than $500,000 have been disregarded except in certain cases of receivers' certificates where apparently there was small lots sold at different times total more than $500,000.

[1] The company was organized to own $3,100,000 common stock and $2,190,000 preferred stock of the Ann Arbor Railroad, which was sold under foreclosure of the $5,500,000 5 per cent. notes of the D., T. & I.

[2] This stock has been deposited with the reorganization committee since 1896.

[3] Clark, Dodge & Co. and White, Weld & Co., both of New York, offered to pay this amount of certificates in cash or extend them for one year.

[4] $500,000 was paid to stockholders as a stock dividend and the other $500,000 was sold to provide for improvements.

[5] These notes were sold to pay in part for the Worcester, Nashua & Rochester, mentioned in the article on Changes in Ownership and Control.

[6] This is Boston & Maine common stock which was paid for with the proceeds of the Railroad holding company's preferred stock.

[7] Offered to stockholders at 150.

[8] Issued, it is understood, to the St. Paul for advances for construction of branch lines, etc.

[9] Part of the proceeds of this sale were used to pay for all of the stock and bonds outstanding of the St. Paul & Des Moines.

[10] Sold to stockholders. The Pennsylvania Company owns the majority of the stock of the Cleveland & Pittsburgh.

[11] Sold to reimburse the Pennsylvania for additions and betterments made under the lease.

[12] Proceeds used to reimburse the Boston & Maine for expenditures under the 99-year lease.

[13] The additional proceeds were used to reimburse the Boston & Maine for additions and betterments.

[16] Guaranteed principal and interest by the Pennsylvania Railroad.

[17] Issued to the Pennsylvania Railroad to pay for advances for improvements.

[18] Guaranteed by the Louisville & Nashville, the Nashville, Chattanooga & St. Louis, the St. Louis, Iron Mountain & Southern, the Southern Railway, and the St. Louis Southwestern.

[19] About half of these notes were issued in the name of the St. Louis, Iron Mountain & Southern, and the other half in the name of the Missouri Pacific.

[20] Guaranteed principal and interest jointly and severally by the St. Raleigh & Southport and the Aberdeen & Ashboro.

[21] The sale of this stock by the New Haven was to provide cash to pay for $5,500,000 Boston & Maine new common stock, authorized.

[24] The proceeds of the sale are to reimburse the N. Y. N. H. & H. for additions and betterments made under the lease.

[25] These bonds were, it is understood, sold to the Union Pacific and then resold to bankers.

[26] There are $15,000,000 additional of these bonds in the Union Pacific's treasury.

[27] This stock was issued to the Reading Company to reimburse it for the payment of $2,545,000 prior mortgage 4 per cent. bonds due and paid in July and for $18,811,000 consolidated mortgage bonds due June 1, 1911.

[28] Issued in connection with the reorganization of the property and taken by a banking syndicate.

[29] The bonds were held by the Seaboard Company of Connecticut and it is understood that the proceeds of their sale will be used to retire $6,360,600 first preferred stock.

[30] These are notes which were extended previously and on February 1 were extended pending the further settlement of Wabash and Wabash-Pittsburgh Terminal affairs. The notes were due in 1908.

[31] Guaranteed jointly and severally by the Norfolk & Western and the Atlantic Coast Line.

*The financing of the K. C. M. & O. has been done this year by a syndicate and the amount of securities placed has not been made public.

than they were the year before, partly, probably, because the stronger or larger companies had their needs more fully taken care of in 1910, so that the competition for money was not so keen.

It must be carefully borne in mind that the table showing the list of securities issued is made up from records that have been made public during the year, and it is quite possible that certain companies have made private arrangements for loans or for placing securities which have not been made public and which, therefore, are not shown in our table. The table is not totaled because this would be quite misleading. Even if the column showing the amount of refunding covered were totaled and the sum subtracted from the "amount sold" column, the difference would not represent the additional railway capital secured this year, because, for instance, there may be a considerable part of these new securities which are in the nature of collateral trust bonds and which are issued against other railway securities.

The Southern Pacific, the Missouri, Kansas & Texas and the Chicago, Rock Island & Pacific sold whole issues of securities abroad—the Southern Pacific and the Missouri, Kansas & Texas in France, and the Rock Island in England. Of course, parts of many of the other issues of securities were marketed abroad, but, in the three cases mentioned, arrangements were made with foreign bankers by the railway companies and the securities were issued with a face value in French or English currency.

In cases where railway companies have been through the hands of receivers and have been reorganized, the new securities issued in exchange for old securities and to raise new capital are not shown in the accompanying table. Their bonds and stocks are shown in the lists of receiverships and foreclosure sales in the article on that subject elsewhere in this issue.

The changes in dividends shown in the small table are about what might have been expected, with the possible exception of the New York Central's reduction of its annual rate from 6 per cent. to 5 per cent. Roads like the Baltimore & Ohio have continued their regular dividend rate despite difficulties which, on the surface, appear comparable at least to the difficulties of the New York Central. The New York Central's relations, however, with its bankers are such that it can to an unusual extent

DIVIDEND CHANGES IN 1911.

Name of Company.	*Declared in 1911. Per Cent.	Present Annual Rate. Per Cent.	Month.	Rate in 1910. Per Cent.
Albany Southern	3	3	November	6
Atlantic Coast Line, common	6½	7	January	0
Atlantic Coast Line of Conn.	10½	12	December	10
Boston & Maine, common	4½	4	May	6
Buffalo, Rochester & Pittsburgh, common	5	5	February	4
Canadian Pacific	9½	10	January	8
Central of Georgia, [1] incomes	..	..	.....	..
Chicago & Alton, preferred	0	0	June	4
Chicago & Alton, prior liens	2	0	June	6
Chicago, Mil. & Puget Sound	5[2]	..	March	[2]
Chicago, Terre Haute & South Eastern, income bonds	2	4	September	..
Cincinnati, New Orleans & Pacific	8[3]	6	November	5
Cleveland, Cincinnati, Chicago & St. Louis, common	0	..	March	4
Delaware, Lackawanna & Western, common	55[4]	20	November	20
Denver & Rio Grande, preferred	0	0	June	4
Florida East Coast, income bonds	4	4	September	3½
Georgia R. R. & Banking	12	12	March	11
Grand Trunk, 3d preference stock	½[5]	..	February	..
Hocking Valley	5	6	November	4
Interborough Rapid Transit	11	11	September	9
Kanawha & Michigan	6½	..	June	0
[6] New York & Harlem	14	14	September	13
N. Y. C. & H. R. R.	5	5	March	6
Norfolk & Western, common	5¼	6	November	5
Norfolk Southern	[7]	[7]	May	..
Northern Securities Co.	3	3	December	4
Pittsburgh & Lake Erie	35	10	March	10[7]
St. Lawrence & Adirondack	4	4	December	0
Southern Railway, preferred stock	2	2	February	0
Vandalia	4	4	May	5
Wabash, Debenture Bs.	3	2	June	4

*This is the amount *declared* in 1911 regarless of when *paid*.

[1] The courts found in favor of the income bondholders who had been protesting against the non-payment of dividends on the third preferred and partial payments on the second preferred, and eventually in December the Illinois Central bought the minority outstanding income bonds held by the protective committees of the three series paying back dividends on these bonds.

[2] Beside an increase in the annual rate, there was an extra dividend of 2½ per cent. declared in November.

[3] [illegible] extra stock dividend was paid in the stock of the Lackawanna Railroad.

[4] Declared [illegible] paid from 1910 earnings.

[5] A special [illegible] the stock is paid by the N. Y. C. & H. R. [illegible] proceeds received from the [illegible]

[6] There was [illegible] extra dividend, as will be seen the [illegible]

[7] All of [illegible] owned by the New York Central & Hudson River.

rely on its bankers to take care of its credit. It is possible, therefore, to readjust the dividend rate to current net earnings, or rather current net corporate income, somewhat more closely than is the case with most other railway companies, where a reduction in the dividend rate might make it unprofitable to sell new securities for capital purposes. We may, therefore, fairly say that the New York Central's reduction of dividends was somewhat out of line with the showing made by the other roads.

For instance, it is not surprising to find an increase in the Buffalo, Rochester & Pittsburgh and the Norfolk & Western, and we would expect the Chicago & Alton and the Denver & Rio Grande to discontinue dividends. The reduction in the C. C. C. & St. L. is in line with the New York Central & Hudson River's reduction.

The resumption of a dividend on the preferred stock of the Southern Railway is an indication both of the prosperity of the South and of the results that are being shown from the expenditure of the sale of general development 4 per cent. bonds of 1909. The fact that the dividend rate has only been put on a 2 per cent. basis as yet shows a conservative attitude on the part of the directors, justified by the fact that the Southern Railway still has some discount on securities sold remaining over from the sale of development 4's in recent years to be charged off.

THE TREND OF RAILWAY EARNINGS.

BY FRANK HAIGH DIXON,

Professor of Economics, Dartmouth College; Chief Statistician, Bureau of Railway Economics.

In attempting to comply with the request of the *Railway Age Gazette* for a comparison of the trend of railway earnings and expenses in 1907, 1910 and 1911, the writer is hampered by lack of complete and comparable data. Monthly reports of the railways to the Interstate Commerce Commission were not inaugurated until July, 1907, so that no current data is available for the first half of that year. But to rely altogether for this presentation upon the summary of railway monthly reports as issued by the commission would give us data for only eight months of the present year, the report for September not yet having appeared. It has seemed best, therefore, to rely in the main upon the material separately compiled by the Bureau of Railway Economics, which covers the year 1910 and the first ten months of 1911. The bureau figures include only roads over 50 miles long, that is, about 90 per cent. of the total mileage, but they cover all figures that have any significance from the point of view of this discussion. In using the commission's figures for 1907, it is necessary to keep in mind that they are upon a different basis. Including all mileage, instead of only those roads over 50 miles long, the per mile figure is necessarily lower than it would be if, as in the bureau figures, the small roads were excluded, for the small roads bring down the average per mile in both revenues and expenses. The commission's per mile figures of both revenues and expenses run regularly from 4 to 5 per cent. lower than the figures of the bureau. Hence, an adjustment of the commission's per mile figures, which would raise them on an average 4½ per cent. above the amounts given in the table, would be necessary in order to make them comparable with the bureau figures.

It will be of interest, in the first place, to present (Table I) total and per mile figures of revenues and expenses for the fiscal years 1907 to 1911, inclusive, with the percentage of increase or decrease in the per mile figure for each year. It should be noted that the 1907 figures are not wholly comparable with those of the later years. They are taken from the annual statistical volume of the commission and cover a period just preceding the inauguration of the new accounting system. The figures of the succeeding years are drawn from the summaries of the monthly reports, except that the 1911 figures are a compilation of the unadjusted monthly totals.

The earnings of the year 1907, up to that time the greatest in our history, were exceeded in 1910, when the per mile figure of operating revenues reached $11,660, an increase of 11.4 per cent. over the previous year. The fiscal year 1911 shows a slight falling off from this figure, amounting to 0.21 per cent. The recovery after the panic of 1907 was more rapid in net earnings than in gross, due to rapid diminution in operating expenses, so that, whereas the year 1909 shows a decrease per mile in operating revenues as compared with 1908, net earnings show an increase of 10.12 per cent. Another increase in net earnings per mile followed in 1910, of nearly 11 per cent., but the year 1911 shows a decline of over 7 per cent. from the preceding year. The explanation is found in the operating expense column, where, in face of a decline in operating revenues, the expenses increased over 3 per cent. This situation will be made clearer in the succeeding table. As is generally known, the principal explanation is to be found in the increased cost of labor. But in addition it should be noted as a fundamental principle, which is graphically illustrated in the chart below, that expenses are relatively more stable than earnings. Due to the conditions under which railways operate, increases in gross earnings are not usually followed by parallel increases in expenses, and the increase contributes more than its normal

TABLE I.—REVENUES AND EXPENSES, TOTAL AND PER MILE, ALL ROADS; FISCAL YEARS 1907-1911.

Year	Operating Revenues. Total (000 omitted.)	Per Mile.	Per cent. increase or decrease from previous year.	Operating Expenses. Total. (000 omitted.)	Per Mile.	Per cent. increase or decrease from previous year.	Net Operating Revenue. Total. (000 omitted.)	Per Mile.	Per cent. increase or decrease from previous year.
1907	$2,[illegible]9,196	$11,383	.....	$1,748,716	$7,687	.....	$840,590	$3,696	.....
1909	[illegible]1,747	10,613	—6.76	1,687,143	7,394	- 3.81	734,397	3,219	—12.90
1910	2,443,697	10,466	1.38	1,616,537	6,921	- 6.39	828,123	3,545	+10.12
1910	2,787,166	11,660	+11.40	1,847,190	7,727	+11.64	940,076	3,933	+10.94
1911	2,816,745	11,635	—0.21	1,928,741	7,964	+ 3.32	881,993	3,651	—7.17

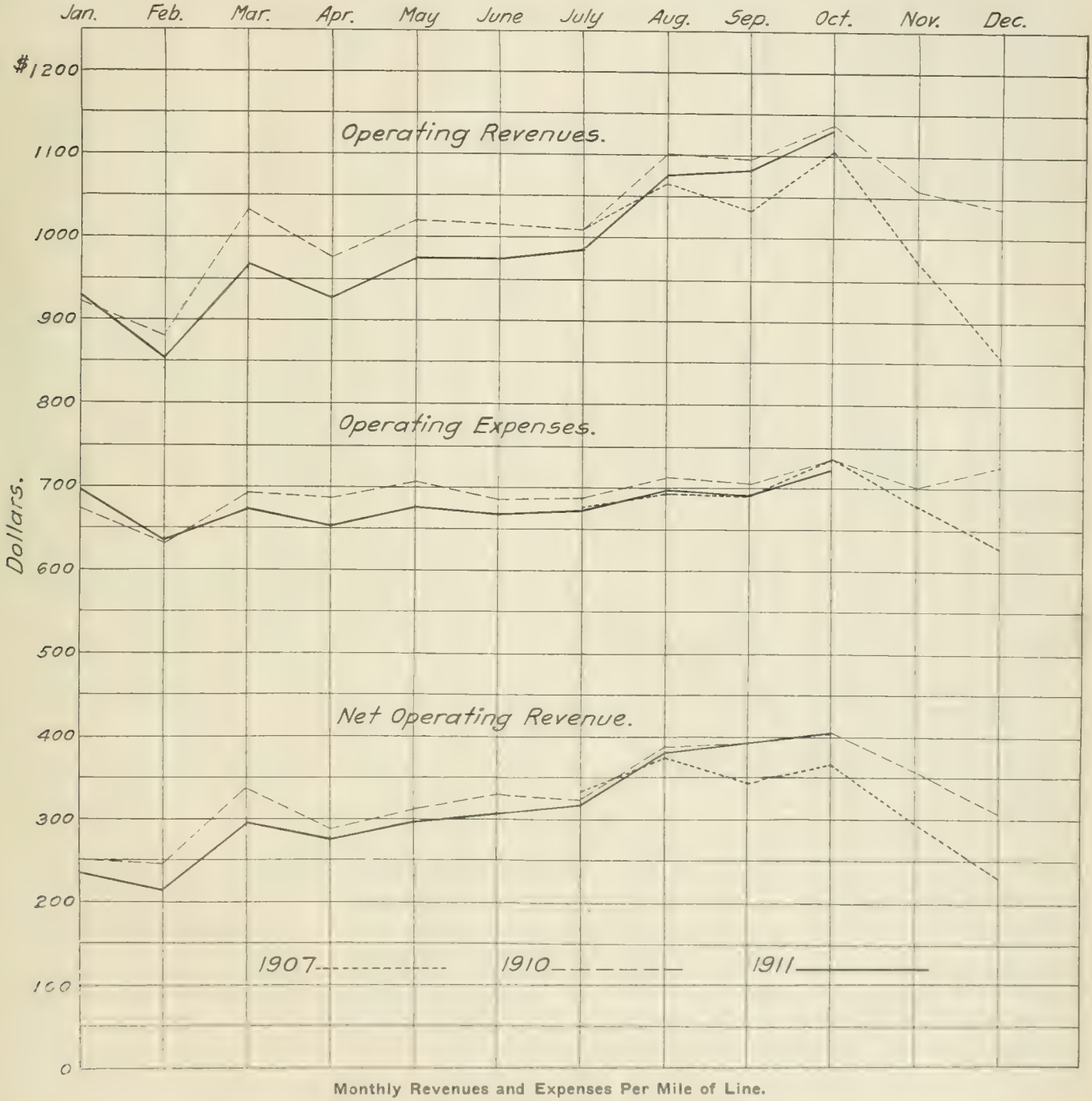
TABLE II.—REVENUES AND EXPENSES PER MILE OF ROAD, 1907, ALL ROADS, 1910 AND 1911, ROADS OVER 50 MILES LONG.

	Operating Revenues per Mile. 1911—			Operating Expenses per Mile.			Net Operating Revenue per Mile. 1911			Operating Ratio.		
	1907.	1910.	Amount.	Per cent. increase or decrease from 1910.	1907.	1910.	Amount.	Per cent. increase or decrease from 1910.	1907.	1910.	1911.
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	$672	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	— 7.0	....	74.9	74.9
[illegible]	[illegible]	[illegible]	[illegible]	- 3.2	[illegible]	[illegible]	[illegible]	+0.8	[illegible]	[illegible]	[illegible]	[illegible]	....	71.7	74.7
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	- 3.0	[illegible]	[illegible]	[illegible]	—12.8	....	67.1	69.4
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	— 4.7	....	70.4	70.4
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	708	[illegible]	[illegible]	[illegible]	[illegible]	312	297	— 4.8	....	69.4	69.5
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	307	— 6.9	....	67.6	68.6
[illegible]	[illegible]	[illegible]	[illegible]	$677	[illegible]	[illegible]	[illegible]	[illegible]	$335	[illegible]	318	— 1.4	66.90	68.1	67.9
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	373	[illegible]	[illegible]	— 1.5	64.99	64.8	64.7
[illegible]	[illegible]	[illegible]	1,089	-1.4	[illegible]	705	691	— 1.9	443	392	391	0.1	66.82	64.3	63.8
[illegible]	[illegible]	[illegible]	[illegible]	- 0.7	735	735	723	1.6	368	361	365	+ 1.0	66.64	64.6	63.9
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	291	[illegible]	[illegible]	[illegible]	69.92	....	....
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	309	[illegible]	[illegible]	73.40	....	....

proportion to net earnings. Similarly, as all railway managers have reason to know, a drop in gross earnings cannot be compensated for, at least immediately, in a corresponding reduction of expenses, and net suffers out of proportion to the decline in gross.

Table II, showing operating revenues, expenses and net revenue for roads over 50 miles long for 1910 and 1911 by months, is taken from the monthly reports of the Bureau of Railway Economics. The 1907 figures, as already noted, are from the commission's reports.

In the spring of 1910 most of the wage increases went into effect. From June until December, 1910, net revenue per mile for each month was less than for 1909, although in only one of these months, November, were the operating revenues less than in the preceding year. Net was directly affected by the increase in expenses. As is shown by the table, from February to October, 1911, operating revenues were consistently less per mile than in 1910, although the difference has been growing less since June. The October per mile figure is only 0.7 per cent. less than that for 1910. A similar decrease has been taking place in operating expenses per mile since March, varying from 4.9 per cent. in April to 1.6 per cent. in October. This vigorous policy on the part of roads, designed to overcome the decline in gross earnings and the increase in wage cost, has displayed itself to a considerable extent in the reduction of maintenance costs. Unfortunately, it is a policy which can have only a temporary efficacy and must be paid for in enlarged appropriations later. This policy of reducing operating expenses is also revealed in the figures of operating ratio which exhibit a general decline throughout the year in the relation of operating expenses to operating revenues. The effect of the policy is seen in the net earnings column, in which there has been an almost continuous



Monthly Revenues and Expenses Per Mile of Line.

All roads in 1907; roads over 50 miles long in 1910 and 1911.

improvement since February. As a result, there is an actual increase of 1 per cent. in net earnings per mile for October as compared with 1910, notwithstanding a decrease of 0.7 per cent. in operating revenues.

Finally, it will be of interest to follow the bureau's division of railways into groups corresponding roughly to the three great classification territories. Table III shows, as might be expected from the diverse character of the traffic regions, a marked variation in the financial condition of the railways of the different sections. In the East, while operating revenues have been slightly less for 1911 than for 1910, operating expenses have been so reduced that since March net earnings per mile have been in excess of those for the corresponding months of 1910. In the South, operating revenues have maintained themselves, and, in all the months except two, have been in excess of those for 1910. Operating expenses have also been larger, but not enough larger to prevent a good showing in net. In seven months out of ten, net operating revenue per mile shows an increase over 1910, the excess in September reaching 10.6 per cent. The Western group presents no such favorable showing. Operating revenues show decreases per mile in every one of the ten months, and the declines in operating expenses have not yet succeeded in offsetting this unfavorable situation. However, by vigorous pruning of their expenses, the roads are steadily improving their condition, the percentage of decrease per mile having fallen continuously from 17.2 per cent. in June to 0.3 per cent. in October.

The accompanying diagram shows graphically the per mile figures of operating revenues, expenses, and net for the last six months of 1907 for all roads, and for the twelve months of 1910 and the ten months of 1911 for roads over 50 miles long. The discrepancy already noted between the 1907 figures and those of the other two years should be recalled in the examination of this diagram.

The question which will naturally be asked is: "What of the future?" It would appear from the tables that the situation has improved considerably as compared with the early months of the year, but it is yet far from satisfactory. As to the future, in the face of the conflicting opinions of the business community which appear in such numbers after every change in the Wall Street barometer, it would be presumptuous for a mere statistician to venture a prediction. Suffice it to say that improvements in railway earnings do not usually come suddenly or without certain well-recognized harbingers of bettered conditions. Such harbingers have not yet appeared in clear outline upon the horizon.

Table III.—Monthly Revenues and Expenses Per Mile of Line in 1911; Roads Over 50 Miles Long, By Groups.

	Eastern Group						Southern Group						Western Group					
	Oper. Rev.		Oper. Exp.		Net Op. Rev.		Oper. Rev.		Oper. Exp.		Net Op. Rev.		Oper. Rev.		Oper. Exp.		Net Op. Rev.	
Month 1911.	Am't per mile.	Per cent. inc. or dec. from 1910.	Am't per mile.	Per cent. inc. or dec. from 1910.	Am't per mile.	Per cent inc. or dec. from 1910.	Am't per mile.	Per cent. inc. or dec. from 1910.	Am't per mile.	Per cent. inc. or dec. from 1910.	Am't per mile.	Per cent. inc. or dec. from 1910.	Am't per mile.	Per cent. inc. or dec. from 1910.	Am't per mile.	Per cent. inc. or dec. from 1910.	Am't per mile.	Per cent. inc. or dec. from 1910.
[illegible]	$[illegible]	[illegible]	$[illegible]	[illegible]	$336	—16.1	$775	—7.4	$535	+9.9	$240	+2.2	$672	—1.0	$500	—2.1	$172	+2.1
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
April	1,515	—0.1	1,056	—1.7	459	+3.7	731	—2.5	513	+1.8	218	—11.4	671	—10.2	479	—9.9	193	—11.0
May	1,598	—0.1	1,109	—1.1	488	+2.1	730	—4.8	516	—3.4	214	—8.1	712	—7.9	493	—6.9	218	—10.0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	498	+2.9	693	+0.8	493	+1.0	200	+0.4	720	—8.5	485	—3.5	235	—17.2
[illegible]	[illegible]	[illegible]	[illegible]	—1.3	514	+7.3	708	+3.0	496	+1.1	212	+7.8	724	—7.3	486	—4.6	239	—12.3
August	1,761	—0.1	1,135	—2.6	627	+4.8	754	+4.3	515	+3.8	239	+5.2	795	—5.9	507	—3.2	288	—10.2
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	596	[illegible]	785	+6.7	518	+4.8	267	+10.6	819	—4.7	500	—4.6	320	—4.8
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	569	[illegible]	842	+5.7	551	+7.1	291	+3.1	876	—2.7	524	—4.2	352	—0.3

MILEAGE OF RAILWAYS BLOCK SIGNALED.

The length of railways worked by the block system in the United States is now something over 73,000 miles, as shown in the accompanying table. This is an increase over the aggregate shown one year ago of probably less than 2,000 miles; but the increase in automatic signals is more than this amount; in other words, the progress that has been made during the past year has been largely in the improvement of existing lines by the substitution of automatic signals for the manual block system.

The condensed comparison of the present figures with those of one year ago, as compiled by the Interstate Commerce Commission and shown in the *Railway Age Gazette* of April 21, 1911, is as follows:

	January 1, 1911.	January 1, 1912.
Automatic signals, miles of road	17,711	19,995
Manual	53,558	53,071
Total	71,269	73,066
Deduct for mileage having both manual and automatic	.....	25
	71,269	73,041

The mileage of the following roads, as given in the table, is copied from the statement issued by the commission a year ago, the replies to our request for revised figures having failed to reach us at the time of going to press: Ann Arbor; Baltimore & Ohio; Chesapeake & Ohio; Cleveland, Akron & Cincinnati; Chicago & Alton; Chicago Great Western; Chicago, Indiana & Southern; Chicago, Peoria & St. Louis; Chicago, Rock Island & Pacific; Elgin, Joliet & Eastern; Kansas City, Clinton & Springfield; Kentucky & Indiana Bridge; Kentwood & Eastern; Louisville & Nashville; Michigan Central; Missouri Pacific; New York Central Lines (Cleveland, Cincinnati, Chicago & St. Louis; Lake Erie & Western; Lake Shore & Michigan Southern); San Francisco, O. & S. J.; Seaboard Air Line; Toledo, St. Louis & Western; Union.

As has been explained in the tables published in previous years, the manual block signaling reported by American railways in many cases represents facilities which provide for the constant use of the space interval for the protection of passenger trains, both in front and in rear, but do not afford such complete protection for freight trains; and on single track lines the protection for trains of both classes, as regards opposing movements, is in part dependent for its security on the rules of the time-table and the supervision of the train despatcher who makes meeting points.

The column in the table showing miles of road operated, excludes sections of road used only for freight trains, and in some cases excludes also those passenger lines on which there is usually but one engine in service at any one time. In a few cases it will be seen that the total mileage of road block signaled is greater than the total length of passenger lines operated, the block system being provided on those lines used exclusively for freight.

The percentages shown in the last column of the table are found by comparison, not with our table published last December, but with the government table above referred to.

LENGTH OF RAILWAYS WORKED BY THE BLOCK SYSTEM JANUARY 1, 1912.

(See Notes in Accompanying Text.)

Name of Railway.	Miles of road — Automatic block signals — Single track.	Automatic block signals — Two or more tracks.	Automatic block signals — Total.	Non-automatic block signals — Single track.	Non-automatic block signals — Two or more tracks.	Non-automatic block signals — Total.	Total, both kinds.	Total passenger lines operated.	Percentage operated under block system.	Increase, miles.
Ann Arbor	...	...	...	1	...	1	1	292	...	...
Atchison, Topeka & Santa Fe System	69	136	205	997	532	1,529	1,734	8,945	19	167
Atlantic Coast Line	3	12	15	373	102	475	490	3,832	13	...
Auburn & Northern	7	...	7	...	...	...	7	7	100	...
Baltimore & Ohio (including B. & O. S. W.)	15	217	232	1,286	720	2,006	2,239	4,122	...	...
Baltimore & Ohio Chicago Terminal	1	11	12	...	...	...	12	46	26	2
Baltimore & Sparrow's Point	...	...	...	2	3	5	5	5	100	...
Bessemer & Lake Erie	...	...	...	65	135	200	200	191	100	...
Boston & Maine	349	593	942	...	...	...	942	2,239	44	240
Boston, Revere Beach & Lynn	...	14	14	...	...	...	14	14	100	...
Buffalo, Rochester & Pittsburgh	...	36	36	301	75	376	412	412	100	...
Butte, Anaconda & Pacific	8	...	8	...	...	...	8	25	32	...
Central New England	...	...	...	16	...	16	16	275	6	...
Central of Georgia	...	...	...	53	7	60	60	1,916	3	...
Central of New Jersey	13	199	212	...	...	...	212	464	45	...
Chesapeake & Ohio	...	183	183	1,543	126	1,669	1,852	1,876	99	...
Chicago & Alton	416	145	561	141	...	141	702	999	...	...
Chicago & Eastern Illinois	...	98	98	277	55	332	430	973	44	...
Chicago & North Western	...	743	743	2,413	116	2,529	3,272	6,980	47	8
Chicago & Western Indiana	...	19	19	...	8	8	27	27	100	...
Chicago, Burlington & Quincy	45	50	95	7,923	659	8,582	8,677	8,990	96	...
Chicago Great Western	61	65	126	1,307	24	1,331	1,457	1,472	...	...
Chicago, Indianapolis & Louisville	162	...	162	416	...	416	578	611	94	10
Chicago, Milwaukee & St. Paul	6	104	110	3,329	478	3,807	3,917	7,296	54	...
Chicago, Milwaukee & Puget Sound	248	...	248	1,119	...	1,119	1,367	1,400	98	...
Chicago, Peoria & St. Louis Ry. of Illinois	1	...	1	...	...	...	1	227	...	...
Chicago, Rock Island & Pacific	653	280	933	998	...	998	1,931	6,683	...	...
Chicago, Rock Island & Gulf	33	...	33	...	...	...	33	466	...	...
Chicago, St. Paul, Minneapolis & Omaha	...	6	6	592	64	656	662	1,527	43	...
Cincinnati, Hamilton & Dayton	19	17	36	115	18	133	169	889	19	2
Colorado Midland	...	...	...	2	...	2	2	258	...	...
Cornwall & Lebanon	...	...	...	8	14	22	22	22	100	...
Cumberland & Pennsylvania	...	...	...	4	3	7	7	31	23	...
Cumberland Valley	4	50	54	11	...	11	65	162	40	39
Delaware & Hudson	165	247	412	...	...	...	412	744	55	...
Delaware, Lackawanna & Western	175	510	685	4	...	4	689	963	71	103
Duluth & Iron Range	14	2	16	...	...	...	16	168	9	...
Durham & Southern	...	...	...	56	...	56	56	56	100	...
Elgin, Joliet & Eastern	2	3	5	11	...	11	16	224	...	...
Erie System	...	281	281	849	584	1,433	1,714	2,264	75	...
Evansville & Terre Haute (included in Chi. & E. I.)	...	...	...	...	...	...	...	...	...	...
Grand Trunk	2	1	3	...	...	...	3	4,745	...	...
Great Northern	10	162	172	284	...	284	456	7,100	8	67
Hocking Valley	...	...	...	144	...	144	144	337	46	...
Hudson & Manhattan	...	8	8	...	...	...	8	8	100	...
Illinois Central	65	247	312	9	5	14	326	4,546	7	...
Yazoo & Mississippi Valley	7	...	7	...	6	6	13	1,371	1	...
Illinois Traction	145	...	145	...	...	...	145	...	...	121
Iowa Central	...	...	...	11	...	11	11	540	2	...
Kanawha & Michigan	2	...	2	2	...	2	4	163	...	...
Kansas City, Clinton & Springfield	...	...	...	2	...	2	2	157	...	...
Kentucky & Indiana Bridge & R. R. Co	...	...	...	5	6	11	11	11	100	...
Kentwood & Eastern	...	...	...	3	...	3	3	30	10	...
Lackawanna & Wyoming Valley	...	...	...	1	2	3	3	23	13	...
Lehigh & New England (less than one mile)	...	...	...	...	...	...	...	...	...	...
Lehigh Valley	14	506	520	646	52	698	1,218	1,178	100	...
Long Island	4	118	122	...	23	23	145	392	37	9
Louisville & Nashville	41	22	63	392	104	496	559	4,372	...	...
Maine Central	420	58	478	...	...	...	478	1,130	42	...
Minneapolis, St. Paul & Sault Ste. Marie	...	...	...	2,447	4	2,451	2,451	3,423	72	...
Missouri, Kansas & Texas	8	...	8	10	...	10	18	2,886	...	...
Missouri Pacific (including Iron Mtn.)	169	34	203	23	8	31	234	...	...	...
Mobile & Ohio	...	5	5	48	...	48	53	825	7	...
Monongahela (less than one mile)	...	...	...	...	...	...	...	...	...	...
Munising, Marquette & Southeastern	...	...	...	4	...	4	4	119	...	...
Nashville, Chattanooga & St. Louis	...	...	...	93	12	105	105	1,230	9	...
Newburgh & South Shore	...	...	...	1	6	7	7	...	100	...
New York & Long Branch	...	38	38	...	...	...	38	38	100	...
New York Central Lines—										
Boston & Albany	...	207	207	...	2	2	209	377	55	...
Chicago, Indiana & Southern	...	5	5	144	60	204	209	309	68	...
Cleveland, Cin., Chicago & St. Louis (including P. & E.)	...	...	...	647	364	1,011	1,011	2,171	...	...
Lake Erie & Western	...	...	...	863	9	872	872	...	...	...
Lake Shore & Michigan Southern (including subsidiaries)	7	512	519	1,174	60	1,234	1,753	...	...	...
Michigan Central	...	272	272	901	19	920	1,192	1,192	100	...
New York Central & Hudson River	2	506	508	1,593	780	2,373	2,881	2,772	100	...
Pittsburgh & Lake Erie	...	152	152	3	...	3	155	170	91	...
New York, New Haven & Hartford	17	277	294	154	282	436	730	1,959	37	22
New York, Ontario & Western	36	132	168	...	...	...	168	493	...	...
Norfolk & Western	71	376	447	1,218	7	1,225	1,672	1,893	88	20
Northern Pacific	103	339	442	780	137	917	1,359	5,321	...	...
Northwestern Pacific	14	12	26	...	...	...	26	383	8	...
Pennsylvania (all east of Pittsburgh and Erie)	...	397	397	2,614	1,287	3,901	4,298	4,666	...	...
Cleveland, Akron & Cincinnati	...	...	...	138	17	155	155	326	...	...
Grand Rapids & Indiana	...	...	...	56	2	58	58	537	11	...
Pittsburgh, Cincinnati, Chicago & St. Louis	...	14	14	490	609	1,099	1,113	1,416	79	...
Pennsylvania Lines, N. W. System	...	517	517	398	179	577	1,094	1,315	83	...
Vandalia	...	...	...	301	61	362	362	827	44	...
Peoria & Pekin Union	...	...	...	...	6	6	6	15	40	...
Pere Marquette	15	...	15	39	...	39	54	1,534	3	...
Philadelphia & Reading	21	480	501	278	96	374	875	1,272	...	...
Quincy, Omaha & Kansas City and Iowa & St. Louis	...	...	...	305	...	305	305	305	100	...
Queen & Crescent Route—										
Alabama Great Southern	108	1	109	...	...	...	109	294	37	17
Cincinnati, New Orleans & Texas Pacific	263	71	334	1	...	1	335	335	100	...
New Orleans & Northeastern	77	15	92	...	...	...	92	196	47	77
Richmond, Fredericksburg & Potomac	...	...	...	...	79	88	88	88	...	...
Rochester, Syracuse & Eastern (Electric)	...	8	8	...	...	...	8	79	10	...
St. Joseph & Grand Island (less than one mile)	...	...	...	...	...	...	...	...	...	...
St. Louis & San Francisco	694	34	728	90	...	90	818	4,732	...	...
Beaumont, Sour Lake & Western	...	...	...	85	...	85	85	117	72	...
New Orleans, Texas & Mexico	...	...	...	158	...	158	158	263	60	...
Orange & Northwestern	...	...	...	62	...	62	62	62	100	...
St. Louis Merchants' Bridge Terminal	...	6	6	...	1	1	7	10	70	...
St. Louis Southwestern (less than one mile)	...	...	...	...	...	...	...	...	...	...
San Francisco, Oakland & San Jose Consolidated	...	4	4	...	...	...	4	16	25	...

LENGTH OF RAILWAYS WORKED BY THE BLOCK SYSTEM JANUARY 1, 1912—(Continued).

Name of Railway.	Miles of road: Automatic block signals: Single track.	Automatic block signals: Two or more tracks.	Automatic block signals: Total.	Non-automatic block signals: Single track.	Non-automatic block signals: Two or more tracks.	Non-automatic block signals: Total.	Total, both kinds.	Total passenger lines operated.	Percentage operated under block system.	Increase, miles.
San Pedro, Los Angeles & Salt Lake	1	...	1	...	...	...	1	904	...	...
Seaboard Air Line	...	...	...	213	...	213	213	2,783	...	...
Southern	...	3	3	1,562	273	1,835	1,838	6,965	26	...
Southern Illinois & Missouri Bridge	...	5	5	...	...	...	5	5	100	...
Southern Pacific, Atlantic System—										
Galveston, Harrisburg & San Antonio	279	...	279	...	...	...	279	1,270	22	...
Louisiana Western	104	...	104	...	...	...	104	140	74	...
Morgan's Louisiana & Texas	95	...	95	...	...	...	95	293	32	...
Texas & New Orleans	110	...	110	...	...	...	110	438	25	...
Southern Pacific; Pacific System	2,266	175	2,441	87	11	98	2,525	6,498	39	...
Staten Island Rapid Transit	...	12	12	2	9	11	23	23	100	...
Spokane, Portland & Seattle	...	10	10	...	...	...	10	422	...	...
Syracuse, Lake Shore & Northern (Electric)	17	6	23	...	...	...	23	38	60	...
Terminal Railroad Association of St. Louis	...	6	6	...	1	1	7	13	53	...
Toledo, Peoria & Western (less than one mile)	...	...	...	...	...	...	...	...	...	...
Toledo, St. Louis & Western	...	...	...	188	...	188	188	451	41	...
Ulster & Delaware	25	...	25	...	...	...	25	128	20	...
Union (Pittsburgh)	...	1	1	1	...	1	2	7	...	...
Union Pacific	778	686	1,464	11	...	11	1,464	3,506	42	...
Oregon Washington Railroad & Navigation Co.	425	14	439	1	...	1	440	1,725	25	...
Oregon Short Line	541	36	577	...	...	...	577	1,762	33	...
Virginian	...	...	...	18	...	18	18	461	4	...
Wabash	...	7	7	1,727	94	1,821	1,828	1,955	93	...
Wabash Pittsburgh Terminal	...	4	4	...	...	...	4	60	7	...
Washington Southern	...	6	6	...	27	27	33	33	100	...
Western Maryland	...	2	2	...	...	...	2	2	100	...
Washington Water Power Co. (Electric)	29	...	29	...	...	...	29	29	100	...
Western Pacific	11	...	11	...	...	...	11	922	...	...
Total	9,465	10,530	19,995	44,648	8,423	53,071	73,041	...	...	...

The total automatic block signal mileage of the country is undoubtedly larger than that here shown, as some of the roads from which revised statistics have not been received are known to have installed new signals during the past year.

Following are notes explanatory of some of the items in the table and giving such information as we have received concerning new work to be done during the coming year. Also, a number of items concerning new work proposed have been published in the news columns of our last two issues.

Boston & Maine.—This road plans to install automatic block signals during the coming year on 192 miles of line, mostly single track, namely: North Cambridge, Mass., to Northampton, 100 miles; Prescott to Rochester, N. H., 77 miles; Claremont Junction to Windsor, Vt., 15 miles. At Worcester two mechanical interlockings are to be built; one at Milbrook street, 68 levers, and one at Barbers, 60 levers.

Central New England.—This company is installing 16.5 miles of automatic signals on double-track, which will go into service probably January 15.

Chicago, Indianapolis & Louisville.—The increase in the aggregate mileage of road block signaled is only 10 per cent., but it will be observed that no less than 162 miles formerly worked by the manual system is now equipped with automatic signals.

Cumberland Valley.—This company during the past year has increased its block signal mileage 39 miles, as shown in the table published in this issue. Within the next two months ten miles more of the line, double track, will be equipped with automatic signals.

Erie.—The mileage of road block signaled includes 42.5 double-track, automatic, used only for freight trains.

Illinois Central.—This company is planning to equip 147 miles of its line with automatic block signals during the coming year.

Lehigh Valley.—The mileage of road block signaled includes 40 miles used only for freight trains.

Maine Central.—This company plans to install automatic block signals during the coming year on 36 miles of line.

New York, Ontario & Western.—This company plans to equip with automatic block signals 16 miles of its Scranton division.

Norfolk & Western.—The increase in the aggregate mileage of road block signaled is 20 miles, but the mileage of road equipped with automatic signals has increased 106 miles.

Northern Pacific.—One hundred and eighty miles of double-track, formerly worked by the manual block system, has been equipped during the past year with automatic block signals.

Pennsylvania.—The plans for new automatic block signals to be put up during the coming year, cover 111 miles of road as follows: From Summerhill to Latrobe, Pittsburgh division, 15 miles electro-pneumatic and 33 miles electric-motor; on the Philadelphia, Baltimore & Washington from Wilmington to Oakington, 36 miles, and Baltimore to Washington, 37 miles, all electric motor signals. In all of these installations the track circuits will be alternating currents.

Pennsylvania Lines West of Pittsburgh.—Automatic block signals are under construction, to be completed in 1912, on eleven miles of line.

Philadelphia & Reading.—The mileage of road signaled includes 15 miles, automatic, used only for freight trains.

Rochester, Syracuse & Eastern.—On 16 miles of line, double-track, there are automatic signals for one track only.

Southern Pacific, Pacific System.—The total length of road block signaled is 14 miles less than is indicated by the detailed items, a length of 11 miles, double-track, being worked in one direction by automatic signals and in the other by non-automatic; and 4 miles single track being equipped with automatic signals, but also controlled by the manual system.

Union Pacific.—Eleven miles worked by both automatic and non-automatic. Automatic block signals are under construction, to be completed in 1912, on 17 miles of line, St. Vrains to La Salle. This is on the Denver Northern main line.

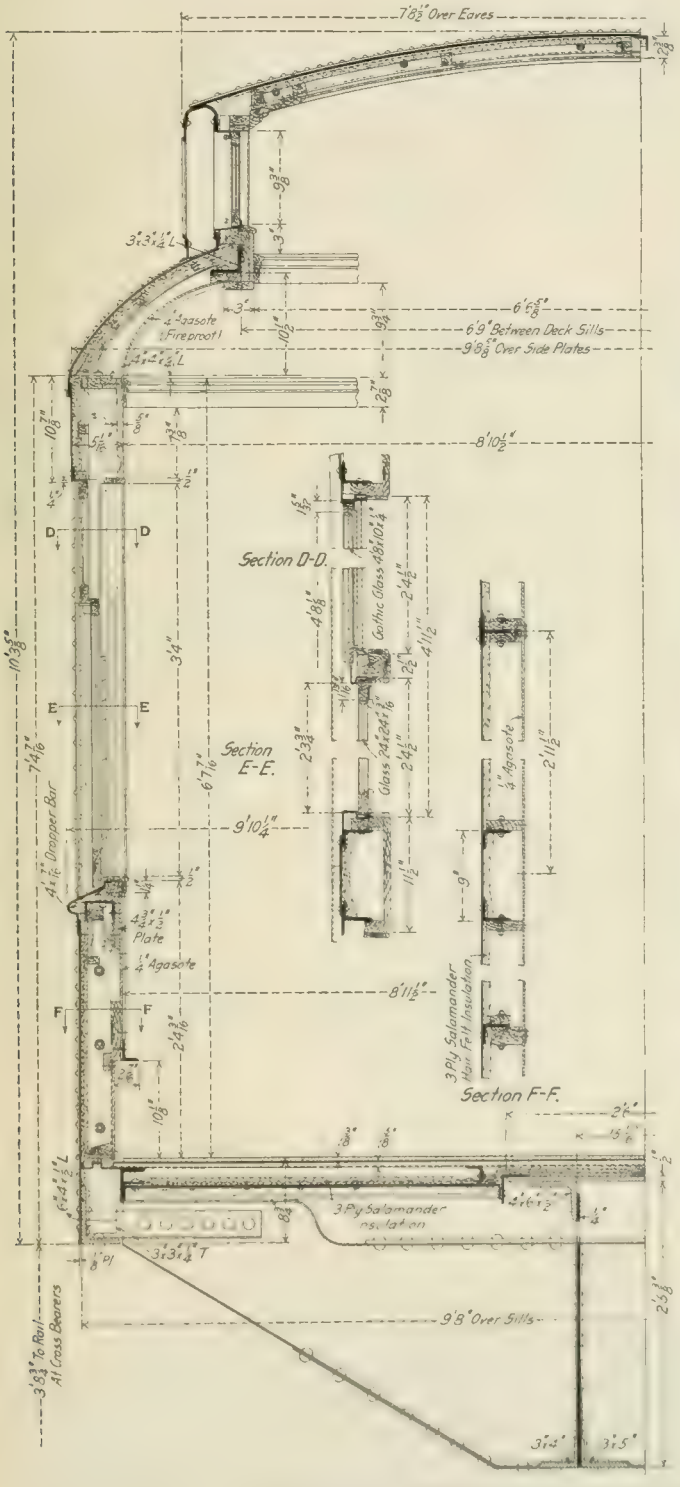
FOREIGN RAILWAY NOTES.

The works of the Pan-American Railway have been inspected between Durazno, in central Uruguay, and Trinidad. Clearing of the right of way and grading between these points have been commenced, and 10 miles of grading have already been finished. Work has been begun on a car barn at Durazno, and material is now on hand at Trinidad for the erection of a station and warehouse at that place. Between 600 and 700 men are employed in the works.

The Pacific Railway of Colombia is intended to connect the port of Buenaventura, on the Pacific coast, with the fertile valley of the Cauca, and ultimately with Bogota. At present the line has been completed for a distance of 60 miles from the coast. For each mile of line constructed the company is entitled to a subsidy of about $60,000 per mile from the Colombian government, which is liquidated by the payment to the company of 50 per cent. of the customs receipts of the ports of Buenaventura and Tumaco. The payments have been punctually made, but have not been equal to the full amount of the subsidy, so deferred customs bonds have been given to the company for the balance.

STEEL COACHES; BALTIMORE & OHIO.

The Baltimore & Ohio recently received 30 coaches from the American Car & Foundry Company, 20 smoking cars and 15 postal cars from the Pullman Company, and 10 baggage cars from the Barney & Smith Car Company. All of these are built entirely of steel, with the exception of the inside finish. The



Half Cross Section Through Steel Passenger Car; Baltimore & Ohio.

following description relates to the 70-ft. coaches, which have a seating capacity for 80 passengers. The construction of both the superstructure and the underframe represents the type of design which has been used by the American Car & Foundry Company for a large amount of equipment. The illustration of the cross section of the car shows in detail the principal features of this design. The center sills are 2 ft. 5⅜ in. deep at the center and are built up of a ¼ in. steel web with a 4 in. x 6 in. x ½ in angle at the top, one 3 in. x 4 in. and one 3 in. x 5 in. angle at the bottom, and the top cover plate ½ in. x 2 ft. 6 in. The side construction has a ⅛ in. steel plate extending from the window sill to the bottom of the side sill, with a 4 in. x 7/16 in. dropper bar at the top, and a 4 in. x 6 in. x ½ in. angle at the bottom.

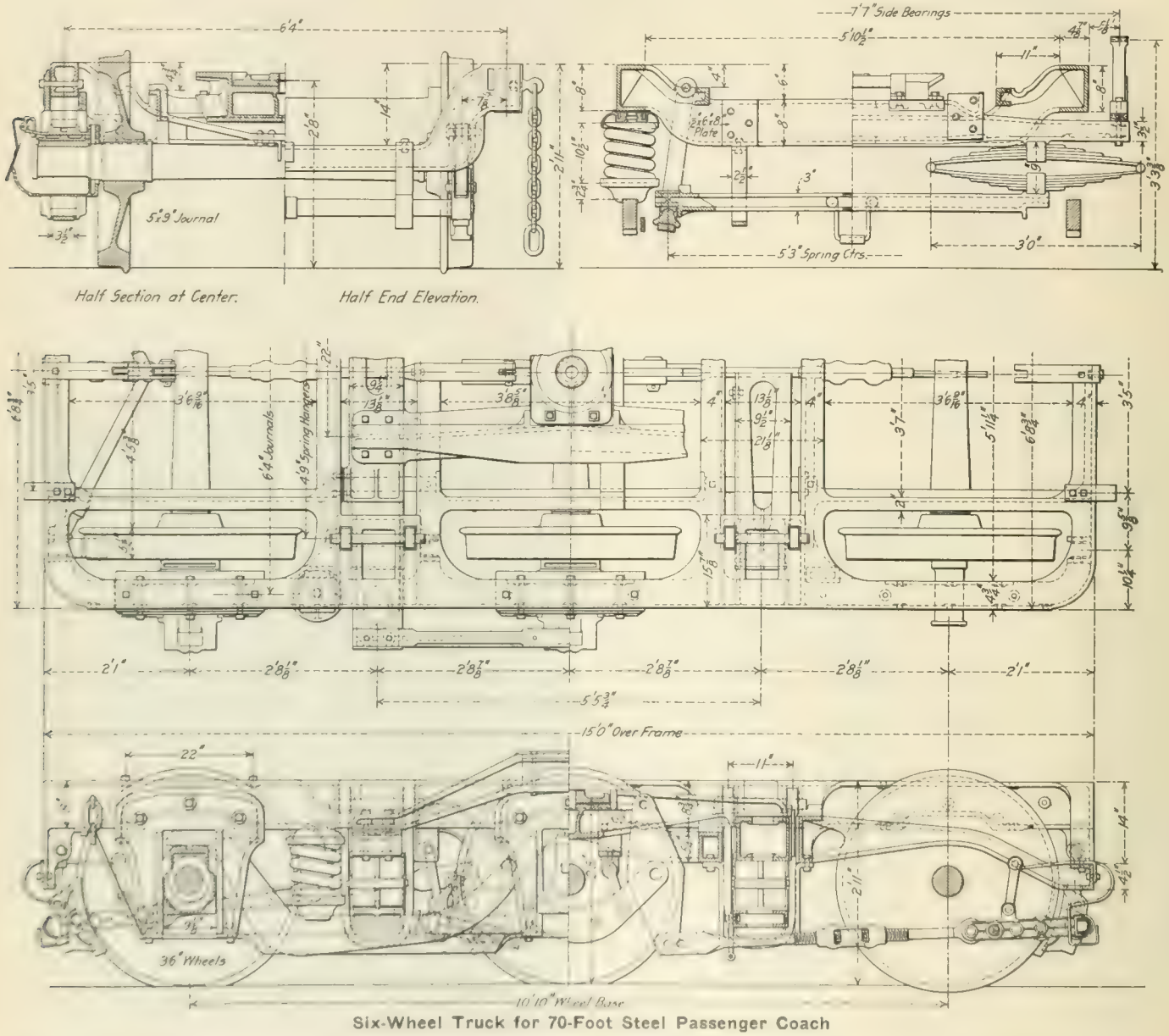
The steel side construction is shown in the vertical section as well as in the horizontal sectional views. The wood inside finish extends between the bulkheads; from these to the ends of the car the construction is steel. The upper and lower decks are lined entirely with fireproof Agasote, and the same material is used in the space under the windows behind the heater pipes, wood being used only in the panels between and above the windows and for the moldings. The floor is covered with Flexolith, making it dust and fireproof. The reason for making the ends of the coaches beyond the bulkheads of steel interior finish was to protect the passengers against any splinters of woodwork should

Interior of Steel Passenger Coach.

there be an accident of sufficient severity to distort the end of the car; in such a case the steel would bend and form a cushion for these shocks and thus protect the interior passenger compartment from damage. Furthermore, the metal used in the interior of the toilet rooms furnishes a more substantial and satisfactory finish from a sanitary standpoint. In the vestibule windows and end doors fire retarding wire glass is used. This will not shatter or fly about in case of accidents.

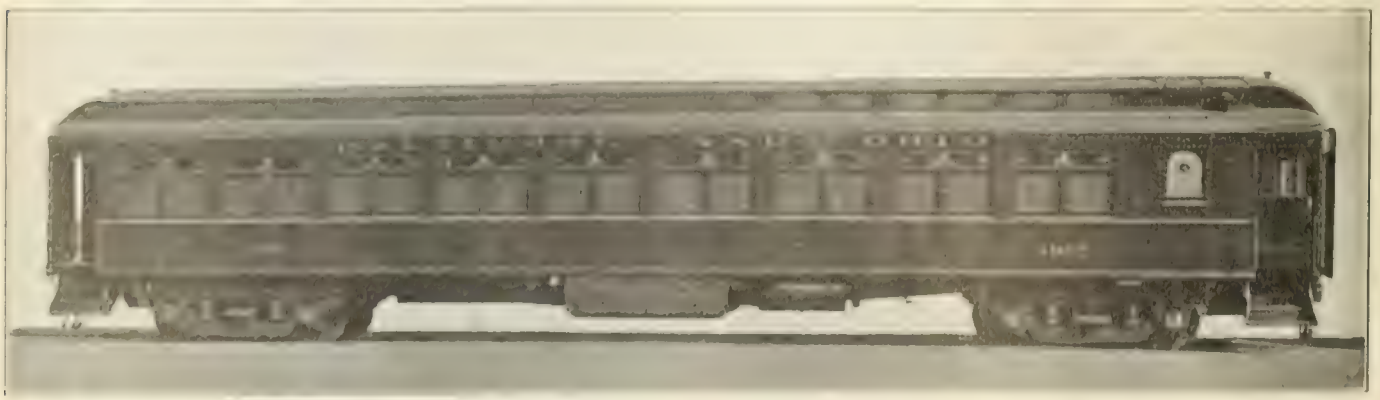
The outside walls of the car are insulated on the inside all around, including the inner side of the roof, with three-ply salamander hair felt insulation, and the inside finish of Agasote, wood and Flexolith provides a second insulation, which should help to make the car comfortable in both winter and summer. In planning these cars the platform has been made more roomy by increasing the length to 3 ft. This will facilitate the discharge of passengers. The cars are lighted both by electricity with the head end system and by Pintsch mantle lamps. Considerable study has been given to the lighting of the Baltimore & Ohio

cars, and the arrangement which had been developed for the old coaches was used for the new cars. The center lamp contains four electric bulbs and one mantle gas lamp, all enclosed within a satin bowl. This arrangement prevents the lamps which are unlighted from showing, and also prevents either set of lamps from casting a shadow when the other is lighted. The cars are equipped with Hale & Kilburn seats covered with green plush and are supplied with electric fans at each end for use in warm weather. The Gold system of steam heating is used. The 70-ft. coaches are equipped with 6-wheel trucks, having 36-in. solid steel wheels, axles with 5 in. x 9 in. journals and cast steel frames. The 60-ft. steel coaches have 4-wheel trucks.



Six-Wheel Truck for 70-Foot Steel Passenger Coach

A bill recently introduced into the congress of Ecuador provides for the reorganization of the board in charge of the construction and administration of the railway from Ambata, Ecuador, [illegible] construction and administration of the railway from Ambata, Ecuador,

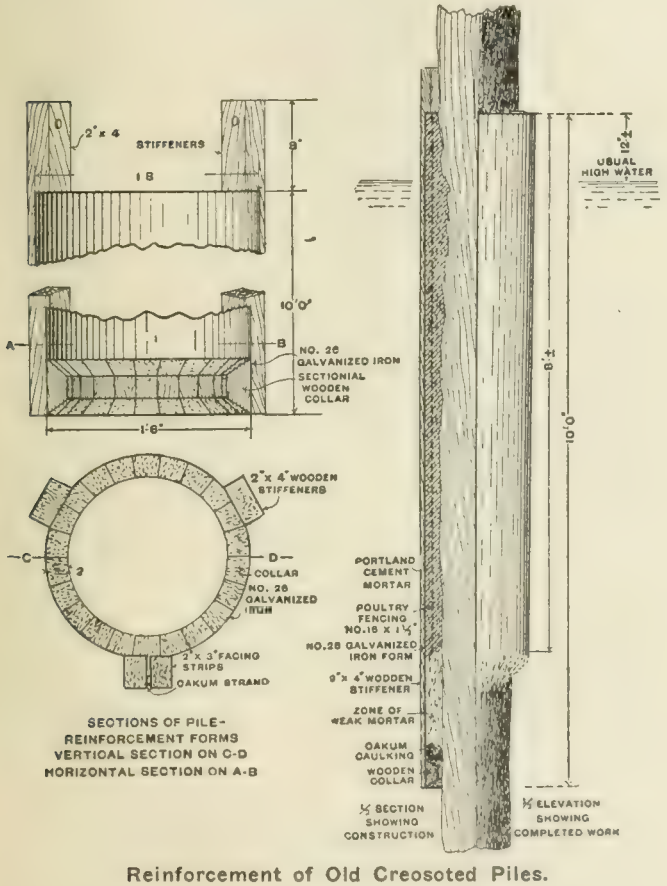


Seventy-Foot Steel Passenger Coach; Baltimore & Ohio.

NOTES ON PILE PROTECTION.

In a paper read before the Boston Society of Civil Engineers, which is printed in the Journal of the Association of Engineering Societies, T. Howard Barnes described some wharf construction for the Guatemala Railway Company in Puerto Barrios, Guatemala, in which it became necessary to deal with some creosoted southern United States piles which had been in place for about seventeen years. These piles were nearly all of them in fair condition, excepting at and near the water line, but at this belt for, say, 5 ft. in width, most of them were badly eaten, many having cavities extending completely through them, resulting from the combined activity of the teredo and the limnoria. The expense of replacing these piles with new ones would approximate $50 each. The incentive for saving them by placing some reinforcement was so great that the writer gave much time to its consideration.

The first idea was to place such reinforcement by using a



Reinforcement of Old Creosoted Piles.

chamber clam-shell like, each half of which should have a semicircular opening in the parting line of the bottom for embracing the pile when clamped about it, and which would admit a workman after unwatering the chamber, the annual space about the pile being first calked. A test chamber was made, but trials in controlling it against the effect of even a wind-chopped sea of moderate force proved the futility of rapid and economical manipulation, and the idea of working in the dry was abandoned Had the apparatus proved successful it was proposed to place a reinforcement of nails, poultry netting and cement mortar, similar to that hereinafter described for protecting some of the piles which were placed in the new construction.

Accordingly, forms were prepared for placing in the wet about the old piles a reinforced cement-mortar envelope which should have a width of about 8 ft. and a minimum thickness of 2 in. These forms were made of No. 26 gage galvanized iron shaped into cylindrical shape with a slight taper and 10 ft. in length. A 2-in. x 3-in. strip of pine having a length of 8 in. greater than the form was attached on each side of the parting line, which was up and down. The metal was folded about the strip 1 in. on to the 3-in. side, leaving 2 in. for attaching an oakum strand, which was needed to prevent egress of mortar. Two 2-in. x 4-in. stiffeners of same length as the facing strips were fastened to the form at one-third points as shown in the cut. A collar of 2-in. stock made from narrow blocks was provided at the foot to serve as a gage for regulating the thickness of the mortar, as well as serving to calk against in closing the foot against the escape of the mortar.

The mortar envelope was reinforced by a wrapping of poultry fencing of No. 16 gage with 1½-in. mesh. The procedure was, first to scrape off the mussel growth on the pile to be treated. This growth forms a complete mat, but is detached quite readily. The poultry fencing was then put in place. This was made up into a roll, 8 ft. long, with sufficient fullness to lap on to itself several inches when placed about the pile. The form, nearly buoyant with the stiffeners, was then floated into place, first having been provided with a wreath of fluffy oakum affixed to the collar. The facing strips were closed tightly with carriage clamps hung from them by cords of such length that when the clamps were squared into horizontal position they were in the proper place for screwing up by the divers. The divers were naked, and their further duties were to close the bottom of the form effectually against the egress of the mortar, watching carefully that none escaped at the time of the filling. Steel bars 8 ft. long of ½-in. stock were hung, one in each of the three sections of the form. They had a shepherd's crook for support on the top edge of the form, and were used for slushing the mortar into compact state as it fills.

The mortar was made, one part cement to about two parts sand, the latter being silica and selected as coarse as possible, say 0.18 mm. effective size. It was assured that there was a little overfill of cement. The operation of filling was carried on rapidly, the effect of the slushing rods being supplemented by tapping with clubs on the stiffness, resulting in securing a sound mass excepting in the lower zone of about 18 in.

It will be noted that the forms were made 2 ft. longer than the reinforcement cage. The separating of the sand from the cement in the lower portion could not be avoided under the limitation of having to drop the mortar through so great a depth of water; accordingly the reinforcement was made to occupy only the sound part of the envelope.

Fig. 2 shows the construction and the finished appearance of the work. At the time of writing, the work is still in progress, with a record showing no failures. It should, however, be added that at times much delay is caused by difficulty in sealing the foot of the form. It is useless to place the mortar when any is escaping at the bottom.

The expense of this treatment is—labor (contract price), $8; materials (cement, fencing, etc.), $4; a total of $12, to which should be added the expense of experimenting and overhead charges.

There seems good reason to expect a further life of the piles thus treated as great as that at present sustained.

PROTECTION OF PILES BEFORE DRIVING.

There was also used experimentally on some of the creosoted piles in new construction in the same work a reinforced mortar protection applied in the following manner: First, wire nails, about 12 d., were driven thickly over the protected zone for one-third their length, the zone being 10 ft. wide; next, the nails were bent over, using in this operation a short length of small iron pipe, which was not only expeditious but prevented the nail from making the angle close to the wood; a wrapping of poultry fencing of the before-described class was then attached; after which a coat of Portland cement plastering was applied, being thoroughly troweled in; this was about ¾ in. thick and was treated when set by a grout wash of Portland cement mixed in a solution of water glass. The envelope was kept wet until well

set. In respect to the water glass it is too early to note its effect in resisting the action of sea water.

The driving of these piles showed the following features of interest, the hammer used being a regular drop-hammer weighing 2,500 lbs. Confining the drop to 4 ft., the envelope was nearly invariably kept intact; above this limit of drop the mortar was detached more or less, occurring nearly always at those places in the envelope where the fencing was in contact with the wood; the mortar was also weakened and became detached through the influence of the creosote which had cooked out of the pile and permeated the mortar as it lay in the yard exposed to the direct sun rays.

The cost of this form of protection was, labor (contract), $1.20; materials, about $2.50; a total of $3.70, exclusive of overhead charges. It must also be observed that the handling cost in placing the piles in the yard in position to be treated was additional and amounted to a considerable item. This expense applied of course in the case of any desired treatment, such as coppering, etc. More care in dragging out the above-described piles over the ground from the yard was actually required than in the case of those protected with copper yellow-metal. The expense of yellow-metal covering in 20-oz. weight was three times that of the mortar protection.

If the netting be placed so as to be free from contact with the wood, leaving a clear space of about ¼ in. for the mortar to enter and get a grip of the wire, ordinary handling with careful driving will not injure the envelope; certainly the use of a steam hammer would insure entire freedom from damage in driving. When applied to creosoted piles there should be maintained a shade to prevent the exuding otherwise of a serious amount of creosote under the heat of the direct sun rays.

It may anticipate some reader's query, "How do you account for the confining of the activity of the sea pests to so narrow a belt?" to remark that the clearness of the water seems to govern the activity of the teredo and of the limnoria. The Puerto Barrios harbor bottom is a mineral ooze, very easily stirred up. Other localities, like Port Limon in Costa Rica, where the limnoria has been active enough at depths of 25 ft. to eat off creosoted piles in seven years, having clear water to the bottom, show an activity of the borers, which, while greatest at the water line, extends to the ground.

Local conditions of murkiness of water may account for curious differences of such activity in neighboring wharves which the writer has had cited to him as occurring in our northern waters.

RAILWAYS IN GERMAN EAST AFRICA.

The development of the German East African protectorate depends for its success on the construction of railways. This fact is being constantly brought to the minds of the imperial legislators and the German public in general by the Colonial Development Committee, which of late has paid considerable attention to the railway policy of German East Africa.

The extension of the East African Central Railway from Tabora to Ujiji is demanded by the committee because the development of the protectorate in question has in the last few years made remarkable progress, which is partly due to the natural advantages, partly to the introduction of improved methods of communication.

According to the report of 1908 concerning the extension of the line from Dar-es-Salam and Morogoro to Tabora, the annual receipts of the protectorate in the years 1902-1907, inclusive, increased on an average to $142,380. Considering the years 1908 and 1909 also, the average annual increase in receipts is about $155,952. More distant districts of the German colonies—the most thickly populated and the most favored by nature—have up to the present been but poorly developed and but partly opened up. Only an extended railway system can make use of the natural advantages and the human material of the colony, and at the same time benefit the home industries.

This is especially true of the western part of German East Africa—the district of the great lakes. Towards this region the Central railway has been more rapidly extended than was at first intended; it will reach Tabora next year. No one who knows the conditions can doubt that this railway must be built as far as the lake Tanganyika, because that will be the only way not only to make it pay, but also to bring the western part of the colony under proper control and make it productive. It is no longer a question of the necessity of the railway extension, but only of the time when the extension must be begun. Arrangements must be made very soon for its extension so that the work shall not be broken off at Tabora. It would be a waste of time, which would not be justified by the conditions, if the already existing organization were laid off on reaching Tabora, only to be taken up again sooner or later. Experience shows that the beginning of any such new undertaking is the most expensive portion. The officials who are at present at work and have got fairly "in the saddle," as it were, would have to be replaced by others who would buy their experience dearly. If the work were broken off on reaching Tabora, it would not only be more expensive, but also would take more time on resuming, after an interim of inaction.

But not only for economical reasons must the extension of the line be undertaken at once, but also to prevent commerce and traffic from being transferred from the western part of the colony in question to the Belgian Congo. By reason of the discovery of ore and the newly introduced free trading and mining laws, the Congo became so much more important that the Belgians are going ahead vigorously with the construction of their own railway. If with their Lukuga railway they reach Lake Tanganyika sooner than the Germans, it will be a great disadvantage to the latter. On the other hand, the Germans by reaching the lake first with their Central railway would gain a big share of the ever increasing traffic of the opposite shore of that lake.

Before all, therefore, it is necessary that the railway be pushed to a conclusion in order to prevent loss and to secure to the country the advantages above named—which would in a very short time cover the comparatively slight expense of finishing the work already begun.

As regards the preparatory work on the Northern Railway from Moshi to Lake Victoria, the committee reports that in a few months this railway will have reached Moshi, and the foot of Mount Kilimanjaro. It is absolutely necessary to undertake at once the surveys of the extension of the line from Moshi to Lake Victoria in order to avail oneself of the surveying force already on hand, and thereby effect considerable saving in this matter, and also to get at the probable cost, and be able to show thorough data concerning the necessary capital which must be secured at an early date. For the necessity of the extension of the line to Lake Victoria there are many reasons. The extensive elevated plateau offers unusual advantages for settling by the whites and for cattle raising. The soda lake, which would be so important for the German soap making and glass making industries could, according to the statements of the experts, be profitably worked, if the railway freight rate from the lake to Tanga did not exceed $2.38 per ton. At present the traffic of the district bordering Lake Victoria goes over the English Uganda railway and the profit on thousands of tons of products from their own districts is lost to the Germans. Their railway would, however, they say, offer the most direct and the most favorable route.

The port of Tanga, the facilities of which, when it is completed in 1912, will be at least as good as those of the present English port of Mombassa, will be ready to take care of the traffic of the proposed railway extension; and to open up to traffic with the rest of the world the thickly populated northern districts of the colony.

General News Section.

The New York, New Haven & Hartford has made a five year contract for coal with the Coastwise Transportation Company as carrier and the Virginia Iron, Coal and Coke Company.

A new speed record for the Galena division of the Chicago & North Western was made on December 22, when a special train of four steel cars was run from Chicago to Clinton, Ia., 138 miles, in 136 minutes.

The east and west headings of the Big Savage tunnel on the Western Maryland's extension to Pittsburgh were connected this week. This tunnel when finished will be 3,275 feet long. It is now expected that tracks can be laid, so that the new line can be opened shortly after February 1.

The Southern Pacific has established at Oakland Mole, Cal., a model kitchen, in charge of Ernest Haeusslein, in which the cooks of the company's dining cars are to be educated to the highest possible skill and efficiency; Mr. Haeusslein is to teach the cooks the "few things they do not already know."

According to a Pittsburgh despatch, the Rail & River Coal Company's mines have been bought by the Grand Trunk Railway, which will operate them to supply its own fuel. The sale includes 31,000 acres in Belmont County, Ohio. There are six mines in operation, with an output of 750,000 tons a year.

In accordance with the plenary powers granted the California Legislature by the constitutional amendments, ratified at a special election in October (*Railway Age Gazette,* October 20, page 775), the railroad commission act, repealing the railroad commission law, passed at the last regular session of the legislature has been approved by the legislature at the special session recently called by the governor. The law creates a commission of five members and defines its powers, and these powers are extended over all public utilities in the state. The provisions of the bill were summarized in our issue of December 15, page 1243.

The United States Steel Corporation has made its annual distribution to employees under its bonus plan, which has been in force nine years. The amount distributed for 1911 is $1,450,000. The corporation will also offer to its employees the right to subscribe to about 25,000 shares of stock. The price has not yet been fixed, but it will probably be a little lower than the market. The bonus is smaller than that for last year and for those of 1909 and 1908. In 1910 $2,700,000 was distributed, in 1909, $2,000,000, and in 1908 $1,500,000. Last year three-fifths of the gift was in Steel common, valued at a price of 70. In 1909 two-fifths was in securities, common and preferred, with the common rated at 90 and the preferred at 124. In 1908 half of the bonus was represented by common at 50. Rights are usually given to employees for subscription at a little below the contemporary market quotation. Steel common closed Wednesday at 68. Between 25,000 and 30,000 employees of the Steel Corporation are stockholders. Since 1903 they have subscribed for 237,632 shares of preferred and 44,437 shares of common. Including this year's allowance of 25,000 shares employees will own stocks with a par value of over $30,000,000.

Government Regulations for Transportation of Dangerous Articles.

The Interstate Commerce Commission, in a pamphlet of 93 pages, has issued the regulations for the transportation of explosives and other dangerous articles, by freight and by express, as revised since the negotiations and hearings which were held a few months ago; and the new rules are to go into effect March 31 next. The rules are now contained under three heads: Regulations for the Transportation of Explosives by Freight; Regulations for the Transportation of Dangerous Articles Other Than Explosives by Freight; and regulations for both kinds by express. The rules dealing with explosives were first prescribed by the commission about two years ago, these being about the same as those which had been prescribed (but without the specific sanction of a statute) by the railways themselves. These rules have now been revised. The rules for the transportation of other dangerous articles, such as acids, inflammable liquids, etc., which likewise were prepared originally by the railways, have been adopted by the commission, following conferences and hearings, as a governmental regulation, under section 15 of the interstate commerce law, which confers on the commission general authority to regulate the "practices" of carriers in connection with the transportation of merchandise. The adoption of a governmental code for express companies is based on the same authority.

New Telephone Lines.

The Central of Georgia has ordered from the Western Electric Company telephone equipment for a line from Columbus to Birmingham, 160 miles.

The Wheeling & Lake Erie is to introduce telephones for train despatching on its line from Canton, Ohio, to Terminal Junction, 88 miles; from Warrenton to Mingo Junction, 10 miles; and from Adena to Neff, 20 miles; and will use Sandwich selectors.

The Lake Shore & Michigan Southern has ordered from the Western Electric Company 55 selectors and other apparatus for the equipment of message telephone circuits between Toledo and Elkhart and between Jackson and Fort Wayne; an aggregate length of line of 245 miles.

The Chesapeake & Ohio has ordered from the United States Electric Company, New York City, 52 Gill selectors for its telephone train despatching circuits. This will make about 250 Gill selectors in use on the C. & O. The Central Vermont has given a similar order for 31 selectors, and the New Iberia & Northern is also extending its telephone circuits in the same manner.

The Buffalo, Rochester & Pittsburgh is to introduce telephones for train despatching on its line from Rochester to East Salamanca, 110 miles, and from East Salamanca to Buffalo, 65 miles, the apparatus to be furnished by the Western Electric Company. At each of twenty way-stations there will be a box outside the building containing the necessary apparatus to enable a conductor to make connections with the telephone at night when the operator is not on duty; and all trains are to carry portable telephone sets to enable this to be done, thus giving to all trains the means of connecting with the despatcher at any time.

The Canadian Pacific has rearranged its telephone despatching lines so as to have one circuit from St. John, N. B., to Vanceboro, and one from Vanceboro to Megantic. During the summer, when business was light, these two lines were worked as a single circuit and during the readjustment, which took two days, the despatchers used the Morse telegraph. From this incident arose a report, published in the newspapers, that the telephones had been found unsatisfactory and would be discarded. An officer of the road informs us that the telephone line has been a complete success in all respects; he says, moreover, that "no road should be without the telephone system of train despatching." The despatchers can do a third more work. The Gill selectors are used on these lines.

New Railway In Colombia.

The Great Northern Central line, Colombia, which starts from Puerto Wilches, on the Magdalena river, and extends toward Bucaramanga, is now under construction. Sixteen miles of track have already been laid; 46 miles run through swampy land and 220 miles through mountainous and rocky territory. The approximate cut and fill per mile is 16,000 cu. yds., the maximum grade is 2 per cent., and the minimum curve radius is a little over 100 yds. More rolling stock will probably be ordered during 1912. This line will carry coffee, tobacco, asphalt, petroleum, cereals, timber, sugar, minerals and cattle. T. P. Gaskell, 130 Dashwood House, London, England, is chairman of the board of directors, and J. Fletcher Toomer, Puerto Wilches, is general manager, chief engineer and one of the directors.

Standard Locomotive Performance Sheet.

Included in the papers for the fourth annual convention of the International Railway Fuel Association will be one on a Standard Locomotive Fuel Performance Sheet, by Robert Collett, superintendent locomotive fuel service, Frisco Lines, Springfield, Mo. In order to facilitate preparation of this paper, Mr. Collett has sent out a circular requesting answer to the questions listed below:

1. Does your company make up a fuel performance sheet? If so, what is the nature of it—daily or monthly, or both?

2. If a performance sheet is kept, is it an individual engine or engineer's record of fuel consumed?

3. Which of the two methods do you prefer and should it in your opinion be a daily or monthly record? Give reasons.

4. What is your opinion with reference to separating charges for fuel used at terminals from that used on the trip?

5. What methods are used to interest enginemen in their fuel performance?

6. Please give your opinion or experience with weighing devices and coal chutes and whether or not you consider it advisable to incur the expense of installing scales at mechanical chutes and incurring extra help needed at mechanical chutes.

7. What methods do you recommend for taking care of the shortage between coal chute measurements and billed weights?

Transportation Club of Buffalo.

George W. Smith, traffic representative of the Lackawanna Steel Company, has been elected president of the Transportation Club of Buffalo, at Buffalo, N. Y. Mr. Smith was for two years president of the Central Railway Club. He is still a member of the executive committee of the Central Railway Club, and will continue in that capacity for another year.

MEETINGS AND CONVENTIONS.

In the following list the names of secretaries, dates of next or regular meetings and places of meeting are given.

Air Brake Association.—[illegible], 53 State St., Boston, Mass.; annual, May 7-10, Richmond, Va.

[illegible].—A. G. Thomson, Boston, [illegible].

American Association of General Passenger and Ticket Agents.—W. C. [illegible], Seattle, Wash.

American Association of Freight Agents.—R. O. Wells, East St. Louis, [illegible].

[illegible].—H. C. Donecker, 29 W. 59th [illegible].

[illegible].—George Kreyer, 165 [illegible].

American Railway Association.—W. F. Allen, 75 Church St., New York.

American Railway Bridge and Building Association.—C. A. Lichty, C. & N. W., Chicago. Convention, 3d week in Oct., Baltimore, Md.

American Railway Engineering Association.—E. H. Fritch, Monadnock [illegible].

American Railway Master Mechanics' Assoc.—J. W. Taylor, Old Colony building, Chicago. Convention, June 17-19, Atlantic City, N. J.

[illegible].—M. H. Rapp, 8 Y. [illegible], New York; 1st and 3d Wed., except June and August, New York.

[illegible].—[illegible], W. [illegible].—W. [illegible].

[illegible].—[illegible].

[illegible].—[illegible].

[illegible].—[

Traffic News.

The number of emigrants arriving at the port of New York during the present year is expected to total not over 800,000, probably 30 per cent. less than the number arriving in 1910.

It is expected that the coal tonnage from the southern West Virginia coal fields of the Norfolk & Western will total 19,000,000 tons for 1911. The tonnage for the 11 months was over 200,000 tons more than the corresponding 11 months of 1910.

A movement has been instituted by the executive committee of the National Industrial Traffic League to ascertain the sentiment of its membership and shippers in general on the question of Panama canal tolls. A committee appointed for the purpose has addressed to the members a series of questions bearing on the subject.

The merchants of Spokane, Wash., at a recent meeting decided to raise a fund of $50,000 to continue the campaign for reduced freight rates to Spokane, and it is reported that their intention is to place the routing of freight shipments in the hands of one man to be turned over to a single railway in an effort to secure concessions by boycotting the other lines.

All railways and express companies doing business in that part of Oklahoma which was formerly the Indian territory, have ordered agents to accept no intoxicating liquors for shipment into that territory. This order follows a decision by the United States Circuit Court of Appeals, in a case against the United States Express Company brought by a liquor dealer at Fort Smith, Ark., in which it is held that the former prohibition of the old federal statutes is still in force, and will remain so until the expiration of a period of 21 years specified in the law.

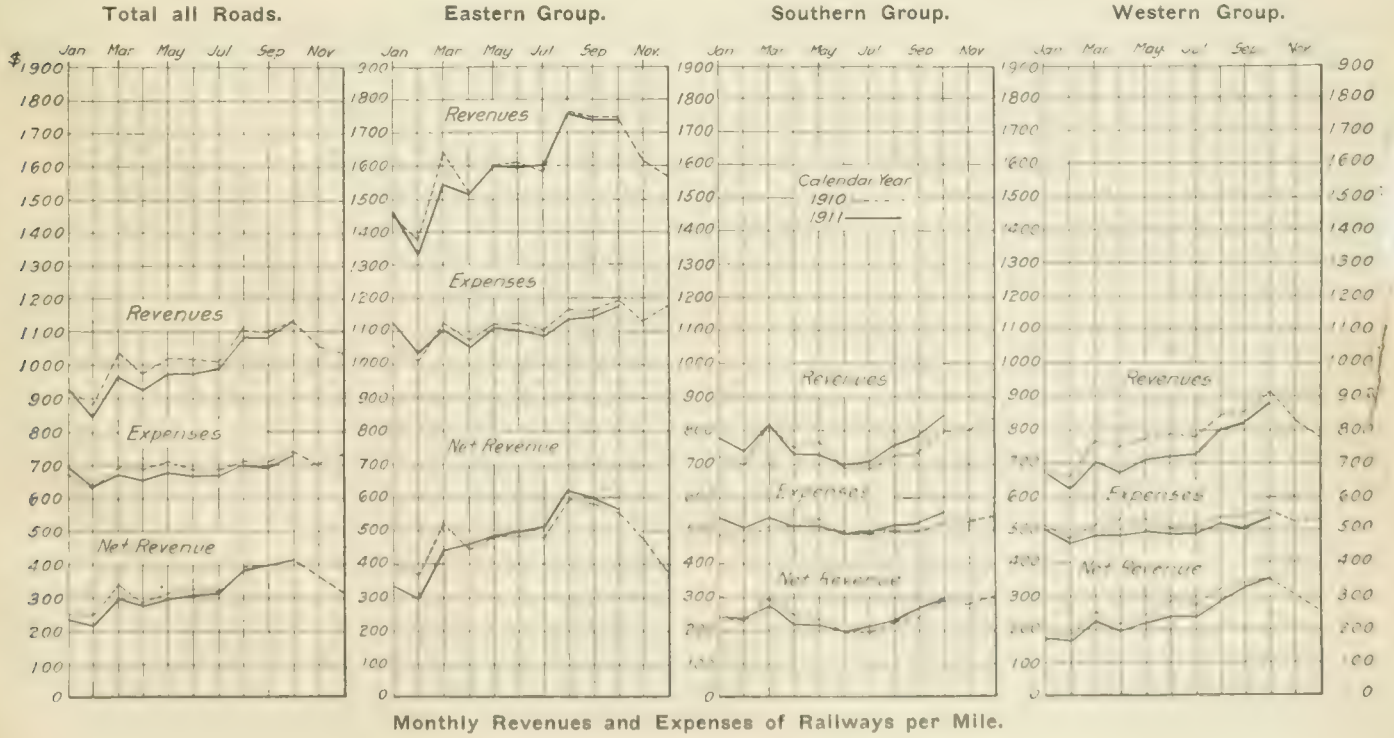
The United States Circuit Court at New York City has refused the petition of the *Review of Reviews,* in which the court was asked to issue a temporary injunction restraining the postmaster-general from forwarding that magazine by freight trains, the claim of the publisher being that in sending his monthly magazine by freight, while weekly magazines, active as competitors of the monthly, are sent by fast passenger trains, the government practices discrimination. The court held that the postmaster-general could rightfully send the mails by any conveyance deemed by him suitable, provided he delivered the mail matter at destination in accordance with the law.

The Florida East Coast has petitioned the Commerce Court to enjoin the Interstate Commerce Commission from making effective an order reducing freight rates on citrus fruits and vegetables. The commission was served with notice to show cause in three days why a temporary injunction should not be issued pending final hearing of the case. The commission on November 6 ordered the railways to reduce rates by January 2. The petition now presented sets forth that on account of this proposed reduction, the increases in wages and expenditures for extensions, it will face a deficit; and that the decreases ordered are unreasonable. It is asserted that the decreases will cause a loss of revenue of $130,000 a year.

B. F. Yoakum, of the St. Louis & San Francisco, is quoted as saying: "On our three-hundred-mile Brownsville line one day last week there were 153 immigrant outfits. Not only are people coming to the Southwest, but virgin land with twenty feet of soil, speaking generally, is being ploughed. The needs arising from this southwestern development are, of course, bringing larger business, and, of course, are having some effect upon the price of land. The fruit and vegetable products of these districts can be delivered and disposed of with a profit in St. Louis, Chicago, Minneapolis and St. Paul as readily as products may be brought from our southern states to New York and New England markets. Normal requirements from these growing sections without the benefit of business expansion guarantee as large a degree of business in the next twelve months as at present."

Total Monthly Earnings and Expenses.

Bulletin Number 26 of the Bureau of Railway Economics giving a summary of revenues and expenses of steam roads in the United States for the month of October, 1911, says: The railways whose returns are included in this bulletin operate 223,227 miles of line, or about 91 per cent. of all the steam railway mileage in the United States. The total operating revenues for the month of October, 1911, amounted to $252,274,379. Compared with October, 1910, the total operating revenues of these railways show an increase of $1,338,557. That this increase was due exclusively to the increase in mileage of these roads in 1911, as compared with 1910, is proved by the fact that when reduced to a per mile basis for the two years total operating revenues show a decrease. Thus total operating revenues per mile of line amounted to $1,130 in October, 1911, and $1,138 in October 1910, a decrease for 1911 of $8, or 0.7 per cent. The table shows that this decrease in operating revenues resulted



Monthly Revenues and Expenses of Railways per Mile.

from decreases both in freight and in passenger revenues.

Operating expenses amounted to $161,405,726. This was $646,326 less than for October, 1910. Operating expenses per mile amounted to $723, compared with $735 in October, 1910. This represents a decrease of $12 per mile, or 1.6 per cent., which was due to decreases in all the primary operating expense accounts except traffic expenses. In the cost of maintaining way and structures, there was a decrease compared with October, 1910, of $4 per mile, or 2.4 per cent.; in the cost of maintaining equipment a decrease of $3 per mile, or 1.9 per cent.; in the cost of conducting transportation a decrease of $5 per mile, or 1.4 per cent.; general expenses showed a slight decrease per mile.

Net operating revenue shows an increase as compared with October, 1910, of $4 per mile, or 1.0 per cent. By thus cutting down operating expenses the railways were able to overcome the decrease of $8 per mile in operating revenues. The net revenue for each mile of line for each day of October averaged $13.13, as compared with $13 for October, 1910.

Taxes for the month of October amounted to $9,694,033, or $43 per mile, an increase of 12.8 per cent. over October, 1910.

The operating ratio for October, that is, the per cent. of total operating revenues which was absorbed in operating expenses, was 63.9 per cent., as compared with 63.8 per cent. in September, 1911, and 64.6 per cent. in October, 1910.

The eastern group of railways shows a decrease in total operating revenues per mile as compared with October, 1910, of 0.4 per cent., and the western group a decrease of 2.7 per cent., while the operating revenues per mile of the southern group increased 5.7 per cent. over October, 1910. Operating expenses per mile decreased 1.5 per cent. on the eastern railways as compared with October, 1910, and on the western railways 4.2 per cent., but increased on the southern railways 7.1 per cent. All the primary operating expense accounts of the eastern and western groups of railways decreased as compared with October, 1910, save only the less important accounts of general expenses in the East and traffic expenses in the West. The southern railways, on the other hand, show an increase in every primary expense account. Net operating revenue per mile in the eastern group increased 2.0 per cent. as compared with October, 1910, that of the southern group increased 3.1 per cent., while that of the western group declined 0.3 per cent. Taxes increased in all the groups as compared with October, 1910, the increase per mile amounting to 16.2 per cent. in the eastern group, 10.2 per cent. in the western group, and 8.2 per cent. in the southern group.

When the returns for the ten months of the calendar year 1911 are compared with those of the corresponding months of 1910, they show decreases in total operating revenues per mile of 2.9 per cent., and in net operating revenue per mile of 4.7 per cent. There were decreases in net operating revenue of 1.7 per cent. in the eastern group, and 8.8 per cent. in the western group, while the southern group shows the slight increase of 0.2 per cent. for the period.

Comparison of the returns for the four months of the fiscal year 1912 with those of the corresponding months of the fiscal year 1911 shows a decrease in total operating revenues per mile of 1.5 per cent., and in net operating revenue per mile of 0.5 per cent. The considerable decrease of 6.5 per cent. in the net operating revenue per mile of the western group contrasts with increases of 4.0 per cent. in the eastern group and 6.5 per cent. in the southern group.

INTERSTATE COMMERCE COMMISSION.

The commission has suspended, until April 20, tariffs filed by the Rock Island, [illegible] increased rates on grain.

The commission has decided to permit the advances in rates on sugars and syrups from Norfolk, Va., to points in North and South Carolina. (22 I. C. C., 124.)

Rates on Fire Brick Reduced.

T. N. Atchison v. *the St. Louis, Iron Mountain & Southern et al. Opinion by the commission.*

The rates on fire brick from Paris to Shreveport and other Louisiana points found to be unreasonable. (22 I. C. C., 131.)

Reparation Awarded.

Diamond Coal & Coke Co. v. *Baltimore & Ohio. Opinion by the commission.*

Rates on mining car wheels from Rock Island, Ill., to Diamondville, Wyo., should be the same as rates on mining cars. (22 I. C. C., 129.)

Rate on Brimstone Reasonable.

McLaughlin, Gormley, King Co., v. *the Maine Steamship Company et al. Opinion by the commission.*

The sixth-class rate of 35 cents per hundred pounds on brimstone from New York to Minneapolis via Portland, Me., is found to be not unreasonable. (22 I. C. C., 108.)

Refusal to Equalize Tacoma and Portland.

Carstens Packing Co. v. Oregon & Washington Railroad et al. Opinion by the commission:

The complaint is as to the relation between rates on live stock and on packing-house products from Portland, Ore., to Tacoma, Wash., and Seattle. The whole record in the case makes the conclusion inevitable that the complainant is seeking to have the commission equalize Tacoma and Seattle with Portland as a slaughtering center. Doubtless due to their natural location, Portland has certain advantages as a live-stock market, and the testimony is that the prevailing prices of live stock are somewhat lower there than at the cities on the Sound. The record does not show that this condition is due to any unjust arrangement of rates, and it is well settled that it is not the function of the commission to equalize communities in matters of this character. The complaint is therefore dismissed. (22 I. C. C., 77.)

Rates on Wagons Reduced.

Milburn Wagon Co. v. Lake Shore & Michigan Southern et al. Opinion by Commissioner Clark:

The complaint is against the rate under official classification on wagons and other vehicles from Toledo, Ohio, to Ohio river crossings and Virginia cities. The complainant's difficulties arise from the differences between the official and southern classifications and from the fact that there are no proportional rates on wagons in effect from Toledo. The adjustment rate from Toledo as compared with Chicago is plainly unjust discrimination. The commission inquires whether this complaint shall wait indefinitely for reasonable rates which are withheld because of the inability of the railways to agree on how they will divide the earnings. The fact that the reduction of an unreasonable rate or the correction of an unjust discrimination will require reductions or corrections at other points cannot be accepted as a valid defense for an unreasonable rate. Not only are rates reduced but reparation is awarded on previous shipments. (22 I. C. C., 93.)

Cement Rates Equalized by Advancing Rates.

Elk Cement & Lime Co. v. the Baltimore & Ohio et al. Opinion by Commissioner McChord.

The defendants are parties to joint through rates on cement from the Lehigh Valley district mills in eastern Pennsylvania and western New Jersey to Detroit and other points in Central Freight Association territory, and the rates from these points are on a lower mileage basis than the rates from Detroit and other points to competitive points. The present relative rates allow the cement manufacturers of the Lehigh Valley district to "dump" their surplus stocks on the market at Detroit, while at the same time preventing the Detroit manufacturers from competing with Lehigh Valley manufacturers in points in Central Freight Association territory equidistant from the Lehigh Valley district and Detroit. (22 I. C. C., 84.)

In re suspension of advances in rates on cement originating in Central Freight Association territory. Opinion by Commissioner McChord.

The commission suspended for investigation tariffs carrying advances in rates on cement in carload lots from Michigan, Indiana, Ohio and other points to Detroit. In the Elk cement case above it was found that the rate into Detroit as compared with the rate from Detroit to other points was too low, and the present investigation shows that the railways have sustained

the burden of proof in showing that the advanced rates asked for are reasonable. The advances are therefore permitted. (22 I. C. C., 90.)

The Commission's Power to Equalize Markets Defined.

Ashland Fire Brick Co. et al. v. Southern Railway et al. Opinion by Commissioner Lane:

Complaint urges that rates on brick from kilns on or near the Ohio river to Birmingham and other southern cities are unreasonable as compared with the rates on brick from St. Louis, Mo., to the same destinations. While it is true that the commission has held that where joint or proportional rates are made by all the carriers to certain points of destination it is within its power to end a discrimination as between points of origin by a reducton in their rate from a certain point that is discriminated against, yet this principle only has application where the traffic from both groups of origin is necessarily transported to destination by the same connecting carriers and where it is possible for the delivering carriers to put an end to the discrimination by the exercise of their power to refuse to enter into preferential joint or proportional rates.

Power has not been lodged with this tribunal to equalize economic advantages, to place one market in competition with another, or to treat all railways as part of one great whole, apportion to each a certain territory, or to require all to meet upon a common basis at all points. As to the charges of undue preference or unjust discrimination made against defendants the commission can not find that they are guilty in this instance.

As to Ironton, Ohio, Portsmouth and Oak Hill no order will be entered; but the present rates on brick from Haldeman, Ky., Hayward, Ashland, Taylors and Olive Hill to all points of destination involved found to be unreasonable, and reasonable rates prescribed for the future. (22 I. C. C., 115.)

STATE COMMISSIONS.

The Illinois railway commission at its January meeting will consider an application of the Illinois freight committee for the establishment of specific ratings on aeroplanes.

The Indiana State Railroad Commission has ruled that when a railway gives in writing a freight rate lower than the tariff, the consignee can hold the company to the figures given. On the other hand, if a rate should be quoted in writing higher than the published tariff, only the published rate can be collected. To the irreverent this will sound like "heads I win, tails you lose." The federal rule is that in either case the tariff rate must prevail, even if the carrier finds himself obliged to sue for a part of the money.

The Pennsylvania Company has agreed to a rule promulgated by the state railroad commission of Indiana that when a conductor or engineman has to run over a division which he has not traversed for sixty days, he shall make a trip of inspection over the division before taking charge of a train or engine. Also, that in case a main track is temporarily unfit for regular speed, trainmen shall be notified of the condition of the track by some means better than a general order; train orders should be used. These requirements evidently have been brought about as a result of the investigation of the recent derailment at Fort Wayne.

COURT NEWS.

The United States Circuit Court at San Francisco on application of the Southern Pacific has temporarily enjoined the enforcement of the order of the California railway commission reducing rates between San Pedro harbor and the city of Los Angeles proper.

Engineers who have studied the problem of substituting electricity for steam on the Gotthard Railway report that with traffic no greater than it was in 1904, electricity would cost a little more than steam, but with the traffic grown as it may be expected to by the time the substitution can be effected, electricity will be 25 per cent. cheaper.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

J. Taney Willcox, assistant to the secretary of the Pennsylvania Railroad at Philadelphia, Pa., has been appointed assistant secretary, with office at Philadelphia, succeeding K. S. Green, resigned.

O. L. Dickeson, vice-president and general manager of the White Pass & Yukon Route, has been elected president, with office at Vancouver, British Columbia, succeeding S. H. Graves, deceased. A photograph of Mr. Dickeson and a sketch of his railway career were published in the *Railway Age Gazette* of April 28, 1911, page 1013.

L. E. Katzenbach, assistant secretary of the Chicago, Burlington & Quincy, and assistant secretary and assistant treasurer of the Colorado & Southern at New York, has been appointed also secretary and assistant treasurer of the Great Northern, succeeding Edward Sawyer, who has had his office at St. Paul, Minn., and who has been retired.

William Ellis, commerce counsel of the Chicago, Milwaukee & St. Paul at Chicago, has resigned, effective January 1, to become the publisher of "The Searchlight," at Gray's Lake, Ill., a monthly publication to be devoted to the discussion of commercial and corporate affairs in their relations to the so-called reform and insurgent movement. O. W. Dynes, assistant general solicitor, has been appointed commerce counsel to succeed Mr. Ellis.

Francis I. Gowen, who has been appointed general counsel of the Pennsylvania Railroad, with office at Philadelphia, Pa., as has been announced in these columns, was born at Germantown, Philadelphia, on August 17, 1855, and was educated at the school of Dr. John W. Fairies, preparatory to a course at the University of Pennsylvania. He was admitted to the bar in 1877, and in December, 1902, was appointed general solicitor of the Pennsylvania Railroad. While engaged in general law practice, Mr. Gowen was for several years connected with the legal department of the Lehigh Valley as Philadelphia counsel. He also served as assistant general solicitor of the Philadelphia & Reading for a short period.

George Stuart Patterson, whose appointment as general solicitor of the Pennsylvania Railroad with office at Philadelphia, Pa., has been announced in these columns, was born on December 10, 1868, at Philadelphia, Pa. He graduated from the Germantown Academy in 1884, spent two years at Haverford College, and two years in the academic department of the University of Pennsylvania, from which he graduated in 1[illegible]. After three years in the law department of the University of Pennsylvania, he graduated from that institution in [illegible]. Mr. Patterson entered the service of the Pennsylvania Railroad on February 1, 1900, as assistant solicitor, which position he held until December, 1902, when he became assistant general solicitor. Upon the later reorganization of the company's legal department in November, 1907, Mr. Patterson became assistant general counsel. At his graduation from the department of law of the University of Pennsylvania, Mr. Patterson was elected a Fellow of the Department of [illegible]; and in 1892 he was elected Professor of Law, which chair he still holds.

Operating Officers.

F. A. Huber has been appointed car service agent of the Bessemer & Lake Erie, with office at Greenville, Pa.

R. H. Hunter has been appointed acting assistant superintendent on the Idaho division of the Oregon Short Line, with office at Pocatello, Idaho.

M. Sheehan has been appointed trainmaster of the New Orleans, Texas & Mexico, the Beaumont, Sour Lake & Western, and the Orange & Northwestern, with office at DeQuincy, La.

D. F. Bucher, superintendent of the National Railways of Mexico at Chihuahua, Mex., has been appointed superintendent

of the Mexico North Western, with office at Madera, Chihuahua. E. A. Dewey, who has been superintendent at Madera, will be assistant superintendent at that place; and George Rutledge, who has been superintendent at Ciudad Juarez, Chihuahua, will have the title assistant superintendent at that place.

James Buckelew, superintendent of the Allegheny division of the Pennsylvania Railroad at Oil City, Pa., has been appointed superintendent of the Camden (N. J.) terminal. The Amboy and Belvidere divisions have been combined to form the Trenton division, with Victor Wierman superintendent, with headquarters at Camden, N. J. A. P. Gest, superintendent of the Belvidere division, has been appointed special agent of the New Jersey division. The New York Terminal division and the Hudson division have been combined to form the Manhattan division, with C. S. Krick as superintendent; and A. M. Parker, superintendent of the Hudson division, has been appointed superintendent of the Allegheny division.

C. C. Riley, whose appointment as assistant to general manager of the Baltimore & Ohio, with headquarters at Baltimore, Md., has been announced in these columns, will have supervision over matters of transportation efficiency, particularly with reference to the utilization of equipment, its distribution and proper loading and movement over the road and through terminals. Mr. Riley was born at Cumberland, Ind., on October 1, 1864, and after attending Butler College and Indiana College of Physicians and Surgeons he entered railway service in the operating department of the Cleveland, Cincinnati, Chicago & St. Louis in 1888, remaining in the employ of that company until 1897, when he was appointed superintendent of car service of the Baltimore & Ohio Southwestern at Cincinnati. From 1901 to 1903 Mr. Riley was car service agent of the Chicago Great Western, resigning to accept a similar position with the Erie Railroad, and was later promoted to superintendent of transportation. In 1908 he left the service of the Erie to become superintendent of transportation of the Kansas City Southern, and later became general superintendent of that road, which position he held at the time of his recent appointment as assistant to general manager of the Baltimore & Ohio.

Milton Burnell Murphy, whose appointment as superintendent of the Canadian Northern, with office at Winnipeg, Man., has been announced in these columns, was born September 11, 1866, at Napa, Cal., and received a high school education at Denver, Colo. He began railway work with the Union Pacific at Omaha, Neb., [illegible] ly, until January, [illegible] operator, agent, [illegible] of Carbon county, [illegible]

M. B. Murphy.

[illegible] of locomotive performance statistics on the Chicago, St. Paul, Minneapolis & Omaha despatcher of the Eastern [illegible] division despatcher and chief despatcher of the Union Pacific, despatcher and chief despatcher of the Union Pacific, despatcher and chief despatcher of the Denver & Rio Grande, and chief [illegible] and superintendent of the El Paso & North Eastern, the last position he held under the Mexican Central at Chihuahua, Mex., September 20, 1909, where he remained until January, 1910, and took up his present work as general yardmaster of the Chicago Great Western at Omaha. In May, 1910, he was appointed superintendent of the Second district of the Canadian Northern at Winnipeg, and during August and September of the same year was acting superintendent. He was made superintendent of the Duluth, Rainy Lake & Winnipeg at Virginia, Minn., on February 27, 1911, which position he held until his promotion to superintendent on December 1, 1911.

Traffic Officers.

H. R. Jones has been appointed traveling freight agent of the Southern Railway, with office at Jacksonville, Fla.

J. P. Gordon has been appointed general agent of the Duluth, South Shore & Atlantic, with headquarters at Duluth, Minn.

R. V. McCroskey has been appointed traffic manager of the Michigan, Indiana & Illinois Line, with office at Chicago.

Bryan Snyder has been appointed traffic manager of the Marshall & East Texas, with office at Marshall, Tex., succeeding J. I. Hey, resigned.

W. W. Richardson, whose appointment as general passenger agent of the Southwest System of the Pennsylvania Lines West, has been announced in these columns, was born and educated in Cincinnati, Ohio. He began railway work on September 1, 1880, as a clerk in the motive power department of the Pennsylvania Lines at Cincinnati, and later at Indianapolis. He was then chief clerk to the assistant general passenger agent at Chicago. In 1887 he was made chief clerk in the office of the division superintendent at Richmond, Ind., which position he held until 1893, when he again became chief clerk to the assistant general passenger agent at Chicago, where he was located until 1895. From July, 1895, to June 1, 1897, he was traveling passenger agent of the Pennsylvania Lines, with headquarters at Omaha, Neb., and in June, 1892, he was promoted to district passenger agent at Indianapolis. He was appointed assistant general passenger agent at Indianapolis in December, 1903, and was transferred in the same capacity to the general offices at Pittsburgh on March 15, 1910, which position he held at the time of his recent appointment as above noted.

W. W. Richardson.

G. L. A. Thomson, district passenger agent of the Pennsylvania Lines West at Toledo, Ohio, has been appointed district passenger agent, with office at Chicago.

Walter Walthall, city passenger and ticket agent of the Missouri, Kansas & Texas of Texas at San Antonio, has been appointed district passenger agent, with office at San Antonio.

James Maney, assistant general passenger agent of the Duluth, South Shore & Atlantic, has been appointed general passenger agent with headquarters at Duluth, Minn., effective January 1, succeeding Martin Edson.

F. H. Plaisted, assistant general freight agent of the Oregon Short Line at Salt Lake City, Utah, has been appointed assistant to director of traffic of the Harriman Lines, with office at New York City, effective January 1.

[illegible] McMaster, agent of Grand Trunk Pacific at Prince Rupert, B. C., has been appointed general agent of the Grand Trunk Pacific, the Grand Trunk Pacific Coast S.S. Co., Ltd., and the Grand Trunk, in charge of passenger and freight traffic in western British Columbia, north of Rivers Inlet, including Queen Charlotte Islands, with office at Prince Rupert, B. C.

W. D. Thomas has been appointed traveling freight agent of the Atchison, Topeka & Santa Fe, with office at St. Louis, Mo.

Edmund R. Gregory, traveling passenger agent of the Coast Lines of the Santa Fe at Long Beach, Cal., has been appointed traveling passenger agent, with headquarters at Los Angeles, Cal., succeeding Harold H. Moore, appointed city passenger and ticket agent at San Diego, Cal. G. A. Hoppe, Jr., succeeds Mr. Gregory.

C. W. Strain, general passenger agent of the St. Louis, San Francisco & Texas, the Fort Worth & Rio Grande, and the Paris & Great Northern at Fort Worth, Texas, has been appointed general passenger agent of the New Orleans, Texas & Mexico, the St. Louis, Brownsville & Mexico, the Beaumont, Sour Lake & Western, and the Orange & Northwestern, with office at Houston, Tex. W. C. Preston, general freight agent of the three first mentioned roads at Fort Worth, has been appointed also general passenger agent, succeeding Mr. Strain. William Doherty, traffic manager of the St. Louis, Brownsville & Mexico at Kingsville, Texas, has been appointed general immigration agent of the four 'Frisco lines in south Texas, with office at Houston.

Engineering and Rolling Stock Officers.

Curtis E. Knickerbocker, chief engineer of the New York, Ontario & Western, at Middletown, N. Y., has resigned.

J. J. McNeill has been appointed supervisor of locomotive operation of the Erie Railroad, with office at Cleveland, Ohio, succeeding D. J. Madden, promoted.

G. E. Sisco, assistant master mechanic of the Pennsylvania Lines West of Pittsburgh, has been appointed assistant engineer of motive power, with office at Columbus, Ohio, succeeding H. S. Needham, transferred.

C. W. Cross, superintendent of apprentices of the New York Central Lines, with office at New York, will report to C. E. Schaff, vice-president of the New York Central Lines, after January 1, and will have his office in the La Salle street station, Chicago. His jurisdiction will extend over the New York Central Lines west of Buffalo only. Henry Gardner, now assistant superintendent of apprentices at New York City, will be in charge of the apprenticeship work on the New York Central & Hudson River, and will report to R. T. Shea, general inspector of piece work.

C. H. Hogan, assistant superintendent of motive power of the New York Central & Hudson River at Albany, N. Y., has been appointed assistant superintendent of motive power of the Eastern district (Hudson, Harlem, N. Y. & P., River, Mohawk and Adirondack divisions) with headquarters at Albany. A. J. Fries, district superintendent at Depew, has been appointed assistant superintendent of motive power of the Western district (Buffalo, Rochester, Western, Ontario, St. Lawrence and Pennsylvania divisions) with headquarters at Depew. L. H. Raymond has been appointed superintendent of shops at West Albany, and H. Wanamaker, general foreman of locomotive department at Depew, has been appointed superintendent of shops at Depew. The positions of district superintendent of motive power, with headquarters at West Albany and Depew, have been discontinued.

Arthur Jung, roadmaster of the Atchison, Topeka & Santa Fe at Ellinwood, Kan., has been appointed roadmaster of the First and Bazar districts of the Middle division, with office at Newton, Kan., succeeding W. F. Muff, resigned, and Joseph Westerhaus has been appointed roadmaster of the McPherson and Little River districts, with office at Ellinwood, succeeding Mr. Jung. C. Kelley has been appointed roadmaster, with office at Guthrie, Okla., succeeding H. S. Cox. E. E. Ball, engineer of construction of the Coast Lines of the Santa Fe at Winslow, Ariz., has been appointed division engineer, with office at Winslow, succeeding D. M. Bunker. John Pullar, division foreman at Los Angeles, Cal., has been appointed master mechanic, with office at Richmond, Cal., succeeding E. H. Harlow, appointed terminal master mechanic of the San Francisco Bay terminals, with office at Richmond. F. W. McNutt, roadmaster at Albuquerque, N. Mex., has been transferred to Gallup, N. Mex. L. B. Parsons, roadmaster at Kingman, Ariz., has been transferred to Barstow, Cal., succeeding B. F. Gauldin, who has been transferred to San Bernardino, Cal., in place of A. Ray, and Mr. Ray has been appointed roadmaster on the First district of the Los Angeles division, with headquarters at San Bernardino. J. A. Rohrer, roadmaster at Needles, Cal., succeeds Mr. Parsons, with office at Kingman, Ariz.

J. T. Wallace, superintendent of the West Jersey & Sea Shore, has been appointed general superintendent of motive power of the Pennsylvania Railroad, with office at Altoona, Pa., succeeding R. N. Durborow, deceased. H. S. Hayward, superintendent of motive power of the New Jersey division of the Pennsylvania Railroad, at Jersey City, N. J., has been appointed consulting engineer of floating equipment. D. M. Perine, superintendent of motive power at Pittsburgh, Pa., has been transferred to the New Jersey division as superintendent of motive power. J. M. James, master mechanic of the West Philadelphia shops, has been appointed superintendent of motive power of the Western Pennsylvania division, with headquarters at Pittsburgh. J. M. Henry, master mechanic at the Olean (N. Y.) shops, has been appointed master mechanic of the West Philadelphia shops. C. K. Shelby, master mechanic of the Elmira (N. Y.) shops, has been transferred as master mechanic to Olean. W. J. Rusling, general foreman at Enola, Pa., has been appointed master mechanic of the Elmira shops. C. B. Gray, assistant general foreman of the Pitcairn (Pa.) shops, has been appointed general foreman at Enola. C. D. Porter, foreman of the Park shops at Philadelphia, Pa., has been appointed assistant general foreman at Pitcairn, and J. B. Kapp, assistant general foreman of the tank shop at Altoona, has been appointed foreman of the Park shops at Philadelphia.

OBITUARY.

W. H. Greeger, general agent, passenger department of the Chesapeake & Ohio at Washington, D. C., died on December 17, at that place.

James Martin, superintendent of the Pullman Company for the district south of New York and east of the Mississippi river, with headquarters in Philadelphia, Pa., died at Philadelphia on December 27, at the age of 65. Mr. Martin was born in Bedford, Pa., and had been with the Pullman Company for 40 years.

Warren B. Stimson, assistant to general manager of the Grand Rapids & Indiana, at Grand Rapids, Mich., died at that place on December 25. Mr. Stimson was born October 24, 1848, at Copley, Summit Co., Ohio, and began railway work in 1871, as a rodman on the Grand Rapids & Indiana. From 1871 to 1876 he was assistant engineer of the same road and then for two years was assistant engineer on the Kansas City extension of the Chicago & Alton. From 1878 to 1880 he was division engineer of the Council Bluffs extension of the Wabash, St. Louis & Pacific, and then for three years was assistant engineer on th Grand Rapids & Indiana. He went to the Marquette & Weste in 1883 as resident engineer and the following year returned the service of the Grand Rapids & Indiana as roadmaster. 1890 he was appointed superintendent of the Northern divi and was later made assistant to the general manager of company.

Last spring and summer terrible stories were told in Russian papers of the condition of things on the new rail which the government is building down the Amur river: th were obstacles which it was next to impossible to overcome; the men employed were cheated and were mutinous; and men in control were making a gigantic job of it. A few months ago the minister of transportation went on a journey of inspection to see for himself. He telegraphed to the Czar September 24 that work had gone on satisfactorily, that in addition to the 125 miles opened last year some hundreds more will be opened early next year, including three branch lines; that 40,000 laborers from all parts of Russia, besides 6,000 prisoners, were employed on the work; that they were generally properly cared for and satisfied, being able to save $50 to $60 a year out of their wages; that some 2,000 little settlements had been made along the line; and that in the more unfavorable sections cattle could be raised and dairies established. He also reports that the engineers have overcome incredible difficulties, among thickets and swamps.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Abilene & Southern has ordered one locomotive.

The Grand Trunk will build 30 locomotives in its own shops.

The Chicago, Burlington & Quincy has ordered 25 locomotives from the Baldwin Locomotive Works.

The Western Maryland is preparing specifications for 10 Pacific type locomotives and 15 consolidation locomotives.

The Maine Central has ordered two six-wheel switching locomotives, seven consolidation locomotives and two Pacific type locomotives from the American Locomotive Company. The switching locomotive will have 20-in. x 26-in. cylinders, 51-in. driving wheels, and in working order will weigh 135,000 lbs. The consolidation locomotives will have 23-in. x 28-in. cylinders, 63-in. driving wheels, will be equipped with superheaters and in working order will weigh 201,000 lbs. The Pacific type locomotives will be equipped with superheaters, will have 22-in. x 28-in. cylinders, 73-in. driving wheels, and in working order will weigh 228,000 lbs.

CAR BUILDING.

The Central Vermont is figuring on new car equipment to be ordered early in the year.

The Missouri Pacific has ordered 500 box cars from the Standard Steel Car Company.

The Great Northern has ordered 1,500 refrigerator cars from the Haskell & Barker Car Company.

The Woodward Iron Company, Birmingham, Ala., has ordered 100 freight cars from the Pressed Steel Car Company.

The Chesapeake & Ohio has ordered 200 steel underframe flat cars from the American Car & Foundry Company.

The Grand Trunk Pacific has ordered 300 Hart convertible, steel underframe cars from the Hart-Otis Car Company.

The Chicago, Burlington & Quincy has ordered 1,500 gondola cars from the American Car & Foundry Company, and 1,000 gondola cars from the Pressed Steel Car Company.

The Minneapolis, St. Paul & Sault Ste. Marie is said to have ordered 300 refigerator cars from the American Car & Foundry Company. This item has not been confirmed.

The Chicago, Rock Island & Pacific has ordered 2,500 box cars and 500 furniture cars from the Pullman Company; 200 ballast cars from the Rodger Ballast Car Company. This road is now negotiating for 700 hopper cars.

The Western Maryland is preparing specifications for 2 all-steel 50-ft. mail cars, 10 steel underframe 60-ft. baggage cars, 18 steel underframe coaches, 2 steel underframe combination mail and express cars, 2 steel underframe dining and club cars, 500 50-ton all-steel hopper cars, 500 40-ton steel underframe box cars, 500 all-steel 50-ton, drop-bottom, gondola cars, and 1,000 50-ton end, drop bottom, 50 ton, steel underframe gondola cars.

IRON AND STEEL.

The Nashville, Chattanooga & St. Louis has ordered 10,000 tons of open hearth rails from the Tennessee Coal, Iron & Railroad Company.

The Baltimore & Ohio has ordered about 40,000 tons of rails, of which 7,000 were placed with the Illinois Steel, 17,000 with the Carnegie Steel Company and a part with the Pennsylvania Steel Company.

General Conditions in Steel. The steel industry has shown a marked improvement during the past week. The Steel Corporation is receiving new business on a larger scale and is now operating at about 80 per cent. of its capacity. Prices have been increased slightly and a further and more radical increase is expected shortly. Inquiries for structural steel have been a particularly large increase during the week and these are expected to develop into orders immediately. It is believed that the Steel Corporation will increase its operations to 90 per cent. of capacity within the next two weeks.

Supply Trade News.

The Pressed Steel Car Company, Pittsburgh, Pa., has removed its office from St. Louis, Mo., to the Old Colony building, Chicago.

W. J. Bixby, who has been appointed a receiver of the Wabash, has resigned his position as a director of the American Car & Foundry Company, New York.

James Martin, superintendent of the Pullman Company, Chicago, with office in Philadelphia, Pa., died at his home on December 27, at the age of 65.

A. W. Heinle, engineer in charge of rail manufacture, rail joint construction and rolled track equipment, has resigned from the Heinle Company of Pittsburgh, Pa.

H. M. Percy, for several years mechanical engineer of the Joliet Railway Supply Company, Joliet, Ill., is now in the sales department of the Chicago Car Door Company, Chicago.

William H. Connell, Jr., mechanical engineer, has been made manager of the new office of Hilles & Jones Company, Wilmington, Del., in the Henry W. Oliver building, Pittsburgh, Pa.

G. H. Macdonough, superintendent of construction for the General Railway Signal Company, Rochester, N. Y., with office at Chicago, has been made general manager of the Potter-Winslow Company, Chicago, effective January 1, 1912.

The Julius Pintsch Aktiengesellschaft advises that the Prussian Minister of Public Works has denied a report published in various European papers to the effect that, by action of the Reichstag, at Berlin, the Prussian state railways were to be equipped with electric light.

W. E. Sharp, general superintendent of shops for the Armour Car Lines, Chicago, has resigned to become vice-president and general manager of the Grip Nut Company, Chicago. Mr. Sharp began railway work in April, 1890, as a laborer in the car shops of the Erie at Huntington, Ind. He advanced rapidly through the locomotive and car department until 1898, when he resigned as division foreman of the locomotive and car department to become assistant shop superintendent for the Armour Car Lines. In 1900 he was promoted to shop superintendent, and later to general superintendent of shops. He will retain his connection with the Armour Car Lines as consulting engineer. Mr. Sharp took an active part in the formation of the Car Foremen's Association of Chicago, is a member of the Master Car Builders' Association, worked on various committees, and was president of the Western Railway Club 1909-1910.

W. E. Sharp.

C. B. Flint, manager of the supply department of Manning, Maxwell & Moore, New York, has resigned to become president of Flint & Chester, Inc., 237 Lafayette street, New York. This firm was formed to carry on business in railway, machinists' and contractors' supplies.

The Baldwin Locomotive Works, Philadelphia, Pa., whose reorganization was described in the *Railway Age Gazette* of June 30, has declared initial semi-annual dividends of 3½ per cent. and 1 per cent. on its $20,000,000 preferred stock and $20,000,000 common stock, respectively. The preferred stock has recently been listed on the New York Stock Exchange. The Baldwin Locomotive Works is now negotiating for some land near Chicago for the erection of a western plant.

The Chicago Railway Signal Supply Company, Carpentersville, Ill., has been incorporated in Illinois with $10,000 capital stock, to make and deal in railway signal apparatus. The incorporators are: John F. Furek, Howard C. McNeil and Howard C. Griffiths.

The Jerome Metallic Packing Company, Chicago, has moved its main offices to the Railway Exchange, where larger floor space has been secured. William H. Dickinson, for 14 years connected with the Griffin Wheel Company, Chicago, has gone to the Jerome company, with especial charge of the sales department. The company has secured the sole rights of manufacture and sale of the Stickley pneumatic track sander and will also handle the product of the Ruby Manufacturing Company, Jackson, Mich, consisting of portable galvanized sectional steel buildings, sectional steel bill-boards, bulletins and signs for railway right of way.

TRADE PUBLICATIONS.

STAYBOLTS.—The Falls Hollow Staybolt Company, Cuyahoga Falls, Ohio, has issued a small folder called Boiler Construction Repairs Inspection, giving seven reasons why hollow staybolts should be used in the construction and repair of boilers.

MANGANESE STEEL GEARS.—The Taylor Iron & Steel Company, High Bridge, N. J., has issued bulletin 100-B illustrating and describing Tisco manganese steel gears and pinions and bulletin 113 illustrating and describing the company's manganese steel chains and sprockets. Both bulletins give complete lists of sizes and prices.

BIRD NEPONSET PRODUCTS.—F. W. Bird & Son, East Walpole, Mass., has published a 100-page booklet giving full specifications for waterproofing, building insulation and roofing. The booklet explains clearly and concisely the uses of prepared roofings, felts and waterproof papers in various types of buildings and cold storage work. It also discusses waterproofing problems connected with bridge, tunnel and foundation construction. The use of Bird Neponset products is repeatedly advised, but the specifications are designed to be applied equally well to other products.

CONCRETE.—The Vulcanite Portland Cement Company, Philadelphia, Pa., has published, in pamphlet No. 6, an article on Selection and Preparation of Aggregates for Concrete, by Albert Moyer, Assoc. Am. Soc. C. E. The object of this article is to give a practical method which will enable any plain concrete constructor to make economical use of the best aggregates when proportioning as to give the maximum strength and density with a minimum amount of cement. The laboratory method of obtaining the correct proportion of Portland cement to sand or stone screenings for mortar is given, together with a description of slow-setting, rapid-hardening Portland cement, and the advantages of the Vulcanite brand.

PLANERS.—Joseph T. Ryerson & Son have issued a catalog on Rockford Planers, which include heavy duty, variable speed and motor drive planers. The requirements for modern planers are well stated as follows: With the present use of high speed steels, the limit is only one of efficiency; that is, speed is secured without waste of power, injury to mechanism of planer or sacrificing the quality of the planer's work. Consequently, today, planer speed is not limited by cutting speed alone, nor by cutting and return speeds, but by the time taken in the full cycle, of which a strong, steady forward stroke, a swift, efficient, return stroke, and an ability to reverse promptly and smoothly are important elements. In producing this planer the aim has been to meet all these problems, and the fact has been kept in mind that weight and power, properly distributed and backed by good workmanship, are the factors that determine the efficiency of machines of this class. The motor and variable speed drive are arranged very compactly and placed on top of the housings. The usual cutting speeds are 21, 29, 38 and 47 ft. per minute with a constant return speed of 90 ft. per minute. This catalog is one of the units of a large machine tool catalog the Ryerson company is now preparing.

During the fiscal year of 1911, 314 miles of line were added to the Central Railway of Argentina, and 34 new stations were opened. A proposal to construct further new extensions to the extent of 1,000 miles of line has recently been given official sanction.

Railway Construction.

New Incorporations, Surveys, Etc.

ANACONDA & PACIFIC.—An officer writes that plans have been made to build from Browns, Mont., to Georgetown, 16 miles. The line is being built to carry ore and lumber. It is undecided when contracts for the work will be let. J. G. Ryan, president; C. A. Lemon, chief engineer, Anaconda, Mont.

ATCHISON, TOPEKA & SANTA FE.—The California, Arizona & Santa Fe has been organized in California with $50,000,000 capital by the A. T. & S. F., it is said, to take over the leased lines in Arizona and the main line of the Santa Fe from Needles, Cal., to Mojave, which are to be organized into one company. The plans include building other lines in southern California and Arizona.

BOSTON & EASTERN (Electric).—This company expects to begin construction work on a high speed interurban line between Boston, Mass., and Danvers, as soon as the question of securing the right of way through the city of Lynn can be settled. It is understood that New York and Boston interests will finance the project. Arthur Sturger, 110 State street, Boston, may be addressed. (June 30, p. 1713.)

CALIFORNIA, ARIZONA & SANTA FE.—See Atchison, Topeka & Santa Fe.

CHESAPEAKE & OHIO.—According to press reports this company has arranged to start work soon on a 25-mile branch from Harold, Ky., via Beaver Creek to a coal and timber district at the border of Letcher and Knot counties.

CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS.—Surveys are being made for a line from Pendleton, Ind., to the corporate lines of Anderson, about 8 miles. Geo. P. Smith, chief engineer, Cincinnati, Ohio.

DAKOTA TRANSPORTATION COMPANY.—This company has been organized in South Dakota with $500,000 capital and headquarters at Ottawa, Ont. The plans call for building a system of lines in North Dakota with short sections through South Dakota. The incorporators include J. N. Ponby, E. E. Gognan, L. F. Askwith and H. Despardend, all of Ottawa.

DAVENPORT, IOWA CITY & WESTERN TRACTION.—Incorporated in South Dakota with $1,600,000 capital and headquarters at Pierre, S. D. The plans call for building a line from Davenport, Iowa, to Iowa City, with a branch to Tipton, in all about 70 miles. It is estimated that it will cost $30,000 a mile to build the line. The directors include C. E. Coon, Omaha, Neb.; S. Bradley and G. W. Koontz, Iowa City, Iowa, and T. Todd, Springdale, Iowa.

GREAT NORTHERN.—An officer writes that a contract has been given to the Siems-Currie Company, St. Paul, Minn., for work between Lewiston, Mont., and Moccasin. A. H. Hogeland, chief engineer, St. Paul.

KANSAS CITY, MEXICO & ORIENT.—An official is quoted as saying that this company has on hand construction funds sufficient to carry all work forward to Alpine, Tex. Construction work on the southwestern end is proceeding at an average of five miles a week. Pecos river will be reached by the first of the year, and Fort Stockton, 35 miles additional, will be reached by the middle of February. It is expected that the work to Alpine, 95 miles from Pecos river, will be completed by July, 1912.

LOUISVILLE & NASHVILLE.—According to press reports this company is planning to spend a large amount of money enlarging its yard at Montgomery, Ala., and double tracking between Montgomery and Calera.

NACOZARI RAILROAD.—It is announced that the Phelps-Dodge interests which own this railway will extend the line from Nacozari, Sonora, Mex., south to the Promontorio mines, about 75 miles.

NEVADA ROAD.—The Giroux Consolidated Mining Company of Ely, Nev., is said to have started work on a line from Morris Mine to Kimberly. T. F. Cole is president.

NORFOLK & WESTERN.—An officer writes that work is now under way on the Dry Fork branch and connections, from Cranebrake,

W. Va., to Cedar Bluff, 14.70 miles, and on the Norfolk branch from Jeanette 4.31 miles.

Pacific Great Western.—An officer writes that a contract has been given to MacArthur, Perks Company, Ltd., of Chicago and New York, to build from Eugene, Ore., west via Elmira, Walton, Glentina, Lake creek and Mapleton to Glenada, 73 miles, then south along the Pacific coast to Coos Bay, 42 miles; maximum grades will be .7 per cent., maximum curvatures 6 deg. There will be a steel bridge with a 300 ft. draw, also 4,000 ft. of trestle work and 3,050 ft. of tunnel work. In addition there will be five bridges each 160 ft. long, and ten bridges each 60 ft. long. The line expects to develop a traffic in lumber, general merchandise, farm products and coal. R. B. Hunt, chief engineer, Eugene.

Sacramento Valley Westside (Electric).—A survey has been made, it is said, from Woodland, Cal., to Red Bluff, about 140 miles, by the Dozier Engineering & Contracting Company, Sacramento. The railway company has been granted franchises in Yolo and Glenn counties. C. L. Donohue is president.

St. John Valley.—A contract for building from Grand Falls, New Brunswick, via Centreville, Lakeville, Woodstock and Fredericton to St. John, 208 miles, has been signed, and the location survey is now being made. The St. John & Quebec Railway Company has undertaken the work. F. J. Lisman, New York, is making financial arrangements. The provincial government of New Brunswick guarantee bonds to the extent of $25,000 a mile, and the dominion government grants $6,400 a mile additional. On completion the line is to be taken over by the federal government and operated as a part of the Intercolonial. There will be three large bridges on the line over the St. John River below Grand Falls on the lower reaches at the Mistake and across the Kennebecasis at Perry's Point. The three bridges will cost about $1,250,000. The grade between St. John and Fredericton is not to exceed .4 of 1 per cent. going east, and .6 of 1 per cent. going west, and between Fredericton and Grand Falls it is not to exceed 1 per cent.

St. John & Quebec.—See St. John Valley.

Southern Pacific.—It is understood that this company will complete the Cochise branch in Arizona to Douglas, and will extend the line south to Cumpas in the near future. The grade between Nacozari and Cumpas, about 50 miles, is finished, and it will not take long to complete the line. A branch of the Southern Pacific of Mexico, which is finished from Corral, Sonora, to Tonichi, will also be extended north to Cumpas, about 60 miles. The mines of the Transvaal Copper Company are about 20 miles to the east and that company will connect its works with the Southern Pacific by building a narrow gage line.

Texas Roads.—E. H. Robinson, formerly of Huntsville, Texas, is said to be back of a project to build a 50-mile line from Huntsville west.

RAILWAY STRUCTURES.

[illegible] sidering the location of yards and shops near Chicago.

Denver, Colo.—The executive officers of the principal railways entering Denver held a conference at Chicago last week [illegible] final decision was postponed for other meetings.

[illegible] new passenger station.

[illegible] ;10 ft. high, and is estimated to cost $

Railway Financial News.

Atlantic Coast Line of Connecticut.—This company, which owns the majority of the stock of the Atlantic Coast Line Railroad, has declared a quarterly dividend of 3 per cent., which places its stock on a 12 per cent. annual dividend basis as compared with a 10 per cent. rate declared heretofore. The Atlantic Coast Line Railroad recently increased its annual rate from 6 per cent. to 7 per cent.

Kansas City, Mexico & Orient.—This company has funds sufficient to carry on its work to Alpine, 65 miles southwest of Fort Stockton, but, it is said, will probably offer for sale a block of the recently authorized issue of $20,000,000 first mortgage 4 per cent. bonds.

See this company under Railway Construction.

Kent Northern.—A published report says that this company's line of 27 miles running from Richibucto to Kent Junction, connecting with the Intercolonial, has been sold to Toronto parties for $100,000. Road was built thirty years ago by John C. Brown, who sold to Richibucto syndicate eight years ago for $60,000, the earnings since that time having been spent in improving its condition. Thomas O. Murray, manager and a member of the syndicate, will continue as manager under the new ownership.

New York Central & Hudson River.—This company has sent out to the holders of its Lake Shore 3½ per cent. collateral trust bonds a letter asking them to consent to the consolidation of the New York Central & Hudson River and the Lake Shore & Michigan Southern. The company plans to get the consent of 75 per cent. of the bondholders. A letter was also sent to holders of the Michigan Central 3½ per cent. collateral trust bonds asking for consent to possible future consolidation of the Michigan Central with the New York Central & Hudson River. The indenture securing the Lake Shore collateral bonds provides that the Lake Shore and the N. Y. C. & H. R. can only be consolidated with the consent of 75 per cent. of the Lake Shore collateral bondholders, and provides that if the consolidation takes place and the Lake Shore's stock is canceled, a mortgage on the New York Central & Hudson River itself shall be executed for $100,000,000. There are outstanding $90,578,400 Lake Shore collateral bonds and $19,336,445 Michigan Central collateral bonds.

J. P. Morgan & Co., the First National Bank and the National City Bank, all of New York, are offering the $15,000,000 New York Central Lines equipment trust certificates of 1912, which, as mentioned last week, were authorized by the New York Public Service Commission, at prices to yield approximately 4.46 per cent.

Norfolk Southern.—This company has bought the Raleigh & Southport, running from Raleigh, N. C., to Fayetteville, 64 miles; the Durham & Charlotte, running from Troy to Colon, 50 miles; and the Aberdeen & Ashboro, running from Aberdeen to Ashboro, 57 miles.

Wabash.—The installment of this company's 4½ per cent. equipment bonds maturing January 1, 1912, amounting to $309,000, is to be paid by Lee, Higginson & Co., Boston, and the same bankers will also pay the interest on the $3,090,000 of these bonds remaining outstanding.

The technical section of the Russian department for the construction of railways has now finished its study of the preliminary project of a tunnel under the Amur at the town of Chabarovsk for the junction of the Amur railway, now being built, with the Ussrisk railway. It had been originally intended to cross the Amur river by a bridge 42 ft. above water level in the river in order to accommodate the boating traffic. But as the cost of such a bridge with open arches was placed at something like $9,000,000, the idea took root of seeking a way past the river underground. The first project of a tunnel was similar to the plan of the Detroit river tunnel. But in view of the novelty of such operations in Russia and the extreme importance of an efficient crossing for the Amur railway in one way or another, the minister of ways of communication thought it wise to call together a [illegible] to examine the question.

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